

**PROPOSED IMPROVEMENTS TO
KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
HONOLULU, ISLAND OF OAHU
STATE OF HAWAII**

DRAFT ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to Chapter 343, Hawai`i Revised Statutes (HRS)

**KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN, INC.
1319 PUNAHOU STREET
HONOLULU, HAWAII 96826**



September 2009

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Tax Map Key Numbers:

(1) 2-8-011 Parcels 004, 005, and 013, and Portion of 029

APPLICANT: Kapiolani Medical Center for Women and Children
1319 Punahou Street
Honolulu, Hawaii 96826

APPROVING AGENCY: The City and County of Honolulu
Department of Planning and Permitting

CONSULTANT: EnvironMETeo Services, Inc.
94-520 Uke`e Street Suite A
Waipahu, HI 96797

CLASS OF ACTION: Use of public land

PERMITS REQUIRED: Plan Review Use, Building, Grading, Stormwater runoff

ANTICIPATED
DETERMINATION: Finding of No Significant Impact

AGENCIES AND
INTERESTED PARTIES
CONTACTED: Hawaii Department of Transportation
Hawaii Department of Health
Hawaii Department of Land and Natural Resources
Shriner's Hospital
Central Union Church
McCully/Moiliili, Manoa Neighborhood Boards
Adjacent Property Owners

This document is prepared pursuant to:
The Hawai`i Environmental Protection Act,
Chapter 343, Hawai`i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai`i Department of Health Administrative Rules (HAR).

SUMMARY

The Kapiolani Medical Center for Women and Children (KMCWC) proposes to upgrade its facilities to respond to the current needs of the community, improve parking and circulation, and remain current with the standards of the industry. Medical services have been provided continuously since 1945 from the site located at 1637 Bingham Street. This environmental assessment is triggered by renovations within the State of Hawaii Highway right-of-way along Bingham Street for wastewater capacity improvements.

The Master Plan for the proposed improvements will be accomplished in 3 major phases to be completed over the next 15 years. The phases include:

- Phase I - Construction of new Bingham Street Parking Structure (2010 – 2012),
- Phase II - Demolition of the existing Bingham Street building, and construction of the new building for Neonatal and Pediatric intensive Care Units (2013 – 2017),
- Phase III - Demolition of the older Bingham Street Parking Structure, and construction of a new hospital tower (2020 – 2025), Demolish and replace Punahou Parking Garage (2023 – 2025).

The proposed action will increase the total floor area of the medical center from approximately 280,000 square feet to 350,000 square feet by 2017 and close to 600,000 square feet by 2026. The total number of hospital beds will increase from 207 to 288 over this period.

Alternatives to be considered in the EA include the proposed action, no action, move to an alternate location, and avoid the use of public lands. The no action alternative would reduce KMCWC's ability to meet its objectives of providing quality medical care to the community. Moving the facility to another location may result in greater impacts at both the current and future location. The temporary use of public lands during wastewater system improvements cannot be avoided.

The existing and proposed hospital uses of the property are permitted with its A-2 zoning subject to approval of a Plan Review Use Permit. Other permits required for completion of the project include building and grading permits, and an NPDES construction storm water management. A Plan Review Use Permit is required because of the proposed addition of a 45,971 square foot parcel to the hospital complex and renovations and expansion of the hospital facility on the new parcel and existing hospital campus.

KMCWC anticipates the impacts associated with the proposed action are expected to be mitigated to minimize impacts to the surrounding community and municipal services. These impacts will include added use of municipal services such as power, water and wastewater. Additional temporary construction-related impacts may include impacts from noise and dust. These are expected to be minor, temporary and mitigable. Pending consideration of agency and public comments, KMCWC concludes that the environmental impacts associated with the proposed development will either be insignificant or will be mitigated to minimize impacts to the surrounding neighborhood, and anticipates a finding of no significant impact (FONSI).

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List of Abbreviations

ALISH	Agricultural Lands of Importance to the State of Hawaii
BMP	Best Management Practice
BWS	Honolulu County Board of Water Supply
DLNR	Hawai`i State Department of Land and Natural Resources
DOH	Hawai`i State Department of Health
DPP	Honolulu Department of Planning and Permitting
EA	Environmental Assessment
EIS	Environmental Impact Statement
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
HAR	Hawai`i Administrative Rules
HEPA	Hawai`i Environmental Policy Act
HRS	Hawai`i Revised Statutes
KMCWC	Kapiolani Medical Center for Women and Children
MCL	Maximum Contaminant Level
mg/L	Milligrams per liter
NICU	Neonatal Intensive Care Unit
OEQC	Hawai`i State Office of Environmental Quality Control
PICU	Pediatric Intensive Care Unit
SHPD/O	State Historic Preservation Division/Officer
SMA	Special Management Area
UH	University of Hawai`i
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 PROJECT LOCATION, DESCRIPTION, PURPOSE AND NEED

1.1 Project Location and Existing Condition

Kapiolani Medical Center for Women and Children (KMCWC) is bordered by Punahou Street on the west and Bingham Street to the north (Figures 1 and 2). It is adjacent to the H-1 freeway in urban Honolulu, Hawaii. The street address is listed as 1319 Punahou Street or 1637 Bingham Street. The subject property covered in this Environmental Assessment includes three parcels currently occupied by the facility; designated by Tax Map Keys: (1) 2-8-011:004 (3.28 acres), 2-8-001:005 (1.05 ac.), and 2-8-001:013 (0.24 ac). In addition, the portion of TMK: 2-8-11:029 that passes through the property forming the fire lane to Central Union Church is also included in this assessment. The location is in close proximity to a number of important community service developments including Shriner's Hospital, and Central Union Church. Most of the other buildings in the vicinity are multi-story apartments, offices or schools. The north property boundary is formed by Bingham Street with the H-1 freeway just north of Bingham Street. The H-1 Freeway is the only highway that runs east-west through the primary population center of Honolulu. Punahou Street on the west boundary is one of three major access points to Waikiki. Parking is limited and traffic along Punahou and Bingham, although not usually causing significant queuing, is congested during peak hours of the day.

Topography in the vicinity is relatively flat with a general slope toward the Pacific Ocean approximately 2 miles south of the property. The Koolau Mountains rise approximately 1 mile north of the site behind the primary urban district. Vistas of the ocean are almost completely occluded by development. Mountain views are still available from some points on the property.

The KMCWC site is currently comprised of four main buildings and three parking areas:

- The Hospital/Medical Office Building Tower,
- The Lani Booth Building,
- The Bingham Building,
- The Shared Service Building,
- The Bingham Parking Structure,
- The Punahou Parking Structure, and
- A Maintenance Building

The expansion of KMCWC is made possible by the acquisition of parcel 2-8-001:005 in 2005. The parcel will be incorporated into the KMCWC facility as part of the Master Plan improvements discussed herein. Figure 3 shows the existing Site Plan.

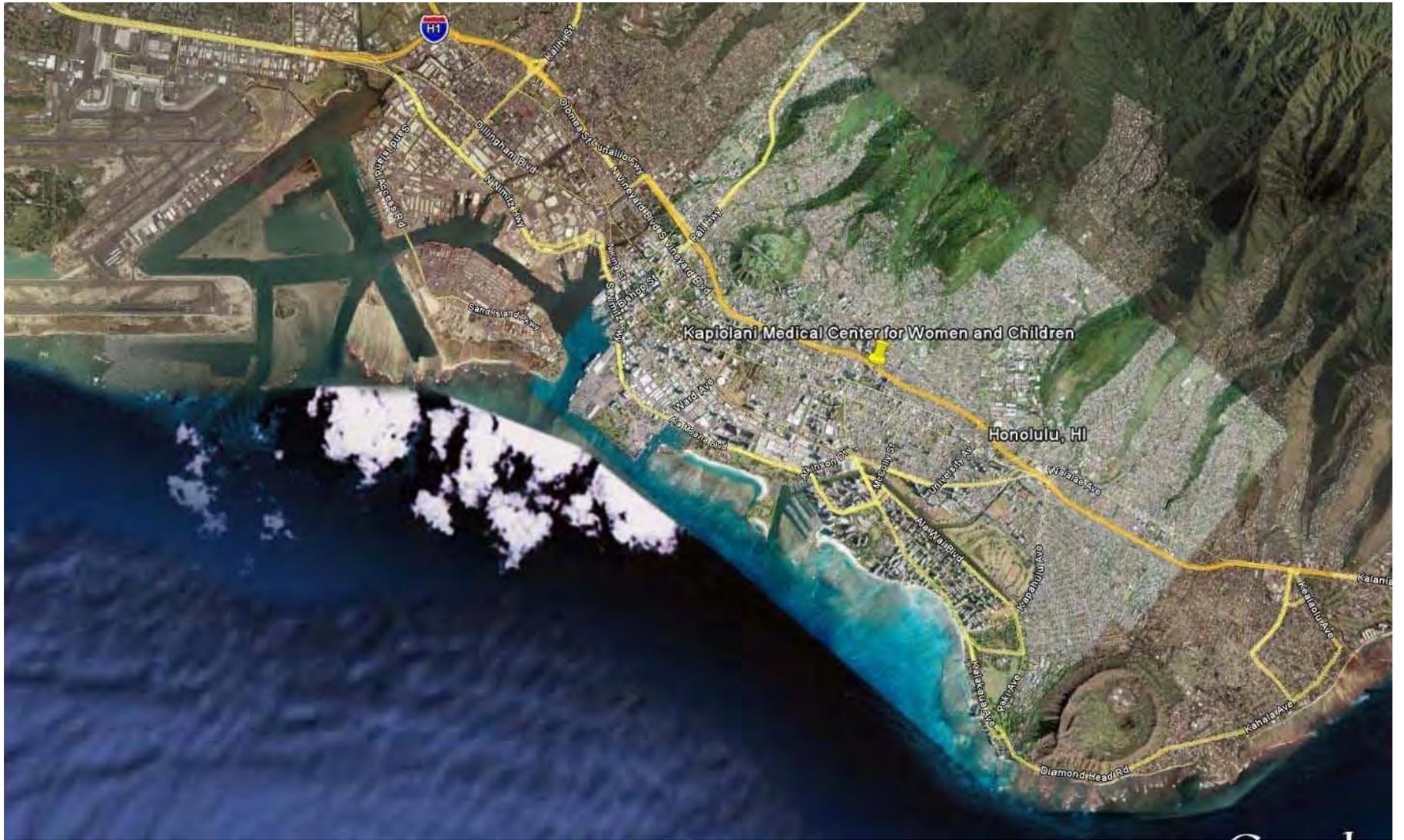


Figure 1: Kapiolani Medical Center for Women and Children, Located in urban Honolulu on the southern portion of the Island of Oahu, Hawaii. Courtesy of Google Earth.

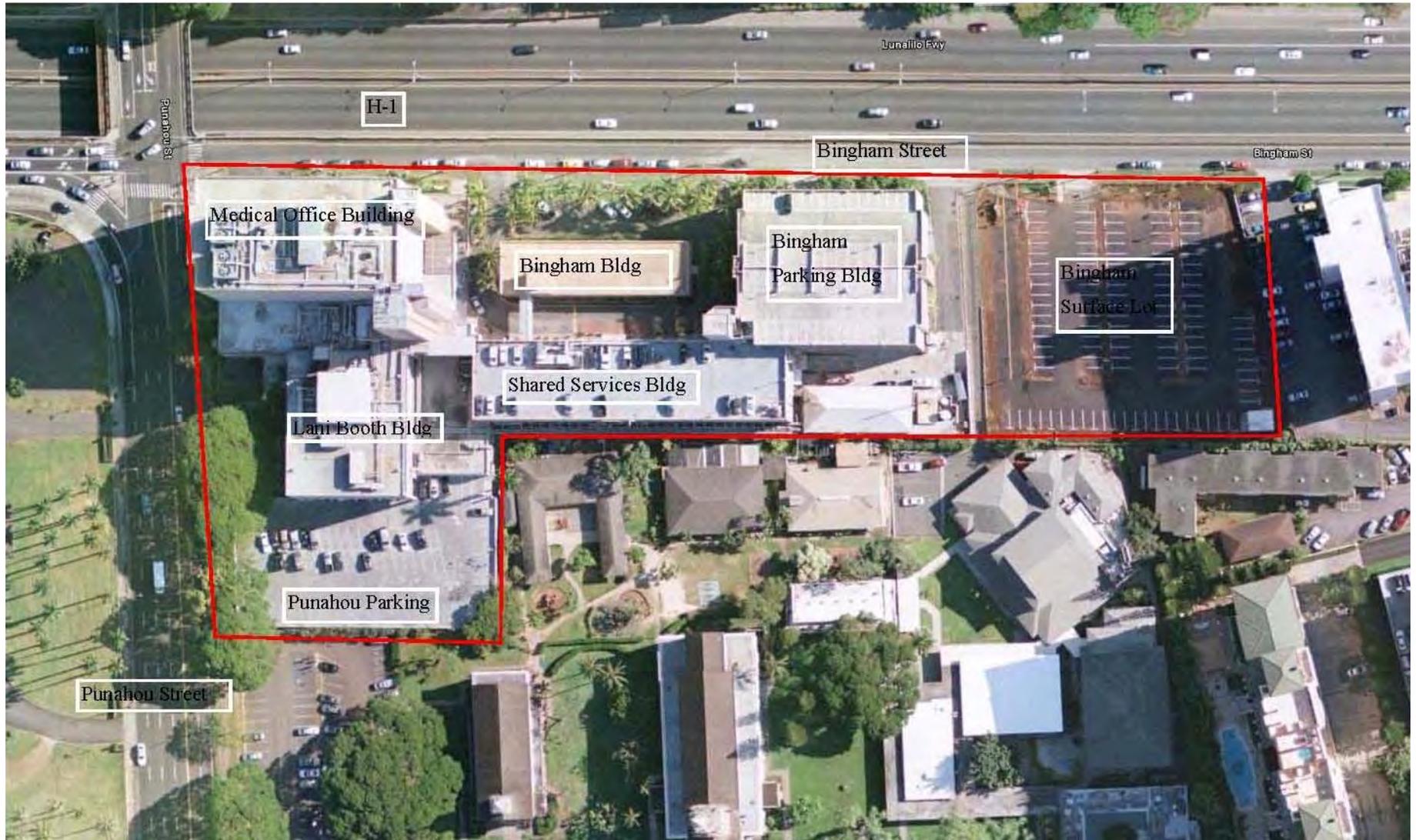
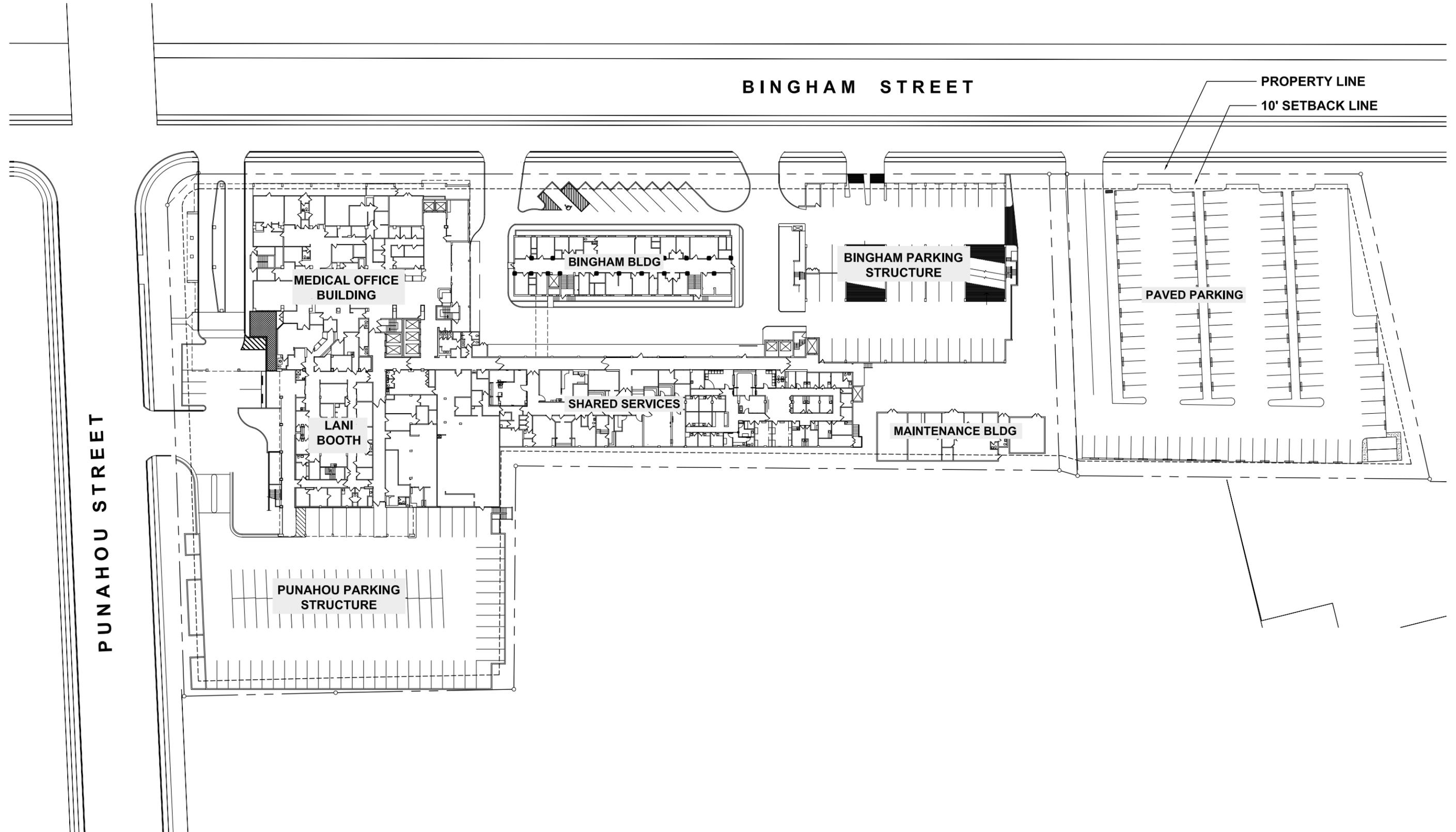


Figure 2: Satellite photograph showing the project site as of 2009. Central Union Church is adjacent to the south. Punahou Street is the west boundary and Bingham Street/ H-1 are to the north.

BINGHAM STREET

PROPERTY LINE
10' SETBACK LINE



PUNAHOU STREET

EXISTING SITE PLAN

1.2 Project Description

Kapiolani Women's Hospital was established at its present location in 1945, and in 1976 the Kapiolani Children's Hospital was added, together they now form the Kapiolani Medical Center for Women and Children (KMCWC), which has become the leading acute-care facility dedicated to improving and advocating the health and well-being of women, children and adolescents of Hawaii, the Pacific Basin and the Pacific Rim.

KMCWC proposes to upgrade the physical facility to respond to the current needs of the community, improve parking and circulation, and remain current with the standards of the industry. The proposed improvements will be accomplished in 3 major phases to be completed over the next 15 years. Improvements include changes in the major structures, changes in circulation, access and egress. This Environmental Assessment (EA) is triggered by the use of public property while expanding wastewater drainage lines beneath Bingham Street.

The Master Plan for expansion of the Hospital covers the period 2010 to 2025. Over the planning period the floor areas of the medical center will increase from approximately 280,000 square feet to 600,000 square feet. The hospital bed capacity will increase from 207 to 288. Onsite parking will increase from 572 to more than 1,108 over the planning period.

1.3 Purpose and Need

As the leading medical institution specializing in the care of women and children in the Pacific, KMCWC needs to continue to provide up to date facilities and services for its patients and staff. The proposed action has been developed to address the following needs:

- More Neonatal Intensive Care Unit (NICU) beds with larger spaces for each baby and family,
- Private rooms for Pediatric Intensive Care Unit (PICU) beds with larger spaces for each baby and family,
- Separate entrances for inpatient and outpatient traffic,
- Additional support services infrastructure,
- Family spaces that are too small,
- More Diagnostic and Treatment space,
- Larger Radiographic rooms,
- Need better clustering of hospital functions within the building,
- Larger Post Partum and Labor Delivery Rooms to accommodate families, and
- The need for The Women's Center programs currently located at Artesian Plaza, 1907 South. Beretania Street to be brought back on campus.

There has been considerable patient care growth at KMCWC without the corresponding physical growth in the hospital facility. The key patient care areas have also not kept up with the adequate sizes needed to accommodate new technology and family-focused care.

The following six areas with the greatest needs have been identified:

- Pediatric Intensive Care Unit (PICU)
- Neonatal Intensive Care Unit (NICU)
- Surgery
- Clinics
- Radiology
- Emergency

Deficiencies in the existing site layout also play a major part in the redesign of the KMCWC.

These issues include:

- The front door being hidden and congested,
- A need for separation of hospital and physician lease space, and
- A need for separate entries for the Hospital, Outpatients and the Medical Office Building.

1.4 The Environmental Assessment Requirement

The action considered in this Environmental Assessment (EA) is the KMCWC 15Year Master Plan, which addresses short and long-term improvements to the existing medical facility. An EA is required under HRS 343 because the improvements will utilize public property owned by the State of Hawaii and controlled by the State Department of Transportation. The project will require installation of an upgraded wastewater drainage line to connect to the City's wastewater main near the intersection of Bingham Street and Alexander Street. The wastewater line replacement will disturb state property for approximately 437 feet along Bingham Street within the public right-of-way.

2.0 PROPOSED ACTION AND ALTERNATIVES CONSIDERED

2.1 Proposed Action

KMCWC or its predecessors have been operating a children's hospital for over 75 years at the site. The hospital facility has grown and changed more or less continuously over that period. Honolulu county records indicate that the last major improvement was in 1976; although other significant improvements were completed in 1995. The recent purchase of a new lot east of the existing campus along Bingham Street (TMK: 2-8-011:005), has made these expansion plans possible. Parcel 5 is currently covered with AC pavement and is used for parking. KMCWC now leases offsite parking at Banyan Tree Plaza as additional offsite parking. Improvements to the KMCWC are required to:

- expand the capacity of the hospital to meet existing service demands,
- Modernize medical facilities and equipment to current standards for the industry,
- Provide needed infrastructure such as parking to support the expansion, and
- Ease current traffic congestion resulting from access and egress from the facility.

The proposed improvements will be accomplished in 3 major phases to be completed over the next 15 years. A description of each phase follows and is shown in Figure 4.

Phase I: Construct a new parking structure along Bingham Street.

Parking will be addressed in the first phase of renovation, by installing a new parking structure. KMCWC will install a ramp-accessed parking structure. The new Bingham Street Parking Structure will be a 16-level self-park structure that utilizes 1 level below grade and 15 levels above grade. A complete description of the proposed parking is contained in Section 3.3.4.

A temporary covered walkway will be built behind (south) of the existing parking building to connect the new parking building with the Shared Services building at a point that is near the loading dock. The existing fire access road is a 12 foot easement from Bingham Street to the rear of Central Union Church. It will be rerouted to the eastern side of the new parking structure and widened to 20 feet to meet fire access standards. Continuous access for fire vehicles will be provided to the rear portions of Central Union Church. Phase I will be completed between 2010 and 2012.

BINGHAM STREET

DEMOLISH BINGHAM BUILDING
PHASE 2 : 2013

DEMOLISH BINGHAM PARKING STRUCTURE
PHASE 3 : 2020

PROPERTY LINE
10' SETBACK LINE

MEDICAL OFFICE BUILDING
(EXISTING)

NEW BINGHAM BLDG
PHASE 2 : 2013 - 2017
(NICU/PICU)

BED TOWER
PHASE 3: 2020 - 2025

BINGHAM RAMP ACCESS
PARKING STRUCTURE
PHASE 1 : 2010 - 2012

LANI BOOTH
(EXISTING)

RAMP
UP FROM
LOWER
LEVEL

REMODEL EXISTING SHARED
SERVICES BUILDING
PHASE 2 : 2013 - 2017

DEMOLISH EXISTING PLANT
PERATONS/ RECEIVING
PHASE 3: 2020

PLANT OPERATIONS
PHASE 3 : 2020 - 2025

PUNAHOU AUTOMATED
PARKING STRUCTURE
PHASE 3 : 2023 - 2025

PUNAHOU STREET

LEGEND

	EXISTING
	PHASE 1
	PHASE 2
	PHASE 3

15 YEAR MASTER PLAN

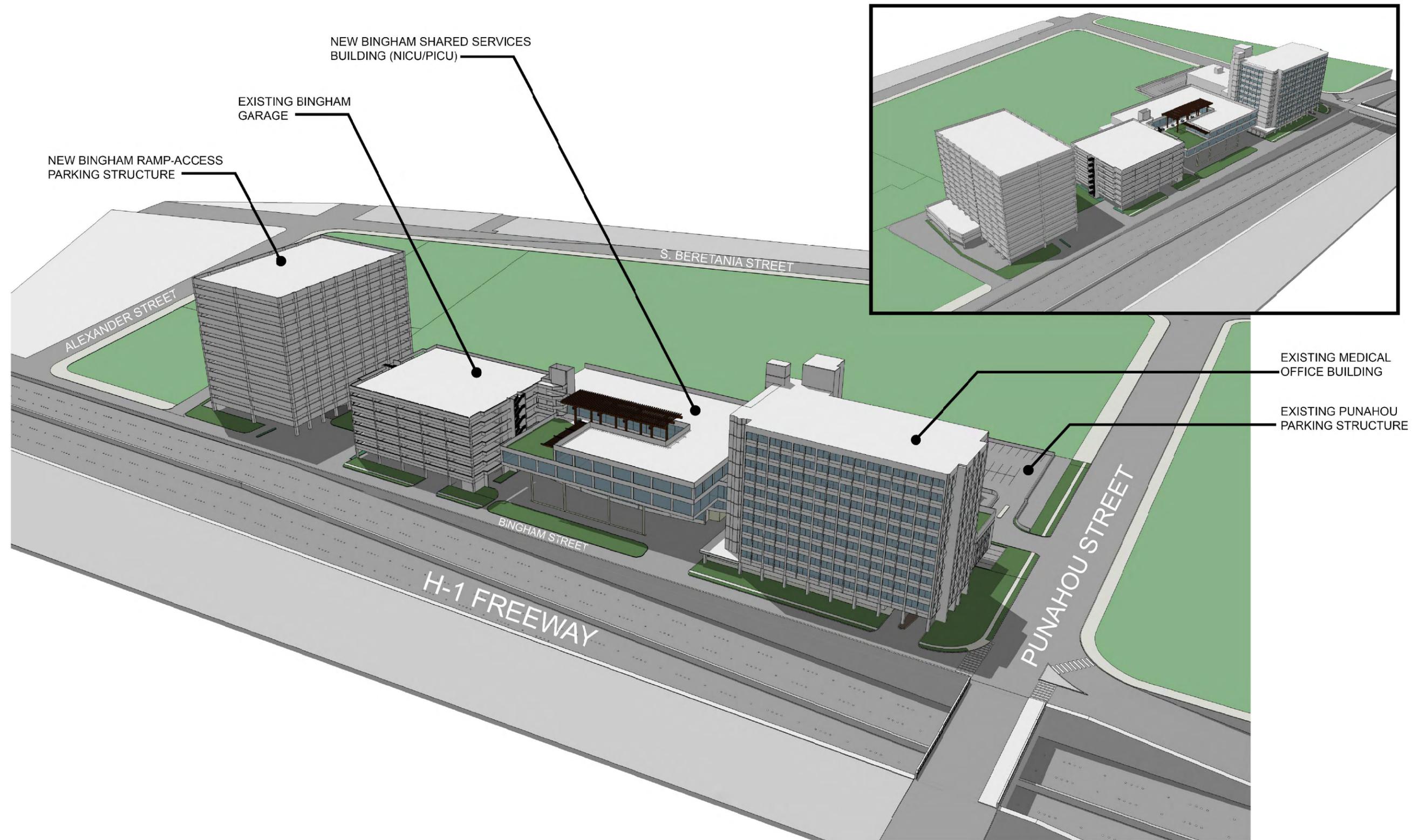
Phase II: Demolish the existing Bingham Building and Construct a new NICU and PICU Building.

The Bingham Building is the oldest of the existing structures at KMCWC, built in 1930. It will be demolished to make room for a new Neonatal Intensive Care Unit (NICU) and Pediatric Intensive Care Unit (PICU). All existing services will be temporarily relocated to other parts of the Medical Center. The new construction will represent a substantial expansion of the Shared Services Building. This new NICU/PICU Building will house all services from the old Bingham Building as well as a covered portico, new entrance and lobby, meeting rooms, NICU, PICU, 12 added post-partum rooms and updated dietary/nutrition spaces complete with an outdoor dining area. As a result of this construction the facility will expand from the existing condition of 207 beds under 329,985 square feet of office and support space to its new configuration with 243 beds under 422,539 square feet of office and support area. The Phase II improvements are shown in profile and section in Figures 5 and 6. Phase II improvements are expected to be completed during the period from 2013 to 2017.

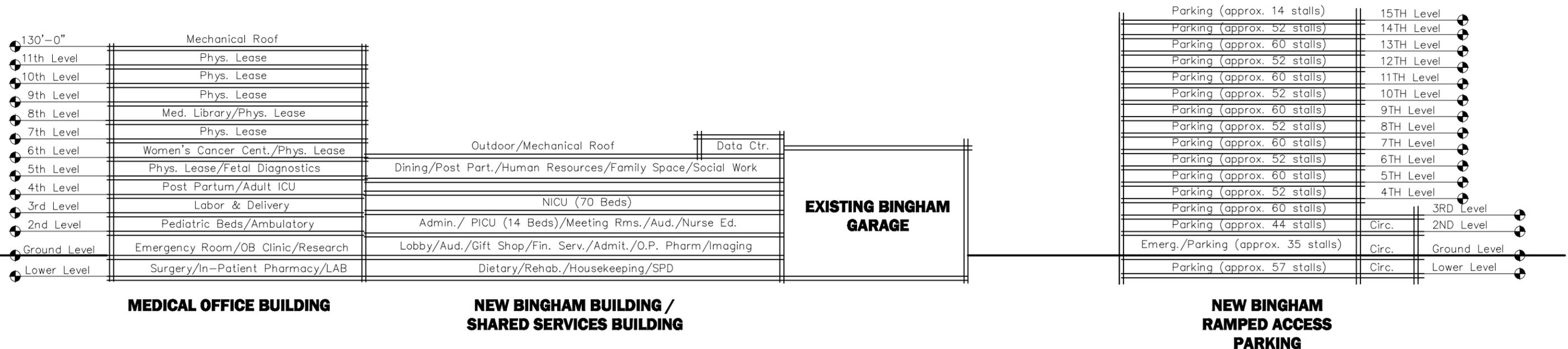
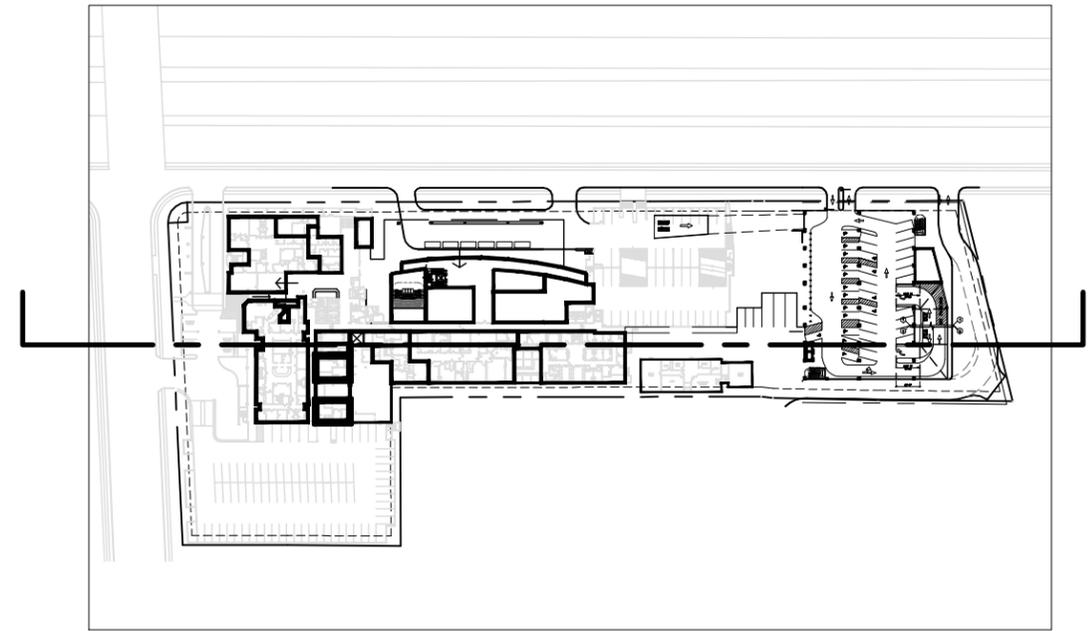
Phase III: Demolish Bingham and Punahou Parking Structures, and construct a new Hospital and Bed Tower, and new Punahou Parking Structure.

Phase III will include demolition of the older parking structure to make room for a new hospital and bed-tower. Its purpose is to update the infrastructure and equipment required by today's standards of care and to emphasize family-centered care. During the construction process access and egress from the hospital will be maintained and kept open. The new hospital will include expanded Emergency and Surgery Departments on the lower three levels. Above the hospital will be 5 bed floors with mountain views from all rooms.

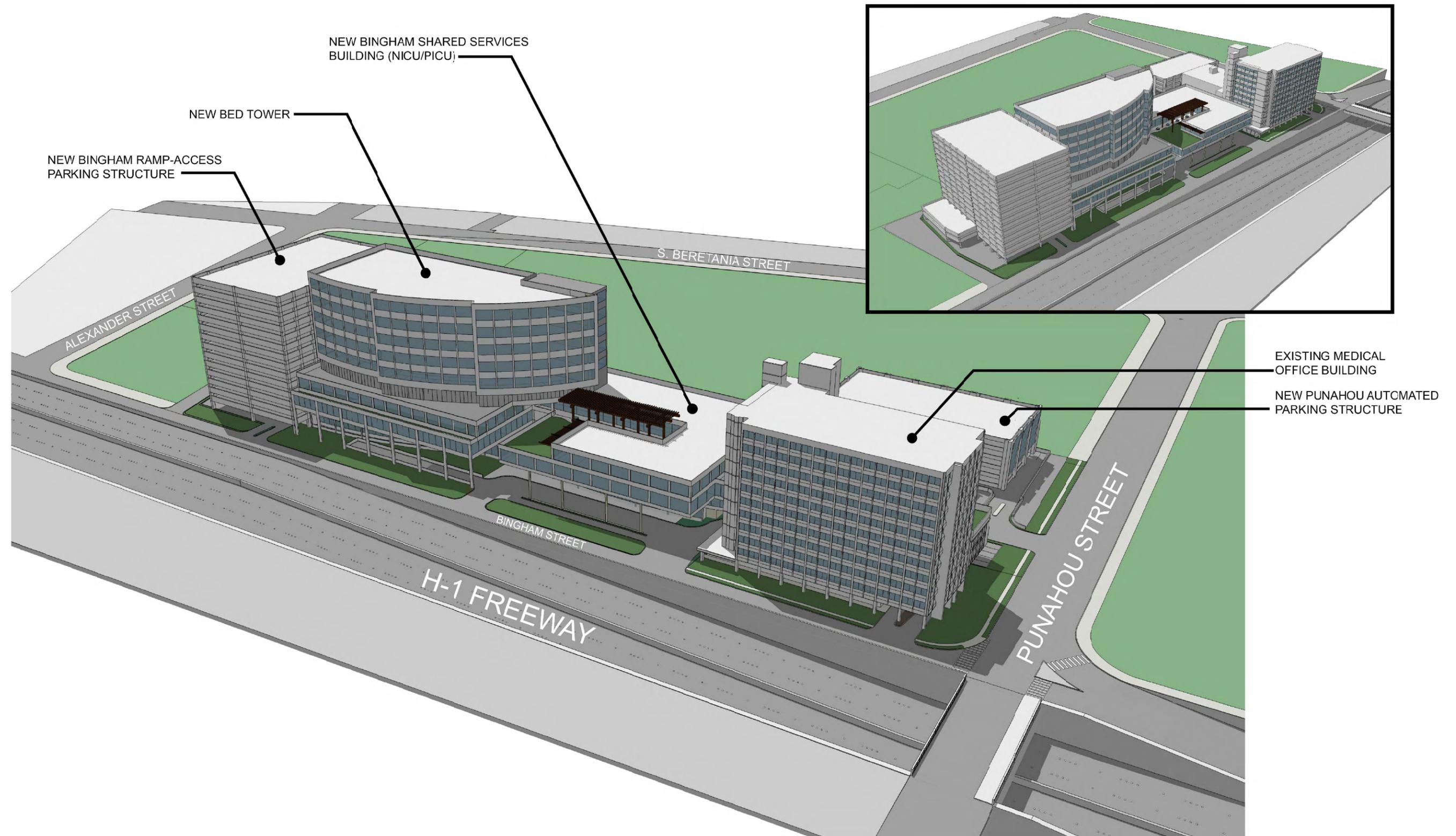
In Phase III parking will be gained by replacing the existing two level Punahou Parking Building with a new multi-level Punahou Parking Building. The new parking structure will occupy space where the existing Punahou Parking Building now stands. The final expansion of the hospital will bring the total number of beds to 288 and the total office and support area to 702,338 square feet. Figures 7 and 8 show the final profile and section of the proposed development.



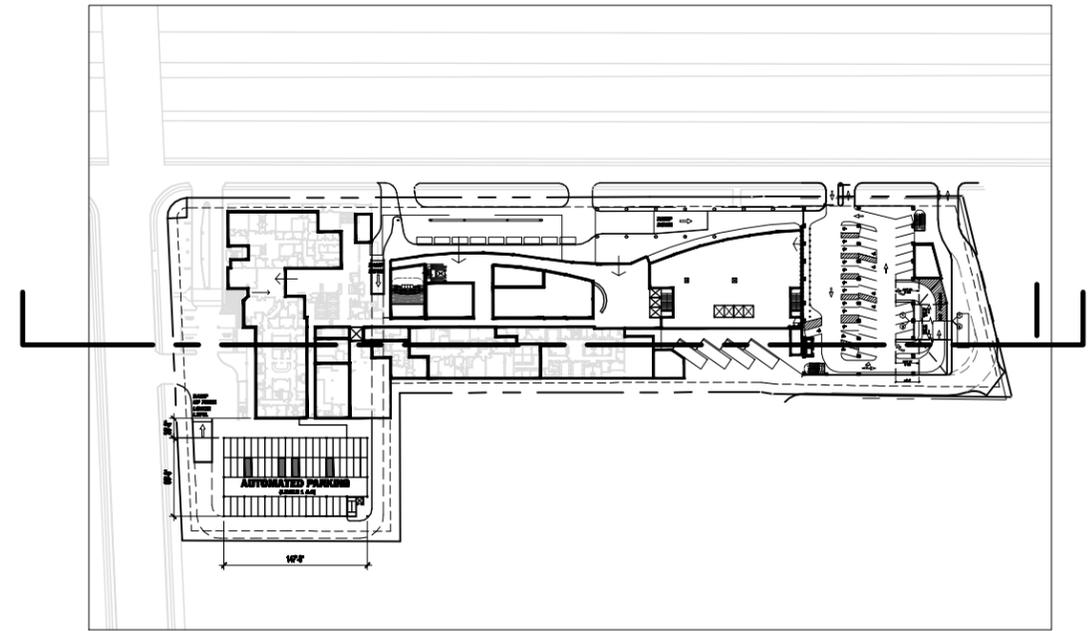
PERSPECTIVE



BUILDING SECTION - RAMPED ACCESS PARKING



PERSPECTIVE



130'-0"	Mechanical Roof			150'-0"			Parking (approx. 14 stalls)	15TH Level
11th Level	Phys. Lease			10th Level	Peds. (30 beds)/Playroom		Parking (approx. 52 stalls)	14TH Level
10th Level	Phys. Lease			9th Level	Peds. (30 beds)/Playroom		Parking (approx. 60 stalls)	13TH Level
9th Level	Phys. Lease			8th Level	ANTE/Postpartum Unit (30 beds)		Parking (approx. 52 stalls)	12TH Level
8th Level	Med. Library/Phys. Lease			7th Level	Peds. (30 beds) Future		Parking (approx. 60 stalls)	11TH Level
7th Level	Phys. Lease			6th Level	Med./Surg. (12 beds)/Adult ICU (3 beds)		Parking (approx. 52 stalls)	10TH Level
6th Level	Women's Cancer Cent./Phys. Lease	Outdoor/Mechanica Roof			Data Ctr.	Data Center/Mechanical	Parking (approx. 60 stalls)	9TH Level
5th Level	Phys. Lease/Kapiolani Med. Spec.	Dining/Post Part./Human Resources/Family Space/Social Work				OR/Surgery/PAV	Parking (approx. 52 stalls)	8TH Level
4th Level	Physician Lease Space					Family Birthing Center (32 Beds)	Parking (approx. 60 stalls)	7TH Level
3rd Level	Physician Lease Space/KMCWC Res. Genet.	NICU (70 Beds)				Step Down Beds/Pediatric Ambulatory Unit	Parking (approx. 52 stalls)	6TH Level
2nd Level	OB+Ped/SATC/KCPC/Hi Com.	Admin./ PICU (14 Beds)/Meeting Rms./Aud./Nurse Ed.				Emergency/Lobby/Dock/Transport./Security	Parking (approx. 60 stalls)	5TH Level
Ground Level	Women Cent./H.M.M/Women Infant Care	Lobby/Aud./Gift Shop/Fin. Serv./Admit./O.P. Pharm/Imaging				SPD/Mech./Biomed./Receiving/Plant Ops.	Parking (approx. 44 stalls)	4TH Level
Lower Level	Lab/Health Info. Serv./Storage	Resp.Care/EVS/Diet & Nutr./Stor./Qual.Risk/CaseMngt./Rehab./IP Pharm.					Parking (approx. 35 stalls)	3RD Level
								2ND Level
								Ground Level
								Lower Level

MEDICAL OFFICE BUILDING

**NEW BINGHAM BUILDING /
SHARED SERVICES BUILDING**

NEW BED TOWER

**NEW BINGHAM
RAMPED ACCESS
PARKING**

BUILDING SECTION - RAMPED ACCESS PARKING

2.2 Alternative Action: Relocate Project to an Alternative Location

As an alternative to the proposed action, it may be possible to relocate KMCWC to vacant or poorly utilized land. One possible advantage of building KMCWC at an alternate location would allow the existing facility to be sold to offset the development costs. The final product would be an entirely new facility rather than a renovated hospital with some new and some old portions. Starting with a vacant or cleared property would allow designers to mitigate traffic impacts to a degree that is not possible at the existing facility which is constrained by the location of existing structures on the property.

Disadvantages associated with an alternative location include the fact that it would almost certainly be farther from the population center, and therefore more difficult to access by most staff and patients. If the new location is not as convenient as the old facility the result may be a loss of market share for the facility. There are substantial sections of the facility including portions of the hospital and all of the medical office building that will be reutilized without renovation in the proposed action. These would either be lost or rebuilt at additional cost in a new location. Land costs are unknown and the cost of constructing a new hospital and Medical office building would be quite a bit more expensive than renovating the existing facility as proposed. Finally, the environmental impacts and required mitigation measures associated with any new location cannot be determined.

2.3 No Action Alternative

The no action alternative has one short-term benefit to KMCWC, which is little or no construction cost associated with this alternative. A long list of disadvantages is associated with the no action alternative. Disadvantages include:

- Gradual loss of patients and qualified doctors resulting from the inability to provide up to date medical care,
- Loss of revenue,
- Existing traffic and parking impacts are unabated over the planning period, and
- Continued and expanded discrepancy between supply and demand for quality medical services in urban Honolulu.

2.4 Selection of Project Alternative

KMCWC has determined that the most rational and efficient strategy for reaching its objective of supplying high quality medical services to the community is to remain at its current location, but renovate its facilities to allow for expanded capacity, new technologies and services, and reduced traffic and parking impacts.

3.0 ENVIRONMENTAL SETTING AND IMPACTS

3.1 Physical Environment

3.1.1 Geography, Geology, and Soils

The project site is located in Honolulu; the capital and most populous census-designated place (CDP) in the U.S. state of Hawaii. Although *Honolulu* refers to the urban area on the southeastern shore of the island, the city and the county are consolidated, known as the City and County of Honolulu, and the city and county is designated as the entire island of Oahu. The City and County of Honolulu is the only incorporated city in Hawaii, as all other local government entities are administered at the county level. The population of the census designated place was 371,657 at the 2000 census, while the population of the City and County was 909,863. In the Hawaiian language, *Honolulu* means "sheltered bay" or "place of shelter".

Most of the city's commercial and industrial developments are located on a narrow but relatively flat coastal plain, while numerous ridges and valleys located inland of the coastal plain divide Honolulu's residential areas into distinct neighborhoods: some spread along valley floors (like Manoa in Manoa Valley) and others climb the interfluvial ridges. Within Honolulu proper can be found several volcanic cones: Punchbowl, Diamond Head, Koko Head (includes Hanauma Bay), Koko Crater, Salt Lake, and Aliamanu being the most conspicuous.

The population density was 4,336.6 people per square mile (1,674.4/km²). There were 158,663 housing units at an average density of 1,851.3/sq mi (714.8/km²). The racial makeup of the CDP was 19.67% White, 1.62% Black or African American, 0.19% Native American, 55.85% Asian, 6.85% Pacific Islander, 0.89% from other races; and 14.93% from two or more races. Hispanics or Latino of any race were 4.37% of the population.

There were 140,337 households out of which 23.7% had children under the age of 18 living with them, 45.5% were married couples living together, 12.1% had a female householder with no husband present, and 37.7% were non-families. 29.7% of all households were made up of individuals and 10.0% had someone living alone who was 65 years of age or older. The average household size was 2.57 and the average family size is 3.23.

The population was spread out with 19.2% under the age of 18, 8.9% from 18 to 24, 29.9% from 25 to 44, 24.1% from 45 to 64, and 17.8% who were 65 years of age or older. The median age was 40 years. For every 100 females there were 96.6 males. For every 100 females age 18 and over, there were 94.5 males.

The median income for a household in Honolulu was \$45,112, and the median income for a family of four was \$56,311. Males had a median income of \$36,631 versus \$29,930 for females. The per capita income for the CDP was \$24,191. About 7.9% of families and 11.8% of the population were below the poverty line, including 14.6% of those under the age of 18 and 8.5% of those 65 and older.

According to the Hawaii State Data Book (2007), acute healthcare facilities in the State of Hawaii decreased from 24 to 23 over the period 1999 to 2005. The total number of beds declined over the period from 2,616 to 2,509. These facilities averaged between 65 and 69% occupancy over the same period, with no general trend. Oahu had 11 of the 23 facilities with 1,938 available beds. Average daily admissions on Oahu were 78,720 on Oahu. Hospitals are the sixth largest industry on Oahu with employment of over 13,000 persons.

The Hawaiian Islands form a chain that extends in a northwest-southeast direction. They are the summits of volcanic domes built up from the ocean floor through countless eruptions as the Pacific Plate moves over a hot spot in the earth's crust. In general, the volcanic activity moved from northwest to southeast. Kauai, on the northwest, is therefore the oldest island in the area, and the eastern part of Hawaii on the southeast is the youngest. The islands formed primarily in thin-bedded *pahoehoe* and *A`a* lava flows. The rocks are mostly basaltic; the basalt is about 50 percent silica. Andesitic rocks as well as volcanic ash and cinders occur in a few places. Adjacent to the ocean is a small amount of coral limestone and coral sand. The relief of the islands varies. The once smooth volcanic domes have been weathered and eroded. The older islands are deeply dissected; their surface is one of ridges, valleys, and alluvial fans. Younger Islands retain their volcanic smooth dome shape.

Large portions of urban Honolulu have soils classified in the Makiki Series. This series consists of well-drained soils on alluvial fans and terraces within the city. These soils formed in alluvium mixed with volcanic ash and cinders. They are nearly level. Ground surface elevations range from 20 to 200 feet. The annual rainfall amounts to 30 to 60 inches. Most of it falls between November and April. The mean annual soil temperature is 73° F. Makiki soils are geographically associated with Kaena and Tantalus soils. These soils are used almost entirely for urban purposes.

Soils beneath the project location consist of Makiki clay loam, 0 to 2 percent slopes (MkA). This soil is on smooth fans and terraces. Included in mapping were small, stony areas and small areas of Kaena soils. In a representative profile the surface layer is dark brown clay loam about 20 inches thick. The subsoil, about 10 inches thick, is dark-brown clay loam that has subangular blocky structure. It contains cinders and rock fragments. The subsoil is underlain by similar material, about 24 inches thick, that is massive. Below this are volcanic cinders. The soil is strongly acid to medium acid. Permeability is moderately rapid. Runoff is slow, and the erosion hazard is no more than slight. The available water capacity is about 1.7 inches per foot of soil. In places roots penetrate to a depth of 5 feet.

Oahu was formerly situated in a seismic zone that is next-to-lowest seismic hazard in the state; seismic hazard 2a. Kauai is seismic hazard 1 which has the lowest seismic risk. Parts of the Big Island were seismic Hazard 4, which is the highest. After the 1997 Uniform Building Code was published the USGS replaced the Hazard zones with maps showing the 50-year probability of horizontal acceleration associated with a certain location. Current seismic maps show the project site in an area having a 10% chance, in 50 years, of horizontal acceleration exceeding 8% of the force of gravity.

Impacts and Mitigation Measures

The geologic conditions impose no overriding constraints on the project, and no unusual mitigation measures are required. Building designers and City Building Inspectors will make certain that the bearing capacity of soils and seismic designs are according to the building code standards prior to issuing building permits.

3.1.2 Floodplains and Surface Water Quality

The properties are designated Zone X, or Special Flood Hazard areas identified in the community flood insurance study as areas of moderate or minimal hazard from the principal source of flood in the area. The project site is not in a special flood hazard district and is outside the tsunami inundation zone. Soil permeability has very little to do with flooding characteristics since the entire site is paved and is served by underground drainage. There are no perennial or intermittent streams in the vicinity. Surface water is known to back up during extremely heavy rains. Surface water quality is currently impacted during stormwater runoff by roads and traffic in the vicinity of the site. Normally, high traffic areas such as this contain metals zinc, copper and molybdenum derived from brake shoe dust. Roads and open parking areas collect oils and transmission fluids from parked cars, which are then released in stormwater runoff. Other potential surface water contaminants originating from the subject property probably include small amounts of nitrogen and phosphorus from landscaped areas as well as particulate debris from dust to litter. This material originates with almost all urban activities.

Impacts and Mitigation Measures

The proposed action will increase the vertical development of the site, but the vast majority of the project site is already covered by impermeable surfaces. Surface water runoff will increase in direct proportion to the amount of new impervious surface added as a result of the proposed action. The City and County of Honolulu is now prohibiting developers from increasing the quantity of stormwater, therefore project designers may be required to install stormwater treatment and storage units in new buildings if these buildings result in new net impervious surface area. Storage volumes would be equivalent or greater than the net increase of stormwater expected during the 10-year 24 hour storms resulting from the increase in impervious area.

Surface water quality during construction has the potential to deteriorate as a result of sediment erosion during storms, or from petroleum leaks originating in construction equipment. The construction project requires a construction stormwater management permit from the Hawaii Department of Health (DOH). This permit will ensure that best management practices (BMPs) will be employed during construction. BMPs are designed to minimize erosion and other offsite discharges that typically may occur during construction. Hospitals are not among the 11 industry types requiring industrial

stormwater discharge permits because they do not typically generate urban pollution from normal operations.

The vast majority of brake dust and other traffic-derived pollutants originate within the public right-of-ways that surround the subject property. Until new technology replaces sacrificial brake shoes and improves the biodegradability of lubricating oils, these will remain unavoidable impacts of urbanization. Although the proposed improvements to KMCWC will increase parking capacity, they will probably decrease the area of uncovered parking since rooftops are the least popular in covered buildings. The proposed action is not likely to increase the amount of stormwater derived pollutants originating from vehicles accessing or parked at the facility.

3.1.3 Groundwater Resources

The Hawaiian Islands obstruct oceanic winds, causing air to rise and moisture to precipitate. This orographic effect provides the mountainous uplands of the larger islands with as much as 300 inches of mean annual rainfall (Hunt et al. 1988). Favorable geologic conditions allow much of the abundant rainfall to accumulate as fresh groundwater. Permeable soils and rocks permit easy infiltration and subsurface movement of water, and low-permeability geologic features impound large amounts of water in thick groundwater reservoirs. Stratified sequences of thin-bedded lava flows form the most productive aquifers in Hawaii. Lava flows on Oahu, as well as the other Hawaiian islands, are mainly of two textural types - *pahoehoe* and *A`A*. Dikes are thin, near vertical sheets of massive intrusive rock that typically only contain fracture permeability. Where dikes intrude lava flows, they inhibit groundwater flow principally in the direction normal to the plane of the dike. The thickness of the volcanic-rock aquifers of Oahu is not known, but probably is at least a 1,000 m. Estimates of specific yield range from about 1-20% percent; most values lie within a narrow range of about 5-10% (Nichols et al. 1996). The primary modes of freshwater occurrence in Oahu are as a basal lens of fresh groundwater floating on saltwater, as dike-impounded groundwater, and as perched groundwater. Basal groundwater is water that lies beneath the water table, below which all permeable rocks are saturated. The freshwater head in a basal water lens is near sea level. Recharge to a given basal water body may occur by direct infiltration of precipitation or stream flow and by groundwater inflow from upgradient groundwater. Oahu is underlain by a regional aquifer system composed of two principal aquifers, the Waianae aquifer in the Waianae Volcanics and the Koolau aquifer in the Koolau Basalt. The aquifers are composed mainly of thick sequences of permeable, thin-bedded lavas. The two aquifers combine to form a layered aquifer system throughout central Oahu, where the Koolau aquifer overlies the Waianae aquifer. Oahu has been divided into seven major groundwater areas based on the occurrence of deep-seated, structural geohydrologic barriers. Hydraulic continuity within these seven areas is generally high, and the potentiometric surface is smoothly continuous, except in rift zones where dikes cause numerous local discontinuities and where internal barriers cause further disruptions (Nichols et al. 1996). The southern Oahu area is bounded on the east by the Koolau and Kau rift zones, on the north by the south Schofield groundwater barrier, on the west by the Waianae rift zone, and on the south by the sea. The area has been divided into six

smaller groundwater areas, mostly by valley-fill type barriers. Each of the areas contains a basal freshwater lens. The Pearl Harbor, Moanalua, Kalihi, Beretania (which includes the project site) and Kaimuki areas are underlain by Koolau Basalt and are separated by valley-fill barriers (Nichols et al. 1996).

Urban Honolulu accounts for 48% of the water demand on the Island, which is derived from the Koolau and Pearl Harbor aquifers. The Honolulu Board of water supply monitors sustainable yield of water from all aquifers and develops groundwater resources to meet demand. The proposed development will increase the site density and as a result increase the demand for potable water.

Impacts and Mitigation Measures

The proposed action has no on-site groundwater uses or impacts. Expanding the facility will increase the demand for potable water slightly from the existing condition. This demand will be addressed by the Honolulu Board of Water (BWS) supply upon request for permits. The BWS was contacted for comments on the Draft of this document. Their response appears in Appendix 2.

3.1.4 Climate and Air Quality

The climate of Honolulu near the project site is mild due to its latitude and consistent northeasterly trade winds. Average annual rainfall in the area is approximately 40 inches per year; however, recent years have been dryer. Winds are generally between 5 and 15 mph during the day, replaced by drainage winds at night. This pattern is occasionally replaced by light and variable southerly “Kona” winds, most often in winter (UH-Manoa, Dept. of Geography 1998).

The mean annual temperature in the area is around 80 degrees Fahrenheit. The annual temperature variation is less than the mean daily temperature variation.

Air quality in the area is mostly affected by vehicular emissions of carbon monoxide, carbon dioxide and volatile components from the H-1 freeway immediately north of the facility. Trade wind flows normally disperse traffic emissions to near non-detectable levels except for rare periods of calm winds. The entire State is occasionally affected by sulfur dioxide from Kilauea Volcano, which converts subsurface lava into particulate volcanic haze (vog). Vog is present on Oahu during southwesterly “Kona” wind periods.

Demolition of structures may produce dust and temporary air quality impacts on and near the construction site. State regulations require that demolition be preceded by removing asbestos-containing building materials, as well as lead based paint and other building components containing hazardous materials that are found or suspected to be present in regulated quantities.

Impacts and Mitigation Measures

Air quality impacts associated with the proposed action are limited to fugitive dust during construction and demolition, vehicular emissions generated from staff and patient traffic into and out of the facility, and potentially very small amounts of volatile organic solvents escaping from hospital operations.

Fugitive dust during construction and demolition is of greatest concern. Demolition of any structure must be preceded by lead and asbestos inspections to ensure that fugitive dust does not contain hazardous materials. All asbestos containing materials shall be removed by professional licensed contractors who will take legally mandated precautions against releasing friable asbestos from the project site or exposing site personnel or workers to hazardous conditions. Best management practices will be required of all construction and demolition contractors to eliminate dust resulting from construction and demolition projects to the standards of the industry. Mitigation measures will include wetting materials before demolition, use of dust-control water trucks to minimize traffic-generated dust, possible wheel wash areas, and possible air monitoring during demolition activities. Special conditions attached to demolition permits will be enforced to protect surrounding users, sensitive hospital users in particular, from impacts resulting from fugitive dust generated during construction and demolition activities.

Vehicular emissions from site traffic are negligible in comparison to the traffic emissions generated along H-1, Bingham, and Punahou Streets. The increase over existing conditions will be mitigated by providing easier access to parking areas and reducing idling and wait times in close proximity to patient and staff spaces.

Air emissions resulting from use of volatile solvents such as alcohol is probably not measurable outside the facility. The use of volatile compounds is an existing use, but emissions resulting from this use are expected to be far below regulatory levels both in current practice and subsequent to the facility expansion.

3.1.5 Odor

With the exception of those emissions discussed in the previous section, no odors are expected to be discernable outside the facility during either construction or operational phases of the proposed action.

Impacts and Mitigation Measures

No impacts or mitigation is proposed in connection with odors associated with the proposed action.

3.1.6 Noise

Existing noise levels on the site are relatively high as expected in urban areas. The vast majority of noise is derived from traffic, commercial and emergency vehicles along H-1,

Punahou and Bingham Streets. These sources will not change significantly as a result of the proposed action. Hospital operations do not generate excessive noise, except for the arrival of ambulances.

Construction related noise is expected to create minor and temporary impacts to the ongoing hospital operations as well as nearby neighbors. Sources include noise generated by heavy equipment, and commercial vehicles servicing the site, and construction activities including hammering, and pile driving. Foundation requirements are currently unknown, but may include driving subsurface piles to support the building load. Pile driving may result in nearby ground shaking and noise. Concrete trucks and concrete pumping equipment are relatively noisy and will be used on days when foundations and structures are poured.

Impacts and Mitigation Measures

Noise generated during construction will create the greatest impacts on the applicant. Hospital quiet zones will be difficult to maintain during certain construction periods.

Construction will be limited to working hours and work will not be conducted on weekends as a consideration for church activities in the area. Noise impacts to surrounding users will be limited by the distance from the source and the relatively high background noise generated along H-1 and Punahou Streets. The construction periods during which noise is a factor will be temporary and its duration will be limited to the initial phases of construction on each building. Although there are three phases, each phase will be separated by periods of years and the impacts to neighboring users are expected to be minor and temporary.

3.1.7 Viewplanes

The site is within the primary urban center. View planes toward the ocean are completely obstructed and partially obstructed toward the mountains. The primary viewplane of concern is the Koolau Mountains which lie to the north of the project site and extend the length of the urban corridor. Large areas of the mountains can be seen from the area despite relatively diverse development which occludes portions of the viewplane. Surrounding land uses include commercial and ecclesiastical neighbors that are low-rise developments and high rise residential users. As everywhere, those residential units on higher floors are more likely to maintain their view of the mountains, while those units on lower floors are not. Zoning codes restrict vertical development to 150 feet. The existing Medical Office Building is 11 stories standing at 130 feet. The tallest structures in the proposed action are a 150-foot New Hospital Bed Tower expansion and a 150-foot New Parking Structure on Bingham Street, which are slightly taller than the existing 130-foot Medical Office Building.

The other new structures include:

- one multi-level parking structure,

- a four story addition to the front of the existing Shared Services Building; and
- an additional floor above the existing Shared Service Building.

The new parking structure will increase the height of the tallest building by 20 feet. The density of buildings on the site will also increase.

Impacts and Mitigation Measures

The overall height of the complex increases by only 20 feet; however, the location of the height shifts around the property and as a result may occlude views for residents in The Courtyards at Punahou that now have partial views between the existing buildings. This development is directly behind the subject property and will have some blockage of mountain views. However, private views are not protected by ordinance and are often affected by development on surrounding properties. The applicant has limited the height of development to that allowed under current zoning, and concludes that impacts to viewplanes will be minor.

3.1.8 Hazardous Substances

Hospitals use hazardous substances including radiological materials. These substances are highly controlled at the state and federal level. The safeguards that are currently in place against release of hazardous materials will remain, and be extended to the proposed expansion of hospital operations.

Impacts and Mitigation Measures

The proposed action will not result in impacts to surrounding land uses resulting from the use or disposal of hazardous materials.

3.2 Biological Environment

Floral and Faunal resources in the vicinity

The subject property is cleared of vegetation with the exception of non-native grass and landscape planted areas in small patches around the perimeter of the buildings. There are no natural areas within the immediate area of the project site.

Consistent with the urban environment, humans and their pets are the only fauna to frequent the area surrounding the project site. Urban species including rats and mice, mongoose, feral chickens and feral cats may also be seen occasionally. A list of birds and mammals common in the area is presented in table 3.2-1

Table 3.2-1 Animals and Birds Reported on, or adjacent to the Project Site

Mammals: Domestic dog (*Canis familiaris*)
Domestic cat (*Felis catus*)

	Mongoose (<i>Herpestes aroupunctatus</i>)
	Common mouse (<i>Mus musculus</i>)
	Polynesian rat (<i>Rattus exulans</i>)
	Roof rat (<i>Rattus rattus</i>)
Birds:	Mynah (<i>Acridotherese t. tristis</i>)
	House finch (<i>Carpodacus mexicanus frontalis</i>)
	Ricebird (<i>Lonchura punctulata</i>)
	Barred dove (<i>Geopelia striata</i>)
	House Sparrow (<i>Passer domesticus</i>)
	Northern cardinal (<i>Cardinalis cardenalisis</i>)
	Spotted dove (<i>Streptopelia chinensis</i>)
	Japanese white-eye (<i>Zosterops j. japonica</i>)
	Pacific golden plover (<i>Pluvialis fulva</i>)
	Hawaiian Owl (<i>Aseo flammeus sandwichensis</i>)

Impacts and Mitigation Measures

No impacts to flora and fauna are expected as a result of the proposed action.

3.3 Socioeconomic

3.3.1 Social Factors and Community Identity

The area surrounding the subject property is identified as the Bingham Block Census Tract 26 by the US Census bureau. The Total Population as of 2006 is 4,146 individuals, whose economic, social and racial characteristics follow in Table 3.3-1

Table 3.3-1 Selected Socioeconomic Characteristics, Census Tract 26

Subject	Number	Percent
Total population	4,146	100.0
SEX AND AGE		
Male	2,057	49.6
Female	2,089	50.4
Median Age Male	38.2	
Median Age Female	44	
Median age (years)	41	

RACE		
White	623	15
Black or African American	46	1.1
American Indian and Alaska Native	8	0.2
Asian	2,493	61
Native Hawaiian and Other Pacific Islander	291	7
Two or more races	623	15
HOUSEHOLDS BY TYPE		
Total households	2,046	100.0
Average household size	1.99	
Average family size	2.83	
HOUSING OCCUPANCY		
Total housing units	2,246	100.0
Occupied housing units	2,011	89.5
Vacant housing units	235	10.5
Vacant Rentals	148	9
For Sale Vacant	6	1
Vacant seasonal, recreational, or occasional use	35	
HOUSING TENURE		
Occupied housing units	2011	100.0
Owner-occupied housing units	542	27
Renter-occupied housing units	1468	73
Economic Characteristics		
Median household income	\$33,646	
Per Capita income	\$19,856	
Below Poverty Line	469	11

Source: U.S. Census Bureau Web Page. <http://factfinder.census.gov/>.

The Census block has major Honolulu landmarks that define the neighborhood character. These include the subject property, Central Union Church, and Shriner's Hospital, which is in a different census tract, but immediately across Punahou Street from the subject Property. There are numerous large apartment/Condominiums in the immediate area with smaller low rise units scattered within and outside the subject property's immediate block. Retail activity in the immediate vicinity is sparse, and the area could be classified as being predominately consisting of community services and multi-story residential.

3.3.2 Public Services, Facilities and Utilities

The subject property is provided with municipal and state roads, power, telephone and solid waste, wastewater, police and Fire services disposal opportunities.

Most wastewater users are connected to the municipal wastewater collection system, that delivers wastewater to the Sand Island wastewater treatment plant. There are no individual wastewater systems known in the immediate area. First response emergency services are provided by emergency contract ambulance services which serve all hospitals in the greater Honolulu area.

The Honolulu Board of Water Supply was contacted to assess the adequacy of potable water and fire protection water to the site upon expansion of the KMCWC Facility. In a letter dated September 28, 2008 the BWS confirmed that the existing public potable water supply and infrastructure is adequate to accommodate the improvements with potable and fire prevention water described in the 15-Year Master Plan.

According to a preliminary design report prepared by Belt Collins, Ltd (Oct. 29, 2008), the existing 3 inch water meter may be supplemented with an additional 2-inch meter to meet demands of the expansion master plan. The facility is served by 4, 6, and 8inch fire protection meters which may be adequate. The fire protection requirements will be re-assessed during the design stage of the project.

Wastewater is delivered to the main sewer line by two 8-inch drainage lines one along Bingham and another along Punahou streets. The existing wastewater discharge of 72,000 gallon/day is expected to increase to 90,000 gallons/day over the short term and 142,000 gallons/day by 2025. The existing drainage lines are inadequate for the short-term expansion plans. When the new supply meter is installed, the wastewater drainage line will be upgraded to a 10 to 12 inch wastewater drainage line. The new wastewater lines placed within Bingham Street for a distance of approximately 427 feet will meet the long-term wastewater demand for services. It is likely that potable water supply meters will be changed between the short and long term improvements; however, the wastewater drainage capacity will be improved only once to accommodate all planned improvements.

The City's stormwater drainage system is known to be over-taxed during severe storm conditions. Under City ordinance the proposed development is allowed to discharge the same amount of stormwater runoff as it does under the existing condition, but to not exceed the existing stormwater runoff. Additional stormwater generation resulting from increased parcel utilization will be stored and reused or disposed by percolation into the

soil. Reuse may involve storing stormwater for irrigation or maintenance activities. Onsite disposal may be enhanced by dispersion pits or injection wells attached to roof drains. It is likely that the City will also require some type of treatment to the stormwater that is discharged into the storm drains. These practices will be developed during the detailed project design stage. KMCWC will acquire permits and include design improvements to comply with all State regulations and City ordinances regarding discharge of stormwater.

Services provided by the hospital will be maintained throughout the construction and operational periods covered in this Environmental Assessment.

Other public utilities including telephone, electrical, and cable services are expected to be adequate with minor infrastructure improvements.

Impacts and Mitigation Measures

Installation of water meters and new potable water lines may involve minor use of the public right of way; however, this impact is expected to be minor and last for a matter of hours. Installation of the expanded wastewater line will involve trenching within Bingham Street and possibly into Alexander Street. This installation will create partial traffic interruptions. Although the exact duration is not known, it is probably on the order of one week. During this period the traffic flow along Bingham Street will be delayed or completely rerouted for shorter periods. The construction may require police traffic control. These impacts are not mitigable through practical methods, but will be temporary. The impacts resulting from wastewater improvements along Bingham Street will be more than balanced by improvements to the availability of medical services in the community.

3.3.3 Roads and Traffic

A Traffic Impact Assessment Report was commissioned as part of the KMCWC's project planning. The complete Traffic Report is included as Appendix 3.

The Scope of services included:

- An evaluation of existing and future road and traffic conditions and the affects of the proposed project on those conditions,
- Identification/analysis of traffic impacts resulting from the proposed project, and
- Recommendations of traffic mitigation measures if appropriate

Traffic capacity is measured as the level of service (LOS) on a scale of A through F, with LOS – A being ideal traffic flow and LOS – F being an unacceptable delay conditions. Definitions of the level of service delays as used in the Traffic Impact Report are based on a statistical average of the delay period for vehicles approaching the intersection as follows:

LOS A: describes operation with low control delay, up to 10 seconds per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive at a signalized intersection during the green phase. Many vehicles do not stop at all. Short cycle lengths may contribute to lower delay values.

LOS- B: describes operation with control delay values greater than 10 seconds per vehicle but less than 20 seconds. This level generally occurs with good progression and short cycle lengths.

LOS-C: describes operations with control delay values of between 20 and 35 seconds per vehicle. Individual cycle failures may begin to appear at this level of service. A cycle failure occurs when a green phase does not serve all queued vehicles and a cycle overflow occurs. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

LOS-D: describes operations with control delay greater than 35 seconds and below 55 seconds per vehicle. At LOS-D the influence of congestion becomes more noticeable. Most vehicles stop and the proportion of vehicles making it through the intersection without stopping declines. Individual cycle failures are more frequent and noticeable.

LOS-E: describes operating conditions where the control delay is between 55 and 80 seconds per vehicle. At this LOS the delays can be long and individual cycle failures become frequent.

LOS-F: describes operating conditions where the control delay is in excess of 80 seconds. This level of service is considered unacceptable to most drivers because arrival flow rates exceed the capacity for many for most lanes of traffic.

The traffic Impact Assessment Report indicates that current LOS for all intersections in the vicinity of the KMCWC is at LOS B or LOS-C during morning and evening peak flow periods. The Study projected traffic to the years 2017 and 2026. Projected traffic increases in traffic without the project change only slightly with the intersection of Punahou and Bingham moving from LOS- B to LOS-C due to unrelated traffic growth. The affect of the proposed project does not change the projected level of service at any of the studied intersections over the planning period to 2026.

Based on this assessment it is concluded that the proposed project has a negligible impact on traffic in the vicinity of KMCWC.

Impacts and Mitigation Measures

Although The Traffic Study concluded that the level of service would not be increased by the proposed action, the consultant made recommendations for design considerations to improve the existing conditions. These recommendations include:

1. Maintain sufficient sight distance for motorists to safely enter and exit all project driveways.
2. Provide adequate on-site loading and unloading areas and prohibit off-site loading and unloading.
3. Provide adequate turnaround area for service, delivery and refuse vehicles to maneuver on the project site without having to reverse into the public right-of-way.
4. Provide sufficient turning radii at all driveways to avoid vehicle encroachments into oncoming traffic.
5. Provide adequate valet staffing to prevent vehicle queues from extending into the public right of way.
6. Prepare a Traffic Management Plan that would detail management strategies such as staggered work hours, Bus pass or ride-sharing programs, and restricted delivery hours.

3.3.4 Parking Requirements

KMCWC is required to maintain 630 parking stalls, based upon their current bed count and floor area, as specified by the PRU approval. The PRU allowed forty percent of the parking stalls to be compact stalls (which at the time of the PRU approval totaled 247 compact stalls). The facility currently has too many compact stalls, and the facility is currently requesting permission to restripe the Punahou Parking structure to correct the ratio of full to compacts stalls. As that change will reduce the number of stalls below the required minimum, additional off-site parking stalls will be obtained at the nearby Banyan Tree Plaza condominium. KMCWC anticipates that the restriping and additional parking will be added to bring them into compliance before the end of 2009.

The first phase of the development will be to construct a new parking structure along Bingham Street. Construction of the parking structure at the beginning of the development provides additional parking, and space for transferring services around the campus without interruption. The new Bingham Street Parking Structure will be a ramp-type structure with capacity for 665 stalls as will be required at the completion of Phase II. KMCWC will maintain the offsite parking capacity to preserve space for essential hospital support services in the event it becomes necessary to instead build fewer on-site stalls. The old Bingham Parking Structure will be temporarily used for services from the current Bingham Building and for storage. During Phase III the older Bingham Parking Structure will be demolished to build the new Hospital Bed Tower. During the construction period the 665 parking stalls required will be supplied from the New Bingham Parking structure and/or existing offsite stalls. Also during Phase III the Punahou Parking structure will be demolished and replaced with a multi-story parking structure that will increase parking availability to 1,108 stalls to meet the requirements of the new medical and support areas developed in Phase III.

3.3.5 Cultural and Historic Resources

The KMCWC property has no recognized archeological, cultural or historical sites within its boundaries. The historical structures in the Capitol District are slightly over 1 mile to the west and several historical residences are within the same radius.

Cultural Surveys Hawaii was contracted to advise KMCWC on the proper approach to the assessment of cultural and historical resources in the proposed project site. After a brief review they prepared a letter recommending no further archaeological or cultural impact study of the site in preparation for the proposed action. The assessment identified several burial sites and other investigations within one mile.

With the exception of the new lot on Bingham Street, the subject property has been graded and excavated repeatedly during construction and previous reviews have not detected evidence of archeological resources. The Bingham site formerly housed several apartment buildings and portions of the property have been excavated for footings at a minimum. Although other areas may have been previously cleared and paved, these other areas may be excavated for the first time. Contractors and engineers will be alerted to the potential for finding culturally important artifacts or burial sites. All site construction personnel will be required to comply with the Native American Graves Protection and Repatriation Act (NAGPRA). Engineers and contractors will prepare an action plan in the event that native Hawaiian gravesites or artifacts are unearthed. The plan will require contacting the State Historic Preservation Division Office if any artifacts or burial sites are unearthed. Any such discovery shall be managed by the appropriate cultural and archeological practitioners. The State Historic Preservation Office was notified during the pre-consultation period. Their comments will be solicited during the comment period following publication of the Draft EA.

3.3.6 Abbreviated Cultural Impact Assessment

During historical times the subject property has been developed. No records of ceremonial use, traditional gathering, burial or other culturally important uses of this site have been discovered. The urban environment surrounding the subject property is heavily developed for commercial service and multi-family residential use. The most culturally significant aspect of the proposed action is the Legacy of Queen Kapiolani. Concerned about the welfare of Hawaii's mothers and their babies, Queen Kapiolani opened the Kapiolani Maternity Home in 1890 at a site that is now within Kapiolani Park in Honolulu. The original purpose of the Maternity Home was to provide care for Hawaii's disadvantaged mothers and mothers-to-be. The queen endowed her legacy with the motto, "Kulia I Ka Nu'u" or "Strive for the Highest," a phrase that has become the Hospital's motto. Today, KMCWC continues the queen's mission to strive to improve the health and well-being of women, children and adolescents. The proposed action is necessary to maintain the high quality care facilities that were first envisioned by Queen Kapiolani.

3.4 Growth-Inducing, Cumulative and Secondary Impacts

Guidelines prepared by the Council on Environmental Quality (CEQ), for implementing NEPA broadly define both secondary and cumulative impacts. Secondary effects are those that are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable" (40 CFR 1508.8). Generally, these impacts are induced by the initial action. They comprise a wide variety of secondary effects such as, changes in land use, water quality, economic vitality and population density. Cumulative effects are impacts which result from the incremental consequences of an action when added to other past and reasonably foreseeable future-actions (40 CFR 1508.7). These impacts are less defined than secondary effects. The cumulative effects of an action may be undetectable when viewed in the individual context of direct and even secondary impacts, but nonetheless can add to other disturbances and eventually lead to a measurable environmental change.

An example of secondary impacts of a new highway may be the effect on businesses from a highway bypass project. Although the development may address a major traffic deficiency, rerouting that traffic may have a significant adverse impact on the commercial establishments where the traffic now flows.

Growth inducing and cumulative impacts may accrue from actions that establish a precedent that allows for other, potentially unrelated actions, to follow. One example that is commonly discussed in Hawaii is development of currently fallow agricultural lands to "higher uses" such as residential. Although a proposed development may not tax water, wastewater or other required infrastructure, once a precedent for up-zoning an area is established it may be reasonable to assume that others will follow.

Expansion of hospital capacity may legitimately be considered a growth-inducing factor. The availability of adequate and quality medical services is an important consideration for families and retirees in selecting an area to live. If the proposed action represents a growth-inducing factor, the appropriate question is whether secondary or cumulative impacts are associated with making the area more attractive to families and retirees. Population growth on Oahu averages 0.5 percent per year over the decade of the 1990s. The proposed action is the first major expansion since 1976. Over the next 15 years the bed-space will increase at a rate that is similar to the expected population increase over this period. The proposed action is not expected to induce hyper-expansion of the community, by providing additional capacity to the hospital because the expansion is required to maintain pace with the existing growth within its service area.

3.5 Required Permits and Approvals

In concert with the PRU permit process, the current and proposed uses of the property by KMCWC are compatible with its A-2 zoning.

Permits required for completion of the project include:

- Building and Grading permits from the City and County of Honolulu to ensure that the new construction complies with existing building codes and the County General Plan,
- NPDES construction stormwater management from the State Department of Health to ensure that construction is done in a manner that minimizes urban pollution from stormwater flowing across or out of the site,
- A Plan Review Use (PRU) Permit is required from the City and County of Honolulu. This permit is specifically required of all hospitals, prisons, airports, colleges, universities, convention centers and other permanent institutions. Its intent is to minimize impacts of these large developments by requiring a Master Plan that stretch for at least 5 years and providing conditions to mitigate potential impacts. The proposed action requires a PRU permit because of the proposed addition of a new parcel to the hospital complex and renovations and expansion of the hospital facility on the new parcel and existing hospital campus. The building area (lot coverage) of the existing facility exceeds the allowable building area in the Land Use Ordinance, and the proposed expansion will also exceed the allowable floor area for all parcels. A request for this modification of the permitted building area and permitted floor area will be incorporated into the PRU permit application.

4.0 CONSISTENCY WITH GOVERNMENT PLANS, POLICIES AND REGULATIONS

4.1 Hawai'i State Plan

The Hawaii State Plan is documented in HRS 226, and has the objective to guide long-range development and coordinate all federal, state, and county planning activities. The State Plan emphasizes self reliance and self determination of its citizens as its guiding principal. There are 23 objectives to support these principals. Those applicable to the proposed action are contained in §226-20 Objectives and Policies for Socio-cultural Advancement of Health as follows:

(a) Planning for the State's socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives:

- (1) Fulfillment of basic individual health needs of the general public.
 - (2) Maintenance of sanitary and environmentally healthful conditions in Hawaii's communities.
- (b) To achieve the health objectives, it shall be the policy of this State to:
- (1) Provide adequate and accessible services and facilities for prevention and treatment of physical and mental health problems, including substance abuse.
 - (2) Encourage improved cooperation among public and private sectors in the provision of health care to accommodate the total health needs of individuals throughout the State.
 - (3) Encourage public and private efforts to develop and promote statewide and local strategies to reduce health care and related insurance costs.
 - (4) Foster an awareness of the need for personal health maintenance and preventive health care through education and other measures.
 - (5) Provide programs, services, and activities that ensure environmentally healthful and sanitary conditions.
 - (6) Improve the State's capabilities in preventing contamination by pesticides and other potentially hazardous substances through increased coordination, education, monitoring, and enforcement.

The proposed action will improve health services and support the objectives and policies contained in HRS 226-20 of the Hawaii General Plan.

4.2 Honolulu Primary Urban Center Development Plan

The Primary Urban Center (PUC) is defined as the urban development stretching from Waialae-Kahala to Pearl City along Oahu's southern shore and plain.

The PUC Development Plan is divided into five chapters that describe elements of how the PUC should be maintained and improved:

1. The Role of the Primary Urban Center in Oahu's Development Pattern
2. The Vision for the PUC's Future
3. Land Use policies, Principals and Guidelines
4. Public Facilities and Infrastructure Policies and Guidelines
5. Implementation

Chapter 3 defines how the Plan relates to land-use and zoning. Recommendations on land uses are described in a series of land-use maps. The subject property is labeled as an institutional area and defined as:

***Institutional.** The location of the Civic Center and major institutional campuses – including public and private secondary schools, colleges, hospitals and other large institutions – are indicated by a blue color on the Land Use Maps. Smaller institutional uses – such as churches, elementary schools, and community centers – are generally not shown, but are allowed in most zoning districts subject to appropriate zoning controls to assure compatibility with surrounding uses.*

KMCWC is recognized as a major health care facility on the land use map and is designated for public or quasi-public use. The present and future planned use of the property is consistent with the PUC Development Plan.

4.3 Hawai'i State Land Use Law

All land in the State of Hawai'i is classified into one of four land use categories – Urban, Rural, Agricultural, or Conservation – by the State Land Use Commission, pursuant to Chapter 183-c, HRS.

The project will involve construction within the State Land Use Urban District, defined in HRS 205-2(b)

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

The proposed hospital expansion is consistent with this Urban designation. HRS 205-2(b) transfers responsibility for land use to the Land Use Ordinance (LUO) of the City and County of Honolulu (See Section 4.4 for discussion of the LUO).

4.4 Hawaii Revised Statutes 343:

This Environmental Assessment (EA) is required by triggers defined in Hawaii Revised Statutes (HRS) Chapter 343, which is also known as the Hawaii Environmental Policy Act (HEPA). HEPA requires an Environmental Assessment or Environmental Impact Statement for actions that fit into one or more of the following eight land uses or administrative acts.

1. Use of state or county lands or funds other than for feasibility studies or the purchase of raw land,
2. Use of any land classified as Conservation District by state law,
3. Use within the Shoreline Setback Area,
4. Use within any Historic Site or District,
5. Use within the Waikiki Special District,
6. Any amendment to county general plans that would designate land as other than agriculture, conservation or preservation,
7. Reclassification of state Conservation District lands,
8. Construction or modification of helicopter facilities which may affect conservation land, the shoreline area, or historic properties, or
9. Proposes one of the following:

Wastewater treatment Plant
Waste-to-Energy facility
Landfill
Oil refinery, or
Power generating Facility,

Once an agency determines that an action “triggers” the EIS law, it must decide if the action is either:

- exempt from preparing a review document;
- will require a relatively brief review via an environmental assessment; or
- will require a full environmental impact statement.

The trigger is the use of public land within the Bingham Street roadway right-of-way, which is a state-owned road. Bingham Street will be utilized for driveway connections and improvements to wastewater transmission lines.

HEPA was enacted by the Hawai`i State Legislature to require State and County agencies as well as certain private applicants to consider the environmental impacts of various actions as part of the decision-making process. The implementing regulations for HEPA are contained in Title 11, Chapter 200, Hawai`i Administrative Rules (HAR).

This Draft EA is prepared to document environmental conditions and impacts, to develop mitigation measures that avoid, minimize or compensate for adverse environmental impacts, and determine whether or not an action has significant impacts upon the environment. Impacts are evaluated for significance according to thirteen specific criteria as presented in HAR 11-200-12. If no significant impacts are expected, then a Final EA with a Finding of No Significant Impact (FONSI) may be issued. When the Draft EA determines that significant impacts are present, then a Notice of Intent is prepared and the Final EA facilitates preparation of an Environmental Impact Statement (EIS).

4.5 County General Plan

The General Plan is a planning document, expressing the aspirations of the residents of Oahu. It sets forth the long-range objectives and policies for the general welfare and, together with the City Charter, provides a direction and framework to guide the programs and activities of the City and County of Honolulu. Its first objective is to provide social, economic, environmental, and design objectives for the County. Secondly, the General Plan specifies broad policies to help reach its objectives.

The General Plan is divided into eleven areas of concern:

1. Population,
2. Economic activity,
3. Housing,
4. Natural Environment,
5. Transportation and Utilities,
6. Energy,
7. Physical development and urban design,
8. Public Safety,
9. Health and education,
10. Culture and recreation, and
11. Government operations and fiscal management.

The General Plan states that it is the responsibility of the City and County of Honolulu to manage population growth to the extent possible and to plan for the anticipated growth of population in the County. The proposed action addresses this objective. Upgrading acute care facilities is an essential aspect of accommodating population growth as well as changes in medical technology.

Title 9, Objective A of the General Plan is to protect the health of the people of Oahu. Policy 1A is to encourage the provision of health-care facilities that are accessible to both employment and residential centers. KMCWC is located in the primary urban core which is accessible to both employment and residential areas. The applicant concludes that the proposed action is compatible with the County General Plan.

4.6 Land Use Ordinance of the City and County of Honolulu (LUO)

The LUO is contained in Chapter 21 of the Revised Ordinances of Honolulu. It establishes county zoning and provides detailed descriptions of the uses allowed in each zone.

The purpose of the LUO is to regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies, including the Oahu general plan and development plans, and to promote and protect the public health, safety and welfare

The LUO stipulates procedures for permit applications including PRU permit Section 2-120, Council review of PRU applications section 2-70.

The purpose and intent of zoning category A-2 is described in Section 21-3.80 (c) :

“The intent of the A-2 medium density apartment district is to provide areas for medium density, multifamily dwellings. It is intended primarily for concentrated urban areas where public services are centrally located and infrastructure capacities are adequate.”

The LUO stipulates that hospitals are a permitted use within A-2 zoning after receipt of a PRU permit.

Development standards are also set out within the LUO Table 2.3.3. Applicable requirements include minimum lot size, height limits, setbacks, and maximum building area. Parcels zoned A-2 that are greater than 20,000 square feet are permitted to utilize only 40 percent of the land area for building area. This standard is currently exceeded and will be exceeded in the proposed expansion. In addition, the allowable floor area on the property will also be exceeded. These standards will be discussed in the PRU and the applicant hopes that the City Council will support these modifications in their action on the PRU.

5.0 COMMENTS AND COORDINATION

5.1 Agencies and Organizations Contacted

The following agencies, individuals, and organizations were contacted for information in preparation of the Draft EA:

CCH Department of Planning and Permitting	Sharon Nishiura	10/12/2008
HDOT Engineering Planning Branch	Douglas Meller	10/12/2008
State Historic Preservation Division	Lauren Morawski	1/27/2009
Honolulu Board of Water Supply	Keith S. Shida	9/22/2009
Neighborhood Board	Chair	10/12/2008
Alexander Arms 1320 Alexander St.	AOAO	10/12/2008
Wm. Lee Trustee 1234 Alexander	Wm. Lee	10/12/2008
Alexander Towers 1228 Alexander	AOAO	10/12/2008
Central Union Church 1660 S. Beretania	Trustees	10/12/2008
Banyan Tree Plaza 1212 Punahou St.	AOAO	10/12/2008
Shriners Hospital 1310 Punahou St.	Stan Berry	10/12/2008
Courtyards at Punahou 1740 S. Beretania	AOAO	10/12/2008
Sovereign Condo 1760 S. Beretania	AOAO	10/12/2008

Meetings were offered and in most cases held with each of the adjacent landowners and association of apartment owners. No written questions were received from these meetings and no significant concerns were presented.

5.2 Public Notice and Coordination

KMCWC and its consultants held a public meeting in conjunction with a special session of the McCully/Moiliili and Manoa Neighborhood boards on June 23, 2009. The meeting announcement, agenda and meeting notes are included in Appendix 1.

During the public meeting KMCWC presented a full description of the Master Plan improvements and showed conceptual drawings of the Phased development of the site. There were six questions or comments from the neighborhood board representatives and participants. The questions appear below, along with a transcript of the answers stated at the meeting. An official response to these and other questions received during comment period will be developed for the Final Environmental Assessment.

Question and answers from June 23 Special Neighborhood Board Meetings are contained in official notes from the meeting and are included in Appendix I of this document.

6.0 LIST OF DOCUMENT PREPARERS

This Document was prepared by EnvironMETeo Services, Inc. and Ms. Pam Davis, the Approving Agency Representative of The Department of Planning and Permitting, The City and County of Honolulu.

The primary author is Project Manager David M. Robichaux. Mr. Robichaux received invaluable information and assistance from the following individuals:

Ricky Murata, KMCWC

Warren Chaiko, KMCWC

Keith Kurahashi, Kusao and Kurahashi, LLC

Clifford How, President EMET Services

7.0 REFERENCES

Hawai`i State Department of Business, Economic Development and Tourism (DBEDT). 1997. *Hawai`i State Data Book*. Honolulu: DBEDT

MacDonald, G.A., A.T. Abbott, and F.L. Peterson. 1986. *Volcanoes in the Sea: The Geology of Hawai`i*. 2nd ed. Honolulu: University of Hawai`i Press

Sato, H.H. et al. 1973. *Soil Survey of Island of Hawaii, State of Hawaii*. Washington: U.S.D.A. Soil Conservation Service.

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U.S. Fish and Wildlife Service (USFWS). 2000. *Threatened and endangered plants in Hawai`i* Washington: GPO.

University of Hawai`i at Hilo, Dept. of Geography. 1998. *Atlas of Hawai`i*. 3rd ed. Honolulu: University of Hawai`i Press.

U.S. Census Bureau Web Page. 2009. *Selected Socioeconomic Characteristics, Census Tract 213*. <http://factfinder.census.gov>

Appendix 1
Agency Coordination Letters and Public Involvement

Agency Name and address

November 12, 2008

**Proposed Improvements to Kapiolani
Medical Center for Women and Children
1637 Bingham St. Honolulu, Hawaii**

Agency:

Hawaii Pacific Health, Inc. as owner of the Kapiolani Medical Center for Women and Children (KMCWC) intends to provide needed upgrades to the facility located at 1637 Bingham Street. The planning process for these improvements includes an Environmental Assessment which will be prepared by EnvironMETeo Services, Inc. (EMET). By this letter EMET is notifying agencies, adjacent landowners and interested parties that the Environmental Assessment is being prepared pursuant to the regulations contained in Hawaii Revised Statutes Chapter 343. As an agency with responsibility to review the project, nearby landowner, or resident we would like to hear any comments or concerns that you may have on the project.

This is the first of several opportunities for you to provide comments. A Draft Environmental Assessment will be made available, and a public hearing will be held to address questions and comments on the proposed improvements. All legitimate questions and comments will be documented and addressed in the Environmental Assessment. The Department of Planning and Permitting has been previously contacted in conjunction with a pending PRU permit. Information from the PRU will be incorporated into the EA.

A brief summary of the project is enclosed. A much more detailed description of the project will be available in the Draft EA. If you would like more information or have comments on the project please contact me by mail or email.

Thank You;



David Robichaux, Project Manager
EMET Services
emet@emetservices.com or
robichaud001@hawaii.rr.com or
PO Box 1018 Haleiwa, HI 96712

Enc: Project Summary

SUMMARY: Proposed Improvements to Kapiolani Medical Center for Women and Children

Hawaii Pacific Health, Inc. proposes to upgrade The Kapiolani Medical Center for Women and Children (KMCWC) to respond to the current needs of the community, improve parking and circulation, and remain current with the standards of the industry. Medical services have been provided continuously since 1930 from the site located at 1637 Bingham Street. This environmental assessment is triggered by the use of the State of Hawaii roadway right-of-way along Bingham Street for new and additional access to, and egress from the facility and for providing an upgraded sewer line within the right-of-way.

The proposed improvements will be accomplished in 3 major phases to be completed over the next 15 years. The phases include:

- Phase I - Construction of new parking areas along Bingham Street,
- Phase II - Demolition of an existing building along Bingham Street, and construction of a new and larger building along Bingham Street,
- Phase III - Demolish older Bingham Street Parking Structure, Construction of a new hospital building with expanded bed space, and construction of a new parking structure along Punahou Street.

The proposed action will be discussed in an Environmental Assessment (EA). Alternatives to be considered in the EA include the proposed action, no action, move to an alternate location; and avoid the use of public lands. The no action alternative would reduce KMC's ability to meet its objectives of providing quality medical care to the community. Moving the facility to another location may result in greater impacts at both the current and future location. Avoiding use of public lands by utilizing only existing access points would also reduce the use and utility of the facility and result in diminished services.

The current and proposed use of the property by KMCWC is compatible with its A-2 zoning, subject to approval of a Plan Review Use Permit. Permits required for completion of the project include a Plan Review Use Permit, building and grading permits, NPDES construction stormwater management, and Joint Development Permits for construction covering multiple parcels. A Plan Review Use Permit is required because of the proposed addition of a 45,971 square foot parcel to the hospital complex and renovations and expansion of the hospital facility on the new parcel and existing hospital campus.

Hawaii Pacific Health anticipates the impacts associated with the proposed action to be minor or may be mitigated to minimize impacts to surrounding neighbors. These impacts including traffic, noise, and dust are expected to be minor, temporary and mitigable. Pending consideration of agency and public comments, Hawaii Pacific Health concludes the impacts associated with this development will be minor or may be mitigated to minimize impacts on surrounding neighbors, and anticipates a finding of no significant impact.

Adjacent Landowner
Address

November 12, 2008

**Proposed Improvements to Kapiolani
Medical Center for Women and Children
1637 Bingham St. Honolulu, Hawaii**

Dear Participant:

Hawaii Pacific Health, Inc. as owner of the Kapiolani Medical Center for Women and Children (KMCWC) intends to provide needed upgrades to the facility. The planning process for these improvements includes an Environmental Assessment which will be prepared by EnvironMETeo Services, Inc. (EMET). By this letter EMET is notifying adjacent landowners and interested parties that the Environmental Assessment is being prepared pursuant to the regulations contained in Hawaii Revised Statutes Chapter 343. As a nearby landowner or resident we would like to hear any comments or concerns that you may have on the project.

This is the first of several opportunities for you to provide comments. A Draft Environmental Assessment will be made available, and a public hearing will be held to address questions and comments on the proposed improvements. All legitimate questions and comments will be documented and addressed in the Environmental Assessment.

A brief summary of the project is enclosed. A much more detailed description of the project will be available in the Draft EA. If you would like more information or have comments on the project please contact me by mail or email.

Thank You;



David Robichaux, Project Manager
EMET Services
emet@emetservices.com or
robichaud001@hawaii.rr.com or
PO Box 1018 Haleiwa, HI 96712

Enc: Project Summary

CULTURAL SURVEYS HAWAII

ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL DOCUMENTATION SERVICES - SINCE 1982



January 27, 2009:

Ms. Lauren Morawski
SHPD O'ahu Archaeologist
Room 555 Kākuhihewa Building
601 Kamōkila Blvd.
Kapolei Hawai'i 96707

Subject: Consultation regarding the Kapi'olani Medical Center for Women and Children Master Plan Punahou Street, Kona District, O'ahu
TMK [1] 2-8-011:004,005 and 013

O'ahu Island

P.O. Box 1114
Kailua, Hawai'i 96734
Ph: (808) 262-9972
Fax: (808) 262-4950

Maui Island

1993 Main Street
Wailuku, Hawai'i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Branch Offices:

Hilo, Hawai'i
Kona, Hawai'i
Lāwai, Kaua'i

Aloha Ms. Morawski,

Cultural Surveys Hawaii Inc. (CSH) is assisting the Kapi'olani Medical Center for Women and Children on their planned long range master plan. The master plan will set forth guidelines and procedures for the medical center's improvements to their Punahou Street campus (Figure 1 to Figure 3). The medical center's staff is requesting State Historic Preservation Division (SHPD) guidance on how the master plan should address the state's historic review process.

Presently the campus is entirely "built-out" with multi-story buildings (i.e. hospitals, offices, parking structures). Plans include extensive improvements over a 15 to 20 year period.

CSH researched historic maps of Mānoa, which depict the project area, and reviewed "The History of Kapi'olani Hospital" (Yardley and Rogers 1984) to provide a brief background review. The earliest maps of the 1850's (Figure 4 and Figure 5) include an O'ahu south coast view showing the alignment of present day Punahou Street and a detail of the Punahou school portion of Land Commission Award (LCA) 387. These early (1850's) maps indicate the absence of structures in the medical center project area. The Punahou LCA 387 map (Figure 5) and the subsequent 1882 Mānoa Valley map (Figure 6) indicate that the Bingham Street side (*mauka* edge) of the project area was within the *makai* most section of the Punahou school portion of LCA 387 (which was to the A.B.C.F.M.). An 1887 map of Honolulu (Figure 7) depicts the grid of streets including Bingham St. on the *mauka* (NE) side of the project area. The 1887 map also depicts a large residential structure in the project area, possibly part of the "Whitney property" (Yardley and Rogers 1984).

In the late 1920's Kapi'olani Medical Center for Women and Children came to the present location, converting the "original Whitney home.... into the nurses' home" (Yardley and Rogers 1984:14). The construction of the new 50 bed hospital was completed in 1929. Additional property was purchased on the *makai* side of the project area, where a residence belonging to the Spaldings was converted into more nurse's housing (Figure 8). Subsequent expansions and improvements included: 1945

November 14, 2008

two-story 'Ewa wing; 1957 a new and enlarged nursery; 1966 Lani Ward Booth; 1970 expansion of Lani Booth wing; 1973 rebuilding of the campus with new construction for eleven- and three-story buildings and parking structure. It is important to note that each multi-story building and parking structure within the project area already has an existing basement floor.

The brief review of the history of the medical centers campus indicates extensive construction, including subsurface grading and excavation, starting in the 1920's and culminating in the massive undertaking of the 1970's. Additional demolition in 2006 of four low rise apartment buildings located in TMK [1] 2-8-011:005 of the project area yielded no cultural deposits.

No previously identified sites have been recorded near the project area (Figure 9). To our knowledge ongoing major construction jobs (e.g. Marynoll [two blocks *mauka*] and Shriners Hospital Improvements [across Punahou St]) have also not encountered any significant finds.

Based on these factors, CSH suggests that it is extremely unlikely that any significant cultural deposits exist within the medical center's campus. Thus, CSH suggests that no archaeological work appears warranted for the proposed master plan or subsequent improvements. In the unlikely event that significant cultural deposits are encountered, all work within the immediate area will be halted and the appropriate agencies (SHPD) will be notified.

Mahalo,



Douglas F. Borthwick, Projects Manager
(dborthwick@culturalsurveys.com)

Cultural Surveys Hawai'i

If you have any questions or comments, please feel free to call me at 262-9972 on O'ahu or toll free at 1-800-599-9962. You may also reach me by e-mail at dborthwick@culturalsurvey.com

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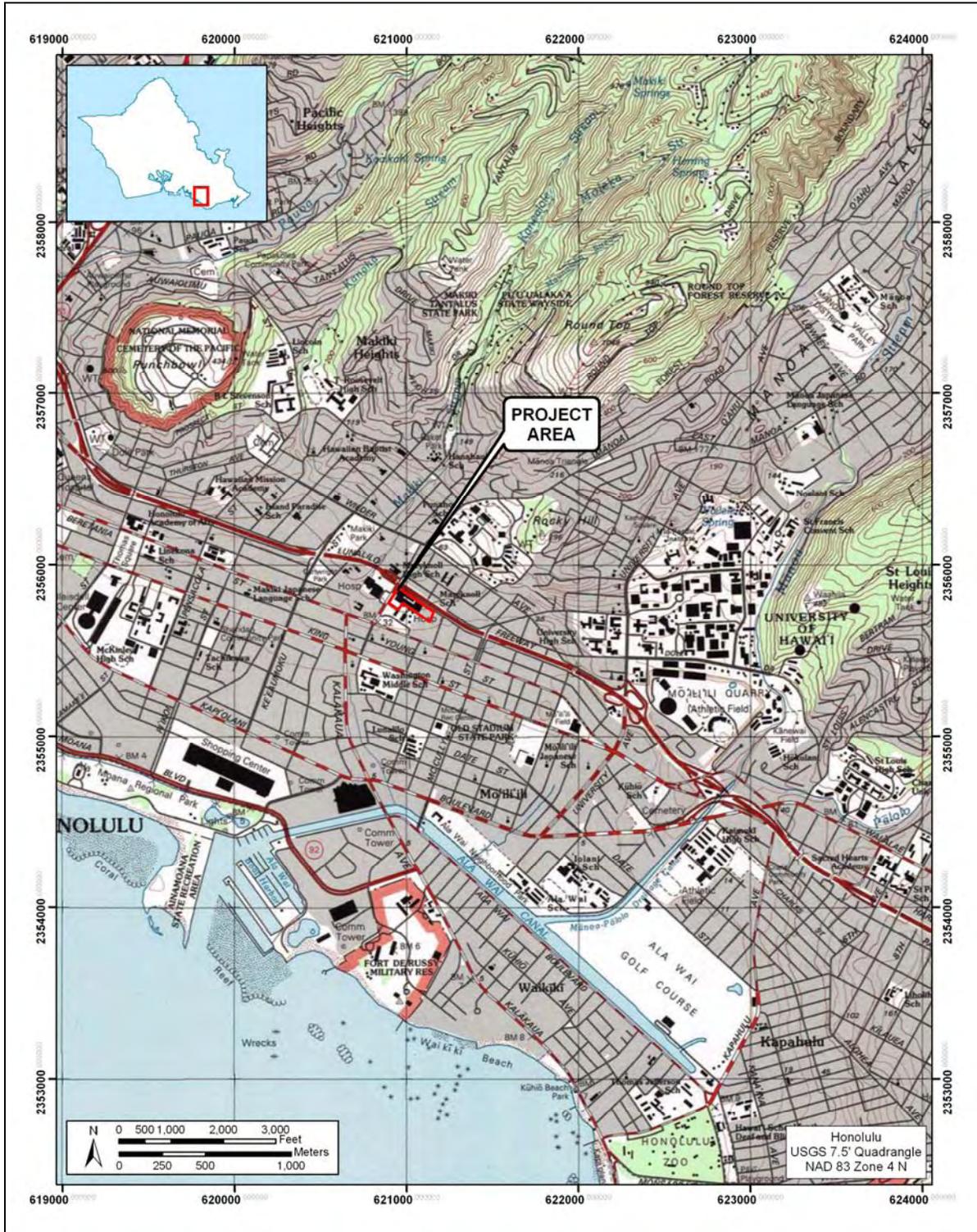


Figure 1. U.S. Geological Survey map showing the location of the Kapi'olani Medical Center for Women and Children.

Consultation regarding the Kapi'olani Hospital Master Plan Punahou Street, Kona, O'ahu

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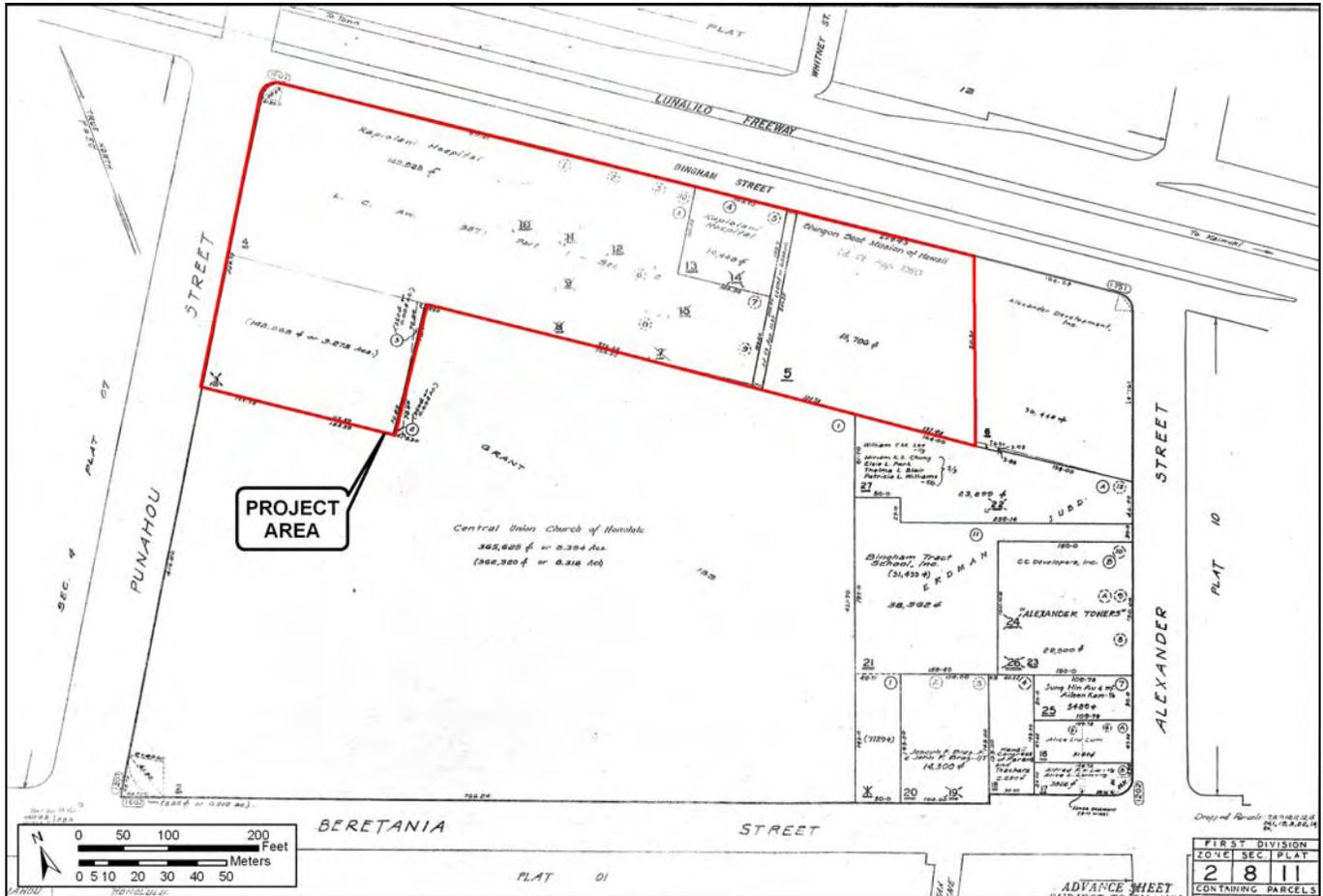


Figure 2. Tax Map Key Plat [1] 2-8-011 showing the location of the Kapi'olani Medical Center for Women and Children.

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Figure 3. Aerial photograph showing the location of the Kapi'olani Medical Center for Women and Children

Consultation regarding the Kapi'olani Hospital Master Plan Punahou Street, Kona, O'ahu

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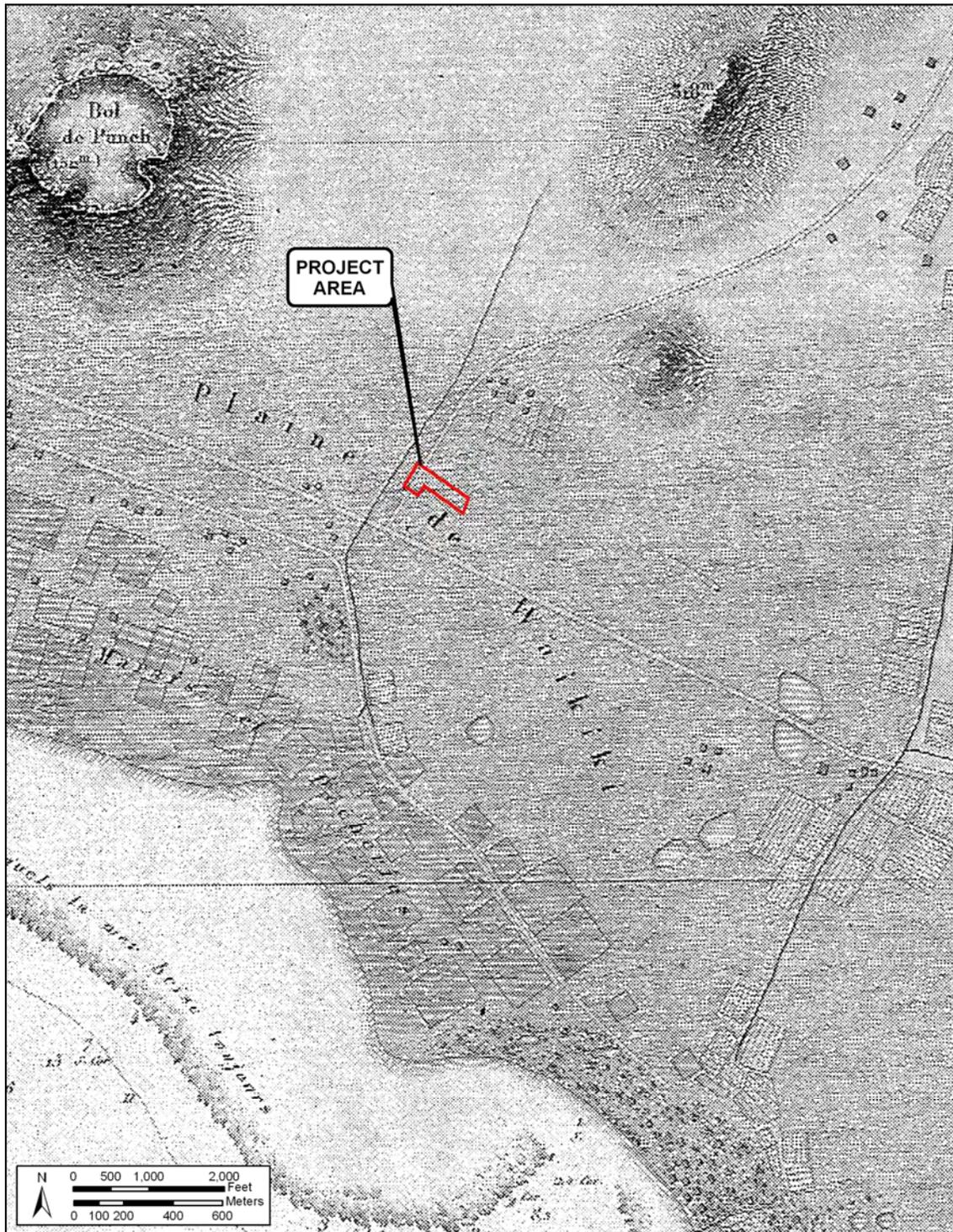


Figure 4. A portion of the 1855 map of the Honolulu area by Joseph Marie Henri de la Passe, of the French naval vessel *Eurydice* showing taro fields and habitations around Kapunahou Spring and the location of the (future) Kapi‘olani Medical Center for Women and Children.

Consultation regarding the Kapi‘olani Hospital Master Plan Punahou Street, Kona, O‘ahu

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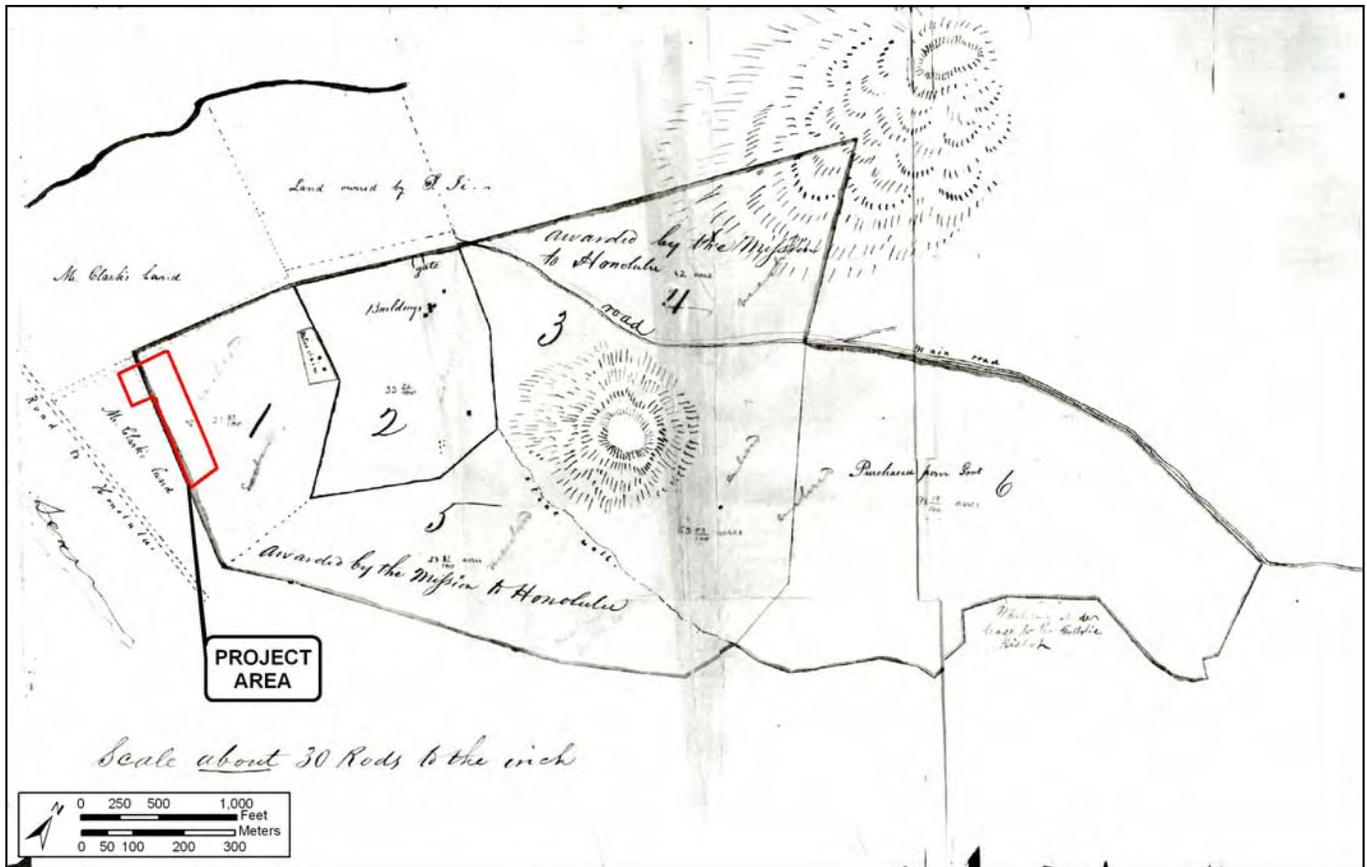


Figure 5. An undated sketch of the Punahou lands, probably dating to the mid-nineteenth century (original sketches in Cooke Library Archives, Punahou School) showing the location of the (future) Kapi'olani Medical Center for Women and Children.

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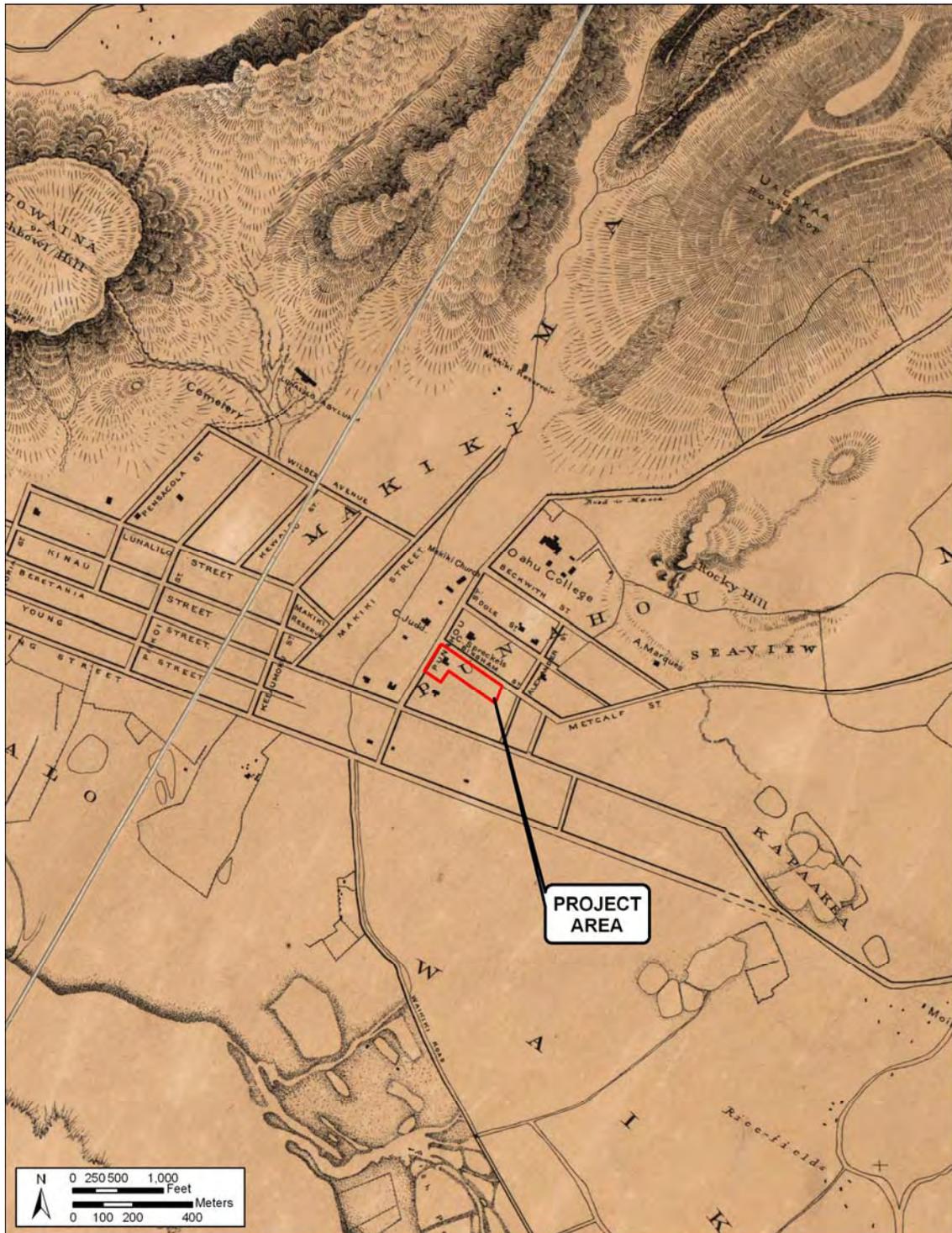


Figure 7. A portion of the 1887 map of Honolulu by W. E. Wall (Hawaii State Survey Division Reg. Map No. 1690) showing the location of the (future) Kapi'olani Medical Center for Women and Children.

Consultation regarding the Kapi'olani Hospital Master Plan Punahou Street, Kona, O'ahu

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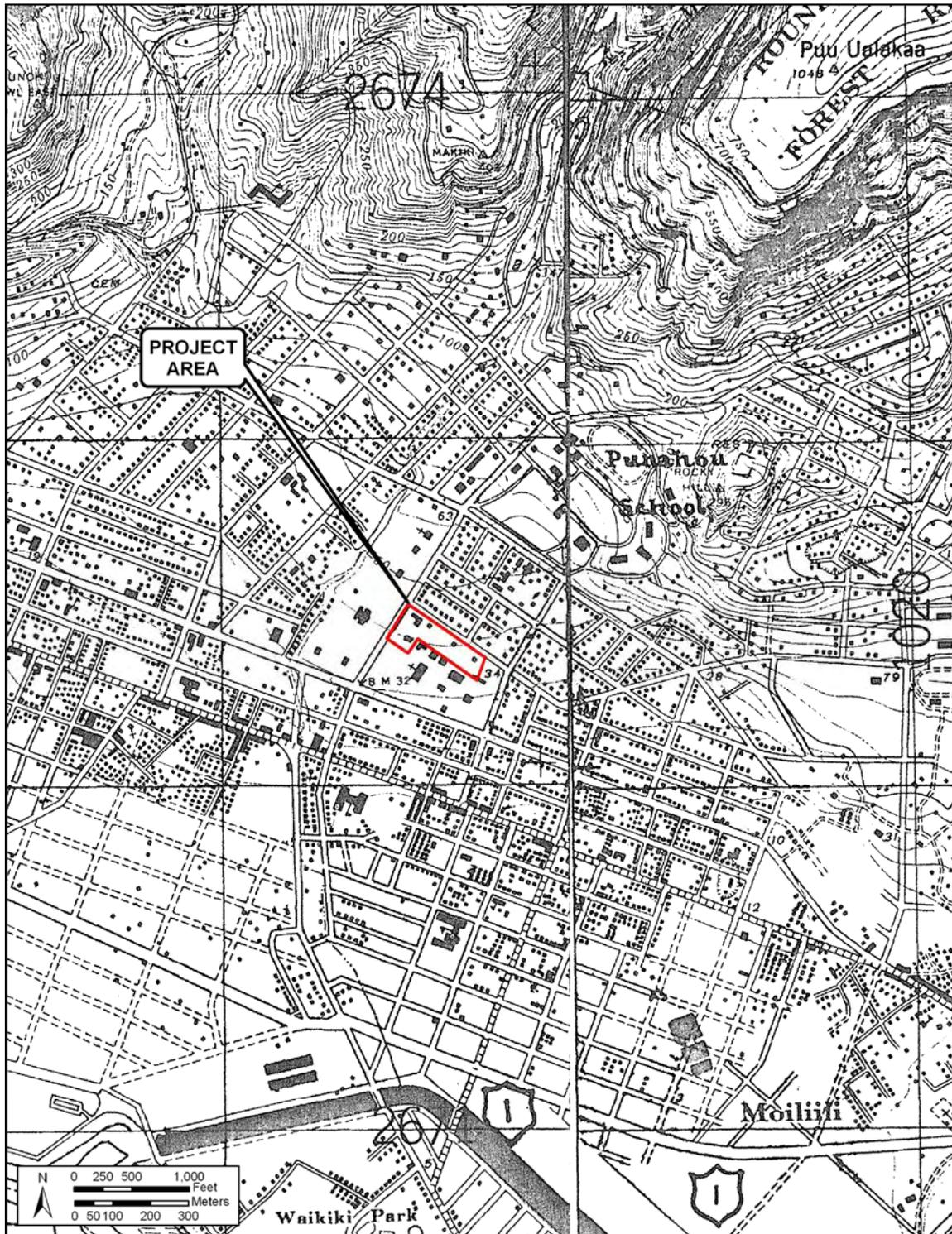


Figure 8. A portion of the 1943 WAR map of Honolulu and Diamond Head showing the location of the Kapi'olani Medical Center for Women and Children.

Consultation regarding the Kapi'olani Hospital Master Plan Punahou Street, Kona, O'ahu

November 14, 2008

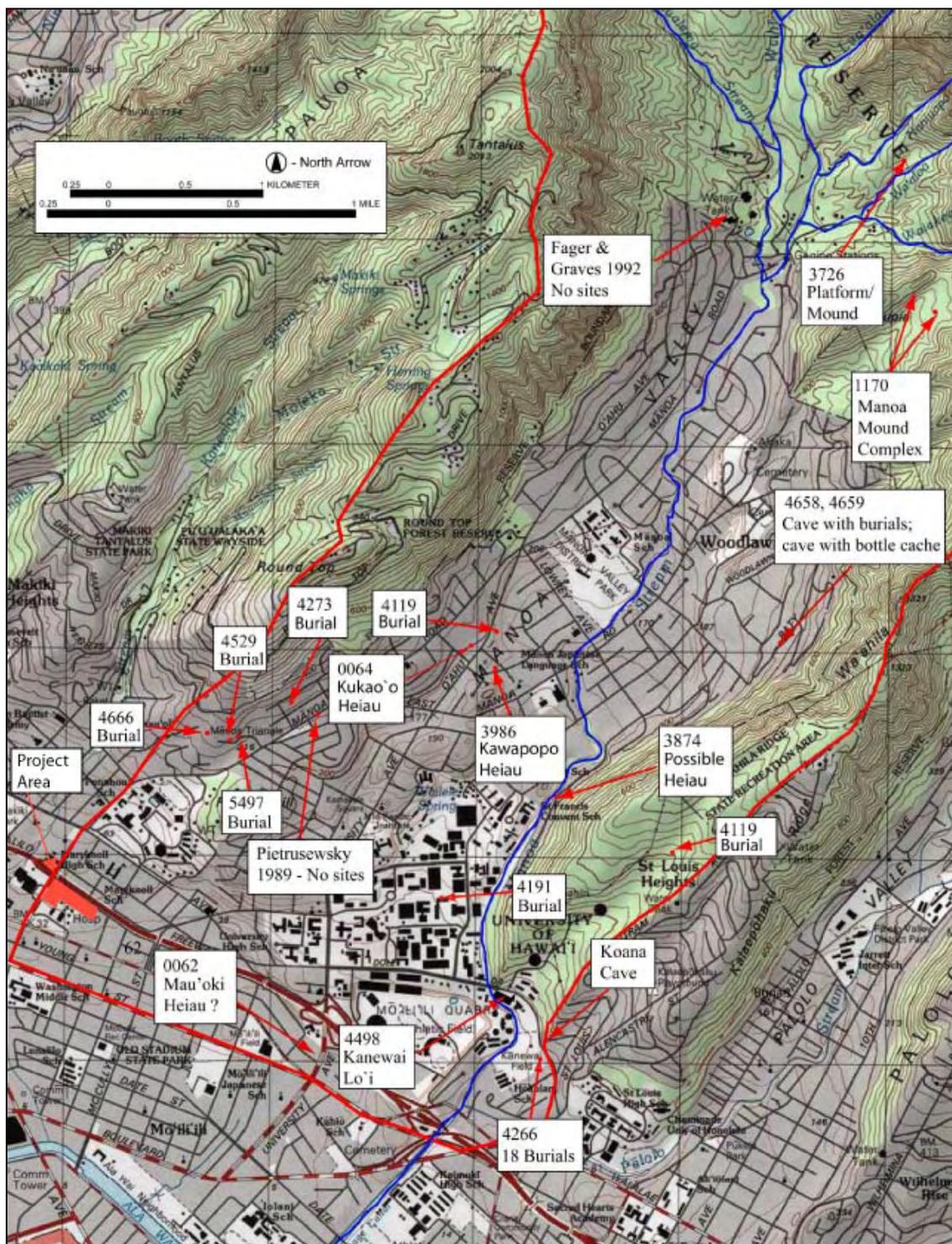


Figure 9. Previously identified archaeological sites in Mānoa Ahupua'a (project areas with no identified sites are denoted by author and year of report) and showing the location of the Kapi'olani Medical Center for Women and Children.

Consultation regarding the Kapi'olani Hospital Master Plan Punahou Street, Kona, O'ahu

November 14, 2008

References

Yardley, Maili and Miriam Rogers

1984 *The History of Kapiolani Hospital*, Ku Pa'a Incorporated, Honolulu, HI.

Announcement and minutes from the
Public Meeting conducted June 23, 2009
At the combined Manoa and Moiliili
Neighborhood Boards

Quick Find: Select One:

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GO

You are here: [Main](#) / [Neighborhood Commission Office](#) / [nb7](#) / [09](#) / [Manoa NB Combo Special Meeting](#)

MANOA NEIGHBORHOOD BOARD

Special Combined Meeting McCully – Mo'ili'ili Neighborhood Board No. 8 & Manoa Neighborhood Board No. 7

Tuesday, 23 June, 2009

6:30 p.m. to 8:30 p.m.

Central Union Church

1660 South Beretania Street

Honolulu, Hawai'i 96826

Please silence all electronic equipment and refrain from unnecessary noise so that all may hear and participate in the discussion before both our boards this evening. All interested person will be afforded an opportunity to ask questions or make comments on any agenda item, pursuant to the "Sunshine Law" – Hawaii Revised Statutes Section 92-3. Persons must first be recognized by the presiding officer before speaking, and will be limited to two (2) turns of one minute each.

Additional turns may be allowed after everyone has had the opportunity to speak. Thank you for your participation and cooperation!

- I. **Call to Order.** Ron Lockwood, Chair, McCully-Mo'ili'ili Neighborhood Board No. 8
PLEASE NOTE: As this is a special combined meeting scheduled pursuant to Neighborhood Plan Sections 2-14-109(c) and 2-13-102, the regular business of the McCully-Mo'ili'ili and Manoa Neighborhood Boards is deferred to their next regular meetings (see Agenda Item 6 below).
- II. **Appointment of Secretary to be Responsible for Taking the Meeting Minutes.**
- III. **Presentation: Kapiolani Medical Center for Women and Children**
Long Range Development Plan. KMCWC is located at 1319 Punahou Street, adjacent to Central Union Church. Presenters: Keith Kurahashi (Kusao & Kurahashi, 988-2231); Martha Smith, Ricky Murata, and Warren Chaiko (KWCWC, 983-6000).
- IV. **Presentation: Status of Proposed H-1 Freeway "Punahou Street On-ramp, Eastbound" Project.** Presenter: Tom Heinrich, Chair, Manoa Neighborhood Board No. 7
- V. **Acknowledgements – Ron Lockwood**
 - Central Union Church for providing the convenient meeting place to be immediately adjacent to KMCWC for this discussion.
 - Bob Farrell and Yvonne Cardenas, proprietors of Makakilo.com for

videotaping this meeting for later repeated cablecast on 'Olelo Channel 54.

- The McCully – Mo'ili'ili and Manoa Neighborhood Boards for cooperatively holding the **first** special combined meeting of neighborhood boards under the new Neighborhood Plan (effective October 20, 2008), which encourages such collaboration. Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10 had been invited to participate, but took no action to do so.

VI. Announcements

- The initial convening meetings of the July 1, 2009 to June 30, 2011 term of the Neighborhood Board System are as follows:

The **Manoa** Neighborhood Board No. 7 will meet on **Wednesday, July 1, 2009 at 7:00 p.m.** at a place to be determined as the board's regular meeting place is not available on that date. Most likely the meeting will be held on the University of Hawaii, Manoa campus. Please verify the meeting place by calling the Neighborhood Commission Office at 768-3710.

The **McCully - Mo'ili'ili** Neighborhood Board No. 8 will meet on **Thursday, July 2, 2009 at 6:30 p.m.** at the Washington Middle School cafeteria, 1633 South King Street.

VII. Adjournment

Any person wishing to attend a Neighborhood Board meeting who has questions about accommodations for a physical disability or a special physical need should call the Neighborhood Commission Office at 768-3710 between 8:00 a.m. and 4:00 p.m. at least 24 hours before the scheduled meeting.

Tuesday, June 16, 2009

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MANOA NEIGHBORHOOD BOARD

MINUTES – Special Combined Meeting of Tuesday, 23 June 2009 6:30 – 8:30 p.m.
Central Union Church 1660 S. Beretania Street Honolulu, HI 96826

- I. The meeting was called to order by Ron Lockwood, Chair of the McCully – Mo'ili'ili Neighborhood Board No. 8 at 6:35 p.m. Chair Lockwood offered his aloha to the audience and to our guests from the Manoa Neighborhood Board No. 7.

As this is a Special Combined Meeting, we are operating according to the Neighborhood Plan sections 2 -14 – 109(c) and 2 – 3 – 102 and therefore the regular business of the McCully – Mo'ili'ili and the Manoa neighborhood boards is deferred until the next regular meetings of each board.

The next regular meeting of the Manoa N.B. is at 7:00 p.m. on Wednesday, 1 July at the UH – Manoa, School of Architecture Auditorium 2410 Campus Road, room 205.

The next regular meeting of the McCully – Mo'ili'ili N.B. is at 6:30 p.m. on Thursday, 2 July at the Washington Middle School cafeteria.

Chair Lockwood asked everyone to silence all electrical equipment and refrain from all unnecessary noise so that everyone may hear and participate in the discussion. Everyone interested will be given the opportunity to ask questions, or make comments on any agenda item, after being recognized by the Chair or presiding officer before speaking. Speakers will be limited to two (2) turns of one minute each, but additional turns may be allowed after everyone has had an opportunity to speak.

Board members from Manoa N.B. attending were: Chair, Tom Heinrich; Frederick Lee; Kimberly Case; Martin Eby; Nadine Nishioka; Milton Ragsdale; and Rodney Chun.

A quorum was present from McCully – Mo'ili'ili N.B. attending were: Chair, Ron Lockwood; Greg Cuadra; Judy DeVilbiss; Les Hata; Shawna Tabor; John Kato; Klement Kondratovich; and Clifton Takamura.

Makiki Neighborhood Board was invited, but took no action. Present was board member, Diane Chong.

Elected officials present included: Rep. Choy; Rep. Saiki; Rep Della Au Belatti; Neighborhood Commissioner Finley; and Diamond Head/Kapahulu/St. Louis Heights chair, Bert Narita.

The attendance sheet was signed by 54 people.

II. Appointment of a Secretary. As a Special Combined Meeting, the Neighborhood Commission Office does not provide note taking assistance. Greg Cuadra, the 2nd vice chair of the McCully – Mo’ili’ili N.B. volunteered.

III. Presentation by Kapiolani Medical Center for Women & Children. Located at 1319 Punahou Street the Kapiolani Medical Center (KMC) sits directly adjacent to Central Union Church where we are holding tonight’s Special Combined Meeting.

Warren
questions would

Keith Kurahashi, from Kusao & Kurahashi; Martha Smith, Ricky Murata & Chaiko all from KMC will be tonight’s presenters. It was decided that be taken, after the presentation.

in the area
keeping the
smoothly as
of Need”

Kurahashi stated, that KMC has spoken with all the condos and neighbors about their project. KMC has hired a civil engineer to study and assist with traffic, from the hospital, off Punahou & Bingham Streets and running much as possible. In terms of this project, they have received a “Certificate from the state, Dept. of Health.

phases and
be
family to assist

The speakers continued, that the development will be completed in several will take up to fifteen years. The NICU – Newborn Intensive Care Unit, will expanding from 46 open bay beds to 70 private rooms. This will allow in the recovery of these NICU children as they learn their special needs.

unit will
above.

The Pediatric Unit cares for children from age 14 days to 21 years old. This change from a 14 bed Open Bay to 14 private rooms for reasons stated

addition,
patients.

On the 4th floor, of the main hospital, 14 woman’s beds will be added. In KMC will be sensitive to the architecture, landscaping and the needs of the

Then questions

At this point a 15 minute DVD was shown of the history of the hospital. were taken.

stations would be
stations with

Question: K. Kondratovich was about the DVD mentioning how work decentralized. Could this be explained? KMC will be replacing the large smaller stations, one for every two private rooms.

renovation? This

Question. Where will the construction equipment be stored during needs to be resolved with the contractor, but construction will be in

phases and the

Hospital will remain open 24/7.

the traffic

Question. T. Heinrich. With new parking being in the first phase, what is pattern and with Bingham Street be closed or remain open? KMC's entrance will remain open; the Hospital may stage equipment and material but the Bingham Street entrance may have to close for safety reasons and repairs need to be done to the street itself.

Bingham Street

on site,

only if

Question. Will all departments move at once? All will move, but in phases will move several times before they settle into their final spot upon

and some

completion.

Question. Could Bingham Street be made two ways instead of one as it additions and renovations should not have any significant impact on no reason to change the traffic flow.

is? The new

traffic so there is

Bingham Street?

Question. Will the State upgrade the fence between the freeway & When KMC meets with the state Dept. of Transportation, they will ask.

will utilize as

Question. Will the new buildings utilize solar power? The construction much green technology as possible.

Yes.

Question. Can a copy of the presentation be provided for the Makiki N.B.?

like

Question. Will the buildings have extensive basements? KMC does not underground structures, as they are aware of artesian wells, lava tubes, to avoid as many of these expensive obstacles as possible. Some a one story underground basement area.

etc and want

buildings will have

Question. Will the noisy part of the construction be done during the Yes, a Noise Permit will be asked for and all neighbors will be kept in during this construction.

daytime?

mind

Artesian Women's

Question. M. Eby. How much will the hospital save if they bring the and Breast Center back to the main campus? KMC may save on rent, but construction costs. Another audience member stated they would like to facilities remain where they are. KMC will consider this, but no decision until at least 2020.

not on

see these

will be made

concerns?
Mahalo for

Question. A. Kobayashi. In meeting with neighbors, what was their main
Traffic studies, parking fees, Alexander Arms condo is on record saying
blocking the afternoon sun.

will the
is already

Question. With the renovations and expansion of the Emergency Room,
Hospital make the ER exit onto Punahou Street a right turn only? The exit
a right turn only, but they will look into new signage.

height,

Question. What is the height of the new building? They will be 150 feet in
which is lower than some surrounding buildings.

start in 2011

Question. What is the construction timetable/schedule? KMC hopes to
and begin the final phase in 2020; but it all depends on permitting, etc.

they offered

At this time the Kapiolani people were thanked for their presentation and
to meet people outside if there were any further questions.

IV.

Presentation on Proposed H-1 Punahou Street on-Ramp Eastbound.
Chair Lockwood introduced tom Heinrich, chair of the Manoa Neighborhood
Board,
who offered that he would take questions following his presentation.

project. It is
through OMPO

The Proposed H-1 Punahou Street On-Ramp Eastbound is a concept
unfunded, lacks any environmental planning & design work. This project
reasonably couldn't begin for at least ten (10) years, due to having to go
which is a required step in order to obtain federal funding.

Manoa
ramp would
study done
King; and

This study was based on a 2003 study by Panos Prevadorous of the UH –
Campus. In this study, it stated that the closing of the Bingham Street off
have a significant impact on traffic in the surrounding areas. However, a
in 2004 disputed this saying the impact would be on South Beretania; South
Kapiolani Blvd; not the side streets.

act upon now,
redevelopment

The point of tonight's presentation is that while not something we need to
it is something to keep in mind especially as we move forward with the
of Kapiolani Women's & Children's Hospital.

Questions.

anytime a

S. Tabor asked if there would be any benefits to the Hospital. No, but
Hospital can have direct access to a major highway it is significant.

Street

C. Takamura asked if emergency vehicles would still use the Alexander
on-ramp? Emergency vehicles always have priority, or they could make a

U-turn

onto the Punahou Street on-ramp (west).

There are
for over

Unidentified person would like to see the Bingham Street off-ramp closed.
mixed opinions on this issue that McCully – Mo'ili'ili N.B. has grappled with
ten years trying to get a sense of which way the community wants to go.

close one would

J. Kato offered that there are spacing intervals in freeway exists and to
require federal waivers.

telephone call
for an
other
Services
meetings as

In closing, t. Heinrich stated that the presentation tonight was by a
from Senator Fukunaga to Heinrich, Lockwood and Ann Kobayashi to ask
update on the project. Sen. Fukunaga will further discuss this project with
elected officials; Dept. of Transportation (state) and Dept. of Transportation
(City) to find out the big picture, follow through and to hold community
needed for up-dates.

Chair Lockwood offered a copy of the 2003 Prevadorous report to anyone.

V. Acknowledgements were given by Chair Lockwood to:

Central Union Church for providing a comfortable & convenient meeting
place.

Bob Farrell & Ivonne Cardenas, proprietors of Makakilo.com for videotaping
the meeting from broadcast on Olelo canal 54.

holding the

McCully – Mo'ili'ili & Manoa Neighborhood Boards for cooperating and
first special combined meeting of boards under the new Neighborhood Plan
(effective October 2008)

VI. Chair Heinrich reiterated the meeting dates, times and locations of the next
regular board meetings.

Council District 5
election

Chair Lockwood announced that all seven (7) neighborhood boards in
are trying to schedule two candidate forums for the upcoming special

VI. Chair Lockwood adjourned the meeting at 8:05 p.m.

Notes taken by Greg Cuadra and reviewed by R. Lockwood

Appendix 2
Response Letters from Agencies and Individuals

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

RECEIVED



2008 SEP 26 PM 2:41

September 24, 2008
BELT COLLINS HAWAII

- Mapes, A.
- Terry, M.
- Aguiar, L.
- Palaniappan, C.
- Abe, R.
- Ancheta, C.
- Billingsley, W.
- Chan, V.
- Chung, J.
- Cunningham, B.
- Grillo, K.
- Hamura, S.
- Kato, A.
- Klein, S.
- Kondo, C.
- Lee, L.
- Len, C.
- Matsunaga, R.
- Miyoshiro, E.
- Onuma, T.
- Rasa, B.
- Rivera, A.
- Tamashiro, E.
- Young, J.

- MUFI HANNEMANN, Mayor
- RANDALL Y. S. CHUNG, Chairman
- SAMUEL T. HATA
- ALLY J. PARK
- ROBERT K. CUNDIFF
- MARC C. TILKER
- CRAIG I. NISHIMURA, Ex-Officio
- BRENNON T. MORIOKA, Ex-Officio
- CLIFFORD P. LUM
Manager and Chief Engineer
- DEAN A. NAKANO
Deputy Manager and Chief Engineer

Mr. Eric Tamashiro
Belt Collins Hawaii, Limited
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Tamashiro:

Job No. 2008-33-5100

Subject: Your Letter Dated September 22, 2008 Requesting the Availability of Water, and Fire Flow Information for Kapiolani Medical Center, TMK:2-8-11:4 & 5

Thank you for your letter on the proposed renovation/expansion project. The existing water system is presently adequate to accommodate the proposed development. However, please be advised that this information is based upon current data and, therefore, the Board of Water Supply reserves the right to change any position or information stated herein up until the final approval of your building permit application. The final decision on the availability of water will be confirmed when the building permit application is submitted for approval.

When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage. The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

We have suspended fire flow tests on fire hydrants as a water conservation measure. However, you may use the following calculated flow data for Fire Hydrant No. M-835 (map attached) on Punahou Street:

Static Pressure.....	58 psi
Residual Pressure.....	29 psi
Flow.....	2000 gpm

The data is based on the existing water system, and the static pressure represents the theoretical pressure at the point of calculation with the reservoir full and no demands on the water system. The static pressure does not indicate the actual pressure in the field. Therefore, in order to determine the flows that are available to the site, you will have to determine the actual field pressure by taking on-site pressure readings at various times of the day and correlating the field data with the above hydraulic design data.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

KEITH S. SHIDA
Program Administrator
Customer Care Division

Attachment

Appendix 3:
Traffic Impact Report for KMCWC

Traffic Impact Report

Kapiolani Medical Center for Women and Children



Prepared for:
Hawaii Pacific Health

Prepared by:
Wilson Okamoto Corporation

July 2009

TRAFFIC IMPACT REPORT
FOR THE
KAPIOLANI MEDICAL CENTER
FOR WOMEN AND CHILDREN

Prepared for:

Hawaii Pacific Health
55 Merchant Street, 27th Floor
Honolulu, HI 96813

Prepared by:

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826
WOC Ref #7855-01

July 2009

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I. INTRODUCTION

A. Purpose of Study

The purpose of this study is to identify and assess the traffic impacts resulting from the proposed improvements at the Kapiolani Medical Center for Women and Children in Honolulu on the island of Oahu. The proposed improvements include the renovation and replacement of several existing buildings and a new mechanical parking structure.

B. Scope of Study

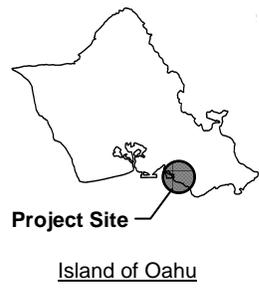
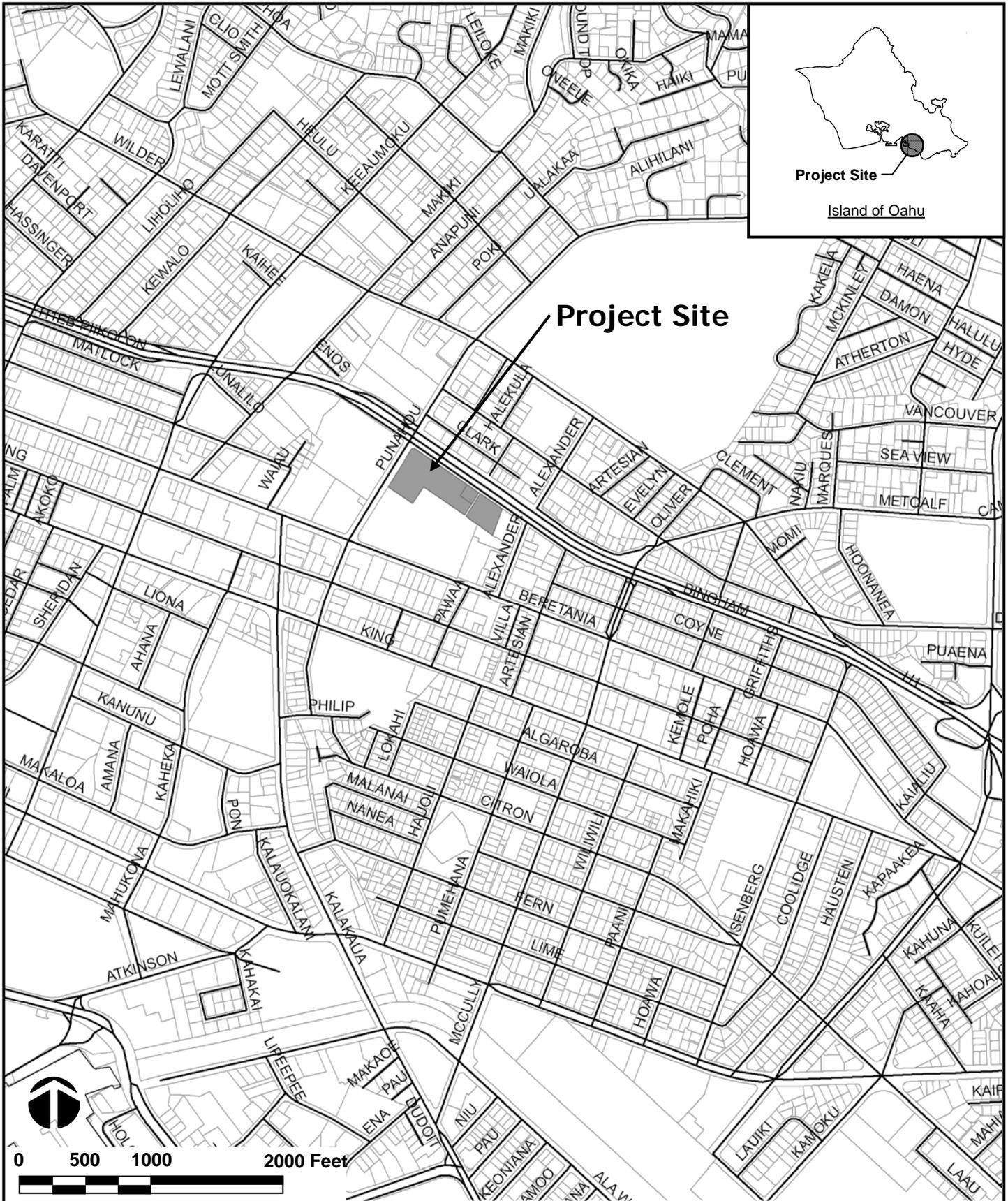
This report presents the findings and conclusions of the traffic study, the scope of which includes:

1. Description of the proposed project.
2. Evaluation of existing roadway and traffic operations in the vicinity.
3. Analysis of future roadway and traffic conditions without the proposed project.
4. Analysis and development of trip generation characteristics for the proposed project.
5. Superimposing site-generated traffic over future traffic conditions.
6. The identification and analysis of traffic impacts resulting from the proposed project.
7. Recommendations of improvements, if appropriate, that would mitigate the traffic impacts resulting from the proposed project.

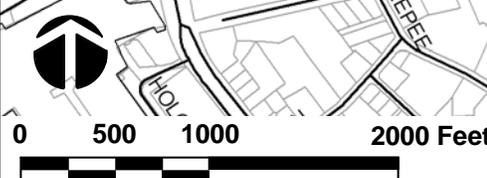
II. PROJECT DESCRIPTION

A. Location

The existing Kapiolani Medical Center for Women and Children is located adjacent to Bingham Street east of Punahou Street in Honolulu on the island of Oahu (see Figure 1) and is further identified as Tax Map Keys: 2-8-011: 004, 005, and 013. The site is bounded by Bingham Street to the north, Punahou Street to the west, Central Union Church to the south, and an apartment building to the east. Access to the hospital will continue to be provided via driveways off Bingham Street and Punahou Street.



Project Site




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KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

LOCATION AND VICINITY MAP

FIGURE
1

B. Project Characteristics

The Kapiolani Medical Center for Women and Children is currently comprised of four main buildings (Medical Office Building (MOB), Lani Booth, Bingham, and Shared Services), two parking structures, and a surface parking lot for employees (see Figure 2). The proposed improvements are required to modernize and expand the capacity of the hospital to meet existing service demands. Phase 1 of the proposed improvements is expected to be completed by the Year 2017 and includes the following:

- Demolition of the existing Bingham building.
- Renovation and addition of a 4th floor to the existing Shared Services building. The new building, referred to as the NICU/PICU building, will provide an additional ~92,554 square feet of hospital area for uses currently housed within the Shared Services building and other areas of the hospital, as well as, 36 additional hospital beds.
- Construction of a mechanical parking structure on the existing surface parking lot.

Phase 2 is expected to be completed by the Year 2026 and includes the following:

- Replacement of the existing parking structure with a new hospital and bed tower that will provide an additional ~279,799 square feet of hospital area for uses currently housed within other areas of the hospital, as well as, 20 additional hospital beds.
- Renovation of the first four floors of the MOB and the Lani Booth building to provide additional clinic and medical office areas. The 1st and 2nd floors of both buildings will provide additional clinic space while the 3rd and 4th floors of both buildings will provide additional medical office space (~49,676 square feet).

Figure 3 shows the proposed site plan.

Access to the hospital will continue to be provided via driveways off Bingham Street and Punahou Street. However, modifications to the existing traffic circulation are anticipated as construction progresses. Currently, the driveway off Punahou Street and the western driveway along Bingham Street provide access to the Emergency Room and employee parking structure. The function and location of these driveways is not expected to change during construction, but the Emergency



KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

EXISTING SITE LAYOUT

FIGURE 2

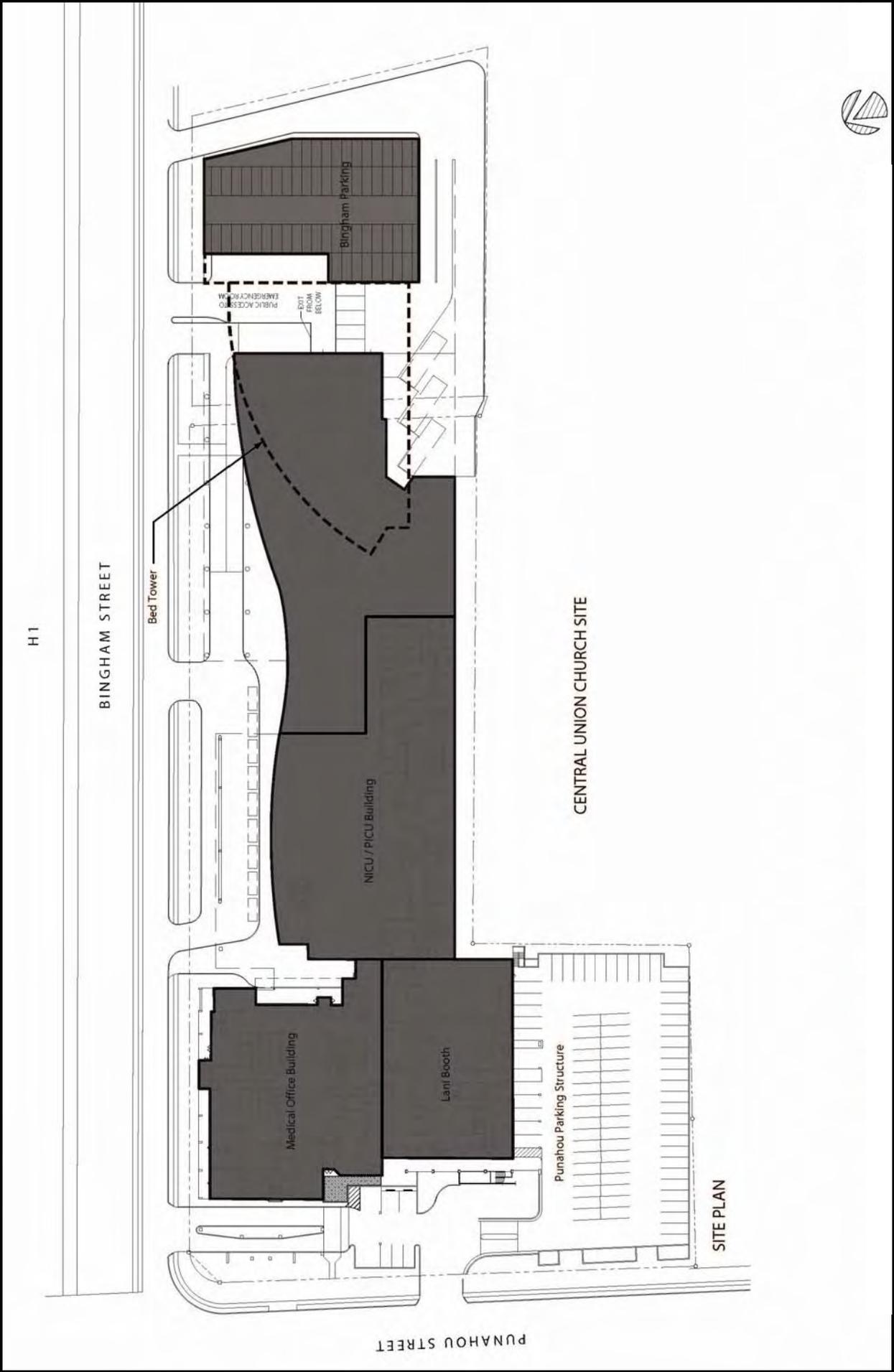


FIGURE
3

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
PROJECT SITE PLAN

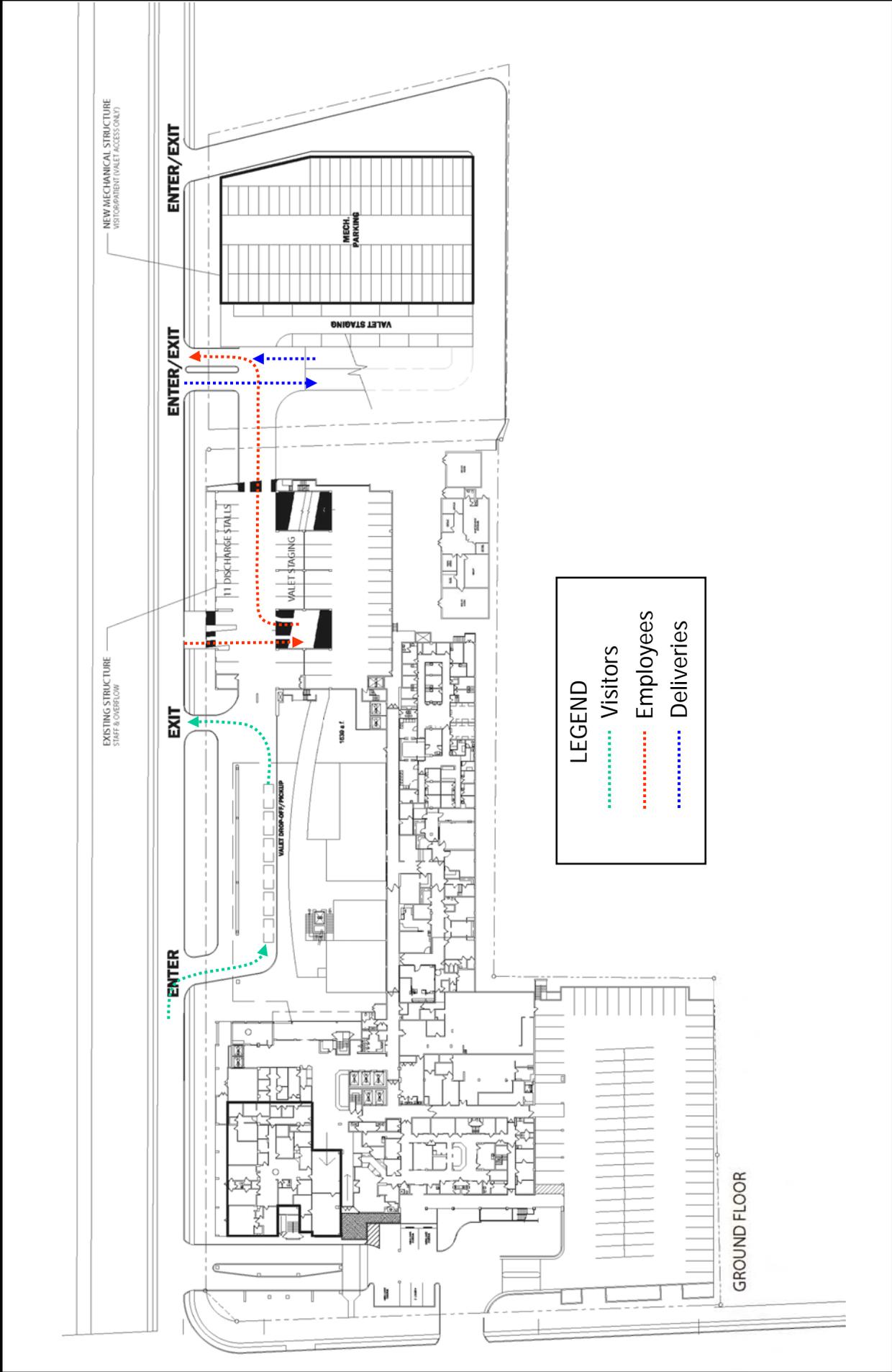

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Room will eventually be relocated to the new NICU/PICU building. The driveway along Bingham Street adjacent to the MOB currently serves as the main entrance driveway while the driveway adjacent to the parking structure currently serves as the main exit driveway. The function and location of these driveways is also not expected to change during construction, but the main exit driveway is ultimately expected to be converted to a two-way driveway that will also serve as a secondary entrance for employees. Internal connections between the main entrance and exit driveways will be provided to accommodate internal circulation between the parking garage(s) and passenger drop-off/pick-up areas. Although employees will continue to be allowed to self-park during all phases of the proposed project, visitors to the hospital will have to valet park their vehicles once construction is underway with valets utilizing the internal connections to transfer vehicles to and from the parking garage(s). The eastern driveway along Bingham Street currently provides access to an employee surface parking lot. During construction, this driveway will be converted to a one-way exit driveway for employees and deliveries, and, ultimately, will also provide access to the relocated Emergency Room. There is another existing driveway along Bingham Street that currently serves as an exit for the parking structure that will be converted to an employee entrance to the parking structure in Phase 1 and ultimately be eliminated in Phase 2. In addition, a driveway will be added along the eastern edge of the project site that will provide access to the ambulance and delivery parking stalls along the south side of the project site. Figures 4 to 7 show the proposed circulation off Bingham Street.

III. EXISTING TRAFFIC CONDITIONS

A. Area Roadway System

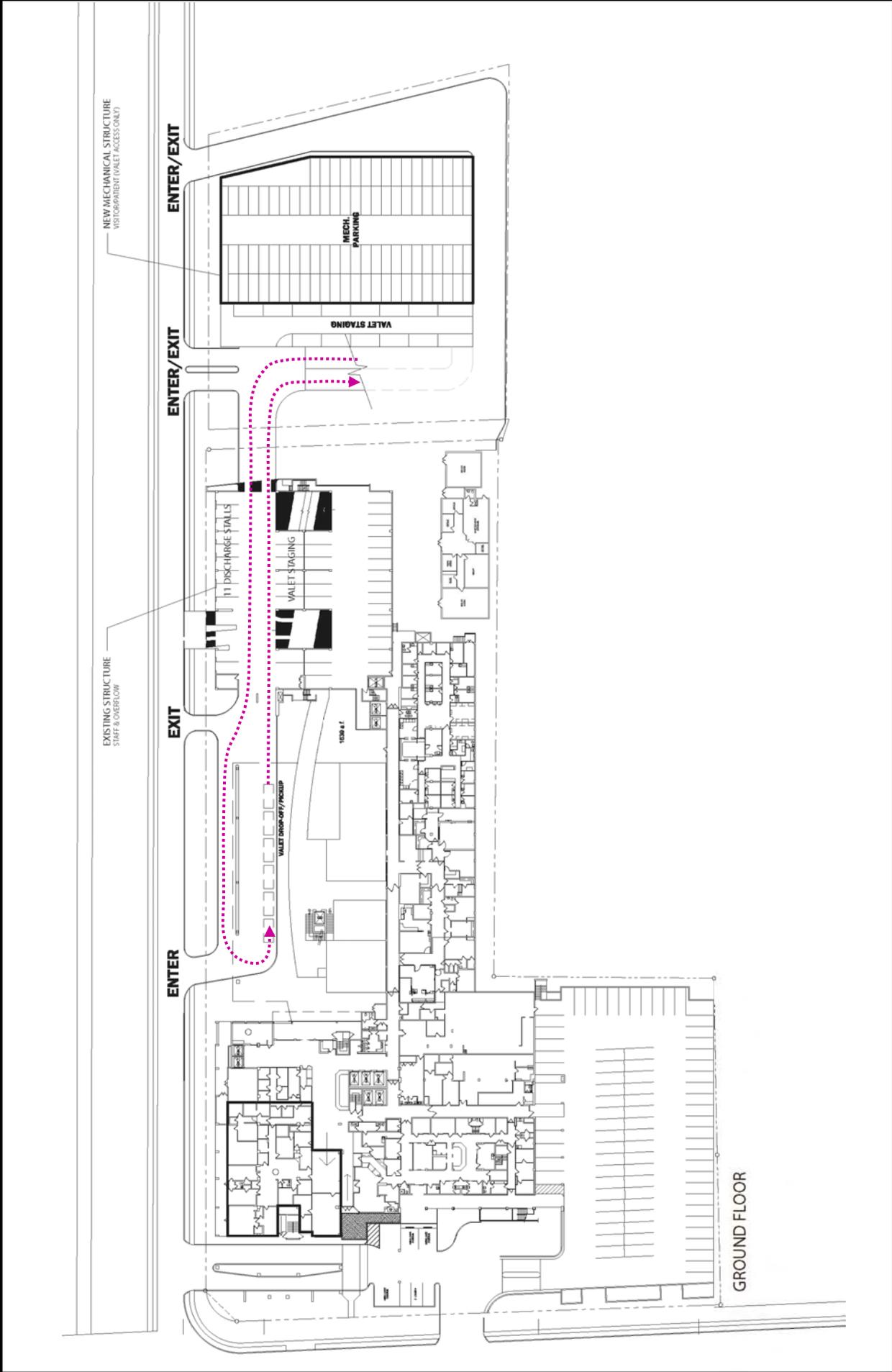
The existing Kapiolani Medical Center for Women and Children is located adjacent to Bingham Street in Honolulu. Bingham Street is a predominantly one-lane (eastbound), one-way roadway generally oriented in the east-west direction that runs parallel to the Interstate H-1 Freeway between Punahou Street and Isenberg Street. At the northwest corner of the project site, Bingham Street intersects Punahou Street and the Interstate H-1 Freeway eastbound off-ramp. At this signalized intersection,



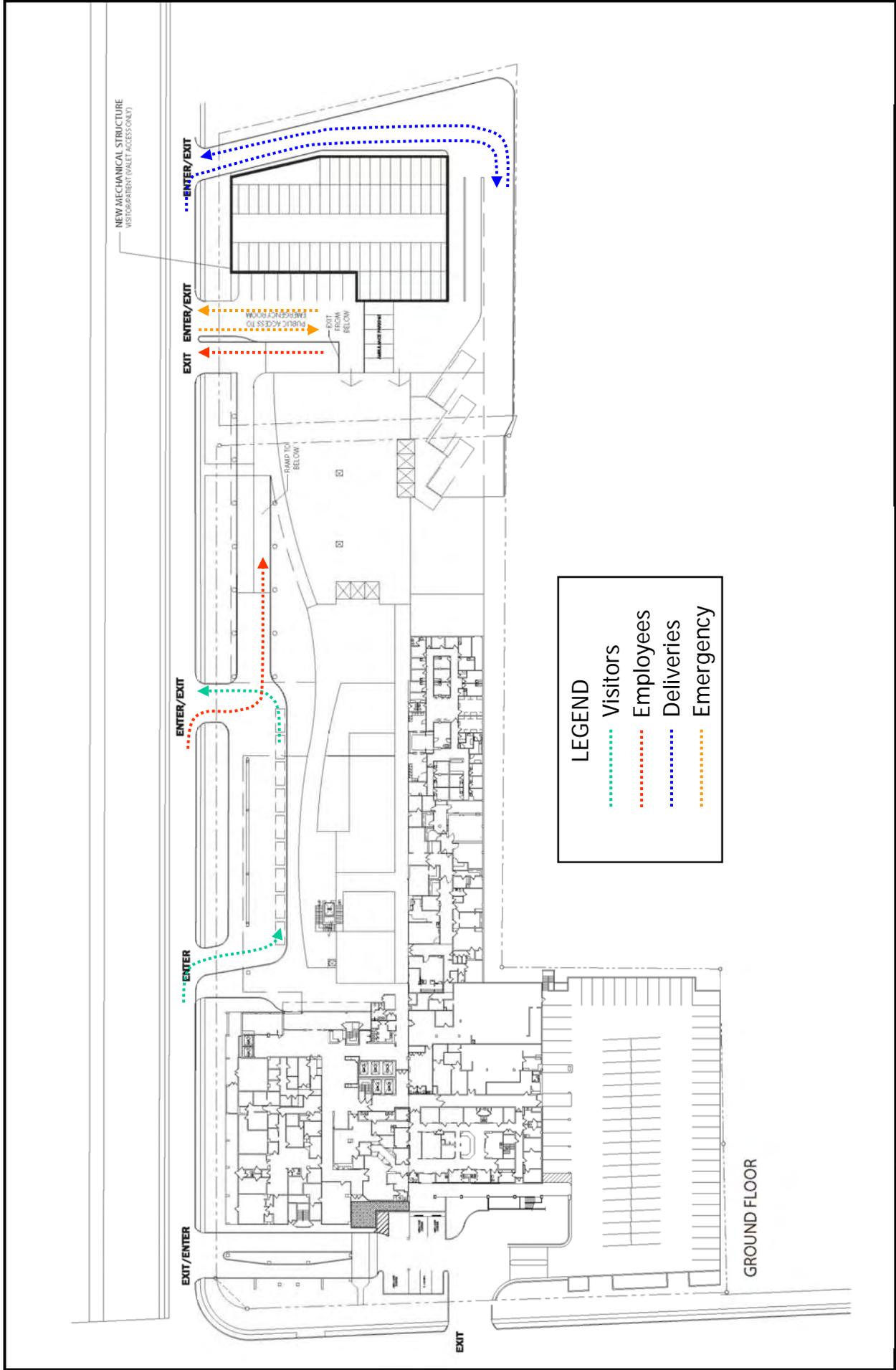
KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
PHASE 1 TRAFFIC CIRCULATION
VISITORS, EMPLOYEES, & DELIVERIES

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FIGURE 4



KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
PHASE 1 TRAFFIC CIRCULATION – VALETS



KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
PHASE 2 TRAFFIC CIRCULATION
VISITORS, EMPLOYEES, DELIVERIES, & EMERGENCY

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FIGURE 6

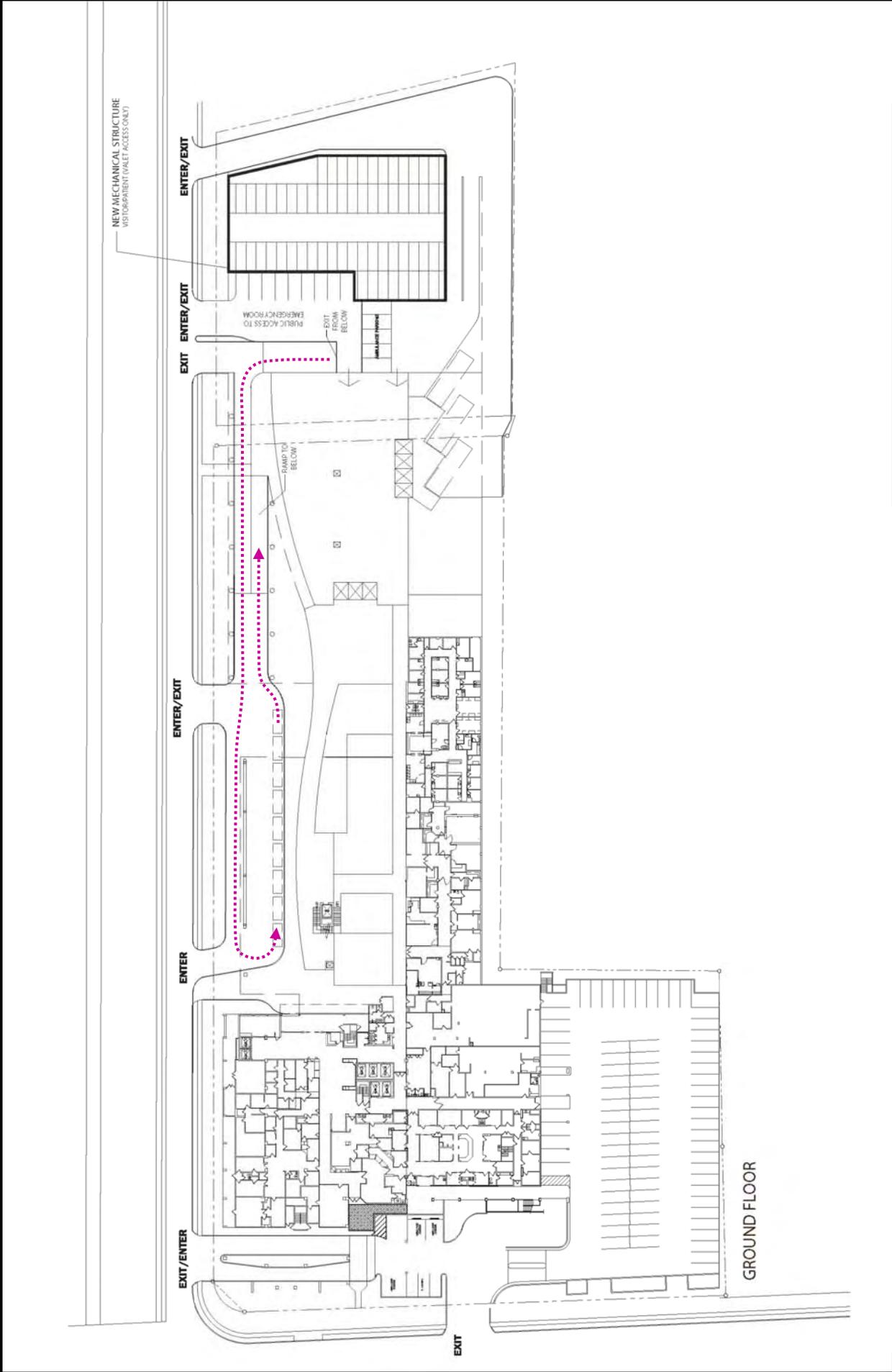


FIGURE
7

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
 PHASE 2 TRAFFIC CIRCULATION – VALETS

Bingham Street has one eastbound departure lane. Punahou Street is a two-way roadway generally oriented in the north-south direction that varies between two-lanes and six-lanes. At the intersection with Bingham Street and the Interstate H-1 Freeway eastbound off-ramp, the northbound approach of Punahou Street has one through lane and a shared through and right-turn lane while the southbound approach has two through lanes and an exclusive left-turn lane. The Interstate H-1 Freeway eastbound off-ramp comprises the eastbound approach of the intersection and has an exclusive left-turn lane, a shared left-turn and through lane, and two exclusive right-turn lanes

Southeast of the intersection with Punahou Street and the freeway off-ramp, Bingham Street intersects Alexander Street. At this unsignalized T-intersection, the eastbound approach of Bingham Street has one lane that serves through and right-turn traffic movements. Alexander Street is a two-lane, two-way roadway between Bingham Street and Beretania Street. At the intersection with Bingham Street, the Alexander Street approach has one stop-controlled lane that serves right-turn traffic movements only.

Southwest of the intersection with Bingham Street and the freeway off-ramp, Punahou Street intersects Beretania Street. At this signalized intersection, the northbound approach of Punahou Street has an exclusive left-turn lane and two through lanes while the southbound approach has two through lanes and two exclusive right-turn lanes. Beretania Street is a one-way (westbound) roadway generally oriented in the east-west direction that, with King Street, forms a couplet system that provides access through Honolulu between downtown Honolulu and Kapahulu. At the intersection with Punahou Street, the Beretania Street approach of the intersection has a shared left-turn and through lane, two through lanes, and a shared through and right-turn lane.

B. Traffic Volumes and Conditions

1. General

a. Field Investigation

Field investigations were conducted on September 16-18, 2008 and consisted of manual turning movement count surveys and traffic

flow assessments during the morning peak hours between 6:00 AM and 9:00 AM, and the afternoon peak hours between 3:00 PM and 6:00 PM at the following intersections:

- Bingham Street, Punahou Street, and the Interstate H-1 Freeway eastbound off-ramp
- Bingham Street and the Emergency Room driveway
- Bingham Street and the Kapiolani Hospital main entrance driveway
- Bingham Street and the Kapiolani Hospital main exit driveway
- Bingham Street and the Kapiolani Hospital employee surface parking lot driveway
- Bingham Street and Alexander Street
- Punahou Street and the Emergency Room driveway
- Punahou Street and the Central Union Church driveway (north)
- Punahou Street and the Central Union Church driveway (south)
- Punahou Street and Beretania Street

Appendix A includes the existing traffic count data.

b. Capacity Analysis Methodology

The highway capacity analysis performed in this study is based upon procedures presented in the “Highway Capacity Manual”, Transportation Research Board, 2000, and the “Highway Capacity Software”, developed by the Federal Highway Administration. The analysis is based on the concept of Level of Service (LOS) to identify the traffic impacts associated with traffic demands during the peak periods of traffic.

LOS is a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS “A” through “F”; LOS “A” representing ideal or free-flow traffic operating conditions and LOS “F” unacceptable or potentially congested traffic operating conditions.

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

exceeds the road's carrying capacity. The LOS definitions are included in Appendix B.

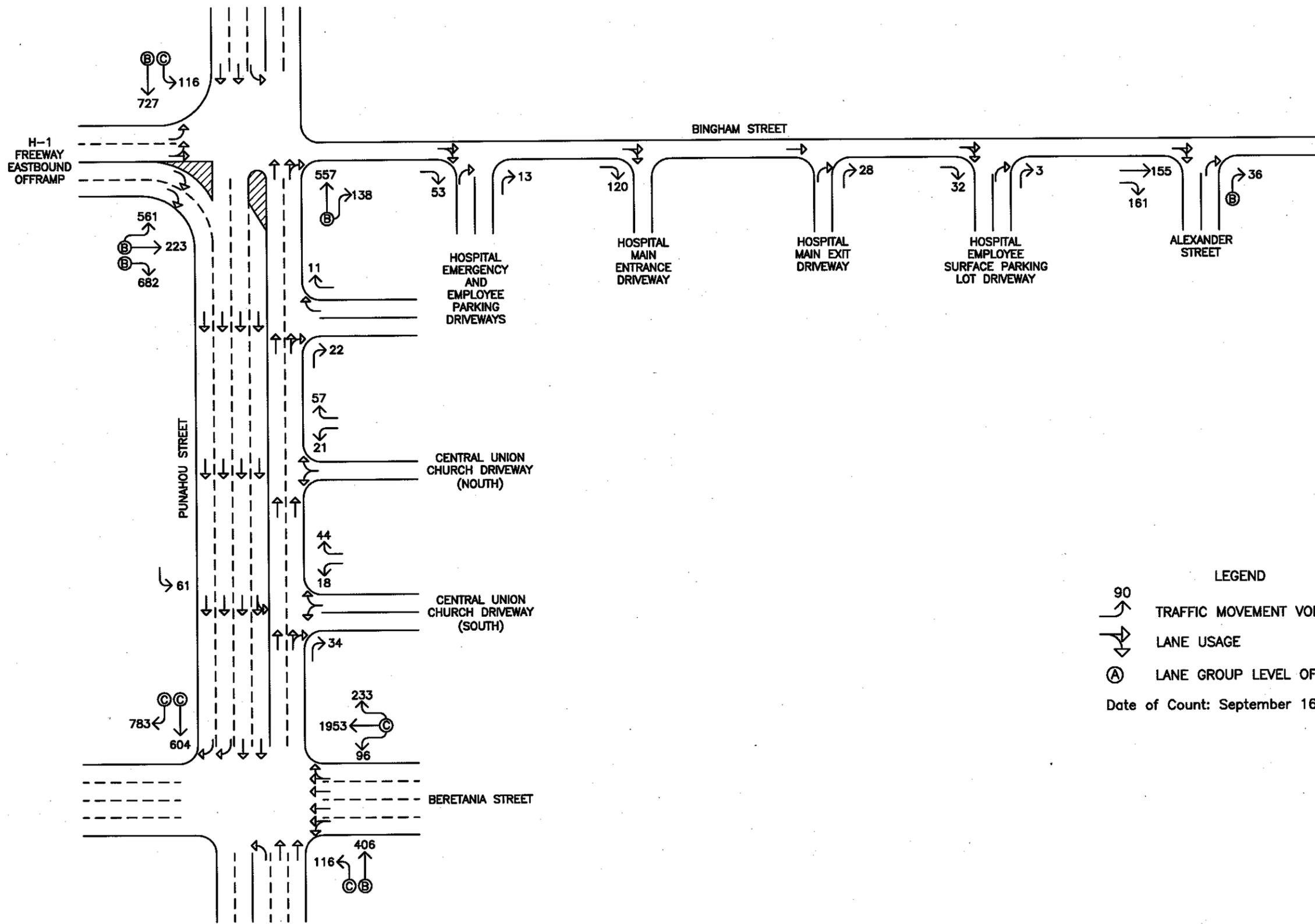
2. Existing Peak Hour Traffic

a. General

Figures 8 and 9 show the existing AM and PM peak period traffic volumes and operating conditions. The AM peak hour of traffic generally occurs between 7:15 AM and 8:15 AM in the vicinity of the hospital. In the afternoon, the PM peak hour of traffic generally occurs between the hours of 3:00 PM and 4:00 PM. The analysis is based on these peak hour time periods for each intersection to identify the traffic impacts resulting from the proposed project. LOS calculations are included in Appendix C.

b. Bingham Street, Punahou Street, and the Interstate H-1 Freeway Eastbound Off-Ramp

At the intersection with Bingham Street and the Interstate H-1 Freeway Eastbound Off-Ramp, Punahou Street carries 695 vehicles northbound and 843 vehicles southbound during the AM peak period. During the PM peak period, the overall traffic volume is less with 850 vehicles traveling northbound and 596 vehicles traveling southbound. The northbound approach and the southbound through traffic movement operate at LOS "B" during both peak periods while the southbound left-turn traffic movement operates at LOS "C" during both peak periods. Traffic queues periodically formed on the Punahou Street approaches of the intersection with the most significant queuing occurring on the northbound approach during the PM peak period. During this period, traffic queues from the downstream intersection with Wilder Avenue consistently extended through this intersection, as well as, the upstream intersection with Beretania Street, and occasionally past the upstream intersection with Young Street.



LEGEND

90
 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

(A) LANE GROUP LEVEL OF SERVICE

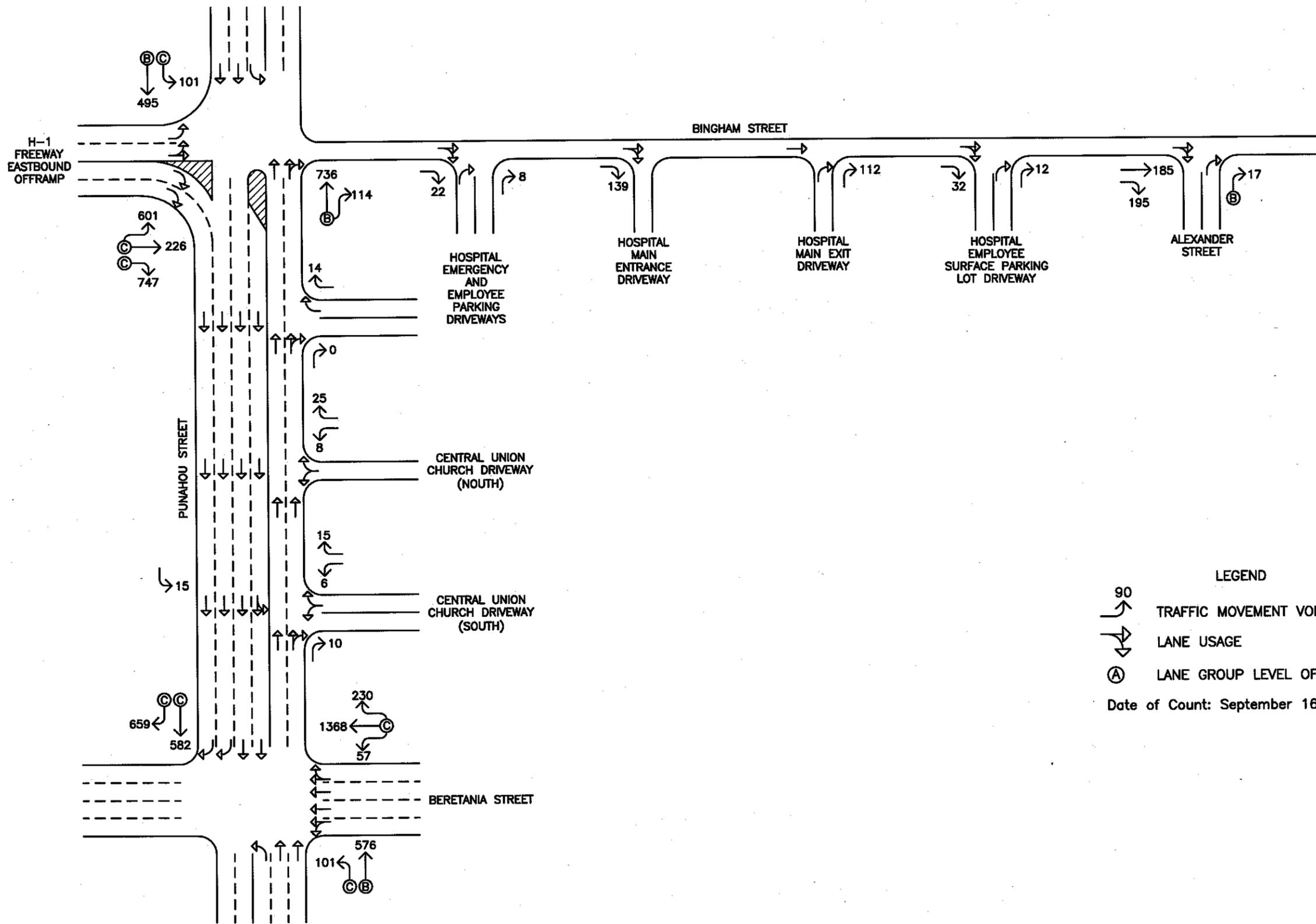
Date of Count: September 16-18, 2008

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

EXISTING AM PEAK HOUR OF TRAFFIC

FIGURE
8





LEGEND

90
 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

(A) LANE GROUP LEVEL OF SERVICE

Date of Count: September 16-18, 2008

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

EXISTING PM PEAK HOUR OF TRAFFIC

FIGURE
9



The Interstate H-1 Freeway eastbound off-ramp approach of the intersection carries 1,466 vehicles eastbound during the AM peak period. During the PM peak period, the traffic volume is higher with 1,574 vehicles traveling eastbound. The traffic movements on the freeway off-ramp approach of the intersection operate at LOS "B" and LOS "C" during the AM and PM peak periods, respectively. Traffic queues periodically formed on the freeway off-ramp approach with average queue lengths of 7-9 vehicles observed on this approach during both peak periods. Most of these queues were observed to clear the intersection after each traffic signal cycle change, but occasionally vehicles had to wait for more than one traffic signal cycle length.

c. Bingham Street and Alexander Street

At the intersection with Alexander Street, Bingham Street carries 316 and 380 vehicles eastbound during the AM and PM peak periods, respectively. Traffic volumes on the Alexander Street approach of the intersection are lower with 36 vehicles and 17 vehicles observed traveling northbound during the AM and PM peak periods, respectively. The critical traffic movement at this intersection is the northbound right-turn traffic movement which operates at LOS "B" during both peak periods.

d. Punahou Street and Beretania Street

At the intersection with Beretania Street, Punahou Street carries 522 vehicles northbound and 1,387 vehicles southbound during the AM peak period. During the PM peak period, the overall traffic volume is approximately the same with 677 vehicles traveling northbound and 1,241 vehicles traveling southbound. The northbound left-turn traffic movement and the traffic movements on the southbound approach of the intersection operate at LOS "C" during both peak periods while the northbound through traffic movement operates at LOS "B" during both peak periods. Traffic queues periodically formed on the Punahou Street approaches of the

intersection the most significant queuing occurring on the northbound approach during the PM peak period. As previously mentioned queues from the downstream intersection with Wilder Avenue consistently extended through this intersection during this peak period and occasionally extended through the upstream intersection with Young Street.

The Beretania Street approach of the intersection carries 2,282 vehicles westbound during the AM peak period. During the PM peak period, the traffic volume is less with 1,655 vehicles traveling westbound. The Beretania Street approach operates at LOS "C" during both peak periods. Traffic queues periodically formed on the Beretania Street approach of the intersection with average queue lengths of 8-10 vehicles observed on this approach during both peak periods. Most of these queues were observed to clear the intersection after each traffic signal cycle change, but occasionally vehicles had to wait for more than one traffic signal cycle length.

IV. PROJECTED TRAFFIC CONDITIONS

A. Site-Generated Traffic

1. Trip Generation Methodology

The trip generation methodology used in this study is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 8th Edition," 2008. The ITE trip generation rates are developed empirically by correlating the vehicle trip generation data with various land use characteristics such as the number of vehicle trips generated per hospital bed or 1,000 square feet of development. Tables 1 and 2 summarize the project site trip generation characteristics applied to the AM and PM peak periods of traffic.

Table 1: Year 2017 Peak Hour Trip Generation

HOSPITAL		
INDEPENDENT VARIABLE:		# of additional beds = 36
		PROJECTED TRIP ENDS
AM PEAK	ENTER	29
	EXIT	12
	TOTAL	41
PM PEAK	ENTER	17
	EXIT	30
	TOTAL	47

Table 2: Year 2026 Peak Hour Trip Generation

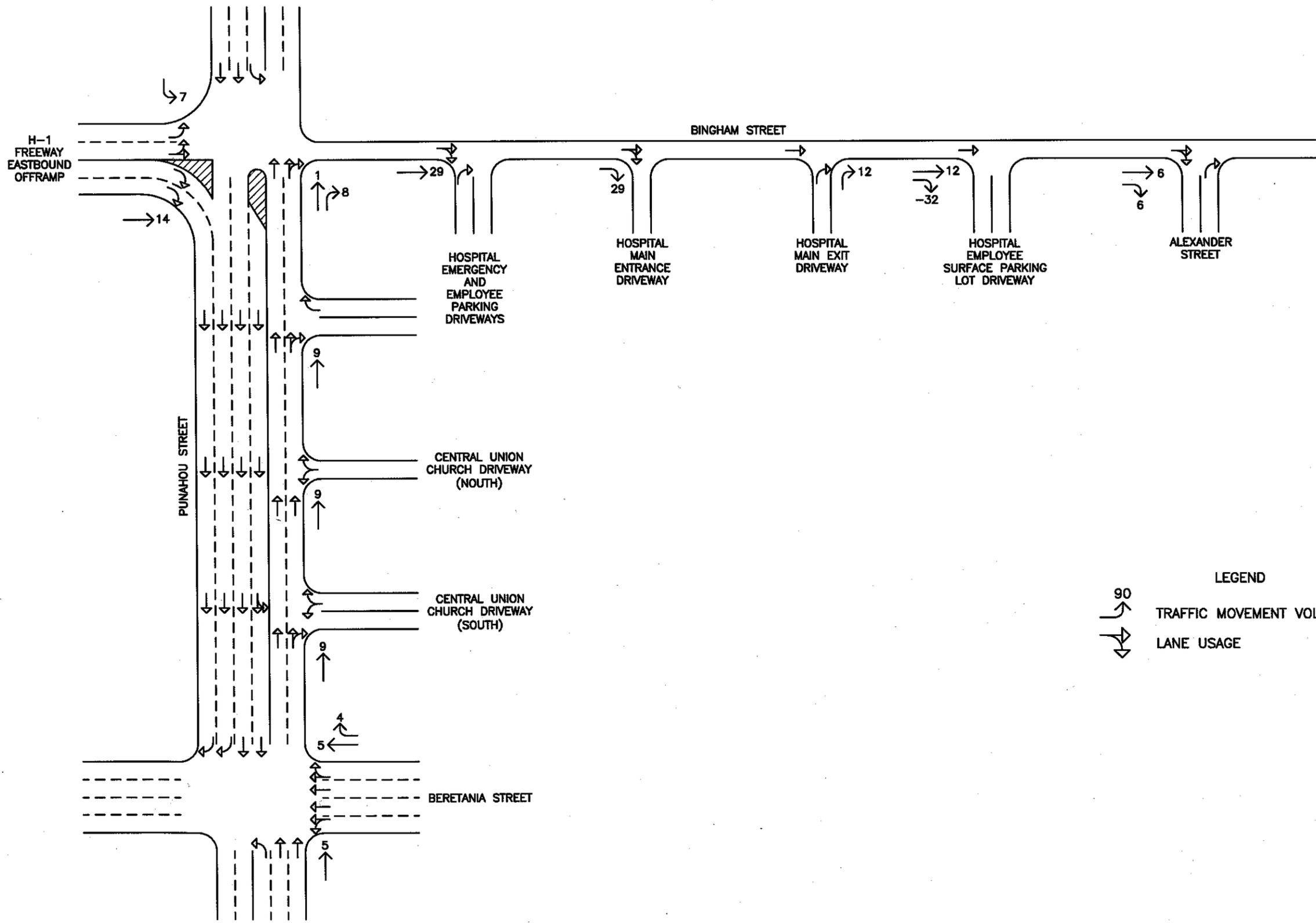
HOSPITAL		
INDEPENDENT VARIABLE:		# of additional beds = 45
		PROJECTED TRIP ENDS
AM PEAK	ENTER	36
	EXIT	15
	TOTAL	51
PM PEAK	ENTER	21
	EXIT	38
	TOTAL	59
MEDICAL OFFICES (MEDICAL-DENTAL OFFICE BUILDING)		
INDEPENDENT VARIABLE:		1,000 sf of additional development = 49.676
		PROJECTED TRIP ENDS
AM PEAK	ENTER	90
	EXIT	24
	TOTAL	114
PM PEAK	ENTER	41
	EXIT	111
	TOTAL	152
TOTALS.		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	126
	EXIT	39
	TOTAL	165
PM PEAK	ENTER	62
	EXIT	149
	TOTAL	211

2. Trip Distribution

Figures 10 to 13 show the Year 2017 and Year 2026 distribution of site-generated traffic during the AM and PM peak periods. Access to Kapiolani Medical Center will continue to be provided via driveways off Punahou Street and Bingham Street. Although some employees may park in the employee parking structure adjacent to Punahou Street, for the purpose of this report, all new trips are assumed to access the hospital via the driveways off Bingham Street. As such, all new entering trips are assumed to utilize the intersection of Bingham Street with Punahou Street and the Interstate H-1 Freeway eastbound off-ramp to access the hospital driveways along Bingham Street. The directional distribution of entering vehicles is assumed to remain similar to existing conditions at the study intersections.

Since Bingham Street is a one-way (eastbound) roadway, all exiting vehicles initially have to head eastbound along that roadway. At the intersection with Alexander Street, the directional distribution of exiting vehicles is assumed to remain similar to existing conditions. All vehicles that continue along Bingham Street are assumed to be headed to areas to the east while those that turn right onto Alexander Street area assumed to be utilizing that roadway and Beretania Street to turn around. The directional distribution of vehicles at the intersection of Beretania Street with Punahou Street is assumed to remain similar to existing conditions. All exiting vehicles that turn right from Beretania Street to Punahou Street are assumed to travel through the intersection with Bingham Street headed for areas to the north.

As previously mentioned, modifications to the existing traffic circulation at the hospital are anticipated as construction progresses. After the completion of Phase 1 of the proposed project, vehicles currently entering the hospital via the employee surface parking lot driveway are expected to utilize the converted secondary entrance driveway to the existing parking structure instead since employee parking will be temporary relocated to the garage. After the completion of Phase 2 of the proposed project, these employee-



LEGEND

90
 TRAFFIC MOVEMENT VOLUME (VPH)

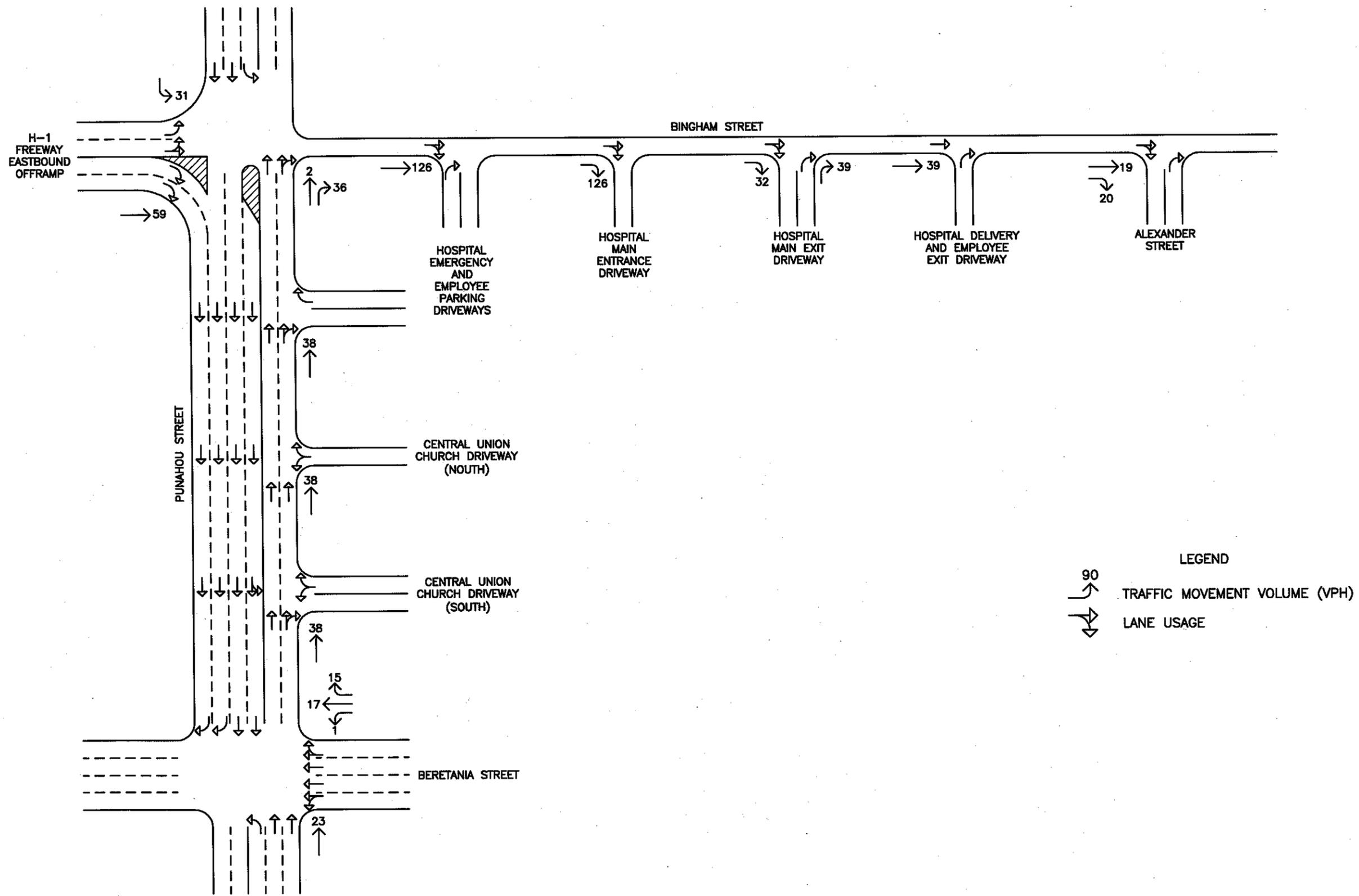
 LANE USAGE

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

YEAR 2017 DISTRIBUTION OF SITE-GENERATED VEHICLES
 AM PEAK HOUR OF TRAFFIC

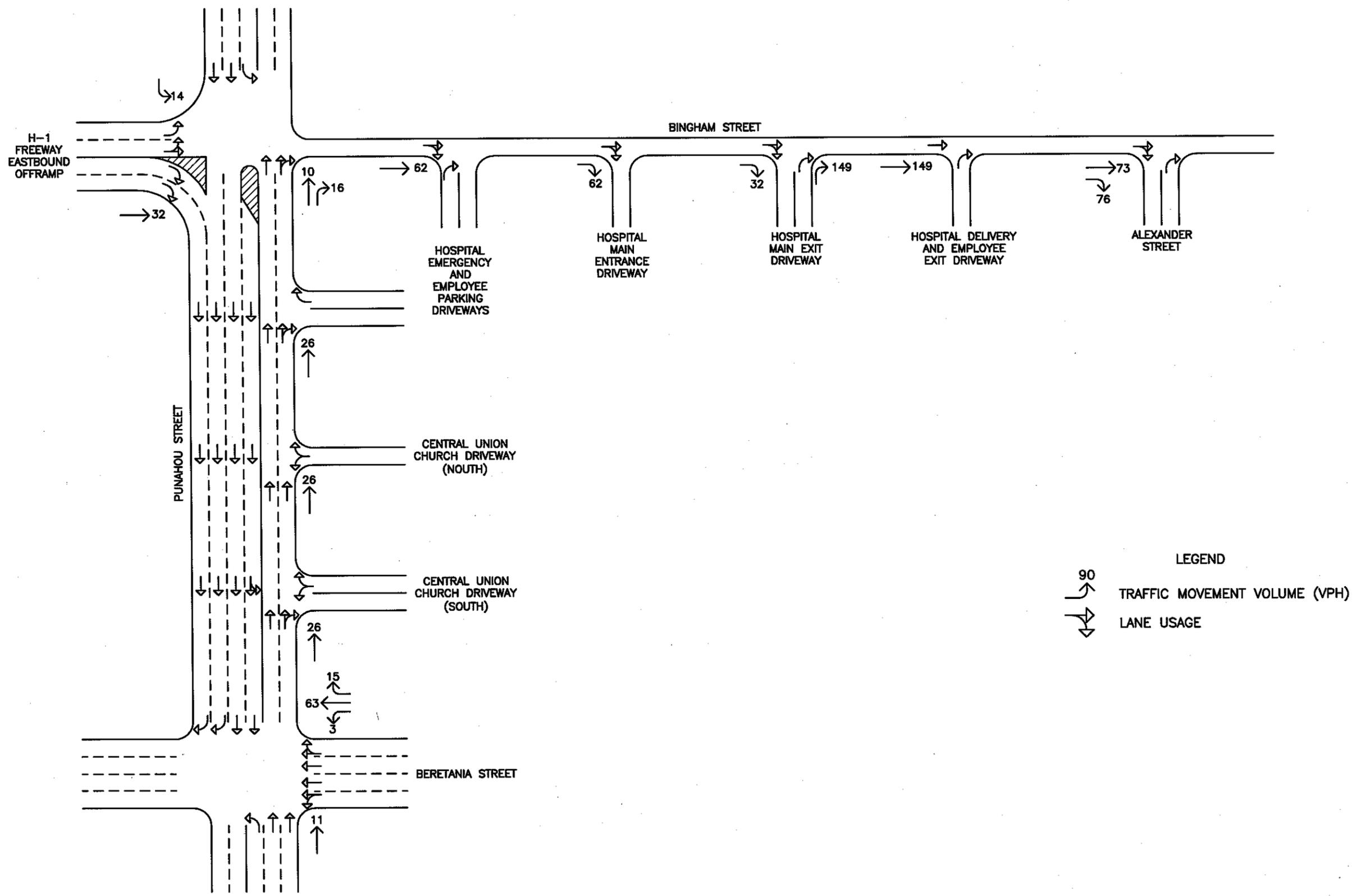


FIGURE
 10



KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

YEAR 2026 DISTRIBUTION OF SITE-GENERATED VEHICLES (FROM YEAR 2017)
AM PEAK HOUR OF TRAFFIC



related entering trips are expected to utilize the converted two-way main exit driveway instead once the secondary access driveway to the parking garage is eliminated.

B. Through Traffic Forecasting Methodology

The travel forecast utilizes a conservative average annual traffic growth rate of 0.5% per year in the project vicinity. As such, using 2008 as the Base Year, growth rate factors of 1.045 and 1.09 were applied to the existing through traffic demands along Punahou Street, Beretania Street, and the Interstate H-1 Freeway to simulate projected Year 2017 and Year 2026, respectively, traffic demands.

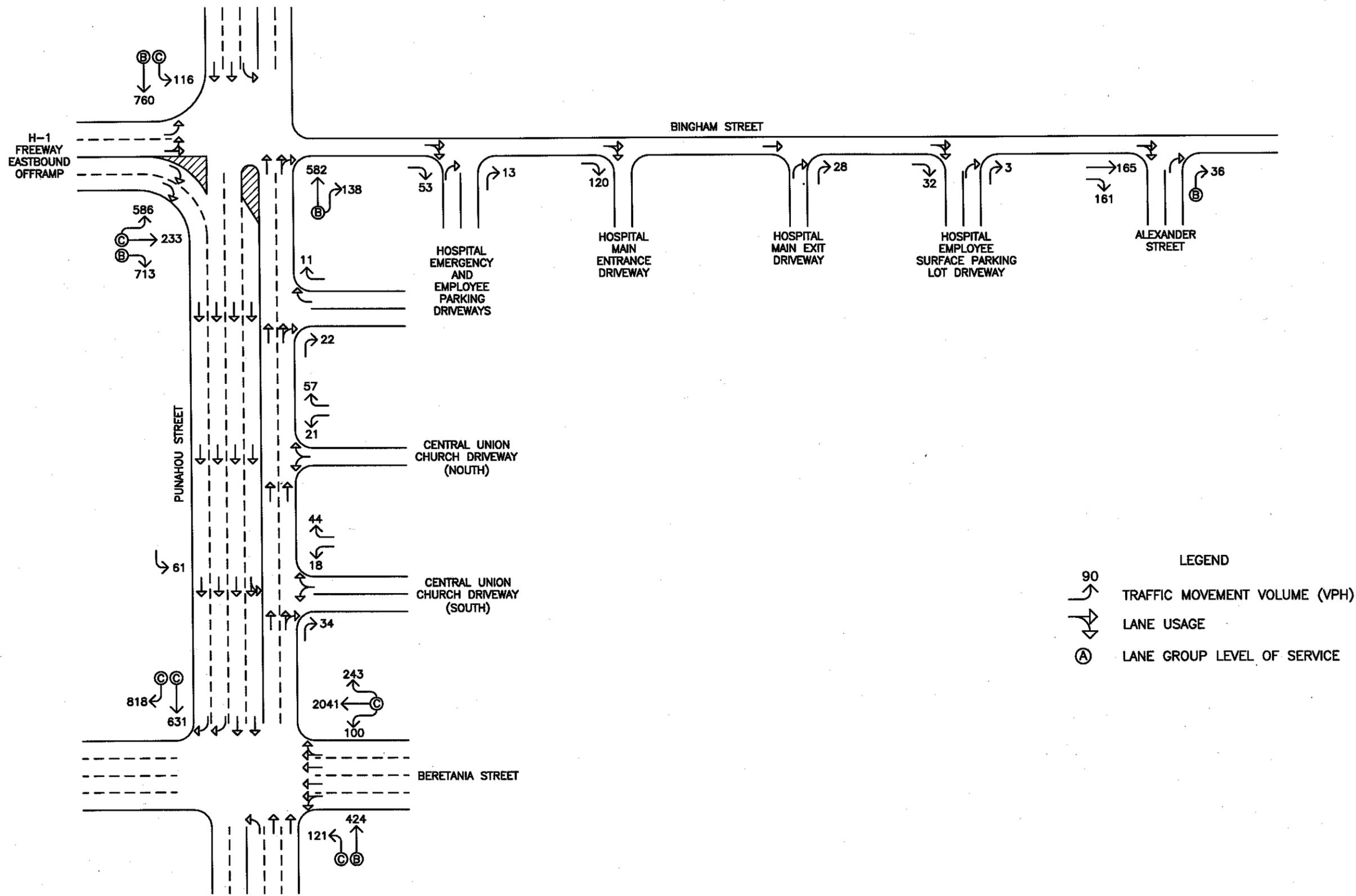
C. Year 2017 Total Traffic Volumes

1. Without Project

The projected Year 2017 AM and PM peak period traffic volumes and operating conditions without the proposed improvements at the Kapiolani Medical Center for Women and Children are shown in Figures 14 and 15, and summarized in Table 3. The existing levels of service are provided for comparison purposes. LOS calculations are included in Appendix D.

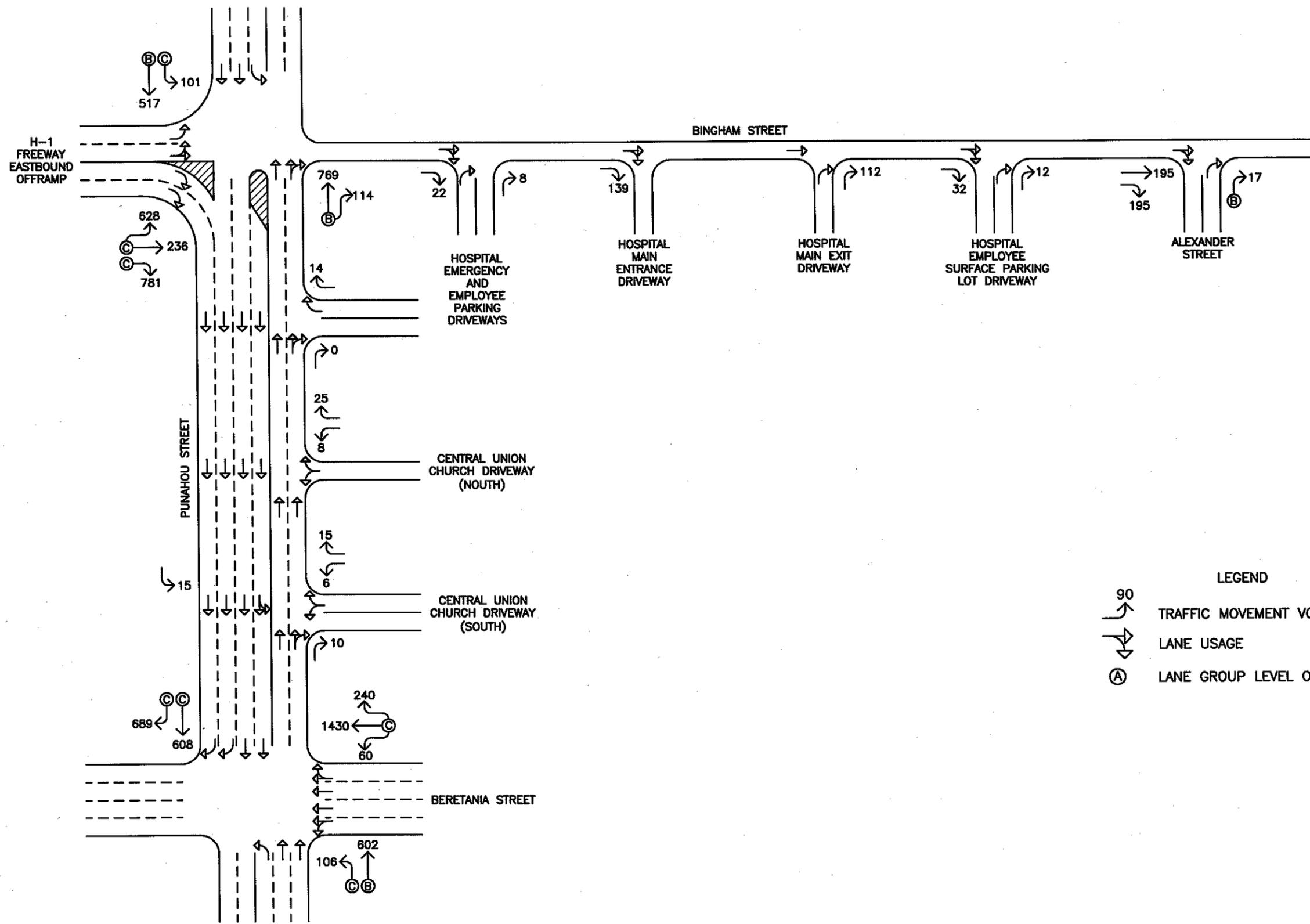
Table 3: Existing and Projected Year 2017 (Without Project) LOS Traffic Operating Conditions

Intersection	Critical Traffic Movement		AM		PM	
			Exist	Year 2017 w/out Proj	Exist	Year 2017 w/out Proj
Bingham St/ Punahou St/ H-1 Fwy Off- Ramp (EB)	Eastbound	LT-TH	B	C	C	C
		RT	B	B	C	C
	Northbound	TH-RT	B	B	B	B
	Southbound	LT	C	C	C	C
TH		B	B	B	B	
Bingham St/ Alexander St	Northbound	RT	B	B	B	B



LEGEND

- 90 (with arrow) TRAFFIC MOVEMENT VOLUME (VPH)
- (with arrow) LANE USAGE
- (A) LANE GROUP LEVEL OF SERVICE



LEGEND

90
 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

LANE GROUP LEVEL OF SERVICE



WILSON OKAMOTO CORPORATION
 ENGINEERS • PLANNERS

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
 YEAR 2017 PM PEAK HOUR OF TRAFFIC WITHOUT PROJECT

FIGURE
 15

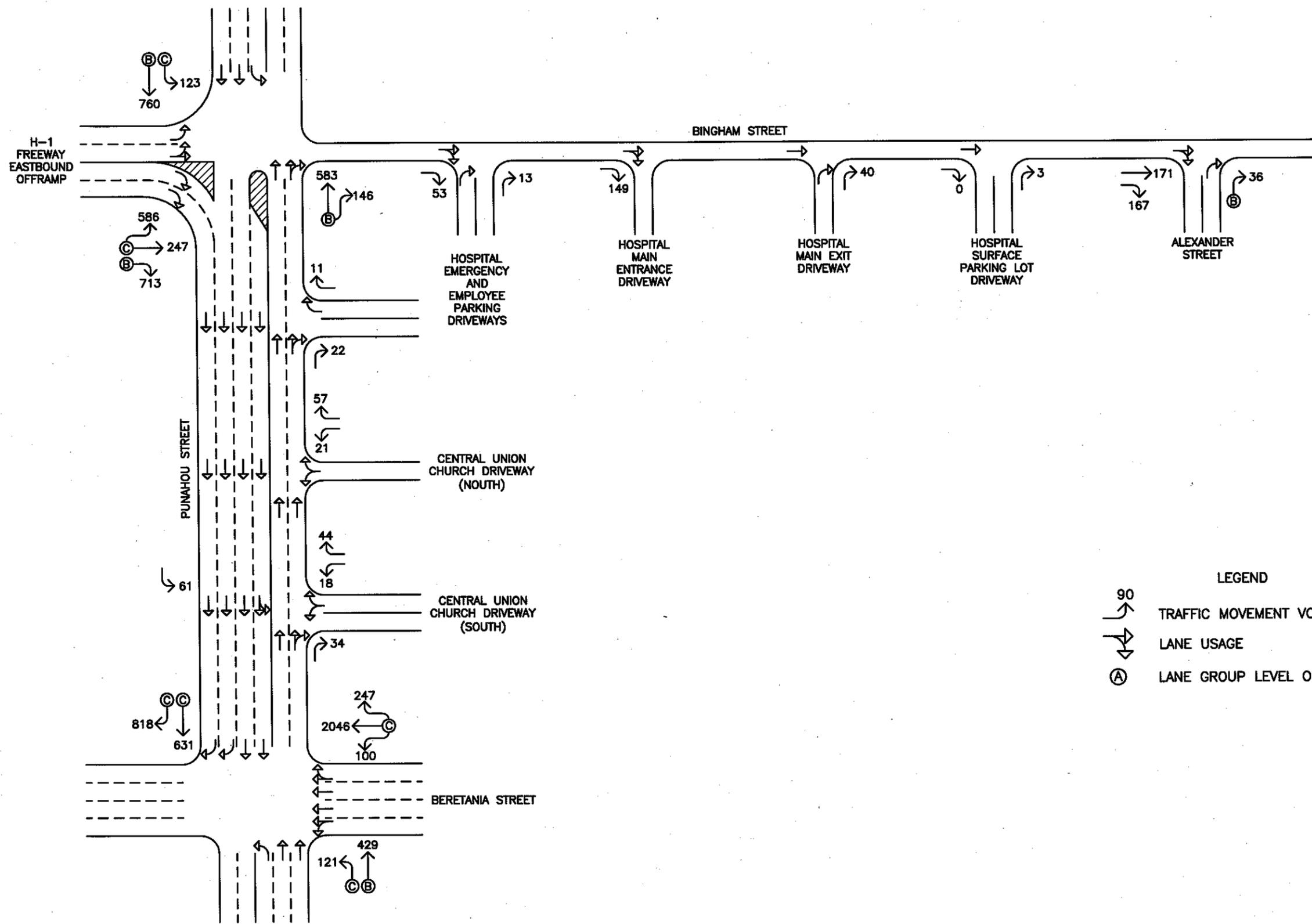
Table 3: Existing and Projected Year 2017 (Without Project) LOS Traffic Operating Conditions

Intersection	Critical Traffic Movement		AM		PM	
			Exist	Year 2017 w/out Proj	Exist	Year 2017 w/out Proj
Beretania St/ Punahou St	Westbound	LT-TH-RT	C	C	C	C
	Northbound	LT	C	C	C	C
		TH	B	B	B	B
	Southbound	LT	C	C	C	C
		RT	C	C	C	C

Traffic operations under Year 2017 without project conditions are expected, in general, to remain similar to existing conditions. During the AM peak period, the eastbound left-turn and through traffic movement on the Interstate H-1 Freeway eastbound off-ramp approach of the intersection with Bingham Street and Punahou Street is expected to deteriorate from LOS “B” to LOS “C.” The remaining critical traffic movements at this intersection, as well as, the other study intersections are expected to continue operating at levels of service similar to existing conditions.

2. With Project

The projected Year 2017 AM and PM peak period traffic volumes and operating conditions with the implementation of Phase 1 of the proposed improvements at the Kapiolani Medical Center for Women and Children is shown in Figures 16 and 17, and summarized in Table 4. The cumulative volumes consist of site-generated traffic superimposed over Year 2017 projected traffic demands. For the purpose of this report, the mechanical parking garage is assumed to process vehicles quickly enough to prevent queuing onto the adjacent public roadway or valet personnel are able to appropriately stage vehicles on-site to accommodate the processing speed of the garage. The existing and projected Year 2017 (Without Project) operating conditions are provided for comparison purposes. LOS calculations are included in Appendix E.



LEGEND

90
 TRAFFIC MOVEMENT VOLUME (VPH)

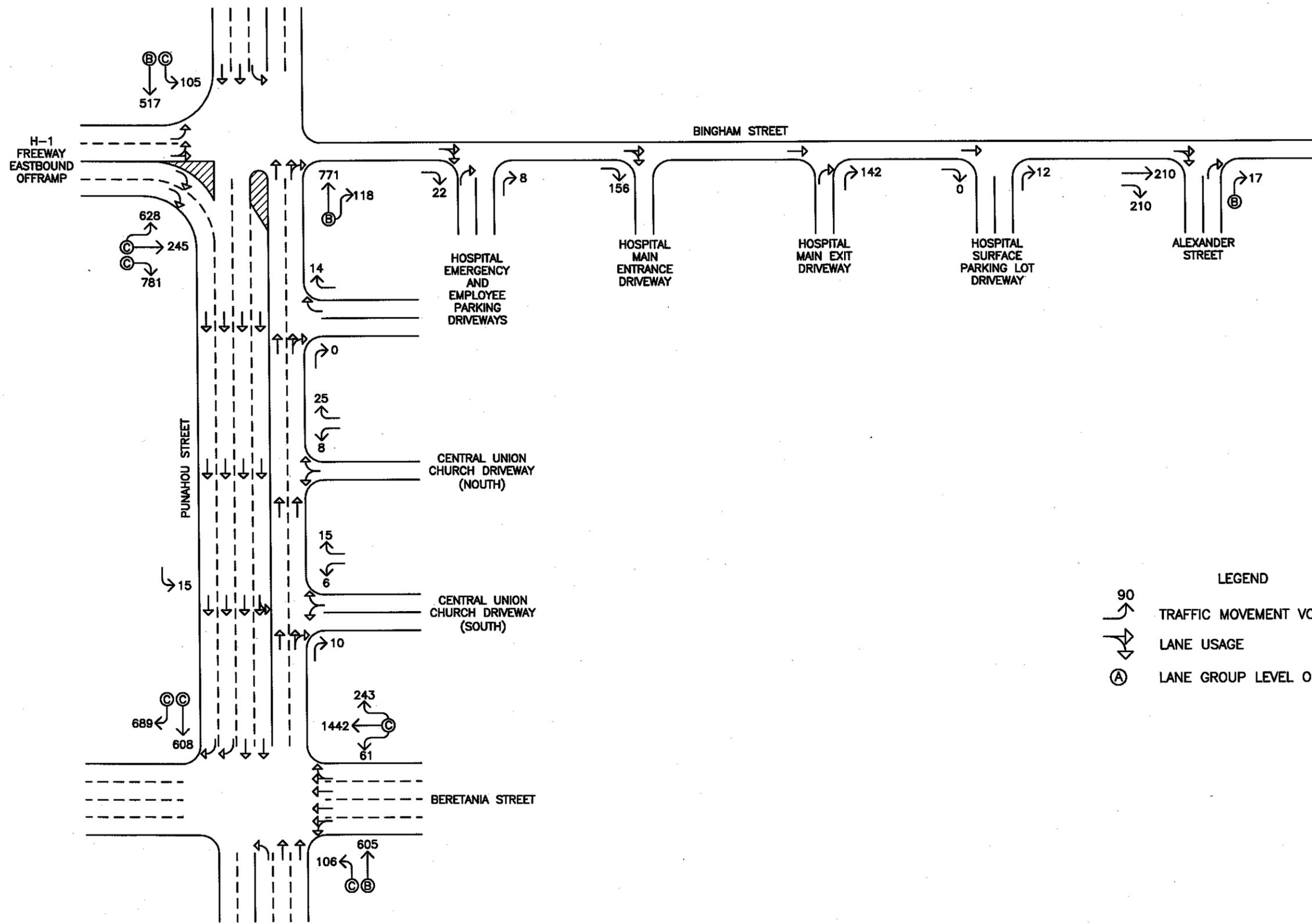
LANE USAGE

LANE GROUP LEVEL OF SERVICE

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

YEAR 2017 AM PEAK HOUR OF TRAFFIC WITH PROJECT





LEGEND

90
 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

LANE GROUP LEVEL OF SERVICE

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

YEAR 2017 PM PEAK HOUR OF TRAFFIC WITH PROJECT



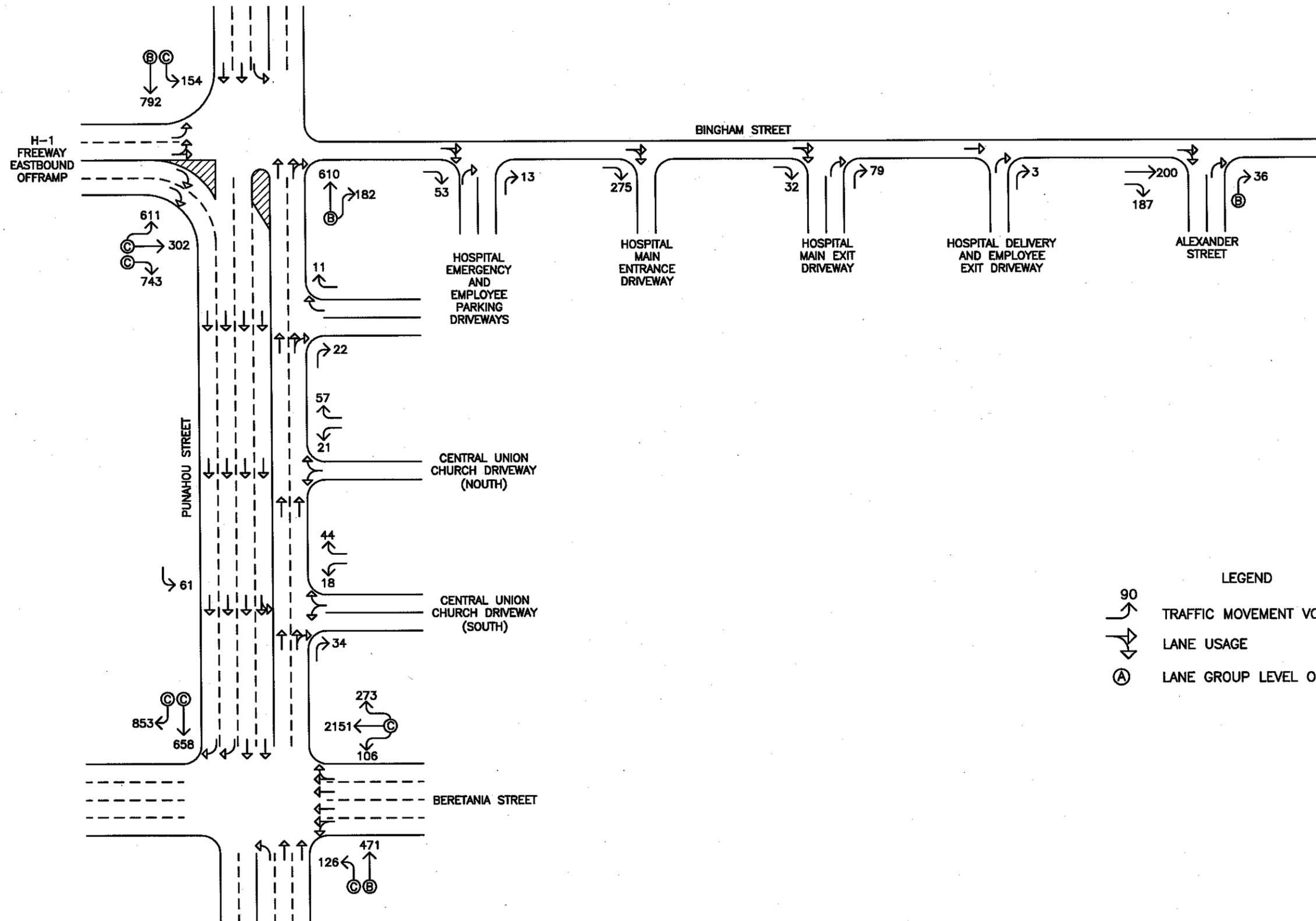
Table 4: Existing and Projected Year 2017 (Without and With Project) LOS Traffic Operating Conditions

Intersection	Critical Traffic Movement		AM			PM			
			Exist	Year 2017		Exist	Year 2017		
				w/out Proj	w/ Proj		w/out Proj	w/ Proj	
Bingham St/ Punahou St/ H-1 Fwy Off-Ramp (EB)	EB	LT-TH	B	C	C	C	C	C	
		RT	B	B	B	C	C	C	
	NB	TH-RT	B	B	B	B	B	B	
	SB	LT	C	C	C	C	C	C	
		TH	B	B	B	B	B	B	
Bingham St/ Alexander St	NB	RT	B	B	B	B	B	B	
Beretania St/ Punahou St	WB	LT-TH-RT	C	C	C	C	C	C	
		NB	LT	C	C	C	C	C	C
			TH	B	B	B	B	B	B
	SB	LT	C	C	C	C	C	C	
		RT	C	C	C	C	C	C	

Traffic operations in the vicinity of the Kapiolani Medical Center for Women and Children are expected to remain similar to Year 2017 without project conditions. The traffic movements at the intersections of Punahou Street with Bingham Street/H-1 Freeway Off-Ramp and Beretania Street are expected to continue operating at LOS “C” or better during both peak periods. Similarly, the critical traffic movement at the intersection of Bingham Street and Alexander Street is expected to continue operating at LOS “B” during both peak periods.

D. Year 2026 Total Traffic Volumes With Project

The projected Year 2026 AM and PM peak period traffic volumes and operating conditions with the implementation of Phases 1 and 2 of the proposed improvements at the Kapiolani Medical Center for Women and Children is shown in Figures 18 and 19, and summarized in Table 5. The cumulative volumes consist of site-generated traffic superimposed over Year 2026 projected traffic demands. For the purpose of this report, the mechanical parking garage is assumed to process vehicles quickly enough to prevent queuing onto the adjacent public roadway or valet



LEGEND

90
 TRAFFIC MOVEMENT VOLUME (VPH)

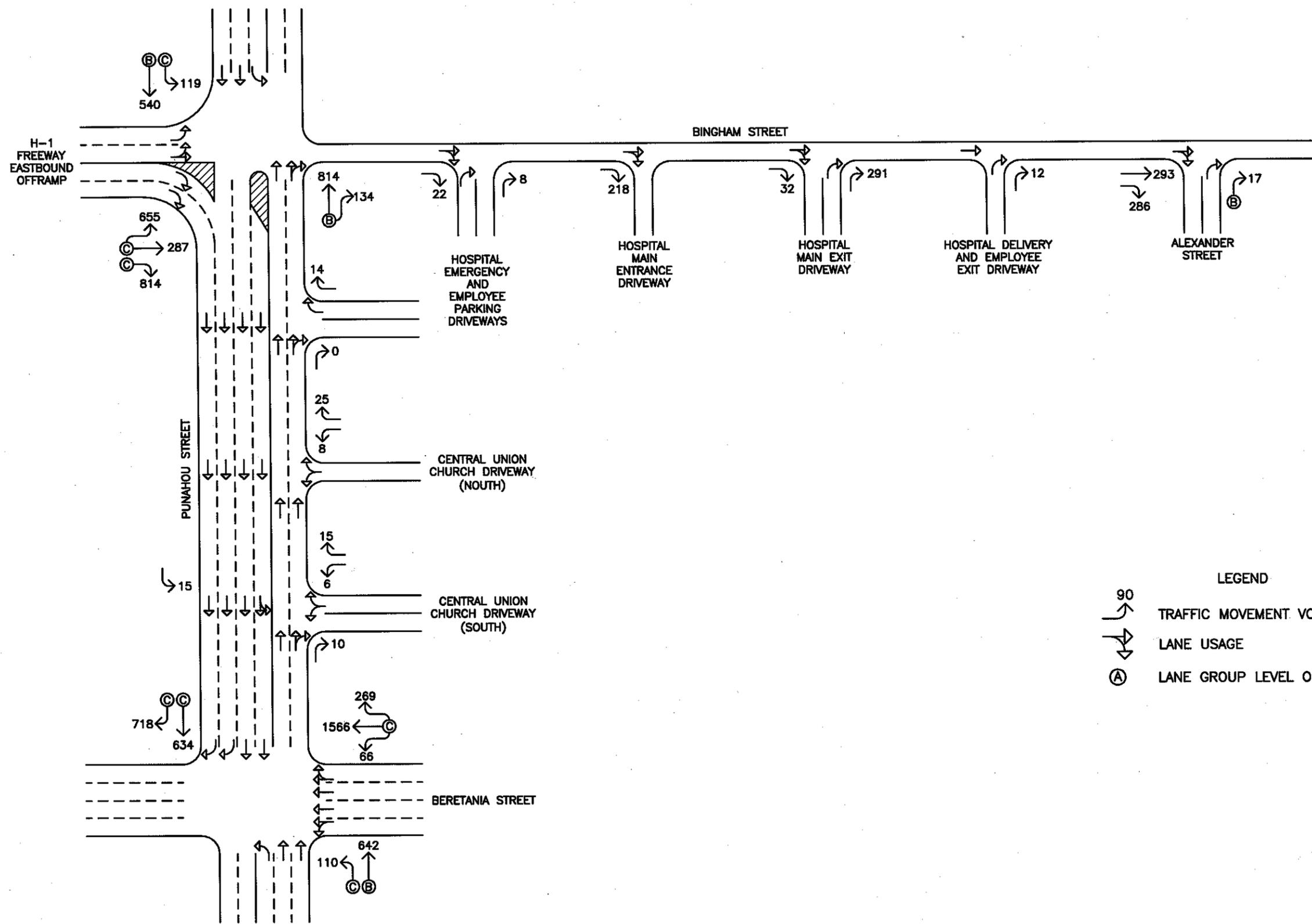
LANE USAGE

LANE GROUP LEVEL OF SERVICE



KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

YEAR 2026 AM PEAK HOUR OF TRAFFIC WITH PROJECT



LEGEND

90
 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

LANE GROUP LEVEL OF SERVICE



KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN

YEAR 2026 PM PEAK HOUR OF TRAFFIC WITH PROJECT

personnel are able to appropriately stage vehicles on-site to accommodate the processing speed of the garage. The projected Year 2017 operating conditions with the proposed project are provided for comparison purposes. LOS calculations are included in Appendix F.

**Table 5: Projected Year 2017 and Year 2026 (With Project)
LOS Traffic Operating Conditions**

Intersection	Critical Traffic Movement		AM		PM	
			Year 2017	Year 2026	Year 2017	Year 2026
Bingham St/ Punahou St/ H-1 Fwy Off- Ramp (EB)	Eastbound	LT-TH	C	C	C	C
		RT	B	C	C	C
	Northbound	TH-RT	B	B	B	B
	Southbound	LT	C	C	C	C
		TH	B	B	B	B
Bingham St/ Alexander St	Northbound	RT	B	B	B	B
Beretania St/ Punahou St	Westbound	LT-TH-RT	C	C	C	C
	Northbound	LT	C	C	C	C
		TH	B	B	B	B
	Southbound	LT	C	C	C	C
		RT	C	C	C	C

Traffic operations in the vicinity of the Kapiolani Medical Center for Women and Children are expected, in general, to remain similar to Year 2017 with project conditions. The eastbound right-turn traffic movement on the Interstate H-1 Freeway eastbound off-ramp approach of the intersection with Bingham Street and Punahou Street is expected to operate at a slightly lower level of service during the PM peak period. The remaining traffic movements at this intersection, as well as, the other study intersections are expected to continue operating at levels of service similar to Year 2017 with project conditions. Although Year 2026 with project conditions are expected to remain similar to Year 2017 with project conditions, traffic in the project vicinity is currently congested with significant queuing observed along Punahou Street during the PM peak period. As such, a traffic management plan is recommended for the Kapiolani Medical Center for Women and Children in

conjunction with the planned improvements to minimize its impact on the roadway network.

V. RECOMMENDATIONS

Based on the analysis of the traffic data, the following are the recommendations of this study to be incorporated in the project design.

1. Maintain sufficient sight distance for motorists to safely enter and exit all project driveways.
2. Provide adequate on-site loading and off-loading service areas and prohibit off-site loading operations.
3. Provide adequate turn-around area for service, delivery, and refuse collection vehicles to maneuver on the project site to avoid vehicle-reversing maneuvers onto public roadways.
4. Provide sufficient turning radii at all project driveways to avoid or minimize vehicle encroachments to oncoming traffic lanes.
5. Provide adequate staffing of valet operations to ensure on-site vehicular queues do not extend onto adjacent public roadways.
6. Prepare a Traffic Management Plan (TMP) for the Kapiolani Medical Center for Women and Children to minimize its impact on the surrounding roadway network. The TMP would detail transportation demand management strategies such as staggered work hours, bus pass or ride-sharing programs, and restricted delivery hours.

VI. CONCLUSION

The Kapiolani Medical Center for Women and Children is currently comprised of four main buildings, two parking structures, and a surface parking lot for employees. Improvements are proposed at the existing hospital to modernize and expand the capacity of the hospital to meet existing service demands. The proposed improvements include the demolition of an existing building and parking structure, renovation and expansion of three existing hospital buildings, and the construction of a mechanical parking structure. In addition, although access to the hospital will continue to be provided via driveways off Punahou Street and Bingham Street, modifications to the existing traffic circulation are anticipated as construction progresses. However, despite the anticipated increases in traffic along the surrounding roadways, the traffic movements at the study intersections are

anticipated to continue operating at levels-of-service similar to without project conditions during both peak periods. As such, with the implementation of the aforementioned recommendations, the proposed improvements at the Kapiolani Medical Center for Women and Children are not expected to have a significant impact on traffic operations in the vicinity.

Although traffic conditions with the implementation of the proposed improvements at Kapiolani Medical Center for Women and Children are expected to remain similar to without project conditions, traffic along the surrounding roadways is currently congested with significant queuing observed along Punahou Street during the PM peak period. As such, a traffic management plan is recommended for the hospital to further minimize its impact on the roadway network. This plan would detail transportation demand management strategies such as the implementation of flexible or staggered work shift schedules and establishment of bus pass and ride-sharing programs that could be adopted to minimize trips during the peak periods.

APPENDIX A

EXISTING TRAFFIC COUNT DATA

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

Counter:D4-5677
 Counted:TO
 Weather:Clear

File Name : BinAlex AM
 Site Code : 0000001
 Start Date : 9/18/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Southbound				Westbound				Alexander Street Northbound				Bingham Street Eastbound					
	App. Total	Thru	Right	Left	App. Total	Thru	Right	Left	App. Total	Thru	Right	Left	App. Total	Thru	Right	Left	Int. Total	
	06:00 AM	0	0	0	0	0	0	0	0	4	0	0	0	0	37	20	0	57
06:15 AM	0	0	0	0	0	0	4	0	5	9	0	0	0	36	24	0	60	69
06:30 AM	0	0	0	0	-0	0	10	0	7	17	0	0	0	41	23	0	64	81
06:45 AM	0	0	0	0	0	0	8	0	7	15	0	0	0	30	27	0	57	72
Total	0	0	0	0	0	0	22	0	23	45	0	0	0	144	94	0	238	283
07:00 AM	0	0	0	0	0	0	9	0	2	11	0	0	0	26	32	0	58	69
07:15 AM	0	0	0	0	0	0	10	0	3	13	0	0	0	21	33	0	54	67
07:30 AM	0	0	0	0	0	0	12	0	9	21	0	0	0	40	46	0	86	107
07:45 AM	0	0	0	0	0	0	11	0	5	16	0	0	0	54	44	0	98	114
Total	0	0	0	0	0	0	42	0	19	61	0	0	0	141	155	0	296	357
08:00 AM	0	0	0	0	0	0	3	0	1	4	0	0	0	51	47	0	98	102
08:15 AM	0	0	0	0	0	0	8	0	3	11	0	0	0	55	42	0	97	108
08:30 AM	0	0	0	0	0	0	6	0	4	10	0	0	0	39	37	0	76	86
08:45 AM	0	0	0	0	0	0	3	0	2	5	0	0	0	48	50	0	98	103
Total	0	0	0	0	0	0	20	0	10	30	0	0	0	193	176	0	369	399
Grand Total	0	0	0	0	0	0	84	0	52	136	0	0	0	478	425	0	903	1039
Apprch %	0	0	0	0	0	0	61.8	0	38.2	13.1	0	0	0	52.9	47.1	0	86.9	
Total %	0	0	0	0	0	0	8.1	0	5		0	0	0	46	40.9	0		

Start Time	Southbound				Westbound				Alexander Street Northbound				Bingham Street Eastbound					
	App. Total	Thru	Right	Left	App. Total	Thru	Right	Left	App. Total	Thru	Right	Left	App. Total	Thru	Right	Left	Int. Total	
	07:30 AM	0	0	12	0	0	0	0	0	9	21	0	0	0	40	46	0	86
07:45 AM	0	0	11	0	0	0	0	0	5	16	0	0	0	54	44	0	98	114
08:00 AM	0	0	3	0	0	0	0	0	1	4	0	0	0	51	47	0	98	102
08:15 AM	0	0	8	0	0	0	0	0	3	11	0	0	0	55	42	0	97	108
Total Volume	0	0	34	0	0	0	0	0	18	52	0	0	0	200	179	0	379	431
% App. Total	.000	.000	.708	.000	.000	.000	.000	.000	.500	.619	.000	.000	.000	.909	.952	.000	.967	.945
PHF																		

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 07:30 AM

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

Counter: D4-5677
 Counted: TO
 Weather: Clear

File Name : BinAlex PM
 Site Code : 00000001
 Start Date : 9/18/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Southbound		Westbound		Alexander Street Northbound					Bingham Street Eastbound					
	App. Total	App. Total	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
03:00 PM	0	0	0	0	0	0	4	7	11	0	57	51	0	108	119
03:15 PM	0	0	0	0	0	0	3	10	13	0	61	56	0	117	130
03:30 PM	0	0	0	0	0	0	1	10	11	0	46	52	0	98	109
03:45 PM	0	0	0	0	0	0	9	6	15	0	42	56	0	98	113
Total	0	0	0	0	0	0	17	33	50	0	206	215	0	421	471
04:00 PM	0	0	0	0	0	0	5	5	10	0	59	50	0	109	119
04:15 PM	0	0	0	0	0	0	9	4	13	0	44	54	0	98	111
04:30 PM	0	0	0	0	0	0	5	3	8	0	55	53	0	108	116
04:45 PM	0	0	0	0	0	0	18	3	21	0	54	57	0	111	132
Total	0	0	0	0	0	0	37	15	52	0	212	214	0	426	478
05:00 PM	0	0	0	0	0	0	5	4	9	0	49	58	0	107	116
05:15 PM	0	0	0	0	0	0	2	4	6	0	47	31	0	78	84
05:30 PM	0	0	0	0	0	0	9	1	10	0	50	39	0	89	99
05:45 PM	0	0	0	0	0	0	2	3	5	0	48	29	0	77	82
Total	0	0	0	0	0	0	18	12	30	0	194	157	0	351	381
Grand Total	0	0	0	0	0	0	72	60	132	0	612	586	0	1198	1330
Apprch %	0	0	0	0	0	0	54.5	45.5	9.9	0	51.1	48.9	0	0	0
Total %	0	0	0	0	0	0	5.4	4.5	9.9	0	46	44.1	0	90.1	0

Start Time	Southbound		Westbound		Alexander Street Northbound					Bingham Street Eastbound					
	App. Total	App. Total	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	5	5	10	0	59	50	0	109	119
04:15 PM	0	0	0	0	0	0	9	4	13	0	44	54	0	98	111
04:30 PM	0	0	0	0	0	0	5	3	8	0	55	53	0	108	116
04:45 PM	0	0	0	0	0	0	18	3	21	0	54	57	0	111	132
Total Volume	0	0	0	0	0	0	37	15	52	0	212	214	0	426	478
% App. Total	.000	.000	.000	.000	.000	.000	71.2	28.8	61.9	.000	49.8	50.2	0	.959	.905
PHF	.000	.000	.000	.000	.000	.000	.514	.750	.619	.000	.898	.939	.000	.959	.905

Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 04:00 PM

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

Counter: D4-5674
 Counted: MM
 Weather: Clear

File Name : Kapiolani Parking Lot. AM
 Site Code : 00000001
 Start Date : 9/18/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Kapiolani Hospital Parking Lot				Bingham Street Eastbound								
	Southbound App. Total	Westbound App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	0	0	0	0	0	0	0	65	14	0	79	79
06:15 AM	0	0	0	0	0	0	0	0	62	1	0	63	63
06:30 AM	0	0	0	0	0	0	0	0	63	7	0	70	70
06:45 AM	0	0	0	0	1	0	1	0	62	6	0	68	69
Total	0	0	0	0	1	0	1	0	252	28	0	280	281
07:00 AM	0	0	0	0	1	0	1	0	57	7	0	64	65
07:15 AM	0	0	0	0	2	0	2	0	51	6	0	57	59
07:30 AM	0	0	0	0	0	0	0	0	85	9	0	94	94
07:45 AM	0	0	0	0	0	0	0	0	106	16	0	122	122
Total	0	0	0	0	3	0	3	0	299	38	0	337	340
08:00 AM	0	0	0	0	1	0	1	0	98	5	0	103	104
08:15 AM	0	0	0	0	0	0	0	0	96	2	0	98	98
08:30 AM	0	0	0	0	1	0	1	0	77	0	0	77	78
08:45 AM	0	0	0	0	2	0	2	0	89	1	0	90	92
Total	0	0	0	0	4	0	4	0	360	8	0	368	372
Grand Total	0	0	0	0	8	0	8	0	911	74	0	985	993
Apprch %	0	0	0	0	100	0	0	0	92.5	7.5	0	0	0
Total %	0	0	0	0	0.8	0	0.8	0	91.7	7.5	0	0	99.2

Start Time	Kapiolani Hospital Parking Lot				Bingham Street Eastbound								
	Southbound App. Total	Westbound App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:30 AM	0	0	0	0	0	0	0	0	85	9	0	94	94
07:45 AM	0	0	0	0	0	0	0	0	106	16	0	122	122
08:00 AM	0	0	0	0	1	0	1	0	98	5	0	103	104
08:15 AM	0	0	0	0	0	0	0	0	96	2	0	98	98
Total Volume	0	0	0	0	1	0	1	0	385	32	0	417	418
% App. Total	0	0	0	0	100	0	0	0	92.3	7.7	0	0	0
PHF	.000	.000	.000	.000	.250	.000	.250	.000	.908	.500	.000	.855	.857

Peak Hour Analysis From 06:00 AM to 08:30 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 07:30 AM

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

Counter: D4-5674
 Counted: MM
 Weather: Clear

File Name : Kapiolani Parking Lot. PM
 Site Code : 00000001
 Start Date : 9/18/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Southbound			Westbound			Kapiolani Hospital Parking Lot						Bingham Street Eastbound											
	App. Total	Thru	Left	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	Int. Total
03:00 PM	0	0	0	0	0	0	4	0	4	0	0	1	0	111	0	0	1	0	112	0	0	1	0	116
03:15 PM	0	0	0	0	0	0	1	0	1	0	0	24	0	88	0	0	24	0	112	0	0	11	0	113
03:30 PM	0	0	0	-0	0	0	3	0	3	0	0	11	0	87	0	0	11	0	98	0	0	0	0	101
03:45 PM	0	0	0	0	0	0	3	0	3	0	0	0	0	91	0	0	0	0	91	0	0	0	0	94
Total	0	0	0	0	0	0	11	0	11	0	0	36	0	377	0	0	36	0	413	0	0	0	0	424
04:00 PM	0	0	0	0	0	0	10	0	10	0	0	0	0	101	0	0	0	0	101	0	0	0	0	111
04:15 PM	0	0	0	0	0	0	7	0	7	0	0	1	0	96	0	0	1	0	97	0	0	0	0	104
04:30 PM	0	0	0	0	0	0	10	0	10	0	0	1	0	94	0	0	1	0	95	0	0	0	0	105
04:45 PM	0	0	0	0	0	0	7	0	7	0	0	0	0	96	0	0	0	0	96	0	0	0	0	103
Total	0	0	0	0	0	0	34	0	34	0	0	2	0	387	0	0	2	0	389	0	0	0	0	423
05:00 PM	0	0	0	0	0	0	5	0	5	0	0	1	0	94	0	0	1	0	95	0	0	0	0	100
05:15 PM	0	0	0	0	0	0	1	0	1	0	0	0	0	67	0	0	0	0	67	0	0	0	0	68
05:30 PM	0	0	0	0	0	0	8	0	8	0	0	0	0	85	0	0	0	0	85	0	0	0	0	93
05:45 PM	0	0	0	0	0	0	5	0	5	0	0	0	0	65	0	0	0	0	65	0	0	0	0	70
Total	0	0	0	0	0	0	19	0	19	0	0	1	0	311	0	0	1	0	312	0	0	0	0	331
Grand Total	0	0	0	0	0	0	64	0	64	0	0	39	0	1075	0	0	39	0	1114	0	0	0	0	1178
Apprch %	0	0	0	0	0	0	100	0	100	0	0	3.5	0	96.5	0	0	3.5	0	94.6	0	0	0	0	0
Total %	0	0	0	0	0	0	5.4	0	5.4	0	0	3.3	0	91.3	0	0	3.3	0	94.6	0	0	0	0	0

Start Time	Southbound			Westbound			Kapiolani Hospital Parking Lot						Bingham Street Eastbound											
	App. Total	Thru	Left	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	Int. Total
03:00 PM	0	0	0	0	0	0	4	0	4	0	0	1	0	111	0	0	1	0	112	0	0	0	0	116
03:15 PM	0	0	0	0	0	0	1	0	1	0	0	24	0	88	0	0	24	0	112	0	0	0	0	113
03:30 PM	0	0	0	0	0	0	3	0	3	0	0	11	0	87	0	0	11	0	98	0	0	0	0	101
03:45 PM	0	0	0	0	0	0	3	0	3	0	0	0	0	91	0	0	0	0	91	0	0	0	0	94
Total Volume	0	0	0	0	0	0	11	0	11	0	0	36	0	377	0	0	36	0	413	0	0	0	0	424
% App. Total	.000	.000	.000	.000	.000	.000	.688	.000	.688	.000	.000	.375	.000	.849	.000	.000	.375	.000	.922	.000	.000	.000	.000	.914
PHF																								

Peak Hour Analysis From 03:00 PM to 05:30 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 03:00 PM

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

Counter:D4-3889
 Counted:DY
 Weather:Clear

File Name : Kapiolani Garage Exit AM
 Site Code : 00000001
 Start Date : 9/18/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Exit From Kapiolani Parking Garage				Bingham Street Eastbound								
	Southbound App. Total	Westbound App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	0	0	0	3	0	3	0	68	0	1	69	72
06:15 AM	0	0	0	0	12	0	12	0	53	0	0	53	65
06:30 AM	0	0	0	0	8	0	8	0	59	0	0	59	67
06:45 AM	0	0	0	0	13	0	13	0	51	0	0	51	64
Total	0	0	0	0	36	0	36	0	231	0	1	232	268
07:00 AM	0	0	0	0	9	0	9	0	49	0	0	49	58
07:15 AM	0	0	0	0	6	0	6	0	43	0	0	43	49
07:30 AM	0	0	0	0	4	0	4	0	55	0	0	55	59
07:45 AM	0	0	0	0	8	0	8	0	98	0	0	98	106
Total	0	0	0	0	27	0	27	0	245	0	0	245	272
08:00 AM	0	0	0	0	7	0	7	0	83	0	0	83	90
08:15 AM	0	0	0	0	13	0	13	0	80	0	0	80	93
08:30 AM	0	0	0	0	21	0	21	0	58	0	0	58	79
08:45 AM	0	0	0	0	32	0	32	0	71	0	0	71	103
Total	0	0	0	0	73	0	73	0	292	0	0	292	365
Grand Total	0	0	0	0	136	0	136	0	768	0	1	769	905
Approch %	0	0	0	0	100	0	100	0	99.9	0	0.1	100	
Total %	0	0	0	0	15	0	15	0	84.9	0	0.1	85	

Start Time	Exit From Kapiolani Parking Garage				Bingham Street Eastbound								
	Southbound App. Total	Westbound App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:45 AM	0	0	0	0	8	0	8	0	98	0	0	98	106
08:00 AM	0	0	0	0	7	0	7	0	83	0	0	83	90
08:15 AM	0	0	0	0	13	0	13	0	80	0	0	80	93
08:30 AM	0	0	0	0	21	0	21	0	58	0	0	58	79
Total Volume	0	0	0	0	49	0	49	0	319	0	0	319	368
% App. Total	.000	.000	.000	.000	.583	.000	.583	.000	.814	.000	.000	.814	.868
PHF													

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:45 AM

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

Counter:D4-3889

Counted:DY

Weather:Clear

File Name : Kapiolani Garage Exit PM

Site Code : 00000001

Start Date : 9/18/2008

Page No : 1

Groups Printed- Unshifted

Start Time	Southbound			Westbound			Exit From Hospital Parking Garage						Bingham Street Eastbound												
	App. Total	Thru	Left	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	Int. Total	
03:00 PM	0	0	0	0	0	0	29	0	29	0	0	0	0	0	57	0	0	0	0	57	0	0	0	0	86
03:15 PM	0	0	0	0	0	0	22	0	22	0	0	0	0	0	75	0	0	0	0	75	0	0	0	0	97
03:30 PM	0	0	0	0	0	0	22	0	22	0	0	0	0	0	48	0	0	0	0	48	0	0	0	0	70
03:45 PM	0	0	0	0	0	0	22	0	22	0	0	0	0	0	57	0	0	0	0	57	0	0	0	0	79
Total	0	0	0	0	0	0	95	0	95	0	0	0	0	0	237	0	0	0	0	237	0	0	0	0	332
04:00 PM	0	0	0	0	0	0	21	0	21	0	0	0	0	0	57	0	0	0	0	57	0	0	0	0	78
04:15 PM	0	0	0	0	0	0	22	0	22	0	0	0	0	0	51	0	0	0	0	51	0	0	0	0	73
04:30 PM	0	0	0	0	0	0	15	0	15	0	0	0	0	0	51	0	0	0	0	51	0	0	0	0	66
04:45 PM	0	0	0	0	0	0	19	0	19	0	0	0	0	0	65	0	0	0	0	65	0	0	0	0	84
Total	0	0	0	0	0	0	77	0	77	0	0	0	0	0	224	0	0	0	0	224	0	0	0	0	301
05:00 PM	0	0	0	0	0	0	30	0	30	0	0	0	0	0	74	0	0	0	0	74	0	0	0	0	104
05:15 PM	0	0	0	0	0	0	16	0	16	0	0	0	0	0	56	0	0	0	0	56	0	0	0	0	72
05:30 PM	0	0	0	0	0	0	17	0	17	0	0	0	0	0	64	0	0	0	0	64	0	0	0	0	81
05:45 PM	0	0	0	0	0	0	11	0	11	0	0	0	0	0	58	0	0	0	0	58	0	0	0	0	69
Total	0	0	0	0	0	0	74	0	74	0	0	0	0	0	252	0	0	0	0	252	0	0	0	0	326
Grand Total	0	0	0	0	0	0	246	0	246	0	0	0	0	0	713	0	0	0	0	713	0	0	0	0	959
Apprch %	0	0	0	0	0	0	100	0	100	0	0	0	0	0	100	0	0	0	0	100	0	0	0	0	0
Total %	0	0	0	0	0	0	25.7	0	25.7	0	0	0	0	0	74.3	0	0	0	0	74.3	0	0	0	0	0

Start Time	Southbound			Westbound			Exit From Hospital Parking Garage						Bingham Street Eastbound												
	App. Total	Thru	Left	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	App. Total	Thru	Left	Right	Peds	Int. Total	
04:45 PM	0	0	0	0	0	0	19	0	19	0	0	0	0	0	65	0	0	0	0	65	0	0	0	0	84
05:00 PM	0	0	0	0	0	0	30	0	30	0	0	0	0	0	74	0	0	0	0	74	0	0	0	0	104
05:15 PM	0	0	0	0	0	0	16	0	16	0	0	0	0	0	56	0	0	0	0	56	0	0	0	0	72
05:30 PM	0	0	0	0	0	0	17	0	17	0	0	0	0	0	64	0	0	0	0	64	0	0	0	0	81
05:45 PM	0	0	0	0	0	0	82	0	82	0	0	0	0	0	259	0	0	0	0	259	0	0	0	0	341
Total Volume	0	0	0	0	0	0	100	0	100	0	0	0	0	0	100	0	0	0	0	100	0	0	0	0	0
% App. Total	.000	.000	.000	.000	.000	.000	.683	.000	.683	.000	.000	.000	.000	.000	.875	.000	.000	.000	.000	.875	.000	.000	.000	.000	.820
PHF																									

Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:45 PM

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

Counter:D4-5671
 Counted:DY
 Weather:Clear

File Name : Kapiolani Garage Entrance AM
 Site Code : 00000001
 Start Date : 9/18/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Southbound		Westbound		Northbound		Bingham Street Eastbound			
	App. Total	App. Total	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	0	0	0	0	0	10	0	10	10
06:15 AM	0	0	0	0	0	0	21	0	21	21
06:30 AM	0	0	0	0	0	0	19	0	19	19
06:45 AM	0	0	0	0	0	0	23	0	23	23
Total	0	0	0	0	0	0	73	0	73	73
07:00 AM	0	0	0	0	0	0	21	0	21	21
07:15 AM	0	0	0	0	0	0	16	0	16	16
07:30 AM	0	0	0	0	0	0	21	0	21	21
07:45 AM	0	0	0	0	0	0	46	0	46	46
Total	0	0	0	0	0	0	104	0	104	104
08:00 AM	0	0	0	0	0	0	38	0	38	38
08:15 AM	0	0	0	0	0	0	40	0	40	40
08:30 AM	0	0	0	0	0	0	71	0	71	71
08:45 AM	0	0	0	0	0	0	65	0	65	65
Total	0	0	0	0	0	0	214	0	214	214
Grand Total	0	0	0	0	0	0	391	0	391	391
Apprch %	0	0	0	0	0	0	100	0	100	100
Total %	0	0	0	0	0	0	100	0	100	100

Start Time	Southbound		Westbound		Northbound		Bingham Street Eastbound			
	App. Total	App. Total	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	0	0	0	0	38	0	38	38
08:15 AM	0	0	0	0	0	0	40	0	40	40
08:30 AM	0	0	0	0	0	0	71	0	71	71
08:45 AM	0	0	0	0	0	0	65	0	65	65
Total Volume	0	0	0	0	0	0	214	0	214	214
% App. Total	.000	.000	.000	.000	.000	.000	.754	.000	.754	.754
PHF										

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 08:00 AM

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

Counter:D4-5671

Counted:JY

Weather:Clear

File Name : Kapiolani Garage Entrance PM
 Site Code : 00000001
 Start Date : 9/18/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Southbound		Westbound		Northbound		Bingham Street Eastbound				Int. Total	
	App. Total	Thru	App. Total	Thru	App. Total	Thru	Left	Thru	Right	Peds		App. Total
03:00 PM	0	0	0	0	0	0	0	0	42	0	42	42
03:15 PM	0	0	0	0	0	0	0	0	42	0	42	42
03:30 PM	0	0	0	0	0	0	0	0	24	0	24	24
03:45 PM	0	0	0	0	0	0	0	0	30	0	30	30
Total	0	0	0	0	0	0	0	0	138	0	138	138
04:00 PM	0	0	0	0	0	0	0	0	19	0	19	19
04:15 PM	0	0	0	0	0	0	0	0	28	0	28	28
04:30 PM	0	0	0	0	0	0	0	0	14	0	14	14
04:45 PM	0	0	0	0	0	0	0	0	19	0	19	19
Total	0	0	0	0	0	0	0	0	80	0	80	80
05:00 PM	0	0	0	0	0	0	0	0	12	0	12	12
05:15 PM	0	0	0	0	0	0	0	0	18	0	18	18
05:30 PM	0	0	0	0	0	0	0	0	19	0	19	19
05:45 PM	0	0	0	0	0	0	0	0	10	0	10	10
Total	0	0	0	0	0	0	0	0	59	0	59	59
Grand Total	0	0	0	0	0	0	0	0	277	0	277	277
Approch %									100	0	100	
Total %									100	0	100	

Start Time	Southbound		Westbound		Northbound		Bingham Street Eastbound				Int. Total	
	App. Total	Thru	App. Total	Thru	App. Total	Thru	Left	Thru	Right	Peds		App. Total
03:00 PM	0	0	0	0	0	0	0	0	42	0	42	42
03:15 PM	0	0	0	0	0	0	0	0	42	0	42	42
03:30 PM	0	0	0	0	0	0	0	0	24	0	24	24
03:45 PM	0	0	0	0	0	0	0	0	30	0	30	30
Total Volume	0	0	0	0	0	0	0	0	138	0	138	138
% App. Total									100	0	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.821	.000	.821	.821

Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 03:00 PM

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

File Name : Kapiolani Hospital Emerg. Dwy. Bingham AM
 Site Code : 00000001
 Start Date : 9/16/2008
 Page No : 1

Counter:D4-5674
 Counted:MM
 Weather:Clear

Groups Printed- Unshifted

Start Time	Southbound				Westbound				Kapiolani Hospital Emergency Dwy. Northbound				Bingham Street Eastbound							
	App. Total	Thru	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	0	0	4	0	0	0	4	0	0	0	0	0	4	0	0	10	0	10	14
06:15 AM	0	0	0	15	0	0	0	15	0	0	0	0	0	15	0	0	12	0	12	27
06:30 AM	0	0	1	16	0	0	1	15	0	0	0	0	0	16	0	0	14	0	14	30
06:45 AM	0	0	2	21	0	0	2	19	0	0	0	0	0	21	0	0	13	0	13	34
Total	0	0	3	56	0	0	3	53	0	0	0	0	0	56	0	0	49	0	49	105
07:00 AM	0	0	1	15	0	0	1	14	0	0	0	0	0	15	0	0	9	0	9	24
07:15 AM	0	0	5	25	0	0	5	20	0	0	0	0	0	25	0	0	14	0	14	39
07:30 AM	0	0	3	25	0	0	3	22	0	0	0	0	0	25	0	0	11	0	11	36
07:45 AM	0	0	3	18	0	0	3	15	0	0	0	0	0	18	0	0	10	0	10	28
Total	0	0	12	83	0	0	12	71	0	0	0	0	0	83	0	0	44	0	44	127
08:00 AM	0	0	2	9	0	0	2	7	0	0	0	0	0	9	0	0	18	0	18	27
08:15 AM	0	0	2	15	0	0	2	13	0	0	0	0	0	15	0	0	8	0	8	23
08:30 AM	0	0	1	14	0	0	1	13	0	0	0	0	0	14	0	0	9	0	9	23
Grand Total	0	0	20	177	0	0	20	157	0	0	0	0	0	177	0	0	128	0	128	305
Approch %	0	0	11.3	88.7	0	0	11.3	88.7	0	0	0	0	0	88.7	0	0	100	0	100	0
Total %	0	0	6.6	51.5	0	0	6.6	51.5	0	0	0	0	0	58	0	0	42	0	42	0

Start Time	Southbound				Westbound				Kapiolani Hospital Emergency Dwy. Northbound				Bingham Street Eastbound							
	App. Total	Thru	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:45 AM	0	0	2	19	0	0	2	19	21	0	0	13	0	21	0	0	13	0	13	34
07:00 AM	0	0	1	14	0	0	1	14	15	0	0	9	0	15	0	0	9	0	9	24
07:15 AM	0	0	5	20	0	0	5	20	25	0	0	14	0	25	0	0	14	0	14	39
07:30 AM	0	0	3	22	0	0	3	22	25	0	0	11	0	25	0	0	11	0	11	36
Total Volume	0	0	11	75	0	0	11	75	86	0	0	47	0	86	0	0	47	0	47	133
% App. Total	.000	.000	12.8	87.2	.860	.000	12.8	87.2	.860	.000	.000	100	.000	.839	.000	.000	.839	.000	.839	.853
PHF	.000	.000	.550	.852	.860	.000	.550	.852	.860	.000	.000	.839	.000	.839	.000	.000	.839	.000	.839	.853

Peak Hour Analysis From 06:00 AM to 08:30 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 06:45 AM

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

File Name : Kapiolani Hospital Emerg. Dwy. Bingham PM
 Site Code : 00000001
 Start Date : 9/16/2008
 Page No : 1

Counter:D4-5674
 Counted:MM
 Weather:Clear

Groups Printed- Unshifted

Start Time	Kapiolani Emergency Driveway Northbound				Kapiolani Emergency Driveway Southbound				Bingham Street Eastbound				Int. Total		
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru		Right	Peds
03:00 PM	0	0	2	8	10	0	0	0	0	0	0	0	8	0	8
03:15 PM	0	0	3	21	24	0	0	0	0	0	0	0	5	0	5
03:30 PM	0	0	1	6	7	0	0	0	0	0	0	0	4	0	4
03:45 PM	0	0	2	9	11	0	0	0	0	0	0	0	5	0	5
Total	0	0	8	44	52	0	0	0	0	0	0	0	22	0	22
04:00 PM	0	0	5	9	14	0	0	0	0	0	0	0	6	0	6
04:15 PM	0	0	4	7	11	0	0	0	0	0	0	0	6	0	6
04:30 PM	0	0	12	15	27	0	0	0	0	0	0	0	10	0	10
04:45 PM	0	0	5	10	15	0	0	0	0	0	0	0	8	0	8
Total	0	0	26	41	67	0	0	0	0	0	0	0	30	0	30
05:00 PM	0	0	3	6	9	0	0	0	0	0	0	0	4	0	4
05:15 PM	0	0	4	11	15	0	0	0	0	0	0	0	7	0	7
05:30 PM	0	0	5	5	10	0	0	0	0	0	0	0	4	0	4
Grand Total	0	0	46	107	153	0	0	0	0	0	0	0	67	0	67
Approch %	0	0	30.1	69.9	69.5	0	0	0	0	0	0	0	100	0	100
Total %	0	0	20.9	48.6	69.5	0	0	0	0	0	0	0	30.5	0	30.5

Start Time	Kapiolani Emergency Driveway Northbound				Kapiolani Emergency Driveway Southbound				Bingham Street Eastbound				Int. Total		
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru		Right	Peds
04:00 PM	0	0	5	9	14	0	0	0	0	0	0	0	6	0	6
04:15 PM	0	0	4	7	11	0	0	0	0	0	0	0	6	0	6
04:30 PM	0	0	12	15	27	0	0	0	0	0	0	0	10	0	10
04:45 PM	0	0	5	10	15	0	0	0	0	0	0	0	8	0	8
Total Volume	0	0	26	41	67	0	0	0	0	0	0	0	30	0	30
% App. Total	0	0	38.8	61.2	61.2	0	0	0	0	0	0	0	100	0	100
PHF	.000	.000	.542	.683	.620	.000	.000	.000	.000	.000	.000	.000	.750	.000	.750

Peak Hour Analysis From 03:00 PM to 05:30 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

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

Counter:D4-5671, D4-3889

Counted:JY, DY

Weather:Clear

File Name : PunBin AM
 Site Code : 00000001
 Start Date : 9/16/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Punahou Street Southbound					Bingham Street Westbound					Punahou Street Northbound					EB H-1 Off-Ramp Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
	06:00 AM	15	44	0	1	60	0	0	0	12	12	0	60	9	3	72	128	44	253	6	
06:15 AM	17	69	0	0	86	0	0	0	23	23	0	68	14	3	85	116	60	249	14	439	633
06:30 AM	16	93	0	0	109	0	0	0	21	21	0	77	24	7	108	143	58	246	8	455	693
06:45 AM	13	134	0	0	147	0	0	0	29	29	0	124	16	7	147	196	54	171	0	421	744
Total	61	340	0	1	402	0	0	0	85	85	0	329	63	20	412	583	216	919	28	1746	2645
07:00 AM	20	132	0	0	152	0	0	0	43	43	0	119	18	10	147	187	32	120	15	354	696
07:15 AM	29	176	0	0	205	0	0	0	43	43	0	163	23	13	199	155	19	108	21	303	750
07:30 AM	23	204	0	0	227	0	0	0	36	36	0	144	35	28	207	171	39	131	40	381	851
07:45 AM	34	210	0	0	244	0	0	0	33	33	0	124	43	16	183	125	81	229	31	466	926
Total	106	722	0	0	828	0	0	0	155	155	0	550	119	67	736	638	171	588	107	1504	3223
08:00 AM	29	139	0	0	168	0	0	0	20	20	0	137	38	3	178	110	81	215	18	424	790
08:15 AM	20	131	0	0	151	0	0	0	18	18	0	110	45	3	158	114	81	202	3	400	727
08:30 AM	33	87	0	0	120	0	0	0	26	26	0	98	26	1	125	95	78	224	2	399	670
08:45 AM	18	106	0	0	124	0	0	0	12	12	0	114	36	2	152	85	80	201	0	366	654
Total	100	463	0	0	563	0	0	0	76	76	0	459	145	9	613	404	320	842	23	1589	2841
Grand Total	267	1525	0	1	1793	0	0	0	316	316	0	1338	327	96	1761	1625	707	2349	158	4839	8709
Approach % Total	14.9	85.1	0	0.1	20.6	0	0	0	100	3.6	0	15.4	3.8	1.1	20.2	33.6	14.6	48.5	3.3	55.6	
	3.1	17.5	0	0		0	0	0	3.6		0					18.7	8.1	27	1.8		

Start Time	Punahou Street Southbound					Bingham Street Westbound					Punahou Street Northbound					EB H-1 Off-Ramp Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
	07:15 AM	29	176	0	0	205	0	0	0	43	43	0	163	23	13	199	155	19	108	21	
07:30 AM	23	204	0	0	227	0	0	0	36	36	0	144	35	28	207	171	39	131	40	381	851
07:45 AM	34	210	0	0	244	0	0	0	33	33	0	124	43	16	183	125	81	229	31	466	926
08:00 AM	29	139	0	0	168	0	0	0	20	20	0	137	38	3	178	110	81	215	18	424	790
Total Volume	115	729	0	0	844	0	0	0	132	132	0	568	139	60	767	561	220	683	110	1574	3317
% App. Total	13.6	86.4	0	0	20.6	0	0	0	100	3.6	0	15.4	3.8	1.1	20.2	33.6	14.6	48.5	3.3	55.6	
PHF	.846	.868	.000	.000	.865	.000	.000	.000	.767	.767	.000	.871	.808	.536	.926	.820	.679	.746	.688	.844	.896

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 07:15 AM

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

Counter: D4-3889, D4-5671
 Counted: DY, JY
 Weather: Clear

File Name : PunBin PM
 Site Code : 00000001
 Start Date : 9/16/2008
 Page No : 1

Groups Printed: Unshifted

Start Time	Punahou Street Southbound						Bingham Street Westbound						Punahou Street Northbound						EB H-1 Off-Ramp Eastbound					
	Left	Thru	Right	Peds	App. Total		Left	Thru	Right	Peds	App. Total		Left	Thru	Right	Peds	App. Total		Left	Thru	Right	Peds	App. Total	
03:00 PM	17	121	0	1	139	0	0	0	6	6	0	191	36	7	234	170	55	193	24	442	821			
03:15 PM	32	145	0	0	177	0	0	0	15	15	0	174	25	7	206	142	62	166	12	382	780			
03:30 PM	21	102	0	0	123	0	0	0	31	31	0	201	34	2	237	140	66	210	5	421	812			
03:45 PM	31	122	0	0	153	0	0	0	28	28	0	178	21	0	199	149	46	163	4	362	742			
Total	101	490	0	1	592	0	0	0	80	80	0	744	116	16	876	601	229	732	45	1607	3155			
04:00 PM	15	111	0	0	126	0	0	0	32	32	0	180	15	12	207	137	45	154	15	351	716			
04:15 PM	19	116	0	0	135	0	0	0	12	12	0	216	26	1	243	132	38	186	8	364	754			
04:30 PM	22	130	0	0	152	0	0	0	33	33	0	218	29	5	252	142	46	160	11	359	796			
04:45 PM	27	123	0	0	150	0	0	0	25	25	0	226	19	3	248	133	46	130	9	318	741			
Total	83	480	0	0	563	0	0	0	102	102	0	840	89	21	950	544	175	630	43	1392	3007			
05:00 PM	22	126	0	0	148	0	0	0	27	27	0	243	24	3	270	112	45	142	2	301	746			
05:15 PM	16	116	0	0	132	0	0	0	24	24	0	239	21	2	262	113	38	153	10	314	732			
05:30 PM	20	110	0	0	130	0	0	0	20	20	0	240	24	0	264	103	43	156	5	307	721			
05:45 PM	20	103	0	0	123	0	0	0	7	7	0	196	15	0	211	135	43	152	5	335	676			
Total	78	455	0	0	533	0	0	0	78	78	0	918	84	5	1007	463	169	603	22	1257	2875			
Grand Total	262	1425	0	1	1688	0	0	0	260	260	0	2502	289	42	2833	1608	573	1965	110	4256	9037			
Approach %	15.5	84.4	0	0.1		0	0	0	100		0	88.3	10.2	1.5		37.8	13.5	46.2	2.6					
Total %	2.9	15.8	0	0	18.7	0	0	0	2.9		0	27.7	3.2	0.5	31.3	17.8	6.3	21.7	1.2	47.1				

Start Time	Punahou Street Southbound						Bingham Street Westbound						Punahou Street Northbound						EB H-1 Off-Ramp Eastbound					
	Left	Thru	Right	Peds	App. Total		Left	Thru	Right	Peds	App. Total		Left	Thru	Right	Peds	App. Total		Left	Thru	Right	Peds	App. Total	
03:00 PM	17	121	0	1	139	0	0	0	6	6	0	191	36	7	234	170	55	193	24	442	821			
03:15 PM	32	145	0	0	177	0	0	0	15	15	0	174	25	7	206	142	62	166	12	382	780			
03:30 PM	21	102	0	0	123	0	0	0	31	31	0	201	34	2	237	140	66	210	5	421	812			
03:45 PM	31	122	0	0	153	0	0	0	28	28	0	178	21	0	199	149	46	163	4	362	742			
Total	101	490	0	1	592	0	0	0	80	80	0	744	116	16	876	601	229	732	45	1607	3155			
04:00 PM	15	111	0	0	126	0	0	0	32	32	0	180	15	12	207	137	45	154	15	351	716			
04:15 PM	19	116	0	0	135	0	0	0	12	12	0	216	26	1	243	132	38	186	8	364	754			
04:30 PM	22	130	0	0	152	0	0	0	33	33	0	218	29	5	252	142	46	160	11	359	796			
04:45 PM	27	123	0	0	150	0	0	0	25	25	0	226	19	3	248	133	46	130	9	318	741			
Total	83	480	0	0	563	0	0	0	102	102	0	840	89	21	950	544	175	630	43	1392	3007			
05:00 PM	22	126	0	0	148	0	0	0	27	27	0	243	24	3	270	112	45	142	2	301	746			
05:15 PM	16	116	0	0	132	0	0	0	24	24	0	239	21	2	262	113	38	153	10	314	732			
05:30 PM	20	110	0	0	130	0	0	0	20	20	0	240	24	0	264	103	43	156	5	307	721			
05:45 PM	20	103	0	0	123	0	0	0	7	7	0	196	15	0	211	135	43	152	5	335	676			
Total	78	455	0	0	533	0	0	0	78	78	0	918	84	5	1007	463	169	603	22	1257	2875			
Grand Total	262	1425	0	1	1688	0	0	0	260	260	0	2502	289	42	2833	1608	573	1965	110	4256	9037			
Approach %	15.5	84.4	0	0.1		0	0	0	100		0	88.3	10.2	1.5		37.8	13.5	46.2	2.6					
Total %	2.9	15.8	0	0	18.7	0	0	0	2.9		0	27.7	3.2	0.5	31.3	17.8	6.3	21.7	1.2	47.1				

Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 03:00 PM

Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
03:00 PM	17	121	0	1	139	0	0	0	6	6	0	191	36	7	234	170	55	193	24	442	821
03:15 PM	32	145	0	0	177	0	0	0	15	15	0	174	25	7	206	142	62	166	12	382	780
03:30 PM	21	102	0	0	123	0	0	0	31	31	0	201	34	2	237	140	66	210	5	421	812
03:45 PM	31	122	0	0	153	0	0	0	28	28	0	178	21	0	199	149	46	163	4	362	742
Total	101	490	0	1	592	0	0	0	80	80	0	744	116	16	876	601	229	732	45	1607	3155
% App. Total	17.1	82.8	0	0.2		0	0	0	100		0	84.9	13.2	1.8		37.4	14.3	45.6	2.8		
PHF	.789	.845	.000	.250	.836	.000	.000	.000	.645	.645	.000	.925	.806	.571	.924	.884	.867	.871	.469	.909	.961

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

File Name : South Church Dwy. At Punahou PM
 Site Code : 00000001
 Start Date : 9/17/2008
 Page No : 1

Counter: D4-5673
 Counted: TO
 Weather: Clear

Groups Printed- Unshifted

Start Time	Punahou Street RT Into Shriners Hospital Central Union South Church Dwy. Southbound				Central Union South Church Dwy. Westbound				Punahou Street Central Union South Church Dwy. Northbound				RT Into Central Union South Church Dwy. Northbound				Banyan Tree Plaza Eastbound					
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	App. Total	Int. Total
03:00 PM	4	0	1	0	1	0	5	50	0	0	3	0	0	0	0	0	0	0	0	12	3	12
03:15 PM	3	0	0	0	3	0	6	38	0	0	1	0	1	0	1	4	1	0	1	4	1	6
03:30 PM	3	0	0	0	1	0	1	31	0	0	2	0	0	0	0	0	0	0	0	3	2	3
03:45 PM	5	0	2	0	1	0	3	31	0	0	4	0	0	0	0	0	0	0	0	4	4	4
Total	15	0	3	0	6	0	15	150	0	0	10	0	1	0	1	23	1	0	1	23	10	25
04:00 PM	3	0	2	0	2	0	4	86	0	0	3	0	0	0	1	6	0	0	1	6	3	7
04:15 PM	3	0	0	0	1	0	2	23	0	0	5	0	1	0	0	1	1	0	0	1	5	2
04:30 PM	4	0	2	0	2	0	6	56	0	0	5	0	1	0	1	5	1	0	1	5	5	7
04:45 PM	5	0	4	0	3	0	5	27	0	0	1	0	0	0	1	2	1	0	1	2	1	4
Total	15	0	8	0	8	0	17	192	0	0	14	0	3	0	3	14	3	0	3	14	14	20
05:00 PM	3	0	2	0	4	0	12	34	0	0	1	0	0	0	0	0	0	0	0	6	1	6
05:15 PM	4	0	0	0	0	0	9	15	0	0	4	0	0	0	1	4	0	0	1	4	4	5
05:30 PM	2	0	1	0	0	0	4	7	0	0	6	0	0	0	0	0	0	0	0	0	6	0
05:45 PM	6	0	1	0	0	0	2	11	0	0	6	0	0	0	0	0	1	0	0	1	6	2
Total	15	0	4	0	4	0	27	67	0	0	17	0	1	0	1	11	1	0	1	11	17	13
Grand Total	45	0	15	0	18	0	59	409	0	0	41	0	5	0	5	48	5	0	5	48	41	58
Approach %	75	0	25	0	3.7	0	12.1	84.2	0	0	100	0	8.6	0	8.6	82.8	8.6	0	8.6	82.8	6.4	9
Total %	7	0	2.3	0	2.8	0	9.1	63.4	0	0	6.4	0	0.8	0	0.8	7.4	0.8	0	0.8	7.4	6.4	9

Start Time	Punahou Street RT Into Shriners Hospital Central Union South Church Dwy. Southbound				Central Union South Church Dwy. Westbound				Punahou Street Central Union South Church Dwy. Northbound				RT Into Central Union South Church Dwy. Northbound				Banyan Tree Plaza Eastbound					
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	App. Total	Int. Total
03:45 PM	5	0	2	0	1	0	3	31	0	0	4	0	0	0	0	4	0	0	0	4	4	4
04:00 PM	3	0	2	0	2	0	4	86	0	0	3	0	0	0	1	6	0	0	1	6	3	7
04:15 PM	3	0	0	0	1	0	2	23	0	0	5	0	1	0	0	1	1	0	0	1	5	2
04:30 PM	4	0	2	0	2	0	6	56	0	0	5	0	0	0	1	5	1	0	1	5	5	7
Total Volume	15	0	6	0	6	0	15	196	0	0	17	0	2	0	2	16	2	0	2	16	17	20
% App. Total	71.4	0	28.6	0	2.8	0	6.9	90.3	0	0	100	0	10	0	10	80	10	0	10	80	8.50	7.14
PHF	.750	.000	.750	.000	.750	.000	.625	.570	.000	.000	.850	.000	.000	.000	.500	.667	.500	.000	.500	.667	.850	.643

Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 03:45 PM

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

File Name : South Church Dwy. At Punahou AM
 Site Code : 00000001
 Start Date : 9/17/2008
 Page No : 1

Counter:D4-3891
 Counted:TO
 Weather:Clear

Groups Printed- Unshifted

Start Time	Punahou Street RT Into Shriners Hospital Central Union South Dwy. Southbound				LT Into Central Union South Dwy.				Central Union South Church Dwy. Westbound				Punahou Street Into Central Union South Church Dwy. Northbound				RT Eastbound					
	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	
06:00 AM	1	0	0	0	1	0	0	1	21	22	0	0	0	0	0	0	0	0	0	0	0	23
06:15 AM	5	0	0	0	5	1	0	0	32	33	0	0	1	0	1	0	0	0	0	0	0	39
06:30 AM	6	0	2	0	8	0	0	3	39	42	0	0	2	0	2	0	0	0	0	0	0	52
06:45 AM	3	0	0	0	3	2	0	10	53	65	0	0	2	0	2	0	0	0	0	0	0	70
Total	15	0	2	0	17	3	0	14	145	162	3	0	14	53	162	0	0	5	0	0	0	184
07:00 AM	9	0	0	0	9	2	0	2	21	25	0	0	0	0	0	0	0	0	0	0	0	37
07:15 AM	14	0	1	0	15	3	0	4	48	55	0	0	6	0	6	0	0	0	0	0	0	76
07:30 AM	15	0	1	0	16	4	0	9	41	54	0	0	12	0	12	0	0	0	0	0	0	82
07:45 AM	27	0	0	0	27	4	0	11	47	62	0	0	11	0	11	0	0	0	0	0	0	100
Total	65	0	2	0	67	13	0	26	157	196	13	0	34	96	196	0	0	32	0	0	0	295
08:00 AM	5	0	0	0	5	7	0	19	21	47	0	0	7	0	7	0	0	0	0	0	0	59
08:15 AM	8	0	0	0	8	0	0	3	33	36	0	0	2	0	2	0	0	0	0	0	0	46
08:30 AM	4	0	0	0	4	3	0	5	24	32	0	0	1	0	1	0	0	0	0	0	0	37
08:45 AM	1	0	1	0	2	1	0	7	18	26	0	0	2	0	2	0	0	0	0	0	0	30
Total	18	0	1	0	19	11	0	34	96	141	11	0	34	96	141	0	0	12	0	0	0	172
Grand Total	98	0	5	0	103	27	0	74	398	499	0	0	49	0	49	0	0	49	0	0	0	651
Approach %	95.1	0	4.9	0	103	5.4	0	14.8	79.8	499	0	0	100	0	100	0	0	100	0	0	0	651
Total %	15.1	0	0.8	0	15.8	4.1	0	11.4	61.1	76.7	0	0	7.5	0	7.5	0	0	7.5	0	0	0	172

Start Time	Punahou Street RT Into Shriners Hospital Central Union South Dwy. Southbound				LT Into Central Union South Dwy.				Central Union South Church Dwy. Westbound				Punahou Street Into Central Union South Church Dwy. Northbound				RT Eastbound					
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total	
07:15 AM	14	0	1	0	15	3	0	4	48	55	0	0	6	0	6	0	0	0	0	0	0	76
07:30 AM	15	0	1	0	16	4	0	9	41	54	0	0	12	0	12	0	0	0	0	0	0	82
07:45 AM	27	0	0	0	27	4	0	11	47	62	0	0	11	0	11	0	0	0	0	0	0	100
08:00 AM	5	0	0	0	5	7	0	19	21	47	0	0	7	0	7	0	0	0	0	0	0	59
Total Volume	61	0	2	0	63	18	0	43	157	218	0	0	36	0	36	0	0	0	0	0	0	317
% App. Total	96.8	0	3.2	0	63	8.3	0	19.7	72	218	0	0	100	0	100	0	0	0	0	0	0	317
PHF	.565	.000	.500	.000	.583	.643	.000	.566	.818	.879	.000	.000	.750	.000	.750	.000	.000	.750	.000	.000	.000	.793

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 07:15 AM

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

File Name : North Church Dwy. At Punahou AM
 Site Code : 00000001
 Start Date : 9/17/2008
 Page No : 1

Counter:D4-5673
 Counted:TO
 Weather:Clear

Groups Printed- Unshifted

Start Time	Punahou Street RT Into Shriners Hospital Central Union North Church Dwy. Southbound				Central Union North Church Dwy. Westbound				Punahou Street LT Into Shriners Hospital Northbound				Shriner Hospital - South Dwy. Eastbound				Int. Total					
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left		Thru	Right	Peds	App. Total	
06:00 AM	2	0	0	0	2	1	0	0	24	25	0	0	0	0	0	0	0	0	0	0	0	27
06:15 AM	0	0	0	0	0	0	0	2	33	35	0	0	0	0	0	0	0	0	2	2	2	37
06:30 AM	0	0	4	0	4	0	0	1	40	41	1	0	0	8	1	0	0	8	4	12	58	
06:45 AM	0	0	1	0	1	0	0	4	58	62	1	0	0	1	0	0	0	1	6	7	71	
Total	2	0	5	0	7	1	0	7	155	163	2	0	0	9	2	0	0	12	21	21	193	
07:00 AM	0	0	2	0	2	0	0	2	23	25	0	0	0	0	0	0	0	1	5	6	33	
07:15 AM	0	0	1	0	1	0	0	5	51	56	1	0	0	1	1	0	0	2	3	3	61	
07:30 AM	0	0	1	0	1	5	0	22	44	71	0	0	0	0	0	0	0	0	0	0	72	
07:45 AM	0	0	2	0	2	9	0	19	47	75	0	0	0	0	0	0	0	1	0	1	78	
Total	0	0	6	0	6	14	0	48	165	227	1	0	0	3	2	0	0	7	10	10	244	
08:00 AM	0	0	0	0	0	7	0	10	21	38	0	0	0	0	0	0	0	0	0	0	38	
08:15 AM	0	0	3	0	3	5	0	2	33	40	0	0	0	2	0	2	0	2	2	6	49	
08:30 AM	0	0	1	0	1	2	0	2	23	27	0	0	0	1	0	0	0	3	4	4	32	
08:45 AM	0	0	0	0	0	1	0	6	18	25	2	0	0	0	0	0	0	10	10	10	37	
Total	0	0	4	0	4	15	0	20	95	130	2	0	0	3	2	0	0	15	20	20	156	
Grand Total	2	0	15	0	17	30	0	75	415	520	5	0	0	0	5	2	0	15	34	51	593	
Approach %	11.8	0	88.2	0	2.9	5.8	0	14.4	79.8	87.7	100	0	0	0	3.9	0	29.4	66.7	0	8.6	0	
Total %	0.3	0	2.5	0	2.9	5.1	0	12.6	70	87.7	0.8	0	0	0	0.8	0	2.5	5.7	0	8.6	0	

Start Time	Punahou Street RT Into Shriners Hospital Central Union North Church Dwy. Southbound				Central Union North Church Dwy. Westbound				Punahou Street LT Into Shriners Hospital Northbound				Shriner Hospital - South Dwy. Eastbound				Int. Total				
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left		Thru	Right	Peds	App. Total
07:15 AM	0	0	1	0	1	0	0	5	51	56	1	0	0	0	1	0	0	1	2	3	61
07:30 AM	0	0	1	0	1	5	0	22	44	71	0	0	0	0	0	0	0	0	0	0	72
07:45 AM	0	0	2	0	2	9	0	19	47	75	0	0	0	0	0	0	0	1	0	1	78
08:00 AM	0	0	0	0	0	7	0	10	21	38	0	0	0	0	0	0	0	0	0	0	38
Total Volume	0	0	4	0	4	21	0	56	163	240	1	0	0	2	1	0	0	2	2	4	249
% App. Total	0	0	100	0	2.9	8.8	0	23.3	67.9	87.7	100	0	0	0	0.8	0	0	50	50	0	0
PHF	.000	.000	.500	.000	.500	.583	.000	.636	.799	.800	.250	.000	.000	.000	.250	.000	.000	.500	.250	.333	.798

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 07:15 AM

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

Counter: D4-5673
 Counted: TO
 Weather: Clear

File Name : North Church Dwy. At Punahou PM
 Site Code : 00000001
 Start Date : 9/17/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Punahou Street RT Into Shriners Hospital Southbound				Central Union North Church Dwy. Westbound				Punahou Street LT Into Shriners Hospital Northbound				Shriners Hospital South Dwy. Eastbound								
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
03:00 PM	0	0	1	0	1	0	0	11	51	62	1	0	0	0	1	0	0	1	12	13	77
03:15 PM	0	0	1	0	1	1	0	4	40	45	1	0	0	0	1	0	0	3	4	7	54
03:30 PM	0	0	0	0	0	3	0	4	36	43	0	0	0	0	0	0	0	8	3	11	54
03:45 PM	0	0	1	0	1	4	0	6	37	47	0	0	0	0	0	0	0	3	4	7	55
Total	0	0	3	0	3	8	0	25	164	197	2	0	0	0	2	0	0	15	23	38	240
04:00 PM	0	0	0	0	0	1	0	8	90	99	0	0	0	0	0	0	0	7	6	13	112
04:15 PM	0	0	0	0	0	1	0	3	29	33	0	0	0	0	0	0	0	4	1	5	38
04:30 PM	0	0	0	0	0	3	0	4	60	67	0	0	0	0	0	1	0	8	5	14	81
04:45 PM	0	0	0	0	0	2	0	11	30	43	0	0	0	0	0	0	0	2	2	4	47
Total	0	0	0	0	0	7	0	26	209	242	0	0	0	0	0	1	0	21	14	36	278
05:00 PM	0	0	0	0	0	0	0	4	33	37	0	0	0	0	0	0	0	4	6	10	47
05:15 PM	0	0	0	0	0	0	0	14	18	32	0	0	0	0	0	0	0	0	4	4	36
05:30 PM	0	0	0	0	0	0	0	12	7	19	0	0	0	0	0	0	0	1	1	2	21
05:45 PM	0	0	0	0	0	0	0	4	11	15	0	0	0	0	0	0	0	0	1	1	16
Total	0	0	0	0	0	0	0	34	69	103	0	0	0	0	0	0	0	5	12	17	120
Grand Total	0	0	3	0	3	15	0	85	442	542	2	0	0	0	2	1	0	41	49	91	638
Approach %	0	0	100	0	0	2.8	0	15.7	81.5	85	100	0	0	0	0.3	1.1	0	45.1	53.8	0.2	0
Total %	0	0	0.5	0	0.5	2.4	0	13.3	69.3	85	0.3	0	0	0	0.3	0.2	0	6.4	7.7	0	14.3

Start Time	Punahou Street RT Into Shriners Hospital Southbound				Central Union North Church Dwy. Westbound				Punahou Street LT Into Shriners Hospital Northbound				Shriners Hospital South Dwy. Eastbound								
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
03:45 PM	0	0	1	0	1	4	0	6	37	47	0	0	0	0	0	0	0	3	4	7	55
04:00 PM	0	0	0	0	0	1	0	8	90	99	0	0	0	0	0	0	0	7	6	13	112
04:15 PM	0	0	0	0	0	1	0	3	29	33	0	0	0	0	0	0	0	4	1	5	38
04:30 PM	0	0	0	0	0	3	0	4	60	67	0	0	0	0	0	0	0	8	5	14	81
04:45 PM	0	0	0	0	0	2	0	11	30	43	0	0	0	0	0	0	0	2	2	4	47
Total	0	0	0	0	0	7	0	26	209	246	0	0	0	0	0	1	0	22	16	39	286
% App. Total	0	0	100	0	0	3.7	0	8.5	87.8	246	0	0	0	0	0	2.6	0	56.4	41	0	0
PHF	.000	.000	.250	.000	.250	.563	.000	.656	.600	.621	.000	.000	.000	.000	.000	.250	.000	.688	.667	.696	.638

Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 03:45 PM

Counter:D4-5677
 Counted:TO
 Weather:Clear

File Name : Kapiolani Hospital Emerg. Dwy. Punahou PM
 Site Code : 00000001
 Start Date : 9/16/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Traffic From Bingham To Parking Garage Via Ambulance Drop-Off Area Southbound				Kapiolani Emerg. Dwy. At Punahou Ped Count Indicates Public Usage Westbound				Punahou Street Ped Count Indicates Employees/Visitors Walking To Hospital Northbound				Eastbound			
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
03:00 PM	0	6	0	0	6	2	0	8	12	22	0	0	0	21	21	49
03:15 PM	0	4	0	0	4	1	0	4	15	20	0	0	0	23	23	47
03:30 PM	0	6	0	0	6	0	0	1	31	32	0	0	0	22	22	60
03:45 PM	0	1	0	0	1	2	0	1	17	20	0	0	0	23	23	44
Total	0	17	0	0	17	5	0	14	75	94	0	0	0	89	89	200
04:00 PM	0	4	0	0	4	0	0	2	17	19	0	0	0	37	37	60
04:15 PM	0	4	0	0	4	0	0	7	13	20	0	0	1	15	16	40
04:30 PM	0	2	0	0	2	0	0	5	14	19	0	0	0	54	54	75
04:45 PM	0	0	0	0	0	1	0	10	29	40	0	0	0	32	32	72
Total	0	10	0	0	10	1	0	24	73	98	0	0	1	138	139	247
05:00 PM	0	0	0	0	0	2	0	8	13	23	0	0	1	27	28	51
05:15 PM	0	0	0	0	0	0	0	3	27	30	3	0	0	6	9	39
05:30 PM	0	0	0	0	0	1	0	5	15	21	0	0	0	11	11	32
05:45 PM	0	0	0	0	0	0	0	10	8	18	0	0	0	10	10	28
Total	0	0	0	0	0	3	0	26	63	92	3	0	1	54	58	150
Grand Total	0	27	0	0	27	9	0	64	211	284	3	0	2	281	286	597
Approch %	0	100	0	0	4.5	3.2	0	22.5	74.3	47.6	1	0	0.7	98.3	47.9	0
Total %	0	4.5	0	0	0	1.5	0	10.7	35.3	17.3	0.5	0	0.3	47.1	0	0

Start Time	Traffic From Bingham To Parking Garage Via Ambulance Drop-Off Area Southbound				Kapiolani Emerg. Dwy. At Punahou Ped Count Indicates Public Usage Westbound				Punahou Street Ped Count Indicates Employees/Visitors Walking To Hospital Northbound				Eastbound			
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	4	0	0	4	0	0	2	17	19	0	0	0	37	37	60
04:15 PM	0	4	0	0	4	0	0	7	13	20	0	0	1	15	16	40
04:30 PM	0	2	0	0	2	0	0	5	14	19	0	0	0	54	54	75
04:45 PM	0	0	0	0	0	1	0	10	29	40	0	0	0	32	32	72
Total	0	10	0	0	10	1	0	24	73	98	0	0	1	138	139	247
% App. Total	0	100	0	0	6.25	1	0	24.5	74.5	47.6	0	0	0.7	99.3	47.9	0
PHF	0.000	0.625	0.000	0.000	0.625	0.250	0.000	6.000	629	613	0.000	0.000	0.250	639	644	823

Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 04:00 PM

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

Counter:D4-5672, D4-3890
 Counted:DY, JY
 Weather:Clear

File Name : BerPun AM
 Site Code : 00000001
 Start Date : 9/17/2008
 Page No : 1

Groups Printed- Unshifted

Start Time	Punahou Street Southbound				Beretania Street Westbound				Punahou Street Northbound				Eastbound				
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total	
06:00 AM	0	122	150	24	296	9	129	15	12	165	7	49	1	2	59	0	520
06:15 AM	0	124	161	30	315	12	181	27	11	231	7	56	0	1	64	0	610
06:30 AM	0	139	171	37	347	7	336	43	14	400	8	61	0	1	70	0	817
06:45 AM	0	124	151	40	315	7	396	52	22	477	16	82	0	1	99	0	891
Total	0	509	633	131	1273	35	1042	137	59	1273	38	248	1	5	292	0	2838
07:00 AM	0	138	156	22	316	14	462	57	33	566	18	119	0	3	140	0	1022
07:15 AM	0	125	152	28	305	20	466	61	45	592	30	103	0	26	159	0	1056
07:30 AM	0	152	195	42	389	28	543	53	23	647	35	91	0	3	129	0	1165
07:45 AM	0	162	210	40	412	32	490	47	24	593	34	90	1	3	128	0	1133
Total	0	577	713	132	1422	94	1961	218	125	2398	117	403	1	35	556	0	4376
08:00 AM	0	160	215	25	400	16	454	53	20	543	17	80	0	10	107	0	1050
08:15 AM	0	153	195	17	365	12	435	48	24	519	14	88	0	3	105	0	989
08:30 AM	0	147	168	18	333	15	402	27	14	458	19	98	0	6	123	0	914
08:45 AM	0	179	149	19	347	21	304	42	17	384	8	89	0	6	103	0	834
Total	0	639	727	79	1445	64	1595	170	75	1904	58	355	0	25	438	0	3787
Grand Total	0	1725	2073	342	4140	193	4598	525	259	5575	213	1006	2	65	1286	0	11001
Approach %	0	41.7	50.1	8.3		3.5	82.5	9.4	4.6		16.6	78.2	0.2	5.1		0	
Total %	0	15.7	18.8	3.1	37.6	1.8	41.8	4.8	2.4	50.7	1.9	9.1	0	0.6	11.7	0	

Start Time	Punahou Street Southbound				Beretania Street Westbound				Punahou Street Northbound				Eastbound				
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total	
07:15 AM	0	125	152	28	305	20	466	61	45	592	30	103	0	26	159	0	1056
07:30 AM	0	152	195	42	389	28	543	53	23	647	35	91	0	3	129	0	1165
07:45 AM	0	162	210	40	412	32	490	47	24	593	34	90	1	3	128	0	1133
08:00 AM	0	160	151	25	400	16	454	53	20	543	17	80	0	10	107	0	1050
Total Volume	0	599	772	135	1506	96	1953	214	112	2375	116	364	1	42	523	0	4404
% App. Total	0	39.8	51.3	9		4	82.2	9	4.7		22.2	69.6	0.2	8		0	
PHF	.000	.924	.898	.804	.914	.750	.899	.877	.622	.918	.829	.883	.250	.404	.822	.000	.945

Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 07:15 AM

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

Counter:D4-5672, D4-3890
 Counted:DY, JY
 Weather:Clear

File Name : BerPun PM
 Site Code : 00000001
 Start Date : 9/17/2008
 Page No : 1

Start Time	Groups Printed- Unshifted																
	Punahou Street Southbound				Beretania Street Westbound				Punahou Street Northbound				Beretania Street Eastbound				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
03:00 PM	0	155	172	327	17	303	46	366	20	125	0	145	0	0	0	0	838
03:15 PM	0	149	183	332	13	310	53	376	33	125	0	158	0	0	0	0	866
03:30 PM	0	156	190	346	11	374	65	450	21	142	0	163	0	0	0	0	959
03:45 PM	0	154	154	308	16	381	58	455	27	162	0	189	0	0	0	0	952
Total	0	614	699	1313	57	1368	222	1647	101	554	0	655	0	0	0	0	3615
04:00 PM	0	140	154	294	20	375	60	455	24	171	0	195	0	0	0	0	944
04:15 PM	0	115	144	259	18	368	57	433	30	174	0	204	0	0	0	0	896
04:30 PM	0	144	160	304	9	321	70	400	26	174	0	200	0	0	0	0	904
04:45 PM	0	125	166	291	26	295	55	376	32	166	0	198	0	0	0	0	865
Total	0	524	624	1148	73	1349	242	1664	112	685	0	797	0	0	0	0	3609
05:00 PM	0	133	135	268	19	291	52	362	20	140	0	160	0	0	0	0	790
05:15 PM	0	110	157	267	18	294	51	363	34	200	0	234	0	0	0	0	864
05:30 PM	0	133	157	290	15	230	54	299	23	195	0	218	0	0	0	0	807
05:45 PM	0	128	139	267	19	209	50	278	21	172	0	193	0	0	0	0	738
Total	0	504	588	1092	71	1024	207	1302	98	707	0	805	0	0	0	0	3199
Grand Total	0	1642	1911	3553	201	3741	671	4613	311	1946	0	2257	0	0	0	0	10423
Apprch %	0	46.2	53.8		4.4	81.1	14.5		13.8	86.2	0		0	0	0	0	
Total %	0	15.8	18.3	34.1	1.9	35.9	6.4	44.3	3	18.7	0	21.7	0	0	0	0	

Start Time	Peak Hour for Entire Intersection Begins at 03:30 PM																
	Punahou Street Southbound				Beretania Street Westbound				Punahou Street Northbound				Beretania Street Eastbound				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
03:30 PM	0	156	190	346	11	374	65	450	21	142	0	163	0	0	0	0	959
03:45 PM	0	154	154	308	16	381	58	455	27	162	0	189	0	0	0	0	952
04:00 PM	0	140	154	294	20	375	60	455	24	171	0	195	0	0	0	0	944
04:15 PM	0	115	144	259	18	368	57	433	30	174	0	204	0	0	0	0	896
Total Volume	0	565	642	1207	65	1488	240	1793	102	649	0	751	0	0	0	0	3751
% App. Total	0	46.8	53.2		3.6	83	13.4		13.6	86.4	0		0	0	0	0	
PHF	.000	.905	.845	.872	.813	.976	.923	.985	.850	.932	.000	.920	.000	.000	.000	.000	.978

APPENDIX B

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

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

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

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

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

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

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

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

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

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

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

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

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

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

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

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

APPENDIX C

**CAPACITY ANALYSIS CALCULATIONS
EXISTING PEAK PERIOD TRAFFIC ANALYSIS**

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: AM PEAK
 Project ID:
 E/W St: H-1 EB Off-Ramp/Bingham St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Existing
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	2	0	1	2	0
LGConfig	L	LT	R					TR		L	T	
Volume	561	223	682					557	138	116	727	
Lane Width	12.0	12.0	12.0					12.0		12.0	12.0	
RTOR Vol			171						14			

Duration 1.00 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A		
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		40.0				40.0		
Yellow		4.0				4.0		
All Red		1.0				1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	787	1770	0.55	0.44	19.2	B		
LT	809	1820	0.62	0.44	20.6	C	19.2	B
R	1246	2803	0.49	0.44	18.0	B		
Westbound								
Northbound								
TR	1533	3449	0.47	0.44	17.8	B	17.8	B
Southbound								
L	250	562	0.53	0.44	20.4	C		
T	1576	3547	0.53	0.44	18.5	B	18.8	B

Intersection Delay = 18.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: PM PEAK
 Project ID:
 E/W St: H-1 EB Off-Ramp/Bingham St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Existing
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	2	0	1	2	0
LGConfig	L	LT	R					TR		L	T	
Volume	601	226	747					736	114	101	495	
LANE Width	12.0	12.0	12.0					12.0		12.0	12.0	
RTOR Vol			187						11			

Duration 1.00 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A		
Right	A				Right	A		
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A		
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	36.5				43.5			
Yellow	4.0				4.0			
All Red	1.0				1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	718	1770	0.58	0.41	22.1	C		
LT	738	1819	0.64	0.41	23.3	C	21.9	C
R	1137	2803	0.53	0.41	20.7	C		
Westbound								
Northbound								
TR	1682	3481	0.55	0.48	16.7	B	16.7	B
Southbound								
L	202	417	0.60	0.48	22.1	C		
T	1714	3547	0.35	0.48	14.6	B	15.8	B

Intersection Delay = 19.0 (sec/veh) Intersection LOS = B

HCS+: Unsignalized Intersections Release 5.3

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
 Agency/Co.:
 Date Performed: 4/27/2009
 Analysis Time Period: AM Peak
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year: Existing
 Project ID:
 East/West Street: Bingham St
 North/South Street: Alexander St
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		155	161				
Peak-Hour Factor, PHF		0.86	0.86				
Hourly Flow Rate, HFR		180	187				
Percent Heavy Vehicles		--	--		--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0				
Configuration			TR				
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume				36			
Peak Hour Factor, PHF				0.64			
Hourly Flow Rate, HFR				56			
Percent Heavy Vehicles				2			
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage				/	/		/
Lanes				1			
Configuration				R			

Delay, Queue Length, and Level of Service

Approach Movement	EB	WB	Northbound			Southbound		
			7	8	9	10	11	12
Lane Config					R			
v (vph)					56			
C(m) (vph)					765			
v/c					0.07			
95% queue length					0.24			
Control Delay					10.1			
LOS					B			
Approach Delay				10.1				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.3

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
 Agency/Co.:
 Date Performed: 4/27/2009
 Analysis Time Period: PM Peak
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year: Existing
 Project ID:
 East/West Street: Bingham St
 North/South Street: Alexander St
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach Movement	Eastbound			Westbound		
	1 L	2 T	3 R	4 L	5 T	6 R
Volume		185	195			
Peak-Hour Factor, PHF		0.90	0.90			
Hourly Flow Rate, HFR		205	216			
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0			
Configuration			TR			
Upstream Signal?		No			No	

Minor Street: Approach Movement	Northbound			Southbound		
	7 L	8 T	9 R	10 L	11 T	12 R
Volume			17			
Peak Hour Factor, PHF			0.83			
Hourly Flow Rate, HFR			20			
Percent Heavy Vehicles			2			
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage				/		
Lanes			1			
Configuration			R			

Delay, Queue Length, and Level of Service

Approach Movement Lane Config	EB	WB	Northbound			Southbound		
	1	4	7	8	9 R	10	11	12
v (vph)					20			
C(m) (vph)					727			
v/c					0.03			
95% queue length					0.08			
Control Delay					10.1			
LOS					B			
Approach Delay				10.1				
Approach LOS				B				

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 04/08/09
 Period: AM PEAK
 Project ID:
 E/W St: Beretania St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Existing
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	4	0	1	2	0	0	2	2
LGConfig				LTR			L	T		T		R
Volume				96	1953	233	116	406		604	783	
Lane Width				12.0			12.0	12.0		12.0	12.0	
RTOR Vol										195		

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	36.0				17.0	27.0		
Yellow	4.0				0.0	4.0		
All Red	1.0				0.0	1.0		
Cycle Length: 90.0 secs								

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

Westbound

Northbound

Southbound

LTR	2663	6657	0.93	0.40	33.6	C	33.6	C
L	334	1770	0.39	0.19	32.7	C		
T	1734	3547	0.26	0.49	13.5	B	17.8	B
T	1064	3547	0.62	0.30	28.3	C	30.7	C
R	841	2803	0.77	0.30	33.1	C		

Intersection Delay = 30.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: PM PEAK
 Project ID:
 E/W St: Beretania St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Existing
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	4	0	1	2	0	0	2	2
LGConfig	LTR						L	T			T	R
Volume				57	1368	230	101	576			582	659
Lane Width				12.0			12.0	12.0			12.0	12.0
RTOR Vol							23			165		

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		31.0				22.0	27.0	
Yellow		4.0				0.0	4.0	
All Red		1.0				0.0	1.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

Westbound

LTR 2282 6625 0.79 0.34 28.7 C 28.7 C

Northbound

L 433 1770 0.27 0.24 27.8 C
 T 1931 3547 0.34 0.54 11.6 B 14.0 B

Southbound

T 1064 3547 0.58 0.30 27.4 C 27.9 C
 R 841 2803 0.62 0.30 28.5 C

Intersection Delay = 25.4 (sec/veh) Intersection LOS = C

APPENDIX D

**CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2017 PEAK PERIOD TRAFFIC
ANALYSIS WITHOUT PROJECT**

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: AM PEAK
 Project ID:
 E/W St: H-1 EB Off-Ramp/Bingham St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2017 w/out project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	2	0	1	2	0
LGConfig	L	LT	R					TR		L	T	
Volume	586	233	713					582	138	116	760	
LANE Width	12.0	12.0	12.0					12.0		12.0	12.0	
RTOR Vol			178						14			

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A		
Right	A				Right	A		
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A		
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	40.0				40.0			
Yellow	4.0				4.0			
All Red	1.0				1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	787	1770	0.58	0.44	19.7	B		
LT	809	1820	0.64	0.44	21.2	C	19.7	B
R	1246	2803	0.51	0.44	18.3	B		
Westbound								
Northbound								
TR	1535	3453	0.48	0.44	17.9	B	17.9	B
Southbound								
L	238	536	0.56	0.44	21.5	C		
T	1576	3547	0.55	0.44	18.9	B	19.2	B

Intersection Delay = 19.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: PM PEAK
 Project ID:
 E/W St: H-1 EB Off-Ramp/Bingham St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2017 w/out project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	2	0	1	2	0
LGConfig	L	LT	R					TR		L	T	
Volume	628	236	781					769	114	101	517	
Lane Width	12.0	12.0	12.0					12.0		12.0	12.0	
RTOR Vol			195						11			

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A		
Right	A				Right	A		
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A		
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	36.5				43.5			
Yellow	4.0				4.0			
All Red	1.0				1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/Lane Grp	Lane Group	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
	Capacity		v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	718	1770	0.61	0.41	22.7	C		
LT	738	1819	0.66	0.41	24.0	C	22.5	C
R	1137	2803	0.55	0.41	21.1	C		
Westbound								
Northbound								
TR	1684	3484	0.57	0.48	17.0	B	17.0	B
Southbound								
L	189	391	0.65	0.48	25.1	C		
T	1714	3547	0.36	0.48	14.7	B	16.4	B

Intersection Delay = 19.5 (sec/veh) Intersection LOS = B

HCS+: Unsignalized Intersections Release 5.3

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
 Agency/Co.:
 Date Performed: 4/27/2009
 Analysis Time Period: AM Peak
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year: Year 2017 w/out project
 Project ID:
 East/West Street: Bingham St
 North/South Street: Alexander St
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		165	161				
Peak-Hour Factor, PHF		0.86	0.86				
Hourly Flow Rate, HFR		191	187				
Percent Heavy Vehicles		--	--			--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0				
Configuration			TR				
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume				36			
Peak Hour Factor, PHF				0.64			
Hourly Flow Rate, HFR				56			
Percent Heavy Vehicles				2			
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage					/		/
Lanes				1			
Configuration				R			

Delay, Queue Length, and Level of Service

Approach Movement	EB	WB	Northbound			Southbound		
			7	8	9	10	11	12
Lane Config					R			
v (vph)					56			
C(m) (vph)					755			
v/c					0.07			
95% queue length					0.24			
Control Delay					10.2			
LOS					B			
Approach Delay				10.2				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.3

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
 Agency/Co.:
 Date Performed: 4/27/2009
 Analysis Time Period: PM Peak
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year: Year 2017 w/out project
 Project ID:
 East/West Street: Bingham St
 North/South Street: Alexander St
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		195	195				
Peak-Hour Factor, PHF		0.90	0.90				
Hourly Flow Rate, HFR		216	216				
Percent Heavy Vehicles		--	--		--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0				
Configuration			TR				
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume				17			
Peak Hour Factor, PHF				0.83			
Hourly Flow Rate, HFR				20			
Percent Heavy Vehicles				2			
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage					/		/
Lanes				1			
Configuration				R			

Delay, Queue Length, and Level of Service

Approach Movement Lane Config	EB 1	WB 4	Northbound			Southbound		
			7	8	9 R	10	11	12
v (vph)					20			
C(m) (vph)					717			
v/c					0.03			
95% queue length					0.09			
Control Delay					10.2			
LOS					B			
Approach Delay				10.2				
Approach LOS				B				

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 04/08/09
 Period: AM PEAK
 Project ID:
 E/W St: Beretania St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2017 w/out project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound				
	L	T	R	L	T	R	L	T	R	L	T	R		
No. Lanes	0	0	0	0	4	0	1	2	0	0	2	2		
LGConfig	LTR						L	T	T R					
Volume				100	2041	243	121	424				631	818	
Lane Width				12.0			12.0	12.0				12.0	12.0	
RTOR Vol													205	

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		37.5				15.5	27.0	
Yellow		4.0				0.0	4.0	
All Red		1.0				0.0	1.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

Westbound

LTR 2774 6657 0.94 0.42 33.0 C 33.0 C

Northbound

L 305 1770 0.44 0.17 34.4 C
 T 1675 3547 0.28 0.47 14.5 B 18.9 B

Southbound

T 1064 3547 0.65 0.30 28.8 C 31.8 C
 R 841 2803 0.80 0.30 34.9 C

Intersection Delay = 30.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: PM PEAK
 Project ID:
 E/W St: Beretania St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2017 w/out project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound			
	L	T	R	L	T	R	L	T	R	L	T	R	
No. Lanes	0	0	0	0	4	0	1	2	0	0	2	2	
LGConfig	LTR						L	T			T	R	
Volume				60	1430	240	106	602			608	689	
Lane Width				12.0			12.0	12.0			12.0	12.0	
RTOR Vol							24						172

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		31.0				22.0	27.0	
Yellow		4.0				0.0	4.0	
All Red		1.0				0.0	1.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

Westbound

LTR 2282 6625 0.83 0.34 29.9 C 29.9 C

Northbound

L 433 1770 0.28 0.24 27.9 C
 T 1931 3547 0.36 0.54 11.7 B 14.1 B

Southbound

T 1064 3547 0.60 0.30 27.9 C 28.4 C
 R 841 2803 0.65 0.30 29.1 C

Intersection Delay = 26.2 (sec/veh) Intersection LOS = C

APPENDIX E

**CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2017 PEAK PERIOD TRAFFIC
ANALYSIS WITH PROJECT**

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: AM PEAK
 Project ID:
 E/W St: H-1 EB Off-Ramp/Bingham St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2017 w/ project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	2	0	1	2	0
LGConfig	L	LT	R					TR		L	T	
Volume	586	247	713					582	146	123	760	
LANE Width	12.0	12.0	12.0					12.0		12.0	12.0	
RTOR Vol			178						15			

Duration 1.00 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A		
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		40.0				40.0		
Yellow		4.0				4.0		
All Red		1.0				1.0		
Cycle Length: 90.0 secs								

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	787	1770	0.58	0.44	19.7	B		
LT	809	1821	0.67	0.44	21.8	C	19.9	B
R	1246	2803	0.51	0.44	18.3	B		
Westbound								
Northbound								
TR	1533	3449	0.49	0.44	18.0	B	18.0	B
Southbound								
L	236	530	0.60	0.44	23.1	C		
T	1576	3547	0.55	0.44	18.9	B	19.5	B

Intersection Delay = 19.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: PM PEAK
 Project ID:
 E/W St: H-1 EB Off-Ramp/Bingham St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2017 w/ project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	2	0	1	2	0
LGConfig	L	LT	R					TR		L	T	
Volume	628	245	781				769	118		105	517	
Lane Width	12.0	12.0	12.0				12.0			12.0	12.0	
RTOR Vol			195					11				

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A		
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		36.0				44.0		
Yellow		4.0				4.0		
All Red		1.0				1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	708	1770	0.62	0.40	23.2	C		
LT	728	1820	0.69	0.40	25.1	C	23.1	C
R	1121	2803	0.56	0.40	21.5	C		
Westbound								
Northbound								
TR	1702	3481	0.57	0.49	16.7	B	16.7	B
Southbound								
L	191	391	0.66	0.49	26.2	C		
T	1734	3547	0.36	0.49	14.4	B	16.4	B

Intersection Delay = 19.7 (sec/veh) Intersection LOS = B

HCS+: Unsignalized Intersections Release 5.3

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
 Agency/Co.:
 Date Performed: 4/27/2009
 Analysis Time Period: AM Peak
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year: Year 2017 w/ project
 Project ID:
 East/West Street: Bingham St
 North/South Street: Alexander St
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street:	Approach	Eastbound			Westbound		
	Movement	1	2	3	4	5	6
		L	T	R	L	T	R
Volume			171	167			
Peak-Hour Factor, PHF			0.86	0.86			
Hourly Flow Rate, HFR			198	194			
Percent Heavy Vehicles			--	--		--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes			1	0			
Configuration				TR			
Upstream Signal?			No			No	

Minor Street:	Approach	Northbound			Southbound		
	Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume				36			
Peak Hour Factor, PHF				0.64			
Hourly Flow Rate, HFR				56			
Percent Heavy Vehicles				2			
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage					/		/
Lanes				1			
Configuration				R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config					R			
v (vph)					56			
C(m) (vph)					744			
v/c					0.08			
95% queue length					0.24			
Control Delay					10.2			
LOS					B			
Approach Delay				10.2				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.3

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
 Agency/Co.:
 Date Performed: 4/27/2009
 Analysis Time Period: PM Peak
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year: Year 2017 w/ project
 Project ID:
 East/West Street: Bingham St
 North/South Street: Alexander St
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach Movement	Eastbound			Westbound		
	1 L	2 T	3 R	4 L	5 T	6 R
Volume		210	210			
Peak-Hour Factor, PHF		0.90	0.90			
Hourly Flow Rate, HFR		233	233			
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage RT Channelized?	Undivided			/		
Lanes		1	0			
Configuration			TR			
Upstream Signal?		No			No	

Minor Street: Approach Movement	Northbound			Southbound		
	7 L	8 T	9 R	10 L	11 T	12 R
Volume			17			
Peak Hour Factor, PHF			0.83			
Hourly Flow Rate, HFR			20			
Percent Heavy Vehicles			2			
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage				/		
Lanes			1			
Configuration			R			

Delay, Queue Length, and Level of Service

Approach Movement Lane Config	EB	WB	Northbound			Southbound		
	1	4	7	8	9 R	10	11	12
v (vph)					20			
C(m) (vph)					693			
v/c					0.03			
95% queue length					0.09			
Control Delay					10.3			
LOS					B			
Approach Delay				10.3				
Approach LOS				B				

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 04/08/09
 Period: AM PEAK
 Project ID:
 E/W St: Beretania St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2017 w/ project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	4	0	1	2	0	0	2	2
LGConfig	LTR						L	T			T	R
Volume				100	2046	247	121	429			631	818
Lane Width				12.0			12.0	12.0			12.0	12.0
RTOR Vol							25			205		

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		37.5				15.5	27.0	
Yellow		4.0				0.0	4.0	
All Red		1.0				0.0	1.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Delay LOS		Approach Delay LOS	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

Westbound

LTR 2773 6656 0.94 0.42 33.4 C 33.4 C

Northbound

L 305 1770 0.44 0.17 34.4 C
 T 1675 3547 0.28 0.47 14.6 B 18.9 B

Southbound

T 1064 3547 0.65 0.30 28.8 C 31.8 C
 R 841 2803 0.80 0.30 34.9 C

Intersection Delay = 31.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: PM PEAK
 Project ID:
 E/W St: Beretania St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2017 w/ project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	4	0	1	2	0	0	2	2
LGConfig	LTR						L	T		T R		
Volume				61	1442	243	106	605		608 689		
Lane Width				12.0			12.0	12.0		12.0 12.0		
RTOR Vol							24			172		

Duration 1.00 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		32.0				21.0	27.0	
Yellow		4.0				0.0	4.0	
All Red		1.0				0.0	1.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

Westbound

LTR 2356 6625 0.81 0.36 28.6 C 28.6 C

Northbound

L 413 1770 0.30 0.23 28.8 C
 T 1892 3547 0.37 0.53 12.3 B 14.8 B

Southbound

T 1064 3547 0.60 0.30 27.9 C 28.4 C
 R 841 2803 0.65 0.30 29.1 C

Intersection Delay = 25.7 (sec/veh) Intersection LOS = C

APPENDIX F

**CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2026 PEAK PERIOD TRAFFIC
ANALYSIS WITH PROJECT**

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: AM PEAK
 Project ID:
 E/W St: H-1 EB Off-Ramp/Bingham St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2026 w/ project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	2	0	1	2	0
LGConfig	L	LT	R					TR		L	T	
Volume	611	302	743				610	182		154	792	
LANE Width	12.0	12.0	12.0				12.0			12.0	12.0	
RTOR Vol			186					18				

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A		
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		36.0				44.0		
Yellow		4.0				4.0		
All Red		1.0				1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	708	1770	0.67	0.40	24.7	C		
LT	731	1828	0.74	0.40	27.1	C	24.2	C
R	1121	2803	0.55	0.40	21.4	C		
Westbound								
Northbound								
TR	1679	3434	0.49	0.49	15.6	B	15.6	B
Southbound								
L	247	506	0.69	0.49	26.2	C		
T	1734	3547	0.51	0.49	15.9	B	17.6	B

Intersection Delay = 20.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: PM PEAK
 Project ID:
 E/W St: H-1 EB Off-Ramp/Bingham St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2026 w/ project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	2	0	1	2	0
LGConfig	L	LT	R					TR		L	T	
Volume	655	287	814					814	134	119	540	
Lane Width	12.0	12.0	12.0					12.0		12.0	12.0	
RTOR Vol			204						13			

Duration 1.00 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A		
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		35.0				45.0		
Yellow		4.0				4.0		
All Red		1.0				1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	688	1770	0.70	0.39	26.3	C		
LT	710	1826	0.72	0.39	26.9	C	25.1	C
R	1090	2803	0.59	0.39	22.6	C		
Westbound								
Northbound								
TR	1739	3478	0.57	0.50	16.1	B	16.1	B
Southbound								
L	193	385	0.68	0.50	27.1	C		
T	1774	3547	0.34	0.50	13.7	B	16.1	B

Intersection Delay = 20.5 (sec/veh) Intersection LOS = C

HCS+: Unsignalized Intersections Release 5.3

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
 Agency/Co.:
 Date Performed: 4/27/2009
 Analysis Time Period: AM Peak
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year: Year 2026 w/ project
 Project ID:
 East/West Street: Bingham St
 North/South Street: Alexander St
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		200	187				
Peak-Hour Factor, PHF		0.86	0.86				
Hourly Flow Rate, HFR		232	217				
Percent Heavy Vehicles		--	--		--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0				
Configuration			TR				
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume				36			
Peak Hour Factor, PHF				0.64			
Hourly Flow Rate, HFR				56			
Percent Heavy Vehicles				2			
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage				/		/	
Lanes				1			
Configuration				R			

Delay, Queue Length, and Level of Service

Approach Movement	EB	WB	Northbound			Southbound		
			7	8	9	10	11	12
Lane Config					R			
v (vph)					56			
C(m) (vph)					702			
v/c					0.08			
95% queue length					0.26			
Control Delay					10.6			
LOS					B			
Approach Delay				10.6				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.3

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
 Agency/Co.:
 Date Performed: 4/27/2009
 Analysis Time Period: PM Peak
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year: Year 2026 w/ project
 Project ID:
 East/West Street: Bingham St
 North/South Street: Alexander St
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		293	286				
Peak-Hour Factor, PHF		0.90	0.90				
Hourly Flow Rate, HFR		325	317				
Percent Heavy Vehicles		--	--		--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0				
Configuration			TR				
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume				17			
Peak Hour Factor, PHF				0.83			
Hourly Flow Rate, HFR				20			
Percent Heavy Vehicles				2			
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage					/		/
Lanes				1			
Configuration				R			

Delay, Queue Length, and Level of Service

Approach Movement	EB	WB	Northbound			Southbound		
			7	8	9	10	11	12
Lane Config	1	4			R			
v (vph)					20			
C(m) (vph)					583			
v/c					0.03			
95% queue length					0.11			
Control Delay					11.4			
LOS					B			
Approach Delay				11.4				
Approach LOS				B				

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 04/08/09
 Period: AM PEAK
 Project ID:
 E/W St: Beretania St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2026 w/ project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	4	0	1	2	0	0	2	2
LGConfig				LTR			L	T		T		R
Volume				106	2151	273	126	471		658		853
Lane Width				12.0			12.0	12.0		12.0		12.0
RTOR Vol							27			213		

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	38.0				15.0		27.0	
Yellow	4.0				0.0		4.0	
All Red	1.0				0.0		1.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

Westbound

LTR 2809 6652 0.94 0.42 33.0 C 33.0 C

Northbound

L 295 1770 0.45 0.17 34.9 C
 T 1655 3547 0.30 0.47 15.0 B 19.2 B

Southbound

T 1064 3547 0.65 0.30 28.8 C 31.8 C
 R 841 2803 0.80 0.30 34.9 C

Intersection Delay = 30.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Analyst: CL
 Agency:
 Date: 4/8/09
 Period: PM PEAK
 Project ID:
 E/W St: Beretania St

Inter.:
 Area Type: All other areas
 Jurisd:
 Year : Year 2026 w/ project
 N/S St: Punahou St

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound			
	L	T	R	L	T	R	L	T	R	L	T	R	
No. Lanes	0	0	0	0	4	0	1	2	0	0	2	2	
LGConfig	LTR						L	T			T	R	
Volume				66	1566	269	110	642			634	718	
Lane Width				12.0			12.0	12.0			12.0	12.0	
RTOR Vol							27						180

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		33.0				20.0	27.0	
Yellow		4.0				0.0	4.0	
All Red		1.0				0.0	1.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

Westbound

LTR 2428 6623 0.81 0.37 28.0 C 28.0 C

Northbound

L 393 1770 0.30 0.22 29.6 C
 T 1852 3547 0.37 0.52 12.8 B 15.3 B

Southbound

T 1064 3547 0.63 0.30 28.3 C 29.0 C
 R 841 2803 0.67 0.30 29.8 C

Intersection Delay = 25.8 (sec/veh) Intersection LOS = C