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JUL - 8 2020

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June 30, 2020

Director
Office of Environmental Quality Control
Department of Health, State of Hawaii
235 S. Beretania Street, Room 702
Honolulu, Hawaii 96813
(*by electronic submittal*)

Dear Director:

Ambulatory Care Center Replacement
Request for Publication
National Environmental Policy Act (NEPA) - Draft Environmental Assessment
Joint Base Pearl Harbor-Hickam, Oahu, Hawaii

On behalf of the United States Department of the Navy, we request publication of the subject NEPA Draft Environmental Assessment (EA) Notice of Availability in the Federal Notices section of the July 8, 2020 edition of the Office of Environmental Quality Control (OEQC) Environmental Notice.

Attached is a completed OEQC Publication Form (for NEPA Action EA) and an Adobe Acrobat PDF file of the Draft EA.

If there are any questions or you need additional information, please contact the Navy's point of contact, Mr. John Bigay, at (808) 472-1442 or by email at john.bigay@navy.mil.

Sincerely,

Adriane Truluck
Project Manager, AECOM

Attachments
1. Draft EA for Ambulatory Care Center Replacement at JBPHH (PDF format)
2. NEPA Action EA/EIS Publication Form (Word format)

cc: ATTN: EV21JB, Naval Facilities Engineering Command, Pacific

20-304

NEPA Action EA/EIS
Publication Form

Project Name: Draft Environmental Assessment for Ambulatory Care Center Replacement at Joint Base Pearl Harbor-Hickam, Oahu, Hawaii

Island: Oahu
District: Joint Base Pearl Harbor-Hickam
TMK: 1-1-1-002:002, 1-9-9-001:008
Permits: N/A

Applicant or Proposing Agency:
Naval Facilities Engineering Command Pacific
Department of Defense, Department of the Navy
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Approving Agency:
Naval Facilities Engineering Command Pacific

Consultant:
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Status:
Comment Period: 30-days
Deadline: 08/08/2020
Transmit Comments by mail to: Naval Facilities Engineering Command Atlantic, 6506 Hampton Boulevard, Norfolk, VA 23508, ATTN: EA Project Manager for ACC Replacement (Code EV21)
Or by email to: NFPAC-Receive2@navy.mil.

Interested parties may also view a copy of the Draft EA for this action at the following website: https://www.navfac.navy.mil/navfac_worldwide/pacific/about_us/national-environmental-policy-act--nepa--information.html (Scroll to bottom of this page for "NEPA documents available for public review")

Summary:

Joint Base Pearl Harbor-Hickam (JBPHH), a command of the United States Department of the Navy (hereinafter, jointly referred to as the Navy) has prepared this Environmental Assessment (EA) to evaluate a proposal to construct and operate a new ambulatory care center (ACC) to consolidate existing facilities and services separately managed by the Navy, Air Force, and Army to a location at JBPHH. This EA evaluates the potential environmental impacts associated with three action alternatives and the No Action Alternative to the following resources: cultural resources, air quality, biological resources, visual resources, transportation, and hazardous materials and wastes.

The purpose of the Proposed Action is to provide comprehensive primary care, dental, behavioral health, occupational, and preventive special medicine services to active duty service members and beneficiaries in facilities that are appropriately sized, configured, and sited to meet mission requirements and comply with current federal criteria for military health facilities. The Proposed Action is needed to rectify current capacity deficiencies at the existing service clinics and ensure that the services continue to provide high-quality health care to entitled military personnel, dependents, and retirees in the JBPHH region.

Public Release Draft

ENVIRONMENTAL ASSESSMENT

for

AMBULATORY CARE CENTER REPLACEMENT

at

JOINT BASE PEARL HARBOR-HICKAM, OAHU, HAWAII

July 2020

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Abstract

Designation:	Environmental Assessment
Title of Proposed Action:	Ambulatory Care Center Replacement
Project Location:	Joint Base Pearl Harbor-Hickam
Lead Agency for the EA:	United States Department of the Navy
Cooperating Agency:	None
Affected Region:	Navy Region Hawaii
Action Proponent:	Joint Base Pearl Harbor-Hickam
Point of Contact:	Mr. Jeffery H. Butts, Code EV21 Naval Facilities Engineering Command, Atlantic 6506 Hampton Boulevard Norfolk, VA 23508
Date:	July 2020

Joint Base Pearl Harbor-Hickam (JBPHH), a command of the United States Department of the Navy, (hereinafter, jointly referred to as the Navy) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality Regulations and Navy regulations for implementing NEPA. The Proposed Action would construct and operate a new ambulatory care center (ACC) at JBPHH. The new ACC would be a consolidated joint service facility replacing several existing facilities separately operated by the Navy, Air Force, and Army. The proposed ACC would be sustained and administered by the Defense Health Agency, a tenant at JBPHH. This EA evaluates the potential environmental impacts associated with three action alternatives and the No Action Alternative to the following resources: cultural resources, air quality, biological resources, visual resources, transportation, and hazardous materials and wastes.

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EXECUTIVE SUMMARY

ES.1 Proposed Action

Joint Base Pearl Harbor-Hickam (JBPHH), a command of the United States Department of the Navy (hereinafter, jointly referred to as the Navy) has prepared this Environmental Assessment (EA) to evaluate a proposal to construct and operate a new ambulatory care center (ACC) to consolidate existing facilities and services separately managed by the Navy, Air Force, and Army to a location at JBPHH. The new facility would be a Tri-Service ACC shared by Navy, Air Force, and Army medical activities to meet the needs of both JBPHH and the Hawaii enhanced Multi-Service Market (eMSM). The proposed ACC would be sustained and administered by the Defense Health Agency (DHA), a tenant at JBPHH. Logistics would be supported by Tripler Army Medical Center (TAMC) with a "Just in Time" delivery model, an inventory strategy where materials are only ordered and received as they are needed. In addition to supporting the Hawaii eMSM, the new facility would also support the current clinical functions of the Naval Health Clinic Hawaii, the Air Force 15th Medical Group, and TAMC in providing a full range of military operations and sustaining the readiness and health of all active duty personnel. The construction of the Proposed Action would be implemented over approximately two years beginning with construction as early as fiscal year (FY) 2023, and steady state operations would begin by FY 2028.

ES.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to provide comprehensive primary care, dental, behavioral health, occupational, and preventive special medicine services to active duty service members and beneficiaries in facilities that are appropriately sized, configured, and sited to meet mission requirements and comply with current federal criteria for military health facilities (e.g., DHA Space Planning criteria and Unified Facilities Criteria 4-510-01, *Design: Medical Treatment Facilities*). The Proposed Action is needed to rectify current capacity deficiencies at the existing service clinics and ensure that the services continue to provide high-quality health care to entitled military personnel, dependents, and retirees in the JBPHH region.

ES.3 Alternatives Considered

Based on screening criteria and an alternatives evaluation process, three practicable action alternatives were found to achieve the Proposed Action and satisfy the project's purpose and need. The three action alternatives and the No Action Alternative are carried forward for analysis. Under the No Action Alternative, the Proposed Action would not occur. The new ACC would not be constructed, and the existing service clinics would continue to be used for all existing health care services. Existing clinics do not have the building space capacity needed to meet mission requirements and comply with current federal criteria for military health facilities. Therefore, the No Action Alternative would not meet the purpose and need for the Proposed Action.

Potential alternatives that meet the purpose and need were evaluated against the following screening factors:

- Availability of space for needed medical facilities and access to existing utilities and sufficient space to accommodate 10 to 20 percent future growth
- Continuity of health clinic services for all patrons

- Proximity of the new facility to entitled military personnel and convenient access for dependents and retirees on the island of Oahu
- Compatibility with existing military operations and future proposed actions
- Minimization of construction challenges (i.e., minimization of secondary cost effects, construction challenges, or escalations based on environmental or historic property mitigation)

The Navy initially considered nine alternative sites at JBPHH, including those on both the Pearl Harbor and Hickam Airfield sides of JBPHH. The Navy determined that three sites on the Pearl Harbor side of JBPHH and three sites on the Hickam Airfield side of the JBPHH would not meet one or more reasonable alternative screening factors outlined above. Therefore, those six sites were not carried forward for detailed analysis in this EA. The Navy retained three remaining sites for detailed consideration in the EA. The three action alternative sites carried forward for evaluation in the EA are:

- Tradewinds-Par 3 Site (Alternative 1)
- Kuntz Gate Site (Alternative 2)
- Bloch Arena Site (Alternative 3)

At each site, the Proposed Action would construct the following:

- An approximately 250,000-square foot (ft^2) (23,226-square meter [m^2]) health/dental clinic facility (over multiple stories)
- An approximately 7,500-ft^2 (697-m^2) central utility plant to service the health/dental clinic
- Approximately 1,500 parking stalls (i.e., 600 in surface parking and 900 in structured parking garage)
- Site preparation work and utility connections including electricity, water, storm sewer, and sanitary sewer

ES.4 Summary of Environmental Resources Evaluated in the EA

Council on Environmental Quality regulations, National Environmental Policy Act (NEPA), and Navy instructions for implementing NEPA specify that an EA should address those resources potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of potential environmental impact. The following resources are analyzed in this EA:

- Cultural resources
- Air quality
- Biological resources
- Visual resources
- Hazardous materials and waste
- Transportation

ES.5 Summary of Potential Environmental Consequences of the Action Alternatives and Major Mitigating Actions

See Table ES-1 for a tabular summary of the potential impacts to the resources associated with each of the alternative actions analyzed.

ES.6 Public Involvement

The Navy will post the Draft EA for public review at the following Navy website: https://www.navfac.navy.mil/navfac_worldwide/pacific/about_us/national-environmental-policy-act--nepa--information.html. A 30-day public comment period is scheduled, as set forth in a Notice of Availability published in *The Honolulu Star-Advertiser*. Comments received from the public and federal, state, and local agencies during the comment period will be considered in the Final EA.

Table ES-1 Summary of Potential Impacts to Resources

Resource Area	*No Action Alternative*	*Alternative 1 – Tradewinds-Par 3 (Preferred Alternative)*	*Alternative 2 – Kuntz Gate*	*Alternative 3 – Bloch Arena*
Cultural Resources	The clinic would not be constructed and there would be no change in operations. No impacts to cultural or historical resources would occur.	Construction period ground-disturbing activities have a low probability to affect undiscovered subsurface cultural resources. Alternative 1 would not result in modifications or demolition of historic architectural resources. No TCPs are within the APE. Therefore, construction and operation of the new clinic would result in no significant, long-term, local impacts to cultural resources.	Construction period ground-disturbing activities have a low probability to affect undiscovered subsurface cultural resources. Several non-NRHP eligible buildings over 50 years old would be demolished. Therefore, construction and operation of the new clinic would result in no significant, long-term, local impacts to cultural resources.	Construction and operation of the new clinic would occur within a highly visible location inside the NHL district, on the site of an eligible historic facility (Ward Field), and in a location of high archaeological probability. Construction and operations would result in significant, long-term, local and regional impacts to cultural resources, which could be reduced to no significant impacts through mitigation.
Air Quality	The clinic would not be constructed and there would be no change in operations. There would be no impacts to air quality or global climate change.	Construction-related emissions would be minor and minimized with implementation of BMPs. Operations would shift localized commutes and related mobile source emissions to and from previous clinics to the proposed ACC, but would not result in significant air quality impacts. Operational GHG emissions would be equal to or less than the No Action Alternative. Therefore, there would be no significant impacts to air quality and climate change.	Construction-related emissions would be minor and minimized with implementation of BMPs. Operations would shift localized commutes and related mobile source emissions to and from previous clinics to the proposed ACC, with slightly higher mobile emissions than under Alternative 1 due to increased congestion, but would not result in significant air quality impacts. Operational GHG emissions would be equal to or less than the No Action Alternative. Therefore, there would be no significant impacts to air quality and climate change.	Construction-related emissions would be minor and minimized with implementation of BMPs. Operations would shift localized commutes and related mobile source emissions to and from previous clinics to the proposed ACC, comparable to Alternative 1, but would not result in significant air quality impacts. Operational GHG emissions would be equal to or less than the No Action Alternative. Therefore, there would be no significant impacts to air quality and climate change.

Table ES-1 Summary of Potential Impacts to Resources

Resource Area	*No Action Alternative*	*Alternative 1 – Tradewinds-Par 3 (Preferred Alternative)*	*Alternative 2 – Kuntz Gate*	*Alternative 3 – Bloch Arena*
Biological Resources	The clinic would not be constructed, and there would be no change in operations. No impacts to biological resources would occur.	There would be removal of existing vegetation to the degree needed for site development. Disturbance to terrestrial wildlife species during the site preparation and construction process could be avoided with the implementation of the suggested BMPs. Operation of the ACC at this site would have no impacts to biological resources. No significant impacts to biological resources would occur. No effect on ESA-listed species.	There would be removal of existing vegetation to the degree needed for site development. Disturbance to terrestrial wildlife during the site preparation and construction process could be avoided with the implementation of the suggested BMPs. Operation of the ACC at this site would have no impacts to biological resources. No significant impacts to biological resources would occur. No effect on ESA-listed species.	There would be removal of existing vegetation to the degree needed for site development. Disturbance to terrestrial wildlife species during the site preparation and construction process could be avoided with the implementation of the suggested BMPs. Operation of the ACC at this site would have no impacts to biological resources. No significant impacts to biological resources would occur. No effect on ESA-listed species.
Visual Resources	The clinic would not be constructed, and there would be no change to landscape character and visual resources. Therefore, no impacts would occur from the No Action Alternative.	Construction would have temporary non-significant impacts that are of local extent and in medium intensity to the common visual resources. Operational impacts to visual resources are not significant because of their local extent and medium intensity.	Construction would have temporary, non-significant impacts to common visual resources that are of local extent and medium intensity. Operational impacts to visual resources are not significant due to their local extent and low to medium intensity.	Visual resources are important due to the historic characteristics of the area. Temporary, less than significant impacts are expected from construction. Operations would lead to permanent, medium to high intensity impacts within its regional contexts. Operational impacts to visual resources could be reduced to no significant impacts through mitigation.

Table ES-1 Summary of Potential Impacts to Resources

Resource Area	*No Action Alternative*	*Alternative 1 – Tradewinds-Par 3 (Preferred Alternative)*	*Alternative 2 – Kuntz Gate*	*Alternative 3 – Bloch Arena*
Transportation	The clinic would not be constructed and there would be no change in operations. No impacts to transportation would occur.	Operation of the ACC replacement facility would result in a shift in traffic patterns from existing clinic areas to the alternative site. Traffic would decrease at existing clinic sites and increase around the Alternative 1 site. With implementation of recommended traffic mitigation measures, transportation impacts would not be significant.	Operation of the ACC replacement facility would result in a shift in traffic patterns from existing clinic areas to the alternative site. Traffic would decrease at existing clinic sites and increase around the Alternative 2 site. With implementation of recommended traffic mitigation measures, transportation impacts would not be significant.	Operation of the ACC replacement facility would result in a shift in traffic patterns from existing clinic areas to the alternative site. Traffic would decrease at existing clinic sites and increase around the Alternative 3 site. Recommended measures would mitigate traffic impacts at intersections adjacent to the ACC site. Increased traffic demand at the Nimitz and Makalapa Gates could be accommodated if entry lane additions recommended by SDDCTEA to handle existing conditions (prior to ACC) are implemented. With the recommended measures adjacent to the ACC site and implementation of SDDCTEA recommendations for existing conditions, transportation impacts would not be significant.
Hazardous Materials and Wastes	The clinic would not be constructed, and there would be no change in operations. Hazardous wastes and materials would continue to be generated at current levels and locations and would be managed under existing protocols. No impacts to hazardous materials and wastes would occur.	There would be some generation of hazardous materials and wastes during construction due to excavation of soil and disposal of construction materials. There would be no operational impacts of the ACC at this site. No significant impacts from hazardous materials and wastes would occur given implementation of existing LUCs, management plans and handling procedures.	There would be some generation of hazardous materials and wastes during construction due to excavation of soil and disposal of construction materials. There would be no operational impacts of the ACC at this site. No significant impacts from hazardous materials and wastes would occur given implementation of existing management plans and handling procedures.	There would be some generation of hazardous materials and wastes during construction due to excavation of soil and disposal of construction materials. There would be no operational impacts of the ACC at this site. No significant impacts from hazardous materials and wastes would occur given implementation of existing LUCs, management plans and handling procedures.

Notes: ACC = Ambulatory Care Center; ADP = Area Development Plan; BMP = best management practice; ESA = Endangered Species Act; GHG = greenhouse gas; HQ = headquarters; IDP = Installation Development Plan; JBPHH = Joint Base Pearl Harbor-Hickam; LUC = land use control; NHL = National Historic Landmark; NRHP = National Register of Historic Places; TBD = to be determined

DRAFT Environmental Assessment

Ambulatory Care Center

Joint Base Pearl Harbor-Hickam, Oahu, Hawaii

TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1

ES.1 Proposed Action ES-1
ES.2 Purpose of and Need for the Proposed Action ES-1
ES.3 Alternatives Considered ES-1
ES.4 Summary of Environmental Resources Evaluated in the EA ES-2
ES.5 Summary of Potential Environmental Consequences of the Action Alternatives and Major Mitigating Actions ES-2
ES.6 Public Involvement ES-3

ABBREVIATIONS AND ACRONYMS V

1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION 1-1

1.1 Introduction 1-1
1.2 Background 1-1
1.2.1 Mission 1-1
1.2.2 NHCH Makalapa Clinic (Building 1407) 1-1
1.2.3 NHCH Shipyard/Occupational Health Clinic (Building 1750) 1-2
1.2.4 Air Force 15th Medical Group (Building 559 and others) 1-2
1.2.5 Tripler Army Medical Center 1-3
1.3 Location 1-4
1.4 Purpose of and Need for the Proposed Action 1-4
1.5 Scope of Environmental Analysis 1-7
1.6 Key Documents 1-7
1.7 Relevant Laws and Regulations 1-8
1.8 Public and Agency Participation and Intergovernmental Coordination 1-9

2 PROPOSED ACTION AND ALTERNATIVES 2-1

2.1 Proposed Action 2-1
2.2 Screening Factors 2-1
2.3 Alternatives Carried Forward for Analysis 2-2
2.3.1 No Action Alternative 2-2
2.3.2 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative) 2-2

2.3.3 Alternative 2: Kuntz Gate Site 2-5
2.3.4 Alternative 3: Bloch Arena Site 2-8
2.3.5 All Action Alternatives: Existing Clinic Buildings Return to the Installation 2-10
2.4 Alternatives Considered but not Carried Forward for Detailed Analysis 2-11
2.4.1 Pearl Harbor Side – Existing NHCH Makalapa Clinic Site 2-11
2.4.2 Pearl Harbor Side – Little Makalapa Site 2-13
2.4.3 Pearl Harbor Side – Paul Hamilton Avenue Site 2-13
2.4.4 Hickam Side – Freedom Avenue Site 2-13
2.4.5 Hickam Side – Par 3 Golf Course Site 2-13
2.4.6 Hickam Side – Kuntz Avenue Baseball Field Site 2-14
2.4.7 Sites Outside of Joint Base Pearl Harbor Hickam 2-14
2.5 Best Management Practices Included in Proposed Action 2-14
3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES 3-1
3.1 Cultural Resources 3-4
3.1.1 Regulatory Setting 3-5
3.1.2 Affected Environment 3-5
3.1.3 Environmental Consequences 3-9
3.2 Air Quality 3-12
3.2.1 Regulatory Setting 3-12
3.2.2 Affected Environment 3-14
3.2.3 Environmental Consequences 3-15
3.3 Biological Resources 3-20
3.3.1 Regulatory Setting 3-20
3.3.2 Affected Environment 3-21
3.3.3 Environmental Consequences 3-24
3.4 Visual Resources 3-30
3.4.1 Regulatory Setting 3-30
3.4.2 Affected Environment 3-31
3.4.3 Environmental Consequences 3-31
3.5 Transportation 3-33
3.5.1 Regulatory Setting 3-34
3.5.2 Affected Environment 3-34
3.5.3 Environmental Consequences 3-36

3.6 Hazardous Materials and Wastes 3-47
3.6.1 Regulatory Setting 3-47
3.6.2 Affected Environment 3-48
3.6.3 Environmental Consequences 3-50
3.7 Summary of Potential Impacts to Resource Areas 3-52
3.7.1 Impact Avoidance and Minimization Measures 3-56

4 CUMULATIVE IMPACTS 4-1

4.1 Definition of Cumulative Impacts 4-1
4.2 Scope of Cumulative Impacts Analysis 4-2
4.3 Past, Present, and Reasonably Foreseeable Actions 4-2
4.4 Cumulative Impacts under the Proposed Action 4-4

5 OTHER CONSIDERATIONS REQUIRED BY NEPA 5-1

5.1 Consistency with Other Federal, State, and Local Laws, Plans, Policies, and Regulations 5-1
5.2 Irreversible or Irretrievable Commitments of Resources 5-2
5.3 Unavoidable Adverse Impacts 5-3
5.4 Relationship between Short-Term Use of the Environment and Long-Term Productivity 5-3

6 REFERENCES 6-5

7 LIST OF PREPARERS 7-1

List of Figures

Figure 1-1 NHCH Makalapa Clinic (Building 1407) 1-1
Figure 1-2 NHCH Shipyard Clinic (Building 1750) 1-2
Figure 1-3 15 MDG Main Clinic (Building 559) 1-2
Figure 1-4 Tripler Army Medical Center 1-3
Figure 1-5 Location Map – Joint Base Pearl Harbor-Hickam 1-5
Figure 1-6 Proposed Action Study Area Locations 1-6
Figure 2-1 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative) 2-3
Figure 2-2 Existing Recreational Pavilion (Building 75097H) on the Tradewinds-Par 3 Site 2-4
Figure 2-3 Proposed Facility Layout at the Tradewinds-Par 3 Site 2-5
Figure 2-4 Alternative 2: Kuntz Gate Site 2-6
Figure 2-5 Proposed Facility Layout at the Kuntz Gate Site 2-7
Figure 2-6 Alternative 3: Bloch Arena Site 2-9
Figure 2-7 Proposed Facility Layout at the Bloch Arena Site 2-10

Figure 2-8 Additional Alternative Sites Considered at JBPHH....2-12
Figure 3-1 Historic District Boundaries at JBPHH....3-8
Figure 3-2 Proposed Site Locations and Gate Locations....3-35
Figure 3-3 Proposed Conceptual Site Plan of Alternative 1: Tradewinds-Par 3 Site....3-37
Figure 3-4 Proposed Conceptual Site Plan of Alternative 2: Kuntz Gate Site....3-40
Figure 3-5 Proposed Conceptual Site Plan of Alternative 3: Bloch Arena Site....3-44

List of Tables

Table 2-1 Best Management Practices....2-15
Table 3-1 Methods for Determining Levels of Impact....3-2
Table 3-2 Summary Impact Levels....3-2
Table 3-3 Ambient Air Quality Monitoring Data (2016)....3-15
Table 3-4 Threatened and Endangered Species Known to Occur or Potentially Occurring in the ROI and Critical Habitat Present in ROI....3-21
Table 3-5 Summary of Potential Impacts to Resource Areas....3-53
Table 3-6 Impact Avoidance and Minimization Measures....3-56
Table 4-1 Cumulative Actions for Evaluation....4-3
Table 5-1 Principal Federal and State Laws Applicable to the Proposed Action....5-1

Appendices

Appendix A National Historic Preservation Act Section 106 Documentation.... A-1
Appendix B Final Transportation Impact Assessment Report....B-1
Appendix C Public and Agency Participation....C-1
Appendix D Coastal Zone Management Act Correspondence.... D-1
Appendix E Entry Control Facility Memorandum....E-1

Abbreviations and Acronyms

Acronym/Abbreviation	Definition
15 MDG	15th Medical Group
ACC	Ambulatory Care Center
ACM	asbestos-containing material
ADP	Area Development Plan
AFB	Air Force Base
AOC	area of concern
APE	Area of Potential Effect
AQCR	Air Quality Control Region
ATR	automatic traffic recorder
BMP	best management practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNRH	Commander, Navy Region Hawaii
CO	carbon monoxide
COC	chemical of concern
CY	calendar year
CZMA	Coastal Zone Management Act
day/year	day per year
DERP	Defense Environmental Restoration Program
DHA	Defense Health Agency
DoD	Department of Defense, United States
DOFAW	Division of Forestry and Wildlife, State of Hawaii
DOH	Department of Health, State of Hawaii
EA	Environmental Assessment
EFH	Essential Fish Habitat
EHMP	environmental hazard management plan
EIS	Environmental Impact Statement
eMSM	enhanced Multi-Service Market
EO	Executive Order
ESA	Endangered Species Act
Fac.	Facility
FS	feasibility study
ft^2	square foot
FY	fiscal year
GHG	greenhouse gas
HAAQS	Hawaii ambient air quality standards
HAP	hazardous air pollutant
HAR	Hawaii Administrative Rules
HART	Honolulu Area Rapid Transit
HAZMART	Hazardous Materials Pharmacy
hour/day	hour per day
HPARC	Human Performance and Rehabilitation Center
HQ PACAF	Headquarters Pacific Air Forces

Acronym/Abbreviation	Definition
HRS	Hawaii Revised Statutes
HTMW	hazardous and toxic materials and wastes
ICRMP	Integrated Cultural Resources Management Plan
ID	identification
IDP	Installation Development Plan
INRMP	Integrated Natural Resources Management Plan
JBPHH	Joint Base Pearl Harbor-Hickam
LBP	lead-based paint
LOS	level of service
LUC	land use control
m^2	square meter
MBTA	Migratory Bird Treaty Act
MHS	Military Health System
MSAT	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards
NAVFAC HI	Naval Facilities Engineering Command, Hawaii
Navy	Department of the Navy, United States
NCTAMS PAC	Naval Computer and Telecommunications Area Master Station Pacific
NEPA	National Environmental Policy Act
NHCH	Naval Health Clinic Hawaii
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
O_3	ozone
Pb	lead
PCB	polychlorinated biphenyl
PHNC	Pearl Harbor Naval Complex
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
ppm	part per million
PUCDP	Primary Urban Center Development Plan
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROI	Region of Influence
SAIA	Sikes Act Improvement Act
SDDCTEA	Surface Deployment and Distribution Command Transportation Engineering Agency
SHPO	State Historic Preservation Officer
SI	site inspection
SIHP	State Inventory of Historic Places
SMART	Sports Medicine & Rehabilitation Therapy
SO_2	sulfur dioxide
SOP	standard operating procedure
TAMC	Tripler Army Medical Center

Acronym/Abbreviation	Definition	Acronym/Abbreviation	Definition
TCP	traditional cultural place	USEPA	U.S. Environmental Protection Agency
TIAR	Traffic Impact Analysis Report	USFWS	U.S. Fish and Wildlife Service
TPH	total petroleum hydrocarbons	UST	underground storage tank
U.S.	United States	VOC	volatile organic compound
U.S.C.	U.S. Code		
UFC	Unified Facilities Criteria		

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1 Purpose of and Need for the Proposed Action

1.1 Introduction

Joint Base Pearl Harbor-Hickam (JBPHH), a command of the United States (U.S.) Department of the Navy (hereinafter, jointly referred to as the Navy) has prepared this Environmental Assessment (EA) to evaluate a proposal to construct and operate a new Ambulatory Care Center (ACC) to consolidate existing facilities and services separately managed by the Navy, Air Force, and Army to a location at JBPHH, on the island of Oahu, Hawaii. The new replacement ACC would provide comprehensive primary care, dental, behavioral health, occupational, and preventive special medicine services to entitled military personnel, dependents, and retirees in the JBPHH region. The proposed ACC would be sustained and administered by the Defense Health Agency (DHA), a tenant at JBPHH. Construction would take place over approximately two years beginning in fiscal year (FY) 2023. The Navy has prepared this EA in accordance with the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality (CEQ) Regulations and Navy regulations for implementing NEPA to evaluate the potential environmental impacts associated with the proposed construction and operation of the new facility.

1.2 Background

1.2.1 Mission

The current medical mission of the Naval Health Clinic Hawaii (NHCH) and the 15th Medical Group (15 MDG) is to provide comprehensive primary care, dental, behavioral health, occupational, and preventive special medicine services to entitled military personnel, dependents, and retirees in the JBPHH region. Currently, outpatient specialty care and tertiary care for U.S. Department of Defense (DoD) beneficiaries, as well as some primary care and behavioral health services, are provided by Tripler Army Medical Center (TAMC). Hawaii enhanced Multi-Service Market (eMSM) coordinates all Military Health System (MHS) healthcare services throughout Oahu.

NHCH provides the majority of medical and dental services to Navy beneficiaries. 15 MDG provides the majority of medical and dental services to Air Force beneficiaries. Over time, the medical operations have expanded to the surrounding buildings to compensate for lack of space. With increasing volumes of patients, a need exists for a new ACC that would be able to provide the space, flexibility, and technology required to serve the Navy, Army, Air Force, Coast Guard, and Marines. TAMC is currently located in an area that is not easily accessible to the general JBPHH population. Redirecting beneficiaries away from TAMC would improve the ease of access for medical care patients and reduce traffic. Incorporating better public transit and pedestrian access to the site also would help mitigate congestion.

Figure 1-1 NHCH Makalapa Clinic (Building 1407)

1.2.2 NHCH Makalapa Clinic (Building 1407)

The NHCH Makalapa Medical and Dental Clinic (hereinafter, referred to as the NHCH Makalapa Clinic) provides the predominant volume of medical and dental services to Navy beneficiaries on Oahu. The NHCH

Makalapa Clinic provides family medicine, pediatrics, dermatology (active duty only), gynecology, immunizations, laboratory, optometry, pharmacy, preventive medicine, radiology and comprehensive dental care (active duty only), physical therapy (active duty only), sports medicine (active duty only), and deployment health. Primary services are located in Building 1407 (Figure 1-1). The facility was built in 1974 and is over 69,000 square feet (ft^2) (6,410 square meters [m^2]). Over time, two new buildings were added and renovated (Building 1514 and Building 1535) in an effort to compensate for lack of space. These newer facilities include services for mental health, physical therapy, and administration. Building 1514 is the home of the NHCH Sports Medicine & Rehabilitation Therapy (SMART) Center. Building 1535, NHCH Mental Health Clinic, built in 1975, was recently renovated and is over 12,000 ft^2 (1,115 m^2).

The NHCH currently has several deficiencies that impact the ability to deliver high quality medical care. The existing space of Building 1407 meets 50 percent of the DoD space criteria for the mission and patient population served. Functionally, the building also fails to perform as required, with deficiencies in fire protection systems, utility piping, internal communication systems, seismic performance, and building system controls.

1.2.3 NHCH Shipyard/Occupational Health Clinic (Building 1750)

NHCH also includes Building 1750 (Figure 1-2), commonly referred to as the Command Headquarters and Shipyard Clinic. The facility was built in 1990 and is over 60,000 ft^2 (5,574 m^2). Undersea medicine, occupational health, radiological health, hearing conservation, and industrial hygiene support the mission readiness of Pearl Harbor Naval Shipyard. The Shipyard Clinic is located near the Shipyard and provides easy access of care for the Shipyard workers and the Fleet. This facility is a critical component to the NHCH mission.

Figure 1-2 NHCH Shipyard Clinic (Building 1750)

Figure 1-3 15 MDG Main Clinic (Building 559)

1.2.4 Air Force 15th Medical Group (Building 559 and others)

The 15 MDG provides the predominant volume of medical and dental services to Air Force beneficiaries on Oahu. The primary services of the 15 MDG are located in several buildings. The main clinic (Building 559) (Figure 1-3) is the largest building (three stories, approximately 71,000 ft^2 (6,596 m^2), built in 1942, and suffered damage during the Pearl Harbor attack) and is located within a historical landmark. The other major buildings include the Mental Health Clinic (Building 554, 6,200 ft^2 [576 m^2], and built in 2005) and Human Performance and Rehabilitation Center (HPARC) (Building 1113, 5,000 ft^2 [465 m^2], and built in 1940). Building 1113 was built for non-medical purposes and has been reused over the past 20 years as a physical therapy clinic. Also included is the 15 MDG Education and Training

function which recently moved to the main clinic (Building 559) and Bioenvironmental Engineering (Building 2155) which is currently a non-medical building.

The 15 MDG facilities currently have several deficiencies that affect the ability to deliver high quality medical care. The existing space of Building 559 does not meet the DoD space criteria for the mission and patient population served. Functionally, the building also does not perform as it should with deficiencies to building infrastructure systems.

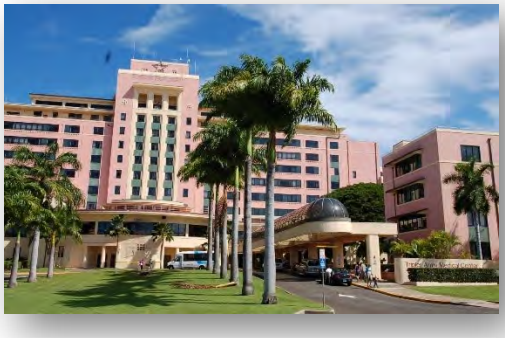

Figure 1-4 Tripler Army Medical Center

1.2.5 Tripler Army Medical Center

TAMC (Figure 1-4) is the headquarters of the Regional Health Command-Pacific and is the largest military hospital in the Indo-Pacific Region. It supports 264,000 local active duty and retired military personnel, their families, and veteran beneficiaries. In addition, the referral population includes 171,000 military personnel, family members, veteran beneficiaries, residents of nine U.S.-affiliated jurisdictions (American Samoa, Guam, and the former Trust Territories), and forward-deployed forces in more than 40 countries throughout the Pacific. TAMC also provides outpatient specialty care and tertiary care for all DoD beneficiaries in Hawaii. Some comprehensive primary care, behavioral health, and low-acuity, high-volume medical specialty care is also provided at TAMC for beneficiaries enrolled at TAMC.

TAMC faces operational constraints from facility age, size, configuration, infrastructure condition, and location-related issues including access, terrain, and parking shortages.

The proposed new ACC replacement would provide the same outpatient services as the aforementioned clinics. In other words, the new ACC facility would replace and provide the same services currently offered at:

- Three existing Navy clinic facilities on Naval Station Pearl Harbor:
    - Building 1407 – NHCH Makalapa Clinic
    - Building 1514 – NHCH SMART Center
    - Building 1535 – NHCH Mental Health Clinic
- Three existing Air Force clinic facilities on Hickam Air Force Base (AFB):
    - Building 559 – Air Force 15 MDG Medical and Dental Clinic
    - Building 554 – Air Force 15 MDG Mental Health Clinic
    - Building 1113 – Air Force 15 MDG HPARC
- Most primary care services currently offered at Tripler Army Medical Clinic
- Approximately half of the current functions and occupants of Building 1750 – Shipyard Clinic

Existing health services would be provided at the existing clinics until the new facility is fully operational.

1.3 Location

Naval Station Pearl Harbor and Hickam AFB combined to form JBPHH on January 31, 2010. The Navy acts as the Component Lead for JBPHH; therefore, Commander, Navy Region Hawaii (CNRH) oversees all Base Operating Support. This responsibility involves 24,895 acres (10,075 hectares) of land and approximately 68,081 acres (27,552 hectares) of water. Figure 1-5 illustrates the boundaries of JBPHH. JBPHH encompasses significant land holdings at the main base, West Loch Annex, Pearl City Peninsula, Waipio Peninsula, and other outlying areas. JBPHH combines two bases into a single joint installation to support both Air Force and Navy missions in the Pacific. JBPHH serves as the home base for Air Force air wings and Navy surface ship and submarine squadrons, and is a regional maintenance center for ships and submarines. The main base is host to Commander, U.S. Pacific Fleet and the Headquarters Pacific Air Forces (HQ PACAF). In addition, JBPHH hosts over 100 tenant commands that support the Navy, Air Force, and other missions in Hawaii and the Indo-Pacific.

Within JBPHH, the EA will focus on three alternative sites for the proposed new ACC as shown in Figure 1-6.

1.4 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to provide comprehensive primary care, dental, behavioral health, occupational, and preventive special medicine services to entitled military personnel, dependents, and retirees in the JBPHH region in facilities that are appropriately sized, configured, and sited to meet mission requirements and comply with current federal criteria for military health facilities (e.g., DHA Space Planning criteria and Unified Facilities Criteria (UFC) 4-510-01, *Design: Medical Treatment Facilities*).

The Proposed Action is needed to rectify current capacity deficiencies at the existing service clinics and ensure that the Services continue to provide high-quality health care to entitled military personnel, dependents, and retirees in the JBPHH region.

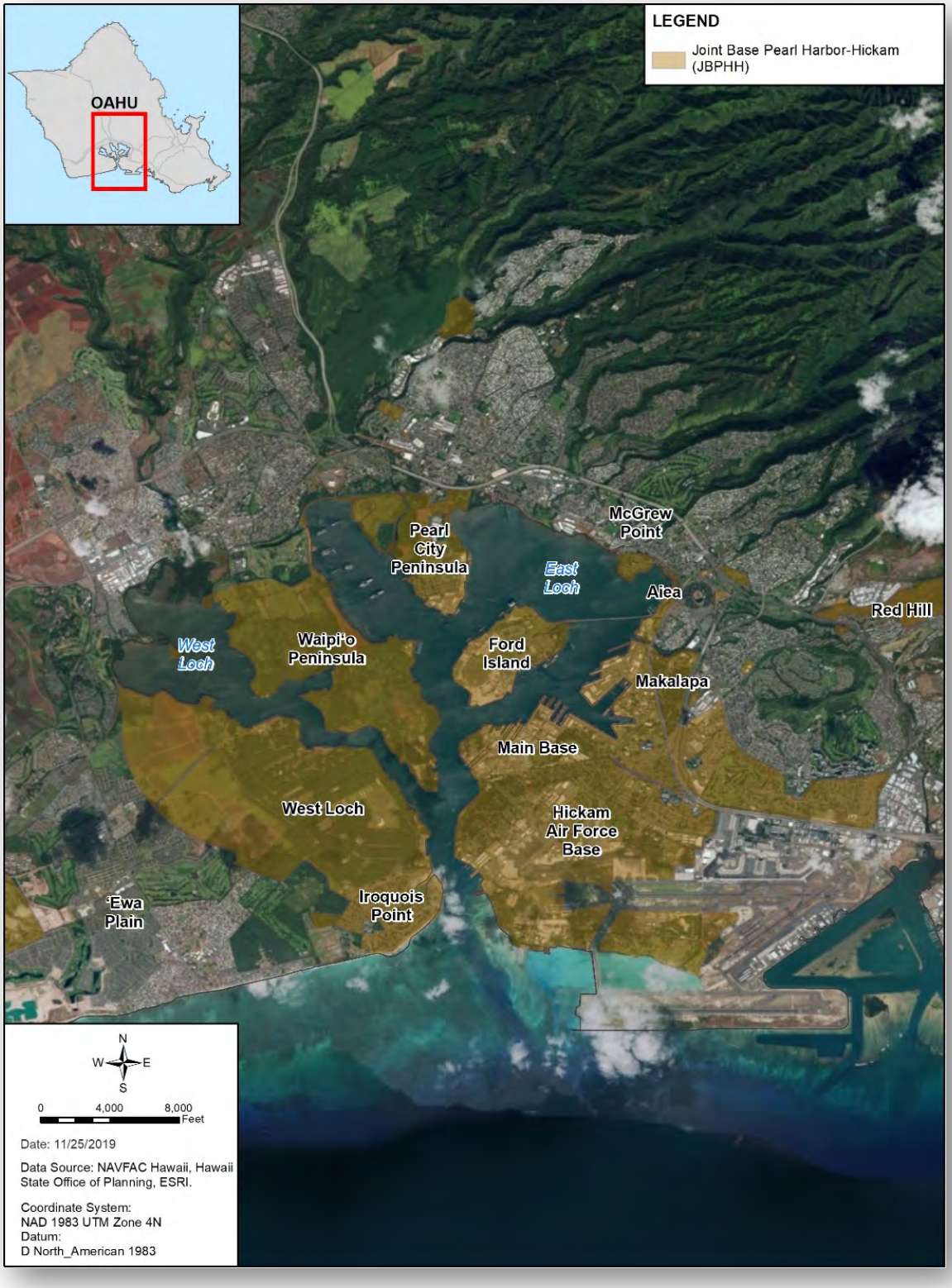

Figure 1-5 Location Map – Joint Base Pearl Harbor-Hickam

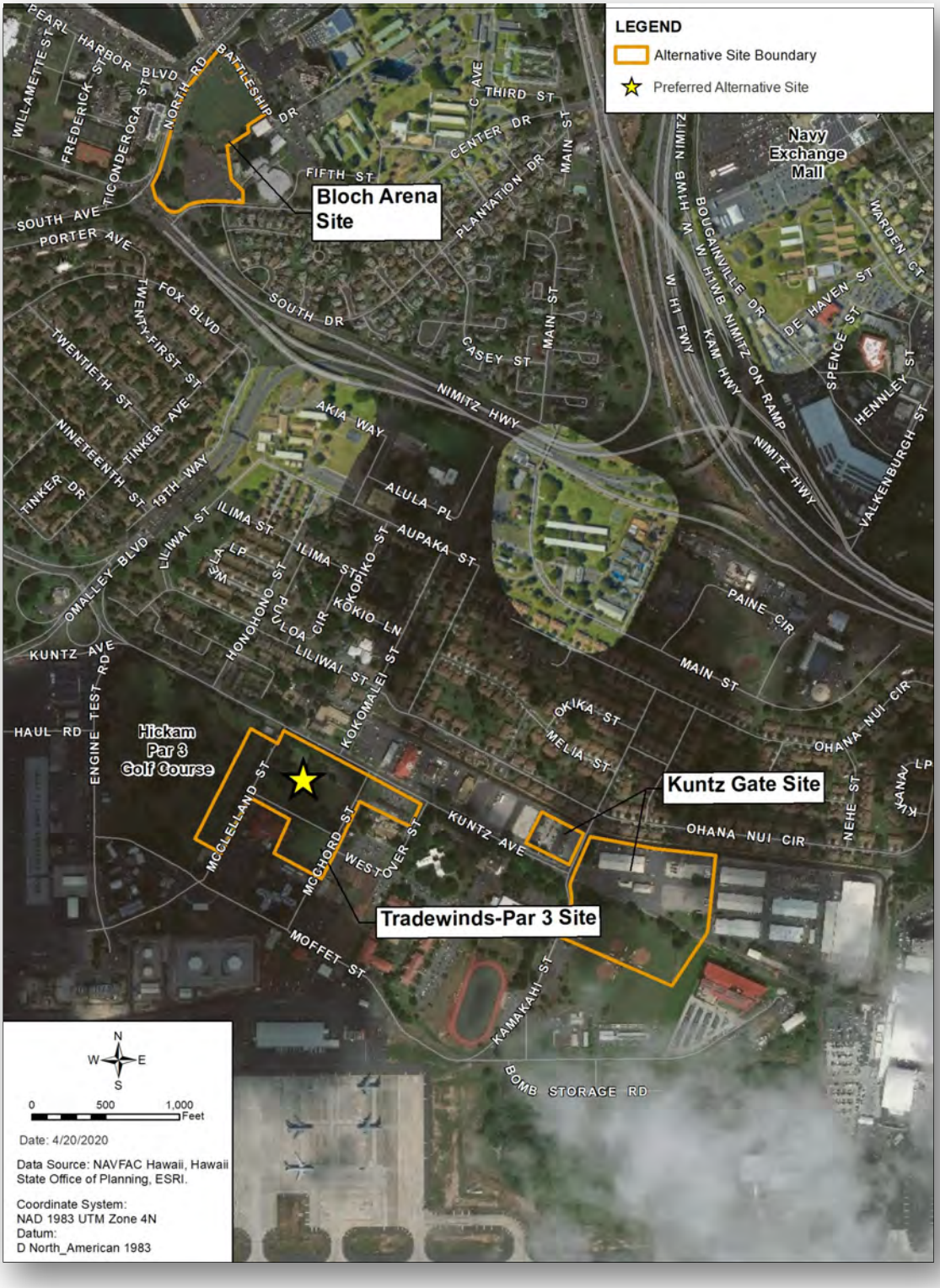

Figure 1-6 Proposed Action Study Area Locations

1.5 Scope of Environmental Analysis

This EA includes an analysis of potential environmental impacts associated with three Action Alternatives and the No Action Alternative. The environmental resources analyzed in this EA include: cultural resources, air quality, visual resources, biological resources (including threatened and endangered species), transportation, and hazardous materials and wastes. The study area for each resource analyzed may differ due to how the Proposed Action interacts with or impacts the resource. For instance, the study area for cultural resources may only include the construction footprint, whereas the transportation study area would expand to include the roads, intersections, and transit corridors that may be impacted by the expected staff and patient loading.

1.6 Key Documents

Key documents are sources of information incorporated into this EA. Documents are considered to be key because of similar actions, analyses, or impacts that may apply to this Proposed Action. CEQ guidance encourages incorporating documents by reference. Documents incorporated by reference in part or in whole include:

- **Integrated Natural Resources Management Plan** (NAVFAC PAC 2011). The Integrated Natural Resources Management Plan (INRMP) was developed for the Navy, CNRH for JBPHH, Oahu to meet statutory requirements of the Sikes Act Improvement Act (SAIA) of 1997 (16 U.S. Code [U.S.C.] 670(a) *et seq.* Public Law 105-85). The primary purpose of this INRMP is to update the 2001 INRMPs for Pearl Harbor Naval Complex (PHNC), Naval Magazine Pearl Harbor, and Naval Computer and Telecommunications Area Master Station Pacific (NCTAMS PAC) Wahiawa and to update the 1997 Natural Resources Management Plan for Navy-retained land at the former Naval Air Station Barbers Point (now known as Kalaeloa). Hickam AFB came under Navy control as of October 1, 2010, as a result of the joint-basing process. Natural resource management at Hickam is included in an Air Force INRMP covering all previously held Air Force properties in Hawaii (U.S. Air Force 2007). The sections pertaining to those properties that are now under Navy jurisdiction were extracted from the Air Force INRMP and inserted in Chapter 7 of the Navy INRMP. The plan provides a framework where natural resources are managed in accordance with the SAIA mandate to provide "no net loss in the capability of military installation lands to support the military mission of the installation."
- **Oahu Integrated Cultural Resources Management Plan** (CNRH 2008). The Oahu Integrated Cultural Resources Management Plan (ICRMP) was prepared in October 2008 by the CNRH in accordance with DoD Environmental Conservation Program Instruction 4715.3. The document updates the 2002 ICRMP for the PHNC. The 2008 ICRMP expands upon the 2002 ICRMP to include all CNRH installations on Oahu, including PHNC; NCTAMS PAC Wahiawa and NCTAMS PAC Radio Transmitter Facility Lualualei; Naval Magazine Pearl Harbor Lualualei Branch; Navy-retained lands at Kalaeloa; and Regional Relay Facility Kahuku.
- **Integrated Cultural Resources Management Plan for Hickam AFB, Hawaii (2008-2012 Update).** The ICRMP for Hickam AFB was prepared in January 2008. This ICRMP for Hickam AFB provides guidance and standard operating procedures (SOPs) to enable the base to meet its legal responsibilities for identification, evaluation, and protection of cultural resources under its jurisdiction while supporting the military mission. The document updated a 1998 ICRMP and was prepared according to Air Force Instruction 32-7065, *Cultural Resources Management Program*.

1.7 Relevant Laws and Regulations

The Navy has prepared this EA based upon federal and state laws, statutes, regulations, and policies pertinent to the implementation of the Proposed Action, including the following:

- NEPA (42 U.S.C. sections 4321–4370h), which requires an environmental analysis for major federal actions that have the potential to significantly impact the quality of the human environment
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508)
- Navy regulations for implementing NEPA (32 CFR 775), which provides Navy policy for implementing CEQ regulations and NEPA
- Clean Air Act (CAA) (42 U.S.C. section 7401 et seq.)
- Clean Water Act (33 U.S.C. section 1251 et seq.)
- Rivers and Harbors Act (33 U.S.C. section 407)
- Coastal Zone Management Act (CZMA) (16 U.S.C. section 1451 et seq.)
- National Historic Preservation Act (54 U.S.C. section 306108 et seq.)
- Endangered Species Act (ESA) (16 U.S.C. section 1531 et seq.)
- Migratory Bird Treaty Act (MBTA) (16 U.S.C. section 703–712)
- Comprehensive Environmental Response and Liability Act (42 U.S.C. section 9601 et seq.)
- Emergency Planning and Community Right-to-Know Act (42 U.S.C. sections 11001–11050)
- Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. section 136 et seq.)
- Resource Conservation and Recovery Act (RCRA) (42 U.S.C. section 6901 et seq.)
- Toxic Substances Control Act (15 U.S.C. sections 2601–2629)
- Executive Order (EO) 11988, Floodplain Management
- EO 11990, Protection of Wetlands
- EO 12088, Federal Compliance with Pollution Control Standards
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations
- EO 13045, Protection of Children from Environmental Health Risks and Safety Risks
- EO 13834, Efficient Federal Operations
- Hawaii Administrative Rules (HAR), Title 11, Chapter 59 (Ambient Air Quality Standards) and Chapter 60 (Air Pollution Control)
- HAR 195 Title 13, Chapter 124
- Hawaii Revised Statutes (HRS) Chapter 195D

A description of the Proposed Action's consistency with these laws, policies and regulations, as well as the names of regulatory agencies responsible for their implementation, is presented in Section 5 (Table 5-1).

1.8 Public and Agency Participation and Intergovernmental Coordination

Regulations from the CEQ direct agencies to involve the public in preparing and implementing their NEPA procedures.

The Navy has prepared this Draft EA to inform the public of the Proposed Action (along with the various alternatives) and to allow the opportunity for public review and comment. The Draft EA is being released for public comment for 30 days. Through the public involvement process, the Navy coordinates with and notifies the public of the Proposed Action. Input from the public is incorporated into the analysis of potential environmental impacts, as appropriate.

The Draft EA review period begins with the publication of a Notice of Availability of the Draft EA in *The Honolulu Star-Advertiser*. The newspaper notice would describe the Proposed Action, solicit public comments on the Draft EA, provide dates of the public comment period, and announce that a copy of the EA would be available for download/review on the Navy's website. All substantive comments received during the comment period will be addressed in the Final EA. The Draft EA is available on the following website:

https://www.navfac.navy.mil/navfac_worldwide/pacific/about_us/national-environmental-policy-act--nepa--information.html

The notice of availability of the Draft EA would also be published in The Environmental Notice, the bi-monthly publication of the State of Hawaii Office of Environmental Quality Control.

The Navy will be coordinating or consulting, as needed, regarding the Preferred Alternative with the following:

- U.S. Fish and Wildlife Service (USFWS) Ecological Services, Pacific Region Office
- State of Hawaii, State Historic Preservation Division, Department of Land and Natural Resources and Historic Partners
- State of Hawaii Office of Planning

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2 Proposed Action and Alternatives

2.1 Proposed Action

The Navy has prepared this EA to evaluate a proposal to construct and operate a new ACC to consolidate existing facilities and services separately managed by the Navy, Air Force, and Army to a location at JBPHH. The new ACC facility would replace and provide the same services currently offered at the following locations:

- Three existing Navy clinic facilities on Naval Station Pearl Harbor:
    - Building 1407 – NHCH Makalapa Clinic
    - Building 1514 – NHCH SMART Center
    - Building 1535 – NHCH Mental Health Clinic
- Three existing Air Force clinic facilities on Hickam AFB:
    - Building 559 – Air Force 15 MDG Medical and Dental Clinic
    - Building 554 – Air Force 15 MDG Mental Health Clinic
    - Building 1113 – Air Force 15 MDG HPARC
- Most primary care services currently offered at Tripler Army Medical Clinic
- Approximately half of the current functions and occupants of Building 1750 – Shipyard Clinic

A new ACC (approximately 250,000 ft^2 [23,226 m^2]) would provide adequate building space to meet current federal criteria and requirements for military health facilities. An ACC of this size would be supported by a central utility plant (approximately 7,500 ft^2 [697 m^2]) and approximately 1,500 parking stalls. The ACC is expected to be staffed by 700 personnel and serve an average of approximately 2,200 patient encounters per day based on being open 250 days per year. Daily services provided in order of expected patient encounter frequency are: pharmacy scripts (642); patient-centered medical home (family medicine) (420); dental (261); physical therapy (189); radiology (139); internal medicine (124); behavioral health (113); immunizations (88); labs (80); pediatrics (55); optometry (40); preventive medicine (22); child and adolescent behavioral health (19); and women's health (16).

The new facility would be a Tri-Service ACC, shared by Navy, Air Force, and Army medical activities to meet the needs of both JBPHH and the Hawaii eMSM. The proposed ACC would be sustained and administered by the DHA, a tenant at JBPHH. Logistics would be supported by TAMC with a "Just in Time" delivery mode, an inventory strategy where materials are only ordered and received as they are needed. In addition to supporting the Hawaii eMSM, the new facility would also support the current clinical functions of the NHCH, the Air Force 15 MDG, and TAMC in providing a full range of military operations and to sustain the readiness and health of all active duty personnel.

Construction of the ACC replacement would take place over approximately two years beginning in FY 2023. The ACC is expected to be fully operational by FY 2028.

2.2 Screening Factors

NEPA's implementing regulations provide guidance on the consideration of alternatives to a federally proposed action and require rigorous exploration and objective evaluation of reasonable alternatives. Only those alternatives determined to be reasonable and to meet the purpose and need require detailed analysis.

Potential alternatives that meet the purpose and need were evaluated against the following screening factors:

- Availability of space for needed medical facilities and access to existing utilities and adequate space to accommodate 10 to 20 percent future growth
- Continuity of health clinic services for all patrons
- Proximity of the new facility to entitled military personnel and convenient access for dependents and retirees on the island of Oahu
- Compatibility with existing military operations and future proposed actions
- Minimization of construction challenges (i.e., minimization of secondary cost effects, construction challenges, or escalations based on environmental or historic property mitigation)

2.3 Alternatives Carried Forward for Analysis

Based on the reasonable alternative screening factors and meeting the purpose and need for the Proposed Action, three action alternatives and one no action alternative are identified and analyzed within this EA.

2.3.1 No Action Alternative

The No Action Alternative is carried forward for analysis in this EA, as required by NEPA regulations and Navy policy. It provides a measure of the baseline conditions against which the impacts of the action alternatives can be compared. Under the No Action Alternative, the Proposed Action would not occur. The new ACC would not be constructed, and the existing service clinics would continue to be used for all existing health care services. As described in Section 1.2, *Background*, existing clinics do not have the building space capacity needed to meet mission requirements and comply with current federal criteria for military health facilities. Therefore, the No Action Alternative would not meet the purpose and need for the Proposed Action.

2.3.2 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative)

Alternative 1 includes construction and operation of a new ACC and supporting infrastructure at the Tradewinds-Par 3 Site (Figure 2-1). The Tradewinds-Par 3 Site is located on the Hickam side of JBPHH, adjacent (east) to the Hickam Par 3 Golf Course. The primary ACC site would be bounded by four secondary roads as follows: Kuntz Avenue to the north, McClelland Street to the west, Mountain Home Street to the south, and McChord Street to the east. Parking may be located across McClelland Street on a portion of the Par 3 Golf Course parcel or along Kuntz Avenue on a parcel currently occupied by a veterinary treatment facility (currently planned for relocation). Alternative 1 would involve construction of the following:

- An approximately 250,000-ft^2 (23,226-m^2) health/dental clinic facility (over multiple stories)
- An approximately 7,500-ft^2 (697-m^2) central utility plant to service the health/dental clinic
- Approximately 1,500 parking stalls (i.e., 600 in surface parking and 900 in structured parking garage)
- Site preparation work and utility connections including electricity, water, storm sewer, and sanitary sewer

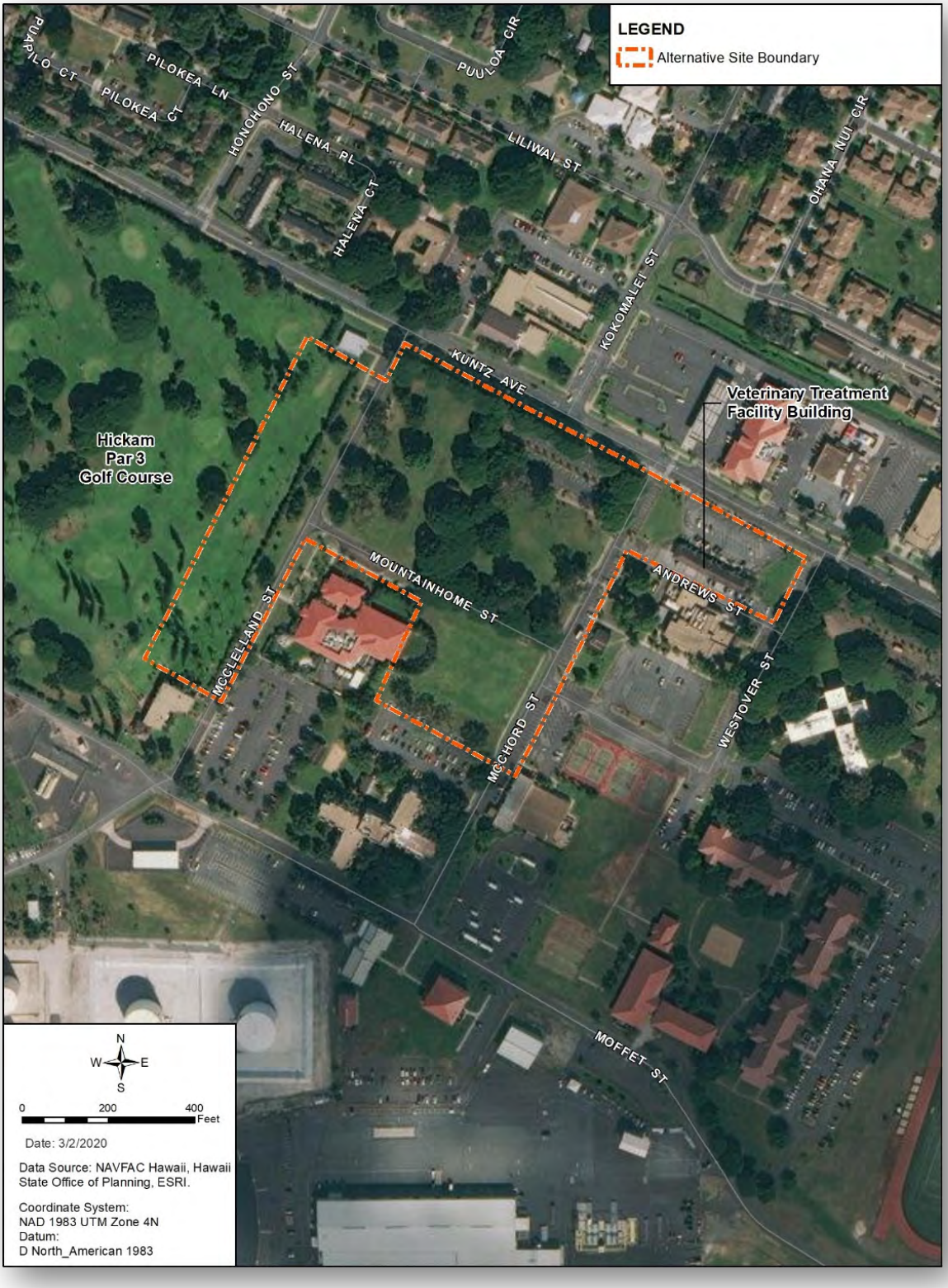

Figure 2-1 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative)

The total square footage of the Tradewinds-Par 3 Site is approximately 680,000 ft^2 (63,174 m^2). To accommodate the new construction, existing facilities on the Tradewinds-Par 3 Site (i.e., Building 75097H) would be demolished to make space for the new ACC. Building 75097H is a recreational pavilion of approximately 1,300 ft^2 (121 m^2) and was last renovated in 1993 (Figure 2-2). An existing veterinary treatment facility building (bounded by McChord Street, Andrews Street, Westover Street, and Kuntz Avenue) would also be demolished to accommodate future parking. A separate project, already in progress, plans to relocate the veterinary clinic to a new facility a few blocks away on Kuntz Avenue. Once operational, the proposed facility would generally operate 250 days per year (days/year) and 9 hours per day (hours/day) per DHA operational standards. The new ACC would be staffed by approximately 700 personnel across approximately 20 separate medical disciplines. Once operational, the new ACC would be expected to have over 2,200 patient encounters each day. The site layout would also allow for at least 20 percent future expansion in accordance with UFC requirements. Other features currently on the Tradewinds-Par 3 Site include surface parking, maintained grass/lawn areas, and scattered trees. To the extent possible, existing trees and surface parking would be incorporated into the new facility layout.

Figure 2-2 Existing Recreational Pavilion (Building 75097H) on the Tradewinds-Par 3 Site

Figure 2-3 Proposed Facility Layout at the Tradewinds-Par 3 Site

The proposed layout of Alternative 1 places the three-story clinic building, with a footprint of approximately 84,000 ft^2 (7,804 m^2), along Kuntz Avenue, with a six-story parking garage including 900 parking spaces and two separate surface parking lots with a total of 600 spaces. The area where the veterinary treatment facility building is would be landscaped or used for additional future surface parking expansion.

2.3.3 Alternative 2: Kuntz Gate Site

Alternative 2 would involve construction and operation of a new ACC and supporting infrastructure at the Kuntz Gate Site (Figure 2-4). The Kuntz Gate Site is located on the Hickam side of JBPHH, west of the Kuntz Gate. The primary ACC site would be bounded by two secondary roads as follows: Halehaka Street to the west and Kuntz Avenue to the south. A drainage canal runs along the parcel's north border and a group of shops and warehouses are situated east of the site. A parking structure would be included, and additional surface parking if needed would be located across Halehaka Street on what is currently a surface parking lot (Hickam Vehicle Resale Lot) and across Kuntz Avenue on what is currently two of four ballfields.

Figure 2-4 Alternative 2: Kuntz Gate Site

Alternative 2 would involve construction of the following:

- An approximately 250,000-ft^2 (23,226-m^2) health/dental clinic facility (over multiple stories)
- An approximately 7,500-ft^2 (697 m^2) central utility plant to service the health/dental clinic
- Approximately 1,500 parking stalls (i.e., 600 in surface parking and 900 in structured parking garage)
- Site preparation work and utility connections including electricity, water, storm sewer, and sanitary sewer

The total square footage of the Kuntz Gate Site is approximately 813,000 ft^2 (75,530 m^2). To accommodate the new construction, existing facilities on the Kuntz Gate Site (Hickam Car Wash [Building 1713H], Flight Crew Motorcycle Repair [Buildings 75065H and 1720H]), and a warehouse would be demolished to make space for the new ACC. Whether these would be replaced elsewhere on the installation is undetermined at this time. Once operational, the proposed facility would generally operate 250 days/year and 9 hours/day per DHA operational standards. The new ACC would be staffed by approximately 700 personnel across approximately 20 separate medical disciplines. Once operational, the new ACC would be expected to have over 2,200 patient encounters each day. The site layout would also allow for 20 percent future expansion in accordance with UFC requirements. Other features currently on the Kuntz Gate Site include surface parking and paved outdoor storage space. A few trees and patches of maintained grass are located on the Kuntz Gate Site along the edges of the parcel and on the baseball fields, but over half of the parcel is paved impervious surface. To the extent possible, existing trees and surface parking would be incorporated into the new facility layout.

Figure 2-5 Proposed Facility Layout at the Kuntz Gate Site

Similar to the proposed layout of Alternative 1, the proposed layout of Alternative 2 also mainly consists of the three-story clinic building, a six-story parking garage and two separate surface parking lots. To preserve green open space and existing tree lines, the proposed layout would not utilize the site area south of Kuntz Avenue.

2.3.4 Alternative 3: Bloch Arena Site

Alternative 3 would involve construction and operation of a new ACC and supporting infrastructure at the Bloch Arena Site (Figure 2-6). The Bloch Arena Site is located on the Pearl Harbor side of JBPHH, north of Nimitz Gate near Bloch Arena. The primary ACC site would be bounded by two secondary roads as follows: North Road to the northwest, and Battleship Drive to the northeast. Situated to the southeast of the site are the Morale, Welfare, and Recreation youth sports office, Pearl Harbor Gym, and the 4,000 seat Bloch Arena. A parking structure and additional surface parking would be located to the southwest of the ACC on what is now a large surface parking lot. Alternative 3 would involve construction of the following:

- An approximately 250,000-ft^2 (23,226-m^2)health/dental clinic facility (over multiple stories)
- An approximately 7,500-ft^2 (697 m^2) central utility plant to service the health/dental clinic
- Approximately 1,500 parking stalls (i.e., 600 in surface parking and 900 in structured parking garage)
- Site preparation work and utility connections including electricity, water, storm sewer, and sanitary sewer

The total square footage of the Bloch Arena Site is approximately 466,000 ft^2 (43,293 m^2). To accommodate the new construction, no existing facilities on the Bloch Arena Site would be demolished to make space for the new ACC, although a ballfield and parking would be removed; based on JBPHH policy, the parking spaces would be replaced elsewhere, though plans have not been developed specifying where this would occur. Once operational, the proposed facility would generally operate 250 days/year and 9 hours/day per DHA operational standards. The new ACC would be staffed by approximately 700 personnel across approximately 20 separate medical disciplines. Once operational, the new ACC would be expected to have over 2,200 patient encounters each day. The site layout would also allow for 20 percent future expansion in accordance with UFC requirements. Features currently on the Bloch Arena Site include baseball fields and a large surface parking lot. Aside from a few trees located along the perimeter of the Bloch Arena Site, the parcel currently consists of either paved impervious surface or maintained grass sports fields. To the extent possible, existing trees and surface parking would be incorporated into the new facility layout.

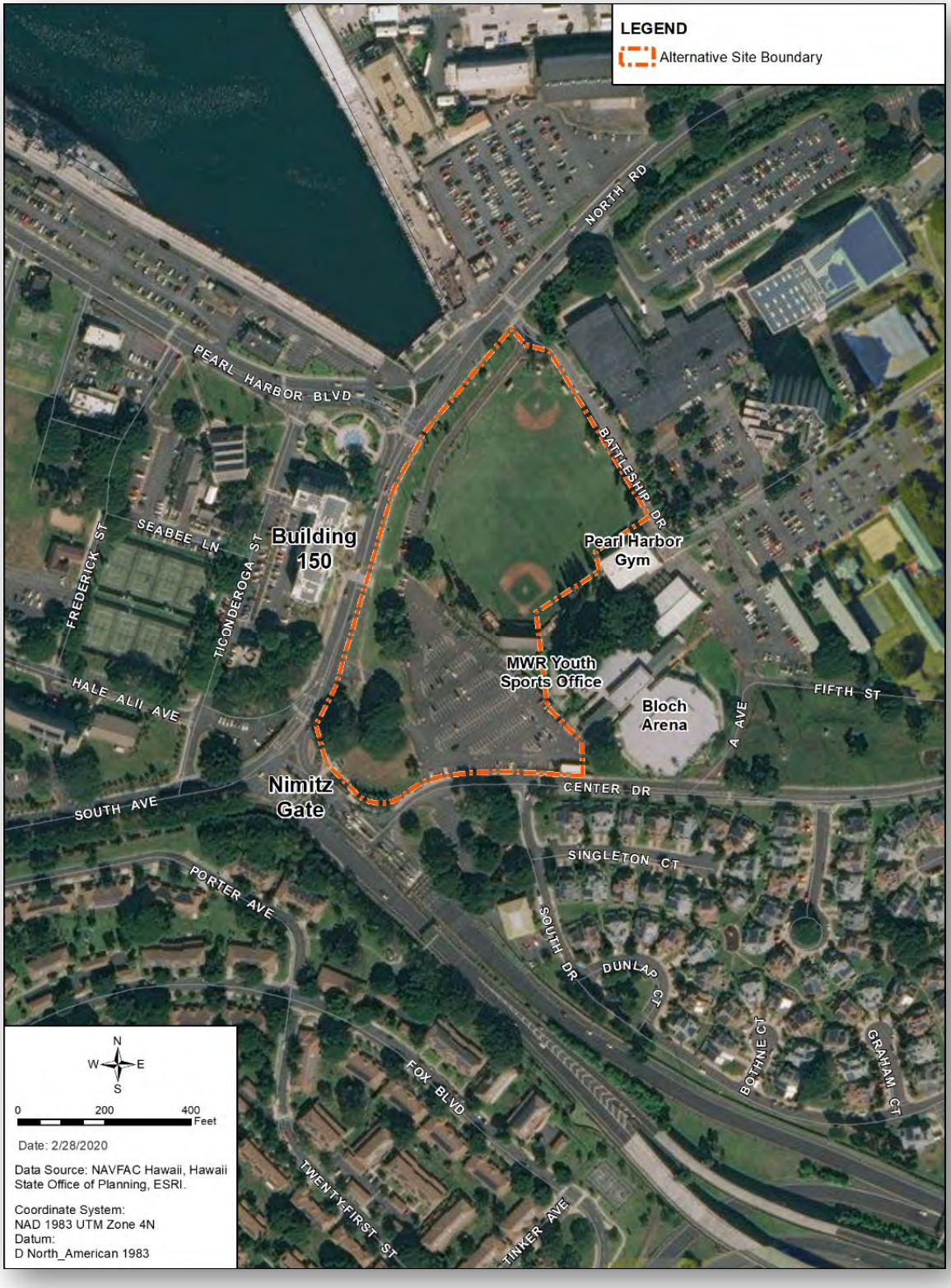

Figure 2-6 Alternative 3: Bloch Arena Site

In the Alternative 3 proposed layout (Figure 2-7), the 900-stall parking garage would be a three-story building that has the same or lower building height as Building 150 to reduce the level of modern intrusions into the surrounding historic viewsheds. One large surface parking would satisfy parking needs for 600 vehicles. Some existing trees would be removed to accommodate the Proposed Action.

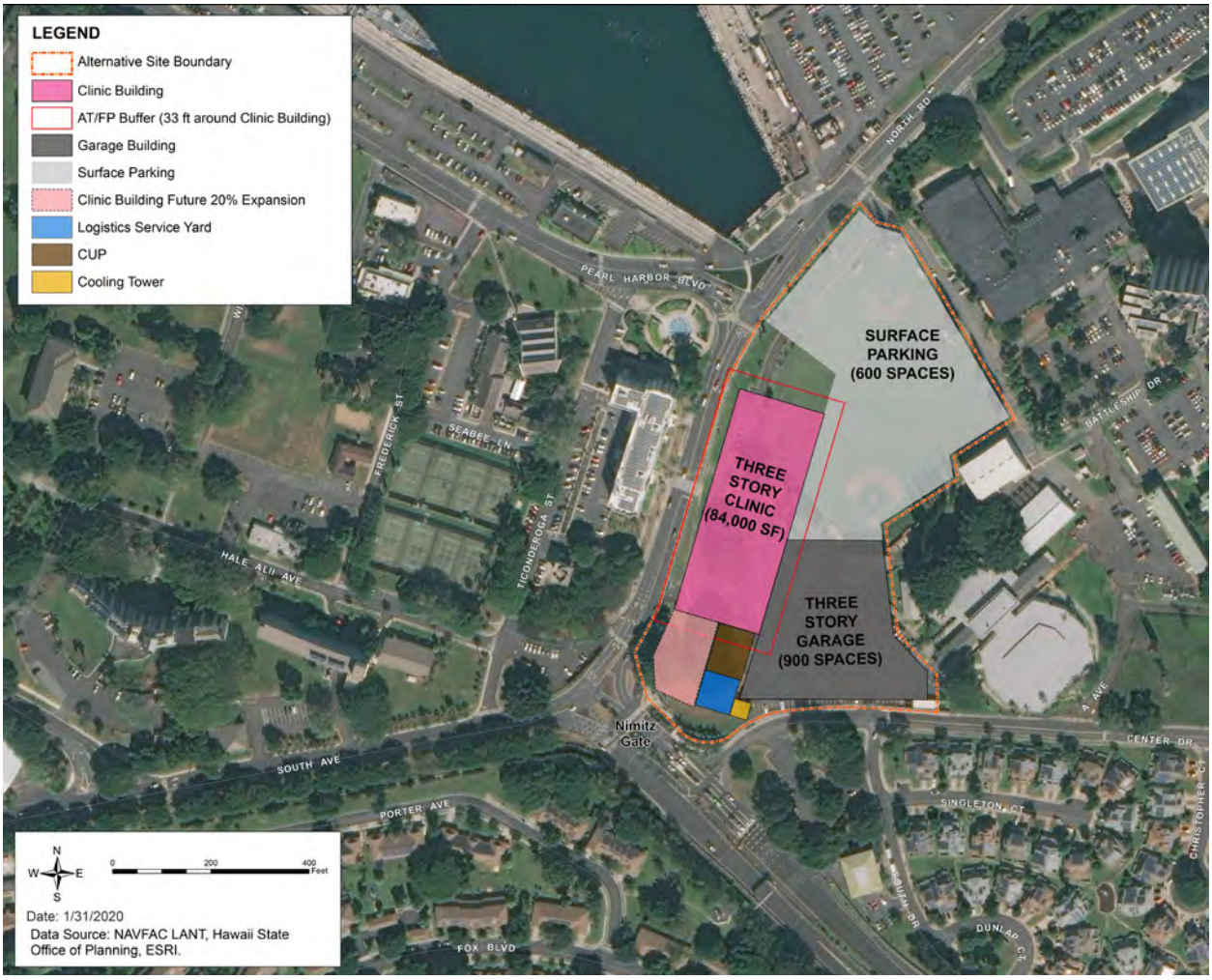

Figure 2-7 Proposed Facility Layout at the Bloch Arena Site

2.3.5 All Action Alternatives: Existing Clinic Buildings Return to the Installation

Alternatives 1, 2, and 3 include the return of existing clinic facilities to the installation, where such buildings are no longer needed by the MHS under the Proposed Action. The facilities expected to be returned to the installation include the following.

Navy:

- NHCH Makalapa Clinic Building 1407 – Medical and Dental Clinic
- NHCH Makalapa Building 1514 – Annex: SMART Center; preventive medicine clinic; travel medicine
- NHCH Makalapa Building 1535 – Mental Health Clinic/Substance Abuse and Rehabilitation Program

Building 1750 is anticipated to remain as the Shipyard Clinic. However, roughly half of its current occupants and functions would be relocated to the ACC. Based on direction from the Hawaii eMSM, once the clinic is partially vacated, a separate project would be awarded to realign the clinical program to support the needs of the Pearl Harbor Naval Shipyard. The Shipyard Clinic would continue to provide Undersea Medicine, Occupational Health, Hearing Conservation, Radiological Health, and Industrial Hygiene services to Navy personnel. The Shipyard Clinic would also provide some limited services to Navy Operational Forces.

- 15 MDG Building 559 – Hickam AFB Medical Clinic
- 15 MDG Building 554 – Hickam AFB Mental Health Clinic
- 15 MDG Building 1113 – Hickam AFB HPARC

Currently, no existing MHS buildings are proposed for demolition.

2.4 Alternatives Considered but not Carried Forward for Detailed Analysis

The following six JBPHH alternatives were considered, but not carried forward for detailed analysis in this EA as they did not meet the purpose and need for the project and satisfy the reasonable alternative screening factors presented in Section 2.2, *Screening Factors*.

2.4.1 Pearl Harbor Side – Existing NHCH Makalapa Clinic Site

The Navy considered building the new ACC facility at the same location as the existing NHCH Makalapa Clinic (Figure 2-8). The site is 76,000 ft^2 (7,061 m^2) which could accommodate a notional four-story building of 250,000 ft^2 (23,226 m^2). The site would be proximate to sailors and a future rail station. However, this alternative was eliminated primarily due to construction phasing issues. If the Proposed Action were implemented at this site, it would require construction of the new clinic on an existing parking lot, temporarily converting a nearby baseball field and another open field to parking lots during construction, demolition of the existing clinic building, and construction of a parking garage in the location of the former clinic. The existing clinic, including associated parking, must remain operational while the new facility is built to ensure continuity of health clinic services. Additional costly phasing analysis and planning would be required to mitigate construction impacts. Therefore, because the existing NHCH Makalapa Clinic site would not meet one or more of the reasonable alternative screening factors, it was not carried forward for detailed analysis in this EA.

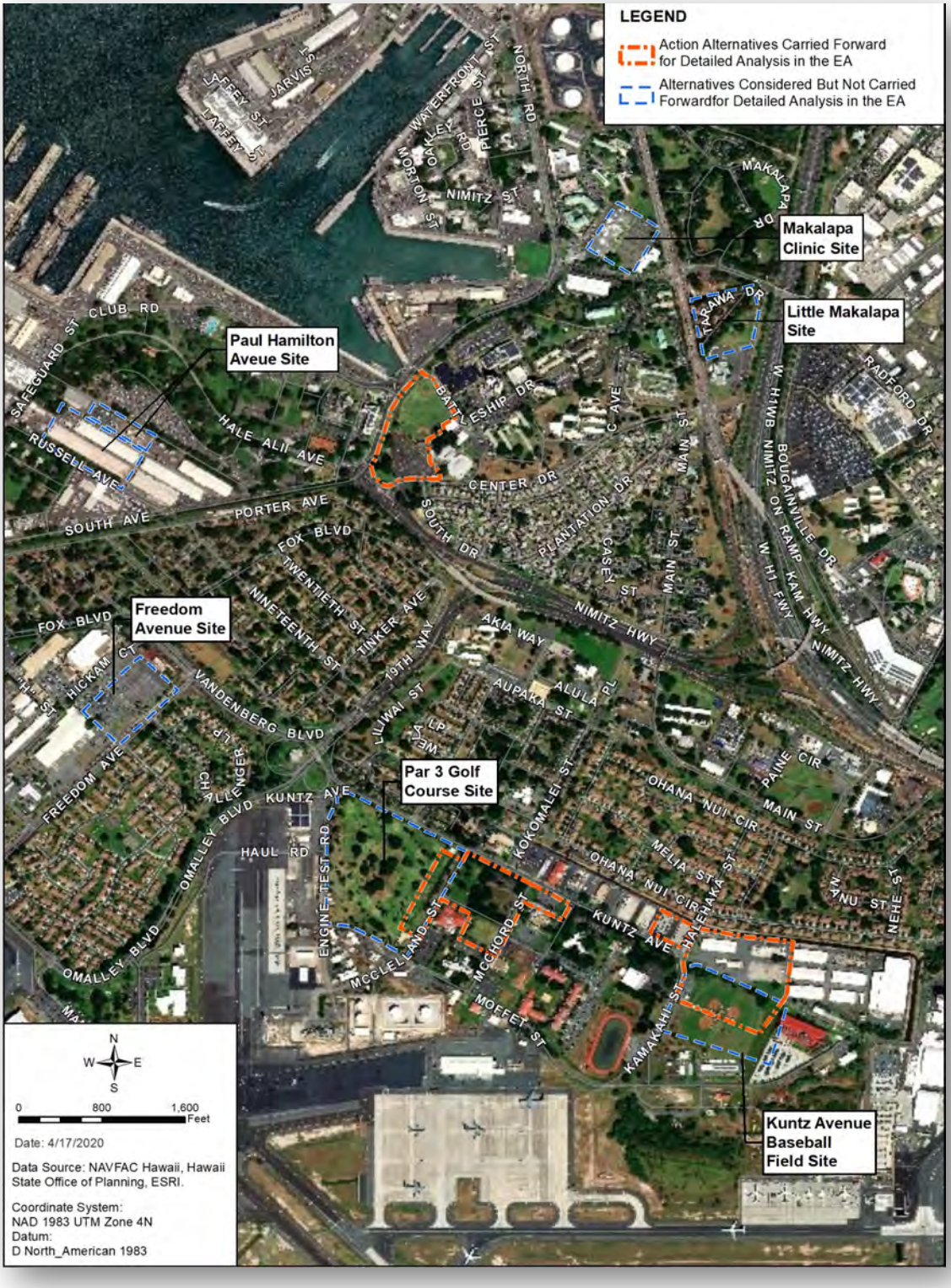

Figure 2-8 Additional Alternative Sites Considered at JBPHH

2.4.2 Pearl Harbor Side – Little Makalapa Site

The Navy considered building the new ACC facility at the Little Makalapa Site (Figure 2-8). The Little Makalapa Site is approximately 265,000 ft^2 (24,619 m^2), which could accommodate a notional four-story building of 250,000 ft^2 (23,226 m^2). This alternative was eliminated as a result of several screening factor challenges including the known presence of environmental and/or cultural resources and potential impacts thereto. The Little Makalapa Site is currently occupied by historic (federally listed) housing units. Additionally, the relatively smaller size of the parcel limits the required potential future growth capability. Moreover, the site is located outside of the existing fenceline and thus would require additional security infrastructure and personnel, and would require more costly utility connections. Finally, as with most sites, traffic mitigation/improvements would also likely be required at this site. Therefore, because the Little Makalapa Site would not meet several of the reasonable alternative screening factors, it was not carried forward for detailed analysis in this EA.

2.4.3 Pearl Harbor Side – Paul Hamilton Avenue Site

The Navy considered building the new ACC facility at the Paul Hamilton Site (Figure 2-8). The Paul Hamilton Site contains two parcels totaling approximately 336,000 ft^2 (31,215 m^2), which could accommodate a notional four-story building of 250,000 ft^2 (23,226 m^2). This alternative was eliminated primarily due to construction challenges. Construction at this site would likely impact existing parking. A parking structure would need to be constructed prior to clinic construction to minimize installation parking impacts. Finally, as with most sites, traffic mitigation/improvements would also likely be required at this site. Therefore, because the Paul Hamilton Avenue Site would not meet several of the reasonable alternative screening factors, it was not carried forward for detailed analysis in this EA.

2.4.4 Hickam Side – Freedom Avenue Site

The Navy considered building the new ACC facility at the Freedom Avenue Site (Figure 2-8). The Freedom Avenue Site contains two parcels totaling approximately 128,000 ft^2 (11,892 m^2), which could accommodate a notional four-story building of 250,000 ft^2 (23,226 m^2). This alternative was eliminated primarily due to construction challenges. Additionally, construction at this site would likely impact existing operations in terms of parking for Exchange and Commissary customers. A parking structure would need to be constructed prior to clinic construction to minimize installation parking impacts. Finally, as with most sites, traffic mitigation/improvements would also likely be required at this site. Therefore, because the Freedom Avenue Site would not meet several of the reasonable alternative screening factors, it was not carried forward for detailed analysis in this EA.

2.4.5 Hickam Side – Par 3 Golf Course Site

The Navy considered building the new ACC facility at the Par 3 Golf Course Site (Figure 2-8). The Par 3 Golf Course Site is a large open parcel currently comprised of a small golf course and totaling approximately 1,000,000 ft^2 (92,903 m^2). The space is easily large enough to accommodate a notional four-story building of 250,000 ft^2 (23,226 m^2). This alternative was eliminated due to a combination of multiple screening factor challenges including construction challenges (mitigation), impacts to airmen quality of life (due to the removal of a recreational facility), and other operational impacts through future airfield tenant growth limitations. Proposed ACC sites should be compatible with existing military operations and future proposed actions. The Par 3 Golf Course Site is situated in a prime location adjacent to the Hickam airfield. Although no firm plans are in place to add new hangars or an additional airfield presence, the Par 3 Golf Course Site would be an ideal site for new airfield dependent uses.

Development of the site for a new ACC would limit potential airfield mission growth. Finally, as with most sites, traffic mitigation/improvements would also likely be required at this site. Therefore, because the Par 3 Golf Course Site would not meet several of the reasonable alternative screening factors, it was not carried forward for detailed analysis in this EA.

2.4.6 Hickam Side – Kuntz Avenue Baseball Field Site

The Navy considered building the new ACC facility at the Kuntz Avenue Baseball Field Site (Figure 2-8). The Kuntz Avenue Baseball Field Site is a large open parcel currently comprised of four baseball fields and totaling approximately 408,000 ft^2 (37,904 m^2). The space is large enough to accommodate a notional four-story building of 250,000 ft^2 (23,226 m^2). This alternative was eliminated due to a combination of multiple screening factor challenges including construction challenges and operational impacts to airmen quality of life via the elimination of recreational facilities, specifically the loss of four recreational fields needed for Morale, Welfare, and Recreation. Finally, as with most sites, traffic mitigation/improvements would also likely be required at this site. Therefore, because the Kuntz Avenue Baseball Field Site would not meet several of the reasonable alternative screening factors, it was not carried forward for detailed analysis in this EA.

2.4.7 Sites Outside of Joint Base Pearl Harbor Hickam

In addition to Little Makalapa described in Section 2.4.2, the Navy also considered other sites outside of JBPHH for the proposed ACC replacement facility. Sites outside of JBPHH were deemed less desirable based on several of the alternative screening factors. First, sites outside of JBPHH would be less convenient to entitled military personnel. A facility outside the fence line was determined to be too isolated from the populations it serves, and would require more stringent Antiterrorism Force Protection requirements with 24-hour active security funded by DHA for the existence of the facility. Additionally, sites outside of JBPHH would likely entail greater costs and construction challenges (e.g., related to land purchase, site preparation work, environmental mitigation, and utility connections). Therefore, because the sites outside of JBPHH would not meet several of the reasonable alternative screening factors, they were not carried forward for detailed analysis in this EA.

2.5 Best Management Practices Included in Proposed Action

This section presents an overview of the best management practices (BMPs) that are incorporated into the Proposed Action in this EA. BMPs are existing policies, practices, and measures that the Navy would adopt to reduce the environmental impacts of designated activities, functions, or processes. Although BMPs mitigate potential impacts by avoiding, minimizing, or reducing/eliminating impacts, BMPs are distinguished from potential mitigation measures because BMPs are: (1) existing requirements for the Proposed Action, (2) regularly occurring practices, or (3) not unique to this Proposed Action. Thus, the BMPs, including general impact avoidance and minimization measures identified in this EA (Table 2-1), are inherently part of the Proposed Action and are not potential mitigation measures proposed as a function of the NEPA environmental review process for the Proposed Action. Project-specific avoidance, minimization, and mitigation measures (if any) are discussed separately in Section 3, *Affected Environment and Environmental Consequences*.

Table 2-1 Best Management Practices

BMP	*Description*	*Impacts Reduced/ Avoided*
Low-impact development in compliance with Section 438 of the Energy Independence and Security Act, UFC 3-210-10 – *Low Impact Development* (DoD 2015).	Comply with stormwater management practices to closely maintain or replicate hydrological behavior of the natural system for a defined design storm event.	Impacts of stormwater runoff and non-point source pollution by maintaining site hydrology
Adherence to the JBPHH Spill Prevention, Control, and Countermeasure Plan.	Adhere to spill response procedures, including notifications and communications, roles and responsibilities, and response equipment inventories.	Impacts to water quality and public health from spills of hazardous substances
Construction activities in accordance with the USEPA General Construction Permit.	Submit a Notice of Intent to USEPA to request coverage under the permit. Develop a Stormwater Pollution Prevention Plan that identifies structural controls such as erosion and sediment controls, berms, or dikes around critical areas, retention/detention basins, and oil-water separators. The plan would also identify non-structural controls such as preventive maintenance practices, regular inspections, and regular pavement cleaning.	Construction impacts to surface water quality and habitats due to erosion/ sedimentation and stormwater contaminants
Air quality BMPs and compliance with federal and state regulations.	Use properly maintained fuel-efficient construction vehicles with emission controls to the maximum extent possible. Control dust emissions from ground disturbance and road traffic. Reduce asbestos emissions from asbestos removal and minimize release and disposal of regulated refrigerants. Limit application of cutback asphalt in paving in accordance with federal and state regulations.	Emissions of air pollutants and resulting impacts to air quality
Protection of native vegetation.	During mobilization of equipment, avoid disturbance of native vegetation outside the limits of construction.	Impacts to native vegetation
Maintain large shade trees where possible.	In accordance with the INRMP, the Navy would minimize tree clearing and earthwork to the maximum extent possible and establish vegetative cover on temporary disturbed areas by seeding with appropriate native or existing plants.	Impacts to vegetation
Project personnel and contractor shall be informed about the presence of endangered species.	Should an endangered species be found on-site, the project personnel and contractor shall be informed of its presence and use additional BMPs to avoid impacts.	Impacts to ESA-listed species
Biological monitoring shall be conducted prior to project initiation.	A biological monitor that is familiar with the species' biology shall conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Surveys will be repeated again within three (3) days of project initiation and after subsequent delay of work of three (3) or more days (during which birds may attempt to nest).	Impacts to Hawaiian waterbirds

Table 2-1 Best Management Practices

BMP	*Description*	*Impacts Reduced/ Avoided*
In areas where waterbirds are known to be present, reduced speed limits shall be posted and implemented.	Speed limit reductions shall be implemented in areas where waterbirds are known to be present to avoid or minimize the likelihood of fatalities and disturbance to Hawaiian waterbirds.	Impacts to Hawaiian waterbirds
Water quality BMPs may include: silt containment; no trash/debris contamination; keep fuel vehicles away from the water; contingency plan for fuel spills; and protect exposed soil from erosion.	Water quality BMPs to reduce sedimentation, erosion, and discharge of impacted runoff to the aquatic environment would be incorporated into the project design.	Impacts to Hawaiian waterbirds
If a Hawaiian waterbird nest is discovered, contact the Naval Facilities Engineering Command, Hawaii Natural Resources Office (808-471-0378) who shall in turn contact the Pacific Islands Fish and Wildlife Office within 48 hours for further guidance.	Establish and maintain a 100-foot (30-meter) buffer around all active nests and/or broods until the chicks/ducklings have fledged. No potentially disruptive activities or habitat alteration will occur within this buffer. A biological monitor shall be present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.	Impacts to Hawaiian waterbirds
Trees shall be surveyed for the presence of white terns prior to trimming, removal, or any other action that could disturb the tree.	If a nest is discovered, the DOFAW shall be notified. Additionally, the Navy has a variety of management actions in place to protect white terns to enhance their habitat. They include: (1) resource agency coordination; (2) cooperative agreements; (3) SOPs; (4) project reviews and consultations; (5) bird surveys; (6) community outreach; and (7) mitigation measures during training.	Impacts to white (fairy) tern
Trees 15 feet (5 meters) in height or taller shall not be cleared during the Hawaiian hoary bat pupping season.	BMP applies to tree trimming or removal during the hoary bat birthing and pup rearing season (June 1 through September 15).	Impacts to Hawaiian hoary bat
Restrict use of barbed wire fencing during construction and in final site design.	Entanglement in barbed wire is a threat to Hawaiian hoary bats. No barbed wire fencing shall be used during construction and shall not be included in the final site design.	Impacts to Hawaiian hoary bat

Table 2-1 Best Management Practices

BMP	*Description*	*Impacts Reduced/ Avoided*
Avoid all night lighting not needed for Anti-Terrorism/Force Protection (AT/FP) or personnel safety.	To minimize effects on nocturnal Migratory Bird Treaty Act (MBTA) seabirds (e.g., wedge-tailed shearwaters), Navy policy (COMNAVREG Hawaii Instruction 5090.1) is to avoid all night lighting not needed for Anti-Terrorism/Force Protection (AT/FP) or personnel safety, install only full cutoff exterior down-lighting fixtures for all new construction whenever possible. Exterior lights shall be LED lights with full cut-off fixtures to comply with the MBTA. Lights that are International Dark-sky Association (IDA; http://www.darksky.org) certified, are preferred but not required.	Impacts to MBTA-listed species
Design of facility to meet minimum structural noise attenuation goals, as stated in OPNAVINST 11010.36C.	Design facilities to meet or exceed minimum outdoor-to-indoor noise level reduction goals.	Noise disturbances for users of the proposed facility
Construction in accordance with UFC for Military Medical Facilities.	UFC 4-510-01 includes architectural and engineering design requirements for military medical facilities, such as isolation of spaces within medical facilities (e.g., examination rooms) from exterior noise sources and other interior spaces. Select construction materials and design to reduce noise levels in noise-sensitive areas.	Noise disturbances for users of the proposed facility
Construction in accordance with DoD Instruction 2000.16 (DoD Antiterrorism Standards).	Incorporate ATFP standards into the design of the new clinic space, where applicable, such as appropriate standoff distances, building separation, unobstructed space, drive-up and drop-off areas, access roads, and parking.	Health and safety impacts
Construction of roadway improvements in accordance with DoD guidelines.	Incorporate DoD design standards for roadway and traffic improvements.	Safety and operational impacts
Incorporate appropriate construction traffic detouring per DoD and MUTCD guidelines.	When implementing roadway and sidewalk closures, adhere to accepted practices outlined in DoD and MUTCD guidelines.	Safety and operational impacts
Adherence to ICRMP Inadvertent Discovery Procedures and related planning guidelines.	In the event of an inadvertent discovery of archaeological sites, the Navy would follow the inadvertent discovery procedures n and related planning guidelines in the installation ICRMPs, and consult with the SHPO and affected Native Hawaiian organizations as appropriate.	Impacts to previously unrecorded or unevaluated cultural resources discovered during ground-disturbing activities
Adherence to procedures for activities in areas of high potential for subsurface archaeological sites outlined in ICRMP guidelines.	Disturbance of potential subsurface archaeological sites in high potential areas could be addressed through ICRMP guidelines, such as limiting ground disturbing activities to known depth of fill, monitoring excavation, conducting investigations in areas with known subsurface sites, and collecting data to inform SHPO and update the ICRMP GIS database.	Impacts to areas of high potential for subsurface archaeological sites during ground-disturbing activities

Table 2-1 Best Management Practices

BMP	*Description*	*Impacts Reduced/ Avoided*
Proposed development to align with the IDP's planning guidance.	The proposed facilities would mirror regional building styles in color, materiality and design where appropriate as recommended in the IDP.	Visual impacts from the built-up facility
Preserving green space and mature canopy trees.	The Eastside ADP promotes a garden city district with buildings connected by accessible greenbelts and tree-lined streets. To retain existing greenery, it is recommended not to remove existing healthy, mature canopy trees. Should the removal of these canopy trees be needed for the Proposed Action, these trees will be replaced by the same amount and type of trees on or off-site within JBPHH. It is also recommended for Proposed Action to maximize accessible green spaces and plant trees along streets when possible.	Visual impacts from the loss of green open space and canopy trees
Traffic impact avoidance measures.	Traffic measures would include preparing a Construction Management Plan that defines the scope and scheduling of construction activities, identifying an on-base construction staging area, using flaggers to control the flow of traffic, scheduling deliveries and pickup of materials during off-peak hours, and maintaining unobstructed access to nearby land uses.	Traffic impacts at JBPHH
Adherence to established LUCs.	LUCs including land use restrictions would be implemented at the Preferred Alternative to guide any excavation, grading, and trenching activities at this site. COCs in the soil would remain in place and exposure to subsurface contaminants would be prevented. The LUCs were developed upon guidance provided in the *Policy on Land Use Controls Associated with Environmental Restoration Activities* (DoD 2001).	Hazardous Materials and Wastes

Notes: ADP = Area Development Plan; ATFP = Antiterrorism Force Protection; BMP = best management practice COC = chemical of concern; DoD = Department of Defense; GIS = geographic information system; ICRMP = integrated cultural resources management plan; IDP = installation development plan; INRMP = integrated natural resources management plan; JBPHH = Joint Base Pearl Harbor-Hickam; LUC = land use control; MUTCD = Manual on Uniform Traffic Control Devices; NRHP = National Register of Historic Places; OPNAVINST = Office of the Chief of Naval Operations Instruction; SHPO = State Historic Preservation Office; SOP = standard operating procedure UFC = Unified Facilities Criteria; USEPA = United States Environmental Protection Agency.

3 Affected Environment and Environmental Consequences

This section presents a description of the environmental resources and baseline conditions that could be affected from implementing any of the alternatives and an analysis of the potential effects of each alternative.

All potentially relevant environmental resource areas were initially considered for analysis in this EA. In compliance with NEPA, CEQ, and Department of Navy guidelines, the discussion of the affected environment (i.e., existing conditions) focuses only on those resources potentially subject to impacts. Additionally, the level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact.

"Significantly," as used in NEPA, requires considerations of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole (e.g., human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of a proposed action. For instance, in the case of a site-specific action, significance would usually depend on the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant. Intensity refers to the severity or extent of the potential environmental impact, which can be thought of in terms of the potential amount of the likely change. In general, the more sensitive the context, the less intense a potential impact needs to be in order to be considered significant. Likewise, the less sensitive the context, the more intense a potential impact would need to be in order to be considered significant.

The region of influence (ROI) is defined for each resource potentially affected by the proposed alternatives. The ROI determines the geographical area to be addressed as the Affected Environment. The ROI is contiguous with the boundary of the direct area of the Proposed Action for some resources, and may extend beyond those boundaries for other resources.

Impact criteria were developed to ensure subject matter experts were analyzing the level of direct and indirect impacts of the Proposed Action to the resources consistently (Table 3-1). These impact criteria were used to evaluate the effects of the Proposed Action on each resource in consideration of magnitude and intensity, geographic extent, context, and duration. Summary impact levels were then assigned to each resource (Table 3-2) based on each impact criterion defined in Table 3-1. The No Action Alternative was used as the baseline scenario when analyzing the impacts of the Proposed Action.

Table 3-1 Methods for Determining Levels of Impact

Impact Assessment Criteria	
Magnitude and Intensity	
Low	A change in the resource condition is minimal and does not noticeably alter the resource's function in the environment.
Medium	A change in the resource condition is measurable or observable, and an alteration in the environment is noticeable and detectable.
High	A change in a resource condition is measurable or observable, and the alteration in the resource's function is clear and consistently observable.
Geographic Extent	
Local	Impact is limited geographically and would not extend to a broad region or broad sector of the resource population.
Regional	Impact extends beyond the project area, affecting the immediate project area, into the area of concern, and potentially the entire region.
Context	
Common	The affected resource is considered usual or ordinary in the region, is not depleted, and is unprotected by legislation. The resource does not fill a distinctive or irreplaceable role in the region.
Important	The affected resource is protected by legislation other than the Endangered Species Act, e.g., Migratory Bird Treaty Act, and/or fills a distinctive role in the local area or region that is important or irreplaceable.
Unique	The affected resource is listed as threatened or endangered (or proposed for listing) under the Endangered Species Act or is depleted within either the locality or the region. The portion of the resource affected fills a distinctive ecosystem role within the locality or the region.
Duration	
Temporary	Impact is limited to the construction period.
Long-term	Impact lasts throughout the operational period.

Table 3-2 Summary Impact Levels

Impact Level	*Description of Impact Level*
Beneficial	Project implementation would improve condition of a given resource, preserve or increase resource availability to the general public, or increase the presence of an important or unique resource. Change can be of any magnitude but must be interpreted as a positive impact to the resource area of concern. Effect can be of any geographic extent. Context is dependent on the resource. Impact can be of any duration, although it generally is improved long-term.
No Impact	No measurable effect of the proposed project on the resource for any criterion when compared to the No Action Alternative. Actions involve continuation of previously implemented Integrated Natural Resources Management Plan management objectives and strategies, and/or actions involve the implementation of new or increased monitoring measures.
No Significant Impact	Impacts are less than significant. This means they are generally low (cannot be measured or observed) or medium (can be observed) in intensity, and can be of local or regional extent. Common resources may experience more intense impacts but important or unique resources are unlikely to be affected. Impact is either temporary or long-term.
Significant	Impacts are generally medium or high intensity, of long-term duration, of a regional extent, and have negative effects on important or unique resources.

Based on the above considerations for significance and in keeping with the intent of *ASN Memorandum for NAVFAC Environmental Planning Streamlining and Process Improvement* dated October 16, 2019, this EA focuses on the following resources requiring analysis for significant impacts: cultural resources, air quality, biological resources, visual resources, transportation, and hazardous materials and wastes.

The potential impacts to the following resource areas are considered to be not significant or non-existent, so they were not analyzed in detail in this EA:

Water Resources: None of the alternatives would result in impacts to groundwater, surface water, marine waters, wetlands, floodplains, and shorelines. The Proposed Action under all alternatives would utilize existing stormwater drainage systems or would be required to upgrade as needed to accommodate additional storm drainage quantities and velocities. Low impact storm water management design features would be incorporated into the site design where practicable.

Geological Resources: No sensitive geological resources are located in or adjacent to any of the alternative project sites. All are located on level coastal plain areas that are heavily developed and not within sensitive soils.

Land Use and Coastal Zone Management: The alternative sites are all located on JBPHH (federal) installation lands and are not subject to municipal or state land use polices or zoning regulations. While all proposed alternative sites are on federal land, by definition, excluded from the coastal zone, even if the sites were within the coastal zone the action would constitute a de minimis activity under the CZMA. The Navy consulted with the State of Hawaii Office of Planning. The Proposed Action is the type of activity which would constitute an agreed de minimis activity under the CZMA per Navy/State List of De Minimis Activities. This project falls within Item 1 of the Navy/Marine Corps De Minimis Activities Under CZMA:

> *Item 1: New construction of facilities and structures wholly within Navy/Marine Corps controlled areas (including land and water) that is similar to present use and when completed, the use or operation of which complies with existing regulatory requirements.*

The Navy will observe all applicable mitigation/conditions for Item 1 per General Condition 16 of the De Minimis Activities Under CZMA. Therefore, no additional review under the Hawaii Coastal Zone Management Program is required. See Appendix D for correspondence with the State.

The Proposed Action would be designed and implemented consistently with the installation Area Development Plans (ADPs) and Installation Development Plan (IDP), as applicable.

Airspace: The Proposed Action would not result in any impacts on airspace, nor would airspace or flight line restrictions impact its design or construction on any of the alternative sites. None of the alternative sites are located in an Accident Potential Zone, Accident Clear Zone, or any other restricted zone associated with airspace at the airfield operations (The Urban Collaborative, LLC 2013).

Noise: The Proposed Action would not result in any noise impacts. Alternative 1 is the only proposed alternative site that is near the JBPHH flight line and the Daniel K. Inouye International Airport noise contours. The Alternative 1 site is within the 60 to 65 decibel noise contour range from runway operations which is the equivalent to conversational speech or an air conditioning unit running (SS&A Page 2019). Construction-related noise would be temporary and is not expected to extend off-base.

Infrastructure: The Proposed Action would not result in any impacts to infrastructure. None of the alternatives are in locations that would require substantial alteration or upgrades to existing utilities and infrastructure, including potable water production, storage, and distribution; wastewater collection, treatment, and disposal; storm water management, solid waste management, energy production, transmission and distribution; communications; and facilities (e.g., airfields, buildings, ranges, training and testing areas, wharves, piers, housing). The capacity at the sewage facility is adequate to handle the anticipated additional loads from the Proposed Action. Electrical and potable water infrastructure are also adequate for any additional loads from this project. Solid waste management and disposal procedures and practices would be adjusted as needed to accommodate waste generation from the Proposed Action. The waste handling process would be modified to accommodate an anticipated reduction in waste generation due to the closure of other facilities as part of the ACC consolidation. As noted above, any storm drainage modifications needed to accommodate the Proposed Action would be designed to handle new impermeable surfaces and be consistent with low-impact development in compliance with Section 438 of the Energy Independence and Security Act, UFC 3-210-10.

Public Health and Safety: The Proposed Action on any of the alternative sites would not result in impacts to public health and safety. Traffic and circulation safety would be incorporated into the design of circulation improvements and traffic management through the use of BMPs and engineering safety features. During construction, BMPs and other required measures would ensure compliance with all public safety standards for construction sites. Once operational the ACC would pose no public health risks.

Socioeconomics: The Proposed Action on any of the alternative sites would not result in impacts to socioeconomics. All of the alternative sites are located within JBPHH installation property and would replace existing, similar DoD-operated facilities in the vicinity. Construction of the Proposed Action would not result in noticeable changes to population demographics, employment characteristics, school enrollment, housing occupancy status, economic activity, or tax revenue.

Environmental Justice: The Proposed Action on any of the alternative sites would not result in any impacts relating to environmental justice. All of the alternative sites are located within the JBPHH installation property and would replace existing facilities in the vicinity that serve the military community, including all entitled military personnel, dependents, and retirees. The alternatives would not affect the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

3.1 Cultural Resources

This discussion of cultural resources includes prehistoric and historic archaeological sites; historic buildings, structures, and districts; and physical entities and human-made or natural features important to a culture, a subculture, or a community for traditional, religious, or other reasons. Cultural resources can be divided into three major categories:

- Archaeological resources (prehistoric and historic) are locations where human activity measurably altered the earth or left deposits of physical remains.
- Architectural resources include standing buildings, structures, landscapes, and other built-environment resources of historic or aesthetic significance.
- Traditional cultural places (TCPs) may include archaeological resources, structures, neighborhoods, prominent topographic features, habitat, plants, animals, and minerals that Native Hawaiians or other groups consider essential for the preservation of traditional culture.

For the purposes of this analysis, the term ROI is synonymous with the "area of potential effect" as defined under the National Historic Preservation Act (NHPA). The ROI for cultural resources is contiguous with the boundaries of the alternative sites described in the Proposed Action.

3.1.1 Regulatory Setting

Cultural resources are governed by other federal laws and regulations, including the NHPA, Archaeological and Historic Preservation Act, American Indian Religious Freedom Act, Archaeological Resources Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990. Federal agencies' responsibility for protecting historic properties is defined primarily by sections 106 and 110 of the NHPA. Section 106 requires federal agencies to consider the effects of their undertakings on historic properties. Section 110 of the NHPA requires federal agencies to establish—in conjunction with the Secretary of the Interior—historic preservation programs for the identification, evaluation, and protection of historic properties. Cultural resources also may be covered by state, local, and territorial laws.

- JBPHH ICRMP is composed of two guidance documents that were separately produced in 2008, one for Pearl Harbor and one for Hickam AFB. All installations are required by DoD Instruction 4715.3 to have an ICRMP, which provides an overarching picture and a framework to help ensure that historic and cultural preservation concerns are properly considered and integrated into the Navy's decision-making process. The ICRMPs identify historic properties and provide guidance on compliance processes and management procedures for cultural resource management, based on active agreement documents and applicable laws and regulations. These plans were separately produced in 2008, prior to the joint basing of the two installations; an updated consolidated JBPHH ICRMP is in progress but not yet approved.
- In 1964, the U.S. Naval Base at Pearl Harbor was designated a National Historic Landmark (NHL). An NHL is a property of national historic significance as designated by the U.S. Secretary of the Interior under the authority of the Historic Sites Act of 1935. The NHL district boundary is delineated as "those water and land areas historically, intimately, and directly associated with its function" as an active naval base supporting the Pacific Fleet (PHNC ICRMP 2008).
- A portion of the Hickam side of JBPHH is listed as Hickam NHL, encompassing the flight line, four hangars, and HQ PACAF. These areas and their management documents are detailed in the Hickam AFB ICRMP.
- The ICRMPs list in detail all other applicable federal regulatory guidance and Navy and DoD manuals, policies, and directives.

3.1.2 Affected Environment

Cultural resources listed in the National Register of Historic Places (NRHP) or eligible for listing in the NRHP are "historic properties" as defined by the NHPA. The list was established under the NHPA and is administered by the National Park Service on behalf of the Secretary of the Interior. The NRHP includes properties on public and private land. Properties can be determined eligible for listing in the NRHP by the Secretary of the Interior or by a federal agency official with concurrence from the applicable State Historic Preservation Office. An NRHP-eligible property has the same protections as a property listed in the NRHP. The historic properties may include archaeological and architectural resources as well as TCPs.

The Navy has conducted surveys and prepared inventories at JBPHH to identify cultural resources that are listed or are potentially eligible for listing in the NRHP. These previously conducted studies and

inventories, associated historic context and significance information, and archaeological probability mapping are described in detail in the two installation ICRMPs noted above. The ICRMPs also provide a gap analysis identifying future research needs and SOPs for addressing impacts to cultural resources.

The area of potential effect (APE) for cultural resources is the geographic area or areas within which an undertaking (project, activity, program or practice) may cause changes in the character or use of any historic properties present. The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. Cultural resource impacts are primarily the result of direct physical changes to historic properties, such as the disturbance of belowground archaeological sites, or demolition or modification of historic architectural resources. However, some impacts may extend beyond the physical boundaries of the alternative sites to encompass settings and views that contribute to the historic significance of a resource. For this Proposed Action, the Navy determined that the APE may include locations from which the new facility would be visible, because historic properties at JBPHH, such as the NHL District, have been identified as potentially affected by modern intrusions into their viewsheds.

3.1.2.1 Archaeological Resources

Archaeological work at JBPHH spans more than a century of surveys and investigations, beginning at Hickam as early as 1905. The entire terrestrial surface of PHNC and Hickam AFB has been surveyed and inventoried for archaeological sites, and, as of 2006, more than 130 archaeological surveys had been completed throughout JBPHH. The JBPHH ICRMPs do not include a complete inventory of archaeological sites and associated evaluations.

In the coastal plain and along the margins of the harbor, fishponds are the predominant archaeological resources identified in the historical record and in surveys. The Pearl Harbor ICRMP identified 31 known fishpond sites, and Hickam ICRMP identified 5 fishponds. In Hawaii, fishponds (*loko ia*) are unique aquacultural systems constructed in the pre-contact period by native Hawaiians throughout the islands. Fish were trapped and cultivated within the sometimes vast pond areas using systems of walls and gates. The ponds were an integral part of Hawaiian culture, communally constructed, subject to strict management protocols, and provided a major source of sustenance to the population. Into the nineteenth century, many such ponds were in the current Pearl Harbor, although this form of aquaculture had begun to be disused well before the military period. Most fishponds along the Pearl Harbor shoreline have since been disturbed or destroyed, and the remains associated with them, such as wall fragments, are found in a subsurface context, especially in developed areas of the installation. The ICRMP identified disturbed fishponds as not NRHP eligible.

During the nineteenth century, the fishponds on Hickam fell into disuse and by the early twentieth century, the area was leveled and filled in with dredged coral fill from Keehi Lagoon and the Pearl Harbor channel. There are no surface remnants of the fishponds. The ICRMP identified disturbed fishponds as not NRHP eligible.

Near the Tradewinds-Par 3 Site is the location of a disturbed fishpond identified as Lelepaua Fishpond (State Inventory of Historic Places [SIHP] #50-80-13-00082). No other archaeological sites have been identified in the vicinity. The Tradewinds-Par 3 Site was extensively disturbed when a large barracks building that previously stood on the site was demolished, within the past 10 years. Therefore, it is anticipated to have a low potential for archaeological resources.

No known archaeological sites are in the area of the Kuntz Gate Site. It is documented in the Hickam ICRMP as having low probability for archaeological resources due to past extensive ground-disturbing activities.

Overlapping approximately 0.6 acre (0.2 hectare) of the Bloch Arena Site along North Road close to the end of Southeast Loch is the site of a former, disturbed fishpond, Wailolokai Fishpond (SIHP #50-80-13-00099). The area of the fishpond is considered to have high probability for archaeological resources. The rest of the Bloch Arena Site sits on an area of developed/fill land that is identified in the Pearl Harbor ICRMP as having low probability for archaeological resources.

3.1.2.2 Architectural Resources

Numerous historic architectural studies have been undertaken throughout JBPHH, covering buildings that are over 50 years of age, comprising more than 2,000 facilities in total. On the Pearl Harbor side of the installation, several hundred architectural resources are considered contributing to the Pearl Harbor NHL district. On the Hickam side of the installation, NRHP-eligible and listed architectural resources are predominantly concentrated in the designated Garden City designed area of the installation, which is encompassed by the Hickam Historic District.

Historic Category Codes are applied to all historic architectural resources inventoried at JBPHH. Categories I, II, and III refer to properties in descending level of importance that all meet the NRHP criteria or contribute to the significance of other properties, and therefore merit consideration in project planning under NHPA and NEPA. Category IV properties are those that do not meet the NRHP criteria and thus are considered to not merit additional consideration under NHPA. The categories, as well as the following historical architectural resource information, are explained in greater detail in the ICRMPs.

Well outside of the Historic District areas of Hickam, the Kuntz Avenue corridor includes no buildings or structures in Categories I or II. Directly across McChord Street from the Tradewinds-Par 3 Site is the Air Force Security Ops building, constructed in 1958 (Facility [Fac.] 2104H), designated as Category III. Several Category IV buildings are in the general area, all barracks or support services related (Facs. 1805H, 1859H, 1860H, and 1864H).

The Kuntz Gate Site encompasses two Category IV warehouses that are over 50 years of age (Facs. 1713H and 1720H), and three other Category IV warehouses immediately to the east (Facs. 1715H, 1722H, and 1723H).

The Bloch Arena Site is located within the Pearl Harbor NHL district (Figure 3-1). Within and adjacent to it are several contributing historic buildings and structures. These include Fac. 150, the Administration Building, a Category I building which overlooks the site from the intersection of North Road and Pearl Harbor Boulevard. Adjacent to the site and presently accessed through it are Bloch Arena (Fac. 161) and an adjacent World War II splinter-proof personnel shelter (Fac. S897), which are Category II buildings. Ward Field (Fac. S1009) is a Category II facility. This grassy, level ballfield was built during World War II and is recognized as contributing to the landscape character within the historic district and the setting of surrounding historic facilities. Additionally, one small Category IV electrical substation (Fac. S1008) is within the Bloch Arena Site. The Enlisted Personnel Club (Fac. 1314, Category III) stands across the street to the northeast.

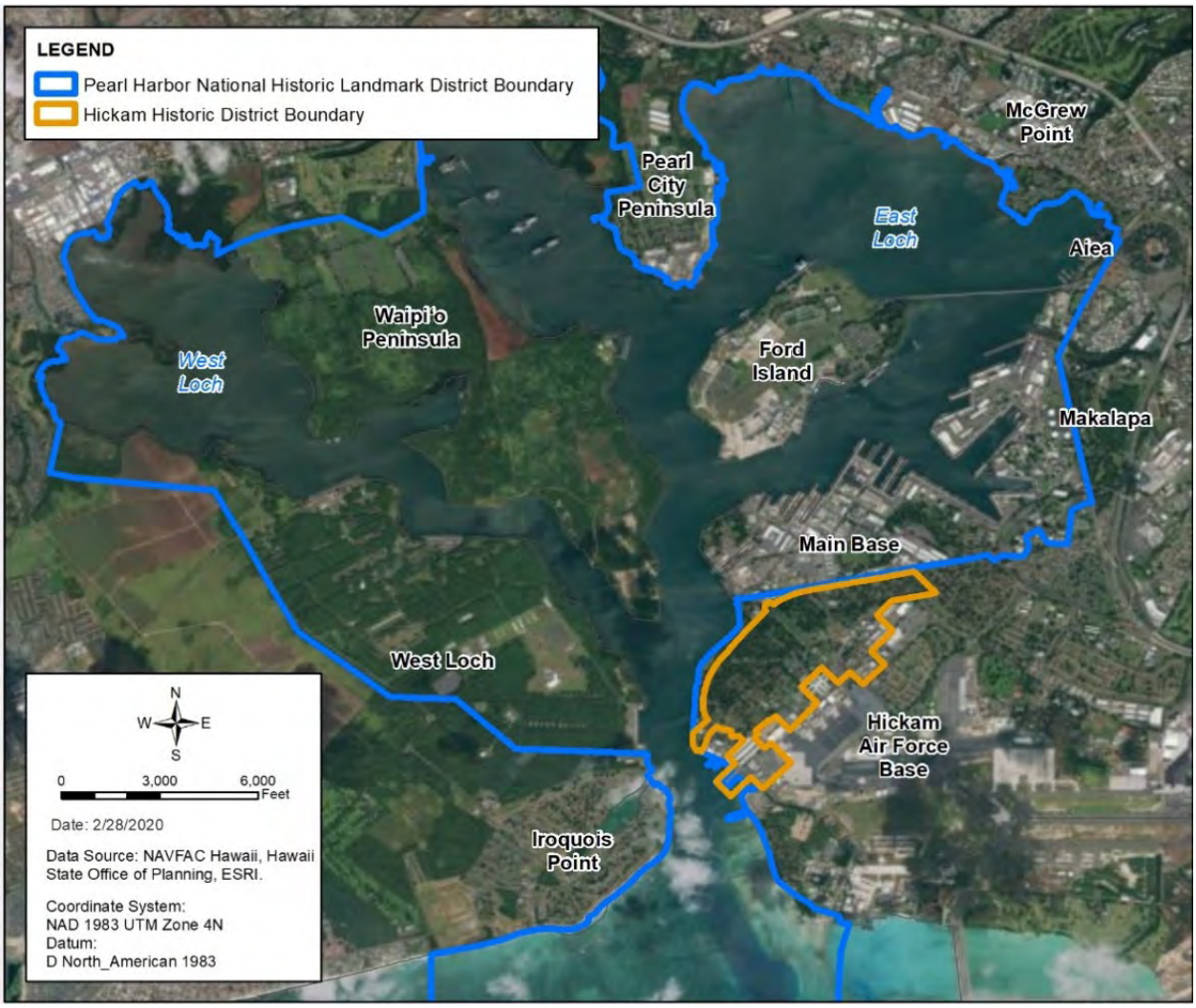

Figure 3-1 Historic District Boundaries at JBPHH

3.1.2.3 Traditional Cultural Places

In traditional Hawaiian cultural geography, place names refer to both the landforms and to events that occurred there. In Hawaii, TCPs may be sacred sites, locations of traditional practices such as resource gathering, or places associated with traditional stories and historical or legendary figures. These places are usually identified by the presence of a traditionally used name, and through associations with historical events, traditional stories, and chants. JBPHH was the subject of a traditional cultural properties study in 2016 (Pacific Consulting Services, Inc. 2016), which identified more than 120 potential Native Hawaiian TCPs throughout the entire JBPHH installation.

The Navy consults with Native Hawaiian organizations on actions with the potential to significantly affect protected traditional cultural resources, sacred sites, traditional resource gathering locations, archaeological sites, or burials.

According to the 2016 TCP study, no TCPs are identified in or close to the Tradewinds-Par 3 Site or the Kuntz Gate Site; the nearest are two sites of former, destroyed fishponds to the south and east. The surveyed site boundary of Loko Lelepaua is located 525 feet (160 meters) to the south of the

Tradewinds-Par 3 Site in the vicinity of the Moffet Street and McChord Street intersection. Loko Kaihikapu lies beneath the runways south of Kamakahi Road, more than 1,650 feet (500 meters) from either Tradewinds-Par 3 or Kuntz Gate sites. The Bloch Arena Site is adjacent to Wailolo, a former natural inlet which is now Southeast Loch, and partly overlaps the area of Wailolokai Fishpond, a former fishpond site (Section 3.1.2.1).

3.1.3 Environmental Consequences

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment that contribute to the importance of the resource, introducing visual, atmospheric, or audible elements that are out of character for the period the resource represents (thereby altering the setting), or neglecting the resource to the extent that it deteriorates or is destroyed.

Criteria used to assess potential impacts to cultural resources are based on the guidance provided in the NRHP. The evaluation of environmental consequences on cultural resources considers impacts to the NRHP eligibility of the property, based on the standard historic significance and integrity criteria provided by the NRHP, detailed in National Register Bulletin 15 (NPS 1995). Actions that diminish or destroy the integrity of a historic property are considered to have an adverse impact. Actions that restore, repair, and sustain a historic property are considered to have beneficial impacts. Additionally, impacts to TCPs are based on changes to the ability of communities and cultural practitioners to access these locations to perform traditional cultural practices.

The impacts on types of cultural resources defined above (archaeological sites, architectural resources, and TCPs) are analyzed together for each alternative as follows.

3.1.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and would not result in changes to cultural resources. Therefore, no impacts to cultural resources would occur with implementation of the No Action Alternative.

3.1.3.2 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative) Potential Impacts

Implementing Alternative 1 would not result in changes to cultural resources. The APE for this action alternative is the site boundary and areas from which it is visible, which generally includes the opposite side of the streets surrounding the proposed site. No identified cultural resources are within or adjacent to the APE. According to the 2008 Hickam ICRMP, there is a low probability of archaeological sites in the area; the majority of the land within the footprint of the Proposed Action has been previously disturbed (a large barracks building that previously stood on the site was demolished in the past 10 years, and subsequent soil remediation activities took place). No ground disturbance would occur outside of the site. The Proposed Action would not result in modifications or demolition of the historic architectural resources identified near the Tradewinds-Par 3 Site. No TCPs are within the APE for the Proposed Action.

Construction

Construction-period activities under Alternative 1 have low potential for permanent adverse impacts to cultural resources through ground disturbance that could damage or destroy as-yet undiscovered subsurface archaeological resources. However, no impacts are expected because no cultural resources

are identified within the construction area; the Tradewinds-Par 3 Site lies within an area considered low archaeological probability; and most of the site has been previously disturbed by construction and demolition activities. In the unlikely event that previously unidentified archaeological sites were discovered during construction, ICRMP SOPs provide guidance on how to protect archaeological resources, address the inadvertent discovery of human remains, and other measures to mitigate impacts on cultural resources. These procedures are identified in the BMP table in Section 2. Therefore, no significant long-term, local impacts to cultural resources would occur from construction.

Operations

Operational-period activities under Alternative 1 have no potential for adverse impacts to cultural resources, because operation of the proposed facility would not involve ground disturbance and no other cultural resources are within the area of facility operational activities. Therefore, no impacts to cultural resources would occur during the operational period of the facility.

No historic properties would be affected. The Navy is in the process of developing correspondence for NHPA Section 106 consultation with the Hawaii State Historic Preservation Officer (SHPO) and informing interested parties. The Navy will request concurrence from SHPO with the extent of the Area of Potential Effects (APE) and the Navy's finding of "No Historic Properties Affected" (see correspondence in Appendix A). In summary, no significant impacts to cultural resources would occur with implementation of the Proposed Action under Alternative 1.

3.1.3.3 Alternative 2: Kuntz Gate Site Potential Impacts

Implementing Alternative 2 would not result in impacts to cultural resources. The APE for this action alternative is the site boundary and areas from which it would be visible, which generally includes the opposite side of the streets surrounding the proposed site. According to the 2008 Hickam ICRMP, there is a low probability of archaeological sites in the area; the majority of the land within the footprint of the Proposed Action has been previously disturbed through mass grading, paving, warehouse construction, and demolition. No TCPs are identified in or near the Kuntz Gate Site.

Construction

No permanent impacts to cultural resources are anticipated from construction-period activities. This alternative would result in the demolition of two Category IV historic properties, both warehouse facilities. Because Category IV facilities are considered non-eligible for the NRHP, there would be no impacts. As with Alternative 1, any inadvertent discovery of artifacts or human remains during construction-period activities would be addressed through BMPs outlined in Table 2-1. Therefore, no significant long-term, local impacts to cultural resources would occur from construction.

Operations

Impacts to cultural resources from operational activities for Alternative 2 are the same as described above in Alternative 1, since the activities would be the same for both alternatives. Therefore, no impacts to cultural resources would occur from operations.

In summary, no significant long-term local impacts to cultural resources would occur with implementation of Alternative 2.

3.1.3.4 Alternative 3: Bloch Arena Site Potential Impacts

Implementing Alternative 3 would result in impacts to cultural resources. The Bloch Arena Site ROI for cultural resources includes adjacent areas from which a building of the size described in the Proposed Action could be noticeable within the viewshed. This site is located within the Pearl Harbor NHL district and is adjacent to multiple NRHP eligible or listed historic properties, including the Category I Administration Building and Ward Field, considered a Category II historic property. These changes to existing views could intrude on and diminish the historic buildings' integrity of setting and alter the character of this area of the NHL district. Ground disturbance during construction has the potential to affect archaeological resources and TCPs, specifically the Wailolokai Fishpond. The boundary of this site defined in previous surveys is close by, and it is possible that past surveys have not identified related resources within a few hundred yards of the site boundary under the Ward Field area. The Proposed Action in Alternative 3 could potentially disturb such previously unidentified resources.

Construction

Ground-disturbing, construction-period activities would occur over a short duration, but changes to subsurface cultural resources, which could include portions of a known pre-contact fishpond site, would be permanent. In addition, the demolition of the historic Ward Field for construction of the ACC building and parking structure would be permanent. Viewsheds within the larger NHL district also would be changed permanently during construction. These construction period changes to cultural resources are significant, long-term, local and regional in nature. The significant local and regional impacts to the NHL district could potentially be mitigated through compliance with historic district design guidelines, and such minimization measures as keeping the building height as low as possible, and using colors and massing that reduce its visibility. Mitigation measures to offset the demolition of historic Ward Field could include documentation prior to demolition and preparation of interpretive exhibits for installation on-site, in coordination with any stipulations in applicable agreements that would be prepared under NHPA Section 106 consultation.

Disturbance of potential subsurface archaeological sites in high potential areas could be addressed through BMPs outlined in PHNC ICRMP planning guidelines, such as limiting ground disturbing activities to known depth of fill, monitoring excavation, conducting investigations in areas with known subsurface sites, and collecting data to inform SHPO and update the ICRMP GIS database. As with other alternatives, any inadvertent discovery of artifacts or human remains during construction-period activities would be addressed using BMPs in compliance with the installation ICRMPs.

Operations

Impacts to cultural resources from operational activities for Alternative 3 are similar to those described above in Alternatives 1 and 2, since the activities would be the same for all alternatives. Therefore, no impacts to archaeological sites or TCPs would occur during operations. However, due to the sensitivity of viewsheds within the NHL district, impacts to the NHL landscape character from the addition of a large non-historic new facility in Alternative 3 would have a significant, local and regional, permanent impact as part of facility operations. This could be mitigated to not significant through the mitigation measures described under construction above, by designing the new facility's appearance to minimize its visibility and comply with historic district design guidelines.

In summary, due to the potential disturbance of subsurface resources, demolition of historic Ward Field, and permanent change to the viewshed within the NHL district, significant long-term local and regional impacts to cultural resources would occur with implementation of Alternative 3. Mitigation measures to

offset the demolition of historic Ward Field could include documentation prior to demolition and preparation of interpretive exhibits for installation on-site, in coordination with any stipulations in applicable agreements that would be prepared under NHPA Section 106 consultation. Additionally, facility appearance impacts could be mitigated to not significant through the mitigation measures such as designing the new facility's appearance to minimize its visibility and comply with historic district design guidelines.

3.2 Air Quality

This discussion of air quality includes criteria pollutants, standards, sources, permitting, and greenhouse gases (GHGs). Air quality is defined by the concentration of various pollutants in the atmosphere in relation to their impact on human health and the environment. A region's air quality is influenced by many factors, including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions that influence the atmosphere's ability to disperse such emissions. The ROI for this air quality assessment is the jurisdictional boundaries of the Hawaii Air Quality Control Region (AQCR).

Most air pollutants originate from human-made sources, including mobile sources (e.g., cars, trucks, buses) and stationary sources (e.g., factories, refineries, power plants, quarries), as well as indoor sources (e.g., some building materials and cleaning solvents). Air pollutants are also released from natural sources such as volcanic eruptions and forest fires.

3.2.1 Regulatory Setting

3.2.1.1 Criteria Pollutants and Ambient Air Quality Standards

The principal pollutants defining the air quality, called "criteria pollutants," include carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), suspended particulate matter less than or equal to 10 microns in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb). CO, SO_2, NO_2, Pb, and some particulates are emitted directly into the atmosphere from emissions sources. O_3, NO_2, and some particulates are formed through atmospheric chemical reactions that are influenced by weather, ultraviolet light, and other atmospheric processes.

Under the CAA, the U.S. Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) (40 CFR 50) for these pollutants. NAAQS are classified as primary or secondary. Primary standards protect against adverse health effects; secondary standards protect against welfare effects, such as damage to farm crops and vegetation and damage to buildings. Some pollutants have long-term and short-term standards. Short-term standards are designed to protect against acute, or short-term, health effects, while long-term standards were established to protect against chronic health effects.

Areas that are and have historically been in compliance with the NAAQS are designated as attainment areas. Areas that violate a federal air quality standard are designated as nonattainment areas. Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are required to adhere to maintenance plans to ensure continued attainment.

The CAA requires states to develop a general plan to attain and maintain the NAAQS in all areas of the country and a specific plan to attain the standards for each area designated nonattainment for a NAAQS. These plans, known as State Implementation Plans, are developed by state and local air quality

management agencies and submitted to USEPA for approval. If a state fails to submit a State Implementation Plan, USEPA is required to develop a Federal Implementation Plan.

In addition to the NAAQS for criteria pollutants, national standards exist for hazardous air pollutants (HAPs), which are regulated under Section 112(b) of the 1990 CAA Amendments. The *National Emission Standards for Hazardous Air Pollutants* regulate HAP emissions from stationary sources (40 CFR part 61).

The Clean Air Branch of the State of Hawaii Department of Health (DOH) is responsible for implementing air pollution control in the state. In addition to the NAAQS established under federal regulations, the DOH has adopted Hawaii ambient air quality standards (HAAQS). These standards are established in the HAR, Title 11, Chapter 59, Ambient Air Quality Standards and Chapter 60, Air Pollution Control.

3.2.1.2 Mobile Sources

HAPs emitted from mobile sources are called Mobile Source Air Toxics (MSAT). MSAT are compounds emitted from highway vehicles and non-road equipment that are known or suspected to cause cancer or other serious health and environmental effects. In 2001, USEPA issued its first MSAT Rule, which identified 201 compounds as being HAPs that require regulation. A subset of six of the MSAT compounds was identified as having the greatest influence on health and included benzene, butadiene, formaldehyde, acrolein, acetaldehyde, and diesel particulate matter. More recently, USEPA issued a second MSAT Rule in February 2007, which generally supported the findings in the first rule and provided additional recommendations of compounds having the greatest impact on health. The rule also identified several engine emission certification standards that must be implemented (40 CFR 59, 80, 85, and 86; Federal Register Volume 72, Number 37, pages 8427–8570, 2007). Unlike the criteria pollutants, there are no NAAQS for benzene and other HAPs. The primary control methodologies for these pollutants for mobile sources involves reducing their content in fuel and altering the engine operating characteristics to reduce the volume of pollutant generated during combustion.

3.2.1.3 General Conformity

The USEPA General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emissions thresholds that trigger requirements for a conformity analysis are called *de minimis* levels. *De minimis* levels (in tons per year) vary by pollutant and also depend on the severity of the nonattainment status for the air quality management area in question. The Hawaii AQCR, within which the Proposed Action is located, is considered to be in attainment for all NAAQS. Therefore, the General Conformity Rule does not apply to the Proposed Action and is not carried forward for analysis.

3.2.1.4 Greenhouse Gases

GHGs are gas emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce negative economic and social consequences across the globe.

In an effort to reduce energy consumption, reduce GHGs, reduce dependence on petroleum, and increase the use of renewable energy resources the Navy has implemented a number of renewable energy projects. The Navy has established FY 2020 GHG emissions reduction targets of 34 percent from a FY 2008 baseline for direct GHG emissions and 13.5 percent for indirect emissions. Examples of Navy-wide GHG reduction projects include energy efficient construction, thermal and photovoltaic solar

systems, geothermal power plants, and the generation of electricity with wind energy. The Navy continues to promote and install new renewable energy projects.

3.2.2 Affected Environment

Under the authority of the CAA and subsequent regulations, the USEPA has divided the country into geographical regions known as AQCRs to evaluate compliance with the NAAQS. JBPHH is located on the southeastern shore of the island of Oahu. The City and County of Honolulu (the island of Oahu) is in the State of Hawaii AQCR (40 CFR 81.76) which also includes the following four counties: Hawaii, Kalawao, Kauai, and Maui. All five counties within the AQCR are designated as attainment/unclassifiable for HAAQS and NAAQS.

The State of Hawaii maintains and collects data from ambient air quality monitoring stations to measure criteria pollutant ambient air concentrations and ensure that HAAQS and NAAQS are met. Two stations nearest to the proposed sites are the Honolulu station and the Sand Island station; neither station monitors for all six criteria pollutants. The Honolulu station, which collects SO_2, CO, PM_{10}, and $PM_{2.5}$ ambient air concentration data, is located across from the Queen's Medical Center in a busy commercial, business, and government district in downtown Honolulu. The Sand Island station, which collects O_3 and $PM_{2.5}$ ambient air concentration data, is in a light industrial, commercial, and recreational area approximately 2 miles (3 kilometers) downwind (southwest) of downtown Honolulu, near the entrance to the Sand Island State Recreation Area. Because neither of these stations monitor for NO_2, ambient air quality monitoring data for this parameter is presented based on data from the Kapolei station, which is on the leeward coast approximately 6 miles (10 kilometers) west of JBPHH. The most recent year of available monitoring data, 2016, is shown in Table 3-3. Excluding the exceedances that were due to the eruption of the Kilauea Volcano located on the island of Hawaii, the State of Hawaii AQCR did not exceed the HAAQS or NAAQS in 2016 and, as noted above, is designated as attainment/unclassifiable for all HAAQS and NAAQS.

Some land uses are considered more sensitive to air pollution than others because of the types of population groups or activities involved. Sensitive receptors include, but are not limited to, children, the elderly, and those with existing health conditions. Accordingly, land uses that are typically considered sensitive receptors include schools, daycare facilities, retirement homes, medical facilities, parks, and playgrounds. Residential areas are considered sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Recreational land uses are considered moderately sensitive to air pollution.

The closest sensitive receptors to Alternative 1 are a daycare center and residences to the north and west along Kuntz Avenue, approximately 350 feet (107 meters) from the alternative sites and opposite of the direction of prevailing winds in the region. The closest sensitive receptors to Alternative 2 are residences approximately 75 feet (23 meters) north of the northern perimeter of the site on the opposite side of the drainage ditch and fence. The nearest sensitive receptors to the Alternative 3 site are residences across Center Drive approximately 75 feet (23 meters) southeast of the southern perimeter of the alternative site.

Table 3-3 Ambient Air Quality Monitoring Data (2016)

Pollutant	*Measured Concentration*	*State AAQS*	*Federal Primary AAQS*	*Federal Secondary AAQS*
CO [a]				
1-hour Average Maximum (ppm)	1.6	9	35	—
8-hour Average Maximum (ppm)	1.2	4.4	9	—
SO_2 [a]				
1-hour Average Maximum (ppm)	0.009	—	0.075	—
3-hour Average Maximum (ppm)	0.007	0.5	—	0.5
24-hour Average Maximum (ppm)	0.002	0.14	—	—
Annual Mean (ppm)	0	0.03	—	—
NO_2 [b]				
1-hour Average Maximum (ppm)	0.036	—	0.100	—
Annual Mean (ppm)	0.004	0.04	0.053	0.053
O_3 [c]				
8-hour Average Maximum (ppm)	0.052	0.08	0.07	0.07
PM_{10} [a]				
24-hour Maximum (µg/m^3)	33	150	150	—
Annual Mean (µg/m^3)	13.8	50	—	—
$PM_{2.5}$ [a]				
24-hour Maximum (µg/m^3)	16.2	—	35	35
Annual Mean (µg/m^3)	2.1	—	12	15

Notes:
— = no data
µg/m^3 = microgram per cubic meter
AAQS = ambient air quality standards
CO = carbon monoxide
NO_2 = nitrogen dioxide
O_3 = ozone
PM_{10} = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter
ppm = part per million
SO_2 = sulfur dioxide
Source: *State of Hawaii Annual Summary, 2016 Air Quality Data* (DOH 2016).
[a] Data from Honolulu Air Monitoring Station.
[b] Data from Kapolei Air Monitoring Station.
[c] Data from Sand Island Air Monitoring Station.

3.2.3 Environmental Consequences

Effects on air quality are based on a qualitative assessment of direct and indirect emissions associated with the action alternatives. The ROI for assessing air quality impacts is the air basin in which the project is located, the air quality management region in which the project is located, the State of Hawaii AQCR.

Expected emissions from a proposed federal action are assessed for potential changes. Impacts to air quality are dependent on expected emissions, emissions release characteristics, distance between emissions release and exposure location, and meteorology.

3.2.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to baseline air quality. Therefore, no impacts to air quality or air resources would occur with implementation of the No Action Alternative.

3.2.3.2 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative) Potential Impacts

Construction

Criteria Air Pollutants

The generation of construction-related emissions and their potential impacts on air quality would be short-term or temporary in duration. Construction-related activities would result in temporary emissions of criteria air pollutants and O_3 precursors, including fugitive dust generated by demolition of existing on-site structures and ground disturbing activities (e.g., excavation, grading, and clearing); exhaust emissions from use of off-road equipment, material delivery, and construction worker commutes; and volatile organic compound (VOC) emissions from asphalt paving and application of architectural coatings. Proposed construction would include the use of BMPs and compliance with federal and state regulations to minimize potential emissions of criteria pollutants. BMPs would include the use of properly maintained fuel-efficient construction vehicles with emissions controls to the maximum extent possible to minimize exhaust-related emissions of nitrogen oxides and particulate matter, and implementation of dust control measures to minimize fugitive dust (particulate matter) emissions from ground disturbance and road traffic. The mobile and/or intermittent operation of proposed emission sources would be temporary in nature and would cease after the completion of construction, would be reduced due to use of fuel-efficient, low-emitting equipment and vehicles to the maximum extent possible, and would therefore produce minimal exhaust-related emissions of criteria air pollutants. The fugitive dust emissions associated with demolition and construction would be minimized through implementation of BMPs. In addition, the nearest sensitive receptors are across Kuntz Boulevard, more than 300 feet (91 meters) away and opposite of the direction of prevailing winds in the region. Therefore, construction-related activities would result in short-term, non-significant impacts to air quality.

Greenhouse Gases

Implementation of Alternative 1 would contribute directly to emissions of GHGs from the combustion of fossil fuels during the short-term construction period. Demolition, site preparation, and construction of the proposed facility would require the use of heavy-duty construction equipment and support vehicles, as well as mobile trips for construction workers. The mobile and/or intermittent operation of equipment and vehicles would be temporary in nature and produce minimal GHG emissions. Emissions calculations for construction projects of similar size and duration have resulted in estimates of minimal GHG emissions. In addition, as described above regarding criteria air pollutant emissions, construction contractors would be required to implement BMPs and comply with federal and state regulations that would minimize potential GHG emissions, including the use of fuel-efficient, low-emitting equipment and vehicles to the maximum extent possible. Therefore, construction activities associated with Alternative 1 would generate a minimal level of GHG emissions that would not result in a significant contribution to global climate change.

Operations

Criteria Air Pollutants

Building Operations: Operations under Alternative 1 would consolidate operations of existing facilities and services that are currently managed individually to a single facility served by centralized staff, building utilities, and parking. Standby generators may be installed for the purposes of providing backup electricity and would be used minimally, only in the case of a power outage, and would replace any standby generators in place for the existing clinic facilities. Such infrequent operations would not result in the generation of substantial emissions and would comply with all applicable permitting requirements. No on-site medical waste incineration is proposed as part of the Proposed Action. The replacement facility would be built to current standards, which would improve energy efficiency and therefore reduce energy-related emissions compared to the existing facilities built between 1942 and 2000. In addition, Alternative 1 would include the demolition of two existing operational buildings on-site; the existing emissions associated with these facilities would no longer occur once demolished, partially offsetting future emissions associated with operations of Alternative 1 buildings. Therefore, building operations would result in the same, if not reduced, emissions compared to baseline emissions due to increased efficiencies and demolition of existing structures.

Mobile Sources: While the Proposed Action would not increase operational services, it would shift existing mobile source activity from staff and patient trips at and around the existing facilities to the proposed centralized facility. Within the vicinity of Alternative 1, the level of service (LOS) would decrease at multiple intersections. As shown in Table 3-8 of the JBPHH Traffic Impact Analysis Report (TIAR) (Appendix B) conducted in support of this EA, vehicle trips associated with the Preferred Alternative, without implementation of proposed traffic mitigation measures, would result in the left turns from McClelland Street and Kokomalei Street onto Kuntz Avenue operating at a LOS F during peak-hour operations. Based on traffic projections from the TIAR, future daily traffic volumes on Kuntz Avenue west of McClelland Street with implementation of the Preferred Alternative are estimated to be 16,821 vehicles per day in the year 2027. While traffic counts were not taken at Kokomalei Street and Kuntz Avenue and daily projections are not available, it is reasonable to assume that traffic would be similar to that of Kuntz Avenue east of Halehaka Street (6,871 vehicles per day).

A decrease in LOS and increase in delay times can result in an increase in mobile source impacts. Of concern on a localized level would be an increase in CO. As noted in Section 3.2.2, the ROI for the Proposed Action is in attainment for all NAAQS and HAAQS, including CO. As shown in Table 3-3, the ambient air concentrations of CO measured in 2016 at the nearest air monitoring station were 1.6 parts per million (ppm) for the maximum 1-hour average and 1.2 ppm for the maximum 8-hour average, which are well below the HAAQS of 9 ppm and 4.4 ppm, respectively, and the NAAQS of 35 ppm and 9 ppm, respectively. Average daily traffic in the vicinity of this monitoring station in 2016 ranged from 19,800 vehicles per day on Punchbowl Street to 34,800 vehicles per day on S. Vineyard Boulevard, approximately 0.2 mile (0.3 kilometer) north of the monitoring station (HDOT 2018). Projected traffic volumes at the affected intersections would be well below these levels. In addition, as described in Section 3.7, mitigation measures to reduce traffic-related impacts would result in all affected intersections operating at an acceptable LOS (level D or better) and reduce potential localized mobile source impacts associated with traffic delays. Therefore, there would be no significant operational impacts of Alternative 1 from mobile source emissions.

Greenhouse Gases

After the completion of construction, operations of the Preferred Alternative would result in a shift in traffic patterns from existing clinic areas to the Preferred Alternative site but would not result in an increase in services provided. Therefore, little change in GHG emissions from mobile sources compared to baseline conditions is anticipated. Operations of the building under the Preferred Alternative would result in the consolidation of multiple existing clinic sites, which would likely achieve more efficient use of utilities to serve the single facility. In addition, the new facility would be more energy efficient as a result of improved building standards compared to the existing buildings that were built between 20 and 90 years ago. Improvements in building energy efficiency would result in a decrease in indirect emissions associated with energy demand and therefore a beneficial contribution to reducing the cumulatively considerable impact of global climate change.

In summary, no significant impacts to air quality, with regard to both criteria pollutant and greenhouse gas emissions, would occur with implementation of the Proposed Action under Alternative 1.

3.2.3.3 Alternative 2: Kuntz Gate Site Potential Impacts

Except as specified below, impacts on air quality under Alternative 2 would be the same as those under the Preferred Alternative. Construction activities associated with Alternative 2 would result in short-term, less-than-significant adverse impacts to air quality from the use of construction equipment and vehicles. However, since there would be greater land clearing under Alternative 2, the resulting air quality impacts would be slightly greater than those anticipated from the Preferred Action Alternative but still not significant. Operation of the Alternative 2 would result in long-term beneficial impacts from energy-efficient improvements and the replacement of multiple facilities with one consolidated facility Therefore, Alternative 2 would reduce the incremental contribution of GHG emissions to global climate change.

The change in localized mobile source activity is similar to but unique from the Preferred Alternative due to the neighborhood-specific changes in traffic patterns. While the Proposed Action would not increase operational services, it would shift existing mobile activity from staff and patient trips at and around the existing facilities to the proposed centralized facility. Within the vicinity of the Alternative 2 site, the LOS would decrease at multiple intersections. As shown in Table 3-9 of the TIAR, vehicle trips associated with Alternative 2, without implementation of proposed traffic mitigation measures, would result in the left turns from Halehaka Street/Kamakahi Street onto Kuntz Avenue operating at a LOS F during peak-hour operations. Traffic associated with Alternative 2 would also reduce the left turn out of Kokomalei Street and the turning movements out of McClelland Street on to Kuntz Avenue to a LOS F during the PM peak hour. Based on traffic projections from the TIAR, future daily traffic volumes on Kuntz Avenue west of McClelland Street with implementation of Alternative 2 are estimated to be 16,705 vehicles per day in the year 2027. While traffic counts were not taken at Kokomalei Street and Kuntz Avenue and daily projections are not available, it is reasonable to assume that traffic would be similar to that of Kuntz Avenue east of Halehaka Street. Based on traffic projections from the TIAR, future daily traffic volumes on Kuntz Avenue east of Halehaka Street with implementation of Alternative 2 are estimated to be 7,072 vehicles per day in the year 2027.

As discussed above with respect to the Preferred Alternative, a decrease in LOS and increase in delay times can result in an increase in mobile source impacts, particularly a localized concentration of CO. The ROI for the Proposed Action is in attainment for all HAAQS and NAAQS including CO and the ambient air concentrations of CO measured in 2016 at the nearest air monitoring station were well

below the HAAQS and NAAQS. Average daily traffic in the vicinity of this monitoring station in 2016 ranged from 19,800 vehicles per day on Punchbowl Street to 34,800 vehicles per day on S. Vineyard Boulevard, approximately 0.2 mile (0.3 kilometer) north of the monitoring station (HDOT 2018). Projected daily traffic volumes with implementation of Alternative 2 would be below these traffic levels in the vicinity of the monitoring station. In addition, similar to the Preferred Alternative and as described in Section 3.7, mitigation measures to reduce traffic-related impacts would result in affected intersections operating at an acceptable LOS (level D or better) and reduce potential localized mobile source impacts associated with traffic delays.

Unlike the Preferred Alternative, traffic mitigation measures would reduce the impacts to the intersections at the Kuntz Gate Site (Halehaka Street/Kamakahi Street) but would not reduce traffic impacts on Kuntz Avenue further west (Kokomalei Street and McClelland Street) to an acceptable LOS. Although these delays would not be mitigated to result in acceptable LOS operations, projected traffic volumes at the affected intersections described above would be well below the traffic levels in the vicinity of the air monitoring sites. Therefore, implementation of this action alternative would result in no significant impacts to air quality.

In summary, no significant impacts to air quality, with regard to both criteria pollutant and greenhouse gas emissions, would occur with implementation of the Proposed Action under Alternative 2.

3.2.3.4 Alternative 3: Bloch Arena Site Potential Impacts

Except as specified below, impacts on air quality under Alternative 3 would be to the same as those under the Preferred Alternative. Construction activities associated with Alternative 3 would result in short-term, less-than-significant adverse impacts to air quality from the use of construction equipment and vehicles. However, because there would be less land clearing and no demolition under Alternative 3 than the other two alternatives, the resulting air quality impacts would be slightly less than those anticipated from the Preferred Action Alternative and still less than significant. Operation of the ACC would result in long-term beneficial impacts from energy-efficient improvements and the replacement of multiple facilities with one consolidated facility and, therefore, reduce the incremental contribution of GHG emissions to global climate change.

The change in localized mobile source activity is similar to but unique from the Preferred Alternative due to the neighborhood-specific changes in traffic patterns. While the Proposed Action would not increase operational services, it would shift existing mobile activity from staff and patient trips at and around the existing facilities to the proposed centralized facility. As shown in Table 3-10 of the TIAR, vehicle trips associated with Alternative 3, without implementation of proposed traffic mitigation measures, would result in projected peak hour intersection LOS levels below LOS D for the AM and PM peak hours at the intersections of North Road and Battleship Drive, as well as at North Road and Pearl Harbor Boulevard. In addition, ACC-generated traffic from off-base locations is projected to increase traffic congestion and queuing entering the Nimitz Gate, especially during the AM peak hour. However, as detailed in Section 3.5 and Appendix E, the additional ACC traffic demand could be accommodated at the gates by implementing the lane count and length recommendations made by the Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA) to handle existing traffic conditions.

As described in Section 3.7, mitigation measures to reduce traffic-related impacts would result in the intersections of North Road and Battleship Drive as well as North Road and Pearl Harbor Boulevard operating at an acceptable LOS (level D or better) and reduce potential localized mobile source impacts

associated with traffic delays in the direct vicinity of the proposed ACC site. Based on traffic projections from the TIAR, future daily traffic volumes on North Road with implementation of Alternative 3 would be approximately 21,580 vehicles per day north of Battleship Drive and approximately 18,503 vehicles per day south of Pearl Harbor Boulevard. These projected daily traffic volumes would be below the traffic levels in the vicinity of the monitoring station, at which CO monitoring data shows ambient air concentration levels well below the NAAQS and HAAQS. Therefore, implementation of this action alternative would not result in long-term significant adverse impacts to air quality.

In summary, no significant impacts to air quality, with regard to both criteria pollutant and greenhouse gas emissions, would occur with implementation of the Proposed Action under Alternative 3.

3.3 Biological Resources

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to generally as vegetation, and animal species are referred to generally as wildlife. Habitat can be defined as the resources and conditions present in an area that support a plant or animal.

Within this EA, biological resources are divided into two categories: terrestrial vegetation and terrestrial wildlife. Threatened, endangered, and other special status species are discussed in their respective categories. The ROI for biological resources includes the geographic scope that could experience meaningful impacts from the Proposed Action, also known as the study area. This includes the project footprint and adjacent areas where construction effects would be experienced. No marine habitat occurs in the ROI for this project; therefore, no effects to marine species or the marine environment are anticipated, or discussed further in this EA. Similarly, although a freshwater drainage canal is located adjacent to the Alternative 2 site, with implementation of BMPs, no impact on aquatic wildlife is anticipated or discussed further in this EA, although the immediately adjacent canal is considered within the ROI with respect to Hawaiian waterbirds.

3.3.1 Regulatory Setting

Special-status species, for the purposes of this assessment, are those species listed as threatened or endangered under the ESA and species afforded federal protection under the MBTA.

The purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend and to conserve and recover listed species. Section 7 of the ESA requires action proponents to consult with the USFWS or National Oceanic and Atmospheric Administration (NOAA) Fisheries to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species or result in the destruction or adverse modification of designated critical habitat. Critical habitat cannot be designated on any areas owned, controlled, or designated for use by the DoD where an INRMP has been developed that, as determined by the Department of Interior or Department of Commerce Secretary, provides a benefit to the species subject to critical habitat designation.

Birds, both migratory and most native-resident bird species, are protected under the MBTA, and their conservation by federal agencies is mandated by EO 13186 (Migratory Bird Conservation). Under the MBTA it is unlawful by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, [or] possess migratory birds or their nests or eggs at any time, unless permitted by regulation.

3.3.2 Affected Environment

The following describe existing conditions for biological resources at JBPHH as relevant to all of the proposed project alternative sites. Threatened and endangered species are addressed in this section, with a composite list applicable to the Proposed Action provided in Table 3-4.

Table 3-4 Threatened and Endangered Species Known to Occur or Potentially Occurring in the ROI and Critical Habitat Present in ROI

Common Name	*Scientific Name*	*Federal Listing Status*	*State Listing Status*	*Critical Habitat Present?*
Hawaiian duck	*Anas wyvilliana*	FE		No
Hawaiian common moorhen	*Gallinula chloropus sandvicensis*	FE		No
Hawaiian coot	*Fulica alai*	FE		No
Hawaiian black-necked stilt	*Himantopus mexicanus knudseni*	FE		No
Hawaiian hoary bat	*Lasiurus cinereus semotus*	FE	SE	No
White tern	*Gygis alba*		ST	No
Hawaiian short-eared owl	*Asio flammeus sandwichensis*		SE	No
Band-rumped storm-petrel	*Oceanodroma castro*	FE	SE	
Hawaiian petrel	*Pterodroma sandwichensis*	FE	SE	No
Newell's shearwater	*Puffinus auricularis newelli*	FT	ST	No

Notes:
Selections for Listing Status Column include:
FE = federal endangered
FT = federal threatened
SE = state endangered
ST = state threatened
Source: INRMP (NAVFAC PAC 2011).

3.3.2.1 Terrestrial Vegetation

Vegetation includes terrestrial plant as well as freshwater aquatic communities and constituent plant species. Approximately 1,953 acres (790 hectares) of 78,315 total acres (31,693 hectares) (approximately 2.5 percent total area) of PHNC has been developed as industrial areas, with an additional 1,299 acres (526 hectares) (approximately 1.7 percent total area) developed for family housing communities (NAVFAC PAC 2011). The remaining 75,063 acres (30,377 hectares) (approximately 95.8 percent) of PHNC have been designated as areas with significant natural resource value, primarily the vast harbor waters and associated intertidal and coastal margins. Vegetation in developed areas consists largely of intensively maintained, exotic non-native grasses and trees. The landscape vegetation today bears little resemblance to the annual grasses, trees, and shrubs that would have been present prior to the development of JBPHH. Native vegetation exists only on small, semi-improved, and unimproved areas, none of which are in the vicinity of alternative sites for this project.

Vegetation at Hickam AFB at JBPHH is largely landscaped areas and includes no undisturbed natural areas. Buffelgrass (*Cenchrus ciliaris*)/kiawe (*Prosopis pallida*) woodlands, kiawe forests, and pickleweed (*Salicornia* ssp. unknown) flats can be found in the southern portion of the base. Pickleweed flats and mangrove communities are considered wetlands. When combined with sandflats, these vegetative

communities are considered the main wildlife habitats of importance at Hickam AFB, since they are suitable habitat for threatened and endangered bird species. Native plants are used occasionally in landscaping projects but there are no native communities that have been created on the base. Landscaping typically includes herbaceous ruderal vegetation and includes streets lined with monkeypod trees and royal palms.

There are no federally- or state-listed plant species that occur naturally in the JBPHH (NAVFAC PAC 2011). Vegetation in the ROI for all of the proposed alternative sites is already disturbed by existing development.

The Tradewinds-Par 3 Site (Alternative 1, the Preferred Alternative) contains non-native vegetation, mostly consists of maintained lawns and includes a section of the Par 3 golf course. Large shade trees exist on-site including monkeypod and palm trees. Ornamental hibiscus shrubs line the fence by building 1804H. No native or endangered plant species are located on or in the vicinity of the site.

The Kuntz Gate Site (Alternative 2) is largely paved with a few areas of maintained lawn and tree vegetation, including mown ballfields. Freshwater aquatic vegetation may exist in the drainage canal behind the Kuntz Gate Site boundary. No native or endangered plant species are located on or in the vicinity of the site.

The Bloch Arena Site (Alternative 3) includes mango, monkeypod, and palm trees lining the parking lot, but mostly consists of impervious surfaces and a maintained ballfield. Ornamental shrubs like hibiscus have been planted lining sections of the ballfield and parking lot. No native or endangered plant species are located on or in the vicinity of the site.

3.3.2.2 Terrestrial Wildlife

Wildlife includes all animal species (i.e., insects and other invertebrates, freshwater fish, amphibians, reptiles, birds, and mammals) focusing on the species and habitat features of greatest importance or interest.

The List of Endangered Species (dated February 13, 2015) obtained from the USFWS Environmental Conservation Online System, Species occurrence by state, identified the federally-listed endangered Hawaiian duck or *koloa maoli* (*Anas wyvilliana*), Hawaiian common moorhen or *alae ula* (*Gallinula chloropus sandvicensis)*, Hawaiian coot or *alae kea* (*Fulica alai)*, Hawaiian black-necked stilt or *aeo* (*Himantopus mexicanus knudseni*), Hawaiian hoary bat or *opeapea* (*Lasiurus cinereus semotus)*, state-listed white tern or *manu-o-ku* (*Gygis alba*), and state-listed Hawaiian short-eared owl or *pueo* (*Asio flammeus sandwichensis*) as potential to occur in the ROI for all of the proposed alternative sites. No critical habitat for any of the species listed above has been designated in the ROI. These species protected under state and federal laws with the potential to occur in the vicinity of the alternative sites are discussed below.

Most wildlife in the ROI and found on the alternative sites are non-native, such as feral cats, mongoose, rats, and common introduced bird species that are widespread across urban areas of Oahu. However, federally and state-listed threatened and endangered terrestrial wildlife species could potentially occur within or fly over all three alternative sites (NAVFAC PAC 2011).

Due to the presence of a number of mature, large trees, suitable habitat exists within the Tradewinds-Par 3 Site for the state-threatened white tern and federally-endangered Hawaiian hoary bat. MBTA-protected bird species may frequent the maintained lawns. Other threatened and

endangered species, like Hawaiian waterbirds, might forage in the ROI but do not have suitable habitat on the Alternative 1 site. With use of BMPs listed in Table 2-1, no impacts to these species are anticipated.

At the Kuntz Gate Site, in addition to threatened, endangered, and MBTA-listed bird species listed that may traverse or forage within the site boundary, there is potential for waterbirds, freshwater fish, and invertebrate species to occur in the small drainage canal located to the north of the site boundary. Federally-listed endangered Hawaiian black-necked stilts have been observed foraging in this canal, but are more commonly found at the Pearl Harbor National Wildlife Refuge located approximately 3 miles (5 kilometers) from the Kuntz Gate site outside of the ROI. There would be no in-water construction for the project and with use of BMPs listed in Table 2-1, all direct and indirect impacts will be avoided and the action would have no effect on listed species.

A few trees are located along the perimeter of the Bloch Arena Site that are suitable habitat for the state-threatened white tern and federally-endangered Hawaiian hoary bat. Otherwise, the parcel currently consists of either paved impervious surface or maintained grass sports fields. MBTA-protected bird species may frequent the mown baseball fields. There is no suitable habitat for Hawaiian waterbirds at this site, and with use of BMPs listed in Table 2-1, no impacts to wildlife are anticipated.

Insects and Other Invertebrates: No federally or state-listed insects or invertebrates were identified to have potential occurrence in the ROI.

Birds: Many bird taxonomic groups have been seen at JBPHH including waterbirds/fowl, songbirds, pigeons, raptors, and various migratory birds. Common introduced bird species observed across developed areas of JBPHH include spotted dove (*Spilopelia chinensis*), zebra dove (*Geopelia striata*), red-vented bulbul (*Pycnonotus cafer*), common myna (*Acridotheres tristis*), and red-crested cardinal (*Paroaria coronata*). There are four federally endangered Hawaiian waterbird species found at JBPHH: Hawaiian common moorhen, Hawaiian coot, Hawaiian black-necked stilt, and possibly the Hawaiian duck. Hawaiian ducks are not common at JBPHH and are often mistaken for koloa-mallard hybrids, which are an invasive species across Oahu. These species will utilize both fresh and brackish waters and can be seen foraging in grassy areas including areas in the ROI, but mostly inhabit the Pearl Harbor National Wildlife Refuge and Waipio peninsula across the main Pearl Harbor channel outside of the ROI. There are two state-listed endangered endemic birds with the potential to use habitat at JBPHH, the white (fairy) tern and the state-listed Hawaiian short-eared owl. Several MBTA-protected bird species have been spotted at JBPHH including the cattle egret (*Bubulcus ibis*), black-crowned night heron (*Nycticorax nycticorax*), Pacific golden plover (*Pluvialis fulva*), ruddy turnstone (*Arenaria interpres*), wandering tattler (*Heteroscelus incanus*), and sanderling (*Calidris alba*).

White Tern: The state-listed threatened white tern is primarily found on the Northwestern Hawaiian Islands, although a large population resides in Oahu. Breeding adults remain close to nest sites and forage in inshore areas, such as shoals and banks, with occasional forays into offshore waters. The species is endangered primarily due to predation by non-native animals and tree clearing/trimming. Suitable habitat (mature monkeypod trees) is present within the ROI; therefore, white terns are likely to occur within the Alternative 1 site.

Hawaiian Short-Eared Owl: The state-listed Hawaiian short-eared owl has the potential to occur in or traverse the project area. This state-listed endangered species is an endemic subspecies occurring on all the main Hawaiian Islands, but are most common on Kauai, Maui, and Hawaii and therefore is not likely to occur in the ROI.

Hawaiian Seabirds: Federally listed Hawaiian seabirds include the endangered band-rumped storm-petrel (*Oceanodroma castro)*, the endangered Hawaiian petrel (*Pterodroma sandwichensis*), and the threatened Newell's shearwater (*Puffinus auricularis newelli)*. Outdoor lighting can have impacts to seabirds including disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and may circle artificial lights until the point of exhaustion. No colonies of these species have been identified on Oahu; however, Hawaiian seabirds may traverse the ROI during their breeding season from March 1 to December 15. Hawaiian seabirds spend a majority of their lives at sea, and therefore are not likely to occur in the ROI.

MBTA-Protected Species: Several MBTA-protected bird species have been spotted at JBPHH including the cattle egret (*Bubulcus ibis*), black-crowned night heron (*Nycticorax nycticorax*), Pacific golden plover (*Pluvialis fulva*), ruddy turnstone (*Arenaria interpres*), wandering tattler (*Heteroscelus incanus*), and sanderling (*Calidris alba*). The MBTA-listed Pacific golden-plover and black-crowned night-heron may be present in the ROI. The Pacific golden-plover frequents mown lawn areas, wetlands and mudflats foraging for insects (National Audubon Society 2020). Black-crowned night-herons forage in shallow waters along the shoreline of Pearl Harbor. Their habitat is primarily marshlands and shores, and therefore these species are not likely to occur in the ROI.

Mammals: Mammals that inhabit JBPHH include non-native species such as feral cats (*Felis catus*), Indian mongoose (*Herpestes javanicus*), and black rats (*Rattus rattus*). None of these species are native to Hawaii and are predators or are invasive to (compete with) native and threatened and endangered species on the installation. The federally-endangered Hawaiian hoary bat is Hawaii's only native terrestrial mammal. This species is more widely distributed than previously thought and uses both native and non-native habitats. Seasonal movement patterns have been consistent over multiple years, showing that Hawaiian hoary bats tend to exhibit strong site fidelity. No Hawaiian hoary bats have been spotted in the ROI and use of BMPs listed in Table 2-1 would be sufficient to avoid impacts to this species should a Hawaiian hoary bat or nest be identified in the ROI.

3.3.3 Environmental Consequences

This analysis focuses on wildlife or vegetation types that are important to the function of the ecosystem or are protected under federal or state law or statute.

Resources were evaluated against various criteria to identify potential impacts resulting from the Proposed Action. Impacts to biological resources would be considered significant if implementation of the alternative would:

- Adversely affect the recovery of a federally or state-listed threatened and endangered species
- Greatly diminish habitat for a plant or animal species
- Interfere with wildlife movement or reproductive behavior
- Result in an infusion of invasive plant or wildlife species

The federal and state-listed species carried forward in this analysis include those with possible presence on the three alternative sites, including:

- Federally Endangered:
    - Hawaiian hoary bat *(Lasiurus cinereus)*
    - Hawaiian black-necked stilt (*Himantopus mexicanus knudseni)*

- State of Hawaii Threatened:
    - White tern (*Gygis alba*)

3.3.3.1 No Action Alternative

Under the No Action Alternative, no construction activities or operational changes would occur and there would be no impacts to biological resources. Existing site conditions would remain.

3.3.3.2 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative) Potential Impacts

The study area for the analysis of effects to biological resources associated with the Tradewinds-Par 3 Site includes the direct project area as shown in Section 2.3.2 (Figure 2-1).

Construction

Vegetation clearing would be required to construct the Proposed Action, resulting in the loss of up to 9.7 acres (3.9 hectares) of vegetation. However, the Navy would minimize tree clearing and earthwork to the maximum extent possible and establish vegetative cover on temporary disturbed areas by seeding with appropriate native or existing plants in accordance with the INRMP. All green waste will be disposed of in accordance with the JBPHH Greenwaste Policy. While this clearing would be a permanent impact, it would be negligible in relation to the overall vegetation composition at JBPHH. Therefore, short- and long-term, non-significant impacts to vegetation would occur from vegetation clearing under the Preferred Alternative.

State-listed threatened or endangered native wildlife species like the white tern could be temporarily affected during the construction phase. However, the Navy has a variety of management actions in place to protect white terns to enhance their habitat, and to avoid impacts during construction, as noted among the BMPs listed in Table 2-1. Additionally, trees at this site could serve as roost trees for the endangered Hawaiian hoary bat. BMPs to avoid potential impacts to Hawaiian hoary bats are listed in Table 2-1, Section 2.5.

Some wildlife species may discontinue using the project area during construction of the clinic, resulting in a temporary reduction in the abundance and diversity of wildlife species at the construction site. However, this change would be negligible because the site does not offer unique habitat that does not exist elsewhere on base. Construction would occur on previously disturbed and cleared or developed areas. Permanent loss of landscaped lawns and shade trees would occur under Alternative 1. The loss of these landscaped areas within a developed site would not negatively impact habitat use by any threatened or endangered species. Construction activities would not impact terrestrial wildlife including threatened and endangered species because, though they may traverse or forage in the project area, no critical habitat is present for these species. Increases in noise levels from construction activities to the ambient noise environment would be temporary and not significant, therefore presenting little to no disturbance to biological resources.

BMPs shall be implemented during construction under Alternative 1 such that all impacts to ESA-listed species, state-listed species, and MBTA-listed birds would be avoided. These BMPs (listed in Table 2-1, Section 2.5) are repeated here and include:

Hawaiian Hoary Bat: Impacts to this species can be avoided by including the following BMPs:

- Trees 15 feet (5 meters) in height or taller must not be cleared during the Hawaiian hoary bat pupping season (June 1 through September 15). Fencing may not include barbed wire.

White Tern: Impacts to this species can be avoided by including the following BMP:

- Trees shall be surveyed for the presence of white terns prior to trimming, removal, or any other action that could disturb the tree.

MBTA-listed birds: The following BMPs shall be implemented to reduce impacts to MBTA species:

- When clearing vegetation, the contractor must verify that trees or bushes scheduled for removal do not contain the active nests of migratory birds. Such nests shall not be destroyed until the chicks have fledged in compliance with the Migratory Bird Treaty Act (MBTA) and Executive Order 13186. Do not to disturb birds or their nests and immediately report sightings to the Naval Facilities Engineering Command, Hawaii (NAVFAC HI) Natural Resources Manager.
- To minimize effects on nocturnal Migratory Bird Treaty Act (MBTA) seabirds (wedge-tailed shearwaters, etc.), Navy policy (COMNAVREG Hawaii Instruction 5090.1) is to avoid all night lighting not needed for Anti-Terrorism/Force Protection (AT/FP) or personnel safety, install only full cutoff exterior down-lighting fixtures for all new construction whenever possible. Exterior lights shall be LED lights with full cut-off fixtures to comply with the Migratory Bird Treaty Act (MBTA). Lights that are International Dark-sky Association (IDA; http://www.darksky.org) certified, are preferred but not required.

Operations

Operation of Alternative 1 would not impact vegetation because activities would remain on the developed site. While general grounds maintenance is expected, the Navy would continue to follow practices outlined in the INRMP to guide vegetation management.

Operation and maintenance of the facility under Alternative 1 is not anticipated to significantly affect wildlife. If maintenance includes construction equipment, trimming of trees or clearing of any vegetation, BMPs noted in Table 2-1 would be implemented as part of the Proposed Action to minimize potential impacts to terrestrial wildlife.

Common birds and mammals in the project area would sustain both short- and long-term, non-significant adverse impacts, primarily associated with loss of habitat within the Tradewinds-Par 3 Site. Additionally, installation personnel would continue to manage habitats according to the INRMP, which is designed to protect and benefit threatened and endangered species.

In summary, no significant impacts to biological resources would occur with implementation of the Proposed Action under Alternative 1. Impacts to MBTA-protected species and their active nests would be avoided during construction. Implementation of the Proposed Action under Alternative 1 (including application of biological resources BMPs during construction) would have no effect on ESA-listed species. BMPs in Table 2-1 specify tree clearing limitations, restrictions on the use of barbed wire fencing, and avoidance of the use of night lighting for construction. Application of these BMPs under the Proposed Action leads to the determination of no effect to ESA-listed species. Therefore, no consultation between the Navy and USFWS or NOAA Fisheries would be required.

3.3.3.3 Alternative 2: Kuntz Gate Site Potential Impacts

The study area for the analysis of effects to biological resources associated with Alternative 2, the Kuntz Gate Site, is the entire site defined in Section 2.3.3 (Figure 2-4).

Impacts to biological resources associated with the Kuntz Gate Site would include those stated above under Alternative 1 including potential impacts to threatened and endangered bird species and the endangered Hawaiian hoary bat. Terrestrial wildlife at the Kuntz Gate Site is similar to terrestrial wildlife at the Tradewinds-Par 3 Site, with the additional potential for the endangered Hawaiian black-necked stilt to occur; BMPs to be included in the Proposed Action to address potential impacts to biological resources are listed in Table 2-1.

Construction

Vegetation clearing would be required during construction of Alternative 2, with the potential loss of up to 7.7 acres (3.1 hectares) of non-native vegetation. However, the Navy would minimize tree clearing to the extent possible. Construction of the Proposed Action under Alternative 2 would have no effect on the Hawaiian black-necked stilt. Although the species may occur in the canal behind the project area (according to surveys), all effects would be avoided through implementation of the BMPs listed in Table 2-1.

These BMPs (listed in Table 2-1, Section 2.5) are repeated here and include:

Hawaiian Hoary Bat: Impacts to this species can be avoided by including the following BMPs:

- Trees 15 feet (5 meters) in height or taller shall not be cleared during the Hawaiian hoary bat pupping season (June 1 through September 15). Fencing should not include barbed wire.

White Tern: Impacts to this species can be avoided by including the following BMP:

- Trees shall be surveyed for the presence of white terns prior to trimming, removal, or any other action that could disturb the tree.

Hawaiian Black-necked Stilt: Because ESA-listed Hawaiian black-necked stilts have been observed foraging in the canal behind the site, the following BMPs are recommended to avoid impacts to Hawaiian black-necked stilts and other Hawaiian waterbirds:

- Project personnel and contractor shall be informed about the potential presence of endangered species.
- In areas where waterbirds are known to be present, post and implement reduced speed limits.
- If water resources are located within or adjacent to the project site, incorporate water quality BMPs to reduce sedimentation and erosion in aquatic environments into the project design. BMPs may include: silt containment; no trash/debris contamination; keep fuel vehicles away from the water; contingency plan for fuel spills; and protect exposed soil from erosion.
- A biological monitor that is familiar with the species' biology shall conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Surveys shall be repeated again within three (3) days of project initiation and after subsequent delay of work of three (3) or more days (during which birds may attempt to nest).

- If a nest or active brood is found:
    - Contact the NAVFAC HI Natural Resources Office (808-471-0378) who shall in turn contact the Pacific Islands Fish and Wildlife Office within 48 hours for further guidance.
    - Establish and maintain a 100-foot (30-meter) buffer around all active nests and/or broods until the chicks/ducklings have fledged. No potentially disruptive activities or habitat alteration will occur within this buffer.
    - A biological monitor that is familiar with the species' biology shall be present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

MBTA-listed birds: The following BMPs shall be implemented to reduce impacts to MBTA species:

- When clearing vegetation, the contractor must verify that trees or bushes scheduled for removal do not contain the active nests of migratory birds. Such nests shall not be destroyed until the chicks have fledged in compliance with the Migratory Bird Treaty Act (MBTA) and Executive Order 13186. Do not to disturb birds or their nests and immediately report sightings to the NAVFAC HI Natural Resources Manager.
- To minimize effects on nocturnal Migratory Bird Treaty Act (MBTA) seabirds (wedge-tailed shearwaters, etc.), Navy policy (COMNAVREG Hawaii Instruction 5090.1) is to avoid all night lighting not needed for Anti-Terrorism/Force Protection (AT/FP) or personnel safety, install only full cutoff exterior down-lighting fixtures for all new construction whenever possible. Exterior lights shall be LED lights with full cut-off fixtures to comply with the Migratory Bird Treaty Act (MBTA). Lights that are International Dark-sky Association (IDA; http://www.darksky.org) certified, are preferred but not required.

Operations

Operation and maintenance activities under Alternative 2 are the same as those described under Alternative 1. No significant impacts to biological resources are anticipated during ACC operation under Alternative 2. All ongoing operations on base shall comply with the ESA, and if an ESA-listed species were detected on-site during operation of the ACC, an installation natural resources manager would respond and implement protective measures to avoid unauthorized take. Operation of the ACC under Alternative 2 would result in no effect on ESA-listed species.

In summary, less-than-significant impacts to biological resources would occur with implementation of the Proposed Action under Alternative 2. Impacts to MBTA-protected species and their active nests would be avoided during construction. Implementation of the Proposed Action under Alternative 2 (including application of biological resources BMPs during construction) would have no effect on ESA-listed species. Therefore, no consultation between the Navy and USFWS or NOAA Fisheries would be required.

3.3.3.4 Alternative 3: Bloch Arena Site Potential Impacts

The study area for the analysis of impacts to biological resources associated with the Bloch Arena Site is the entire site defined in Section 2 (Figure 2-6).

Impacts to biological resources associated with the Bloch Arena Site are the same as those stated above under Alternative 1 including potential impacts to threatened and endangered bird species and the

endangered Hawaiian hoary bat. Terrestrial wildlife at the Bloch Arena Site is similar to terrestrial wildlife at the Tradewinds-Par 3 Site; BMPs included in the Proposed Action to address potential impacts to biological resources are listed in Section 2.5 (Table 2-1).

Construction

Vegetation clearing would be required during construction of Alternative 3, with the potential loss of up to 7.7 acres (3.1 hectares) of non-native vegetation; all tree clearing would follow BMPs described in Table 2-1. Terrestrial wildlife impacts at the Bloch Arena Site are comparable to terrestrial wildlife at the Tradewinds-Par 3 Site.

BMPs shall be implemented during construction under Alternative 3 such that all impacts to ESA-listed species, state-listed threatened or endangered species, and MBTA-listed birds shall be avoided. These BMPs include:

Hawaiian Hoary Bat: Impacts to this species can be avoided by including the following BMPs:

- Trees 15 feet (5 meters) in height or taller shall not be cleared during the Hawaiian hoary bat pupping season (June 1 through September 15). Fencing may not include barbed wire.

White tern: Impacts to this species can be avoided by including the following BMP:

- Trees shall be surveyed for the presence of white terns prior to trimming, removal, or any other action that could disturb the tree.

MBTA-listed birds: The following BMPs shall be implemented to reduce impacts to MBTA species:

- When clearing vegetation, the contractor must verify that trees or bushes scheduled for removal do not contain the active nests of migratory birds. Such nests shall not be destroyed until the chicks have fledged in compliance with the Migratory Bird Treaty Act (MBTA) and Executive Order 13186. Do not to disturb birds or their nests and immediately report sightings to the NAVFAC HI Natural Resources Manager.
- To minimize effects on nocturnal Migratory Bird Treaty Act (MBTA) seabirds (wedge-tailed shearwaters, etc.), Navy policy (COMNAVREG Hawaii Instruction 5090.1) is to avoid all night lighting not needed for Anti-Terrorism/Force Protection (AT/FP) or personnel safety, install only full cutoff exterior down-lighting fixtures for all new construction whenever possible. Exterior lights shall be LED lights with full cut-off fixtures to comply with the Migratory Bird Treaty Act (MBTA). Lights that are International Dark-sky Association (IDA; http://www.darksky.org) certified, are preferred but not required.

Operations

Operation and maintenance under Alternative 3 are comparable to those described under Alternative 1.

The construction and operation of the Proposed Action at the Bloch Arena Site would have non-significant construction impacts and no significant impacts from operation of the ACC.

In summary, no significant impacts to biological resources would occur with implementation of the Proposed Action under Alternative 3. Impacts to MBTA-protected species and their active nests would be avoided during construction. The Proposed Action is not expected to result in any intentional or unintentional taking of migratory birds, and would have no significant impact on migratory birds. Implementation of the Proposed Action under Alternative 3 (including application of biological resources

BMPs during construction) would have no effect on ESA-listed species. BMPs in Table 2-1 specify limitations on tree clearing, restrictions on the use of barbed wire fencing, and avoidance of the use of night lighting for construction. Application of these BMPs under the Proposed Action leads to the determination of no effect to ESA-listed species. Therefore, no consultation between the Navy and USFWS or NOAA Fisheries would be required.

3.4 Visual Resources

This discussion of visual resources includes the natural and built features of the landscape visible from viewpoints, including both general public and areas where access is restricted to military personnel on base, that contribute to an area's visual quality. Visual perception is an important component of environmental quality that can be adversely affected through changes created by various projects. Visual impacts occur as a result of the relationship between people and the physical environment. The ROI for visual resources refers to the area within each project alternative site boundary as well as areas from which the new facility would be visible. People who would potentially be affected by changes of views within the ROI are considered sensitive receptors.

3.4.1 Regulatory Setting

Under NEPA, federal agencies should consider visual impacts of proposed projects on scenic resources, historic properties, and scenic experiences of public who view the landscape.

Aesthetics and views of proposed projects within the JBPHH installation are mainly guided by the JBPHH ADPs and IDP. ADPs identify capacity for future development at various areas of JBPHH.

The IDP serves as a combined plan that consolidates all ADPs. Features of these documents that influence visual resources are as follows:

- Both the JBPHH ADPs and IDP promote planning projects that would maintain historic and cultural patterns of development, viewsheds, and landscapes.
- The IDP recommends planning projects to construct connected green open space network and mirror regional building styles in color, materiality and design where appropriate.
- The JBPHH Eastside ADP aims to create a garden city district with buildings connected by accessible greenbelts and tree-lined streets. The ADP shows the recommended building heights to be 2-5 levels for the Tradewinds-Par 3 Site as well as the Kuntz Gate Site.
- The JBPHH Southside ADP proposes to create an accessible waterfront district with compatible development, convenient parking, complete streets, and flexible open spaces that reflects the historic character of the area. The recommended building heights at the Bloch Arena Site outside of Ward Field are two to six stories; regardless, the ADP requires planning projects to refer to the JBPHH Cultural Landscape Report for historic character-defining patterns.

Regulations regarding viewsheds within NHL District at JBPHH are described in Section 3.1, *Cultural Resources*.

The City and County of Honolulu's Primary Urban Center Development Plan (PUCDP) identifies significant mountain and ocean views and vistas that should be protected for projects within the Primary Urban Center (in which JBPHH is located). Although the PUCDP does not apply to projects on federal property, protection of mountain and ocean views that benefit the ROI's visual quality should be considered.

3.4.2 Affected Environment

All three alternative sites are located in developed areas. The proposed project would be surrounded by existing military buildings, structures and future military developments. No significant mountain views are available from the three alternative sites. The Tradewinds-Par 3 and the Kuntz Gate Site have no waterfront views.

The Tradewinds-Par 3 Site mainly consists of green open space. This open space and approximately thirty medium to large canopy trees create a park-like setting. This green space is visible from the adjacent Hickam Par 3 Golf Course, Kuntz Avenue, and other surrounding roads and buildings.

The Kuntz Gate Site north of Kuntz Avenue has the appearance of a light industrial area with car lots, shops and warehouses. Building heights within and in the vicinity of the site are generally one to two stories and less than 25 feet (8 meters). The site and tree lines along the south side of Kuntz Avenue are visible from the adjacent residential area, baseball fields, Kuntz Avenue, and surrounding roads and buildings.

The Bloch Arena Site has approximately 6 acres (2 hectares) of green open space, which is visible from the Nimitz Gate area, adjacent roads and surrounding buildings, with distant views as far away as the deck of the USS Missouri museum, which is accessible to the general public. Building 150, a Historic Category I building (Section 3.1, *Cultural Resources*), overlooks the site from the intersection of North Road and Pearl Harbor Boulevard. The proximity to the Southeast Loch also provides waterfront views from the Bloch Arena Site.

3.4.3 Environmental Consequences

The evaluation of visual resources in the context of environmental analysis typically addresses the contrast between visible landscape elements. Collectively, these elements comprise the aesthetic environment, or landscape character. The landscape character is compared to the Proposed Action's visual qualities to determine the compatibility or contrast resulting from the buildout and demolition activities associated with the Proposed Action. The Proposed Action's visual qualities are discussed from the perspective of sensitive receptors.

Impacts to visual resources would be deemed significant if disturbances under any alternative to the landscape character would be long-term or permanent, in medium or high intensity, of a regional extent, and negatively affect important or unique resources.

3.4.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to landscape character and visual resources. Therefore, no impacts would occur from the No Action Alternative.

3.4.3.2 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative) Potential Impacts

The sensitive receptors include the users of the Hickam Par 3 Golf Course, people traveling along Kuntz Avenue and users of surrounding facilities within ROI (Alternative 1 site and nearby areas where the Proposed Action would be visually noticeable).

Construction

Construction activities would be contained within the fenced construction site when possible. The fencing would obstruct and minimize views of heavy equipment, stockpile areas, and other building

construction activities. While the view of the golf course from the surrounding areas and the views toward the Alternative 1 site would be impacted in medium intensity by the presence of the large fenced construction site, this impact would be temporary. The sensitive receptors would be limited to the ROI and the affected visual resources would be considered common. Therefore, the construction impacts to visual resources from Alternative 1 would not be significant.

Operations

Sensitive receptors would experience the change of landscape character from a park-like open space to a facility with three- to six-story buildings. It would also include the loss of approximately eighteen canopy trees. The impacts to these common visual resources would be long-term, in medium intensity and of local extent (limited to the ROI). Two BMPs, mirroring regional building design, replacing removed canopy trees and maximizing green space in site design (Table 2-1), would further reduce the level of alteration of the landscape characters.

In summary, impacts to visual resources would not be significant with implementation of the Proposed Action under Alternative 1.

3.4.3.3 Alternative 2: Kuntz Gate Site Potential Impacts

The sensitive receptors of Alternative 2 include the residents in the neighborhood located to the north of the drainage canal adjacent to the Alternative 2 site, people traveling along Kuntz Avenue, users of the baseball fields, and other facilities and roads within the ROI (Alternative 2 site and nearby areas where the Proposed Action would be visually noticeable).

Construction

Similar to Alternative 1, construction activities would impact visual experiences of sensitive receptors within the ROI in medium intensity. The impacts would be temporary, and the affected visual resources are common. Therefore, the construction impacts to visual resources of Alternative 2 would not be significant.

Operations

The three to six-story buildings would alter the site landscape characteristics and likely block the view of the tree lines along the south side of Kuntz Avenue for the residents along the drainage canal. The impacts to these common visual resources would be long-term, in low to medium intensity and of local extent. To reduce the already non-significant impact to visual resources, BMPs could be implemented by planting street-side trees within the Alternative 2 site when possible and designing the proposed facility to mirror the surrounding building styles.

In summary, no significant impacts to visual resources would occur with implementation of the Proposed Action under Alternative 2.

3.4.3.4 Alternative 3: Bloch Arena Site Potential Impacts

Because historic properties at JBPHH, such as the NHL District, have been identified as potentially affected by modern intrusions into their viewsheds, the sensitive receptors of Alternative 3 include visitors at the USS Missouri museum on Ford Island, staff working at Southeast Loch, people accessing Nimitz Gate and traveling along the roads adjacent to the site (North Road, Battleship Drive and Center Drive), residents south of Center Drive, as well as users of surrounding facilities.

Construction

Similar to Alternative 1 and 2, construction activities at the Alternative 3 site would impact visual experiences of sensitive receptors within the ROI. The affected visual resources are important due to the historic characteristics of the area. The impacts are expected to be medium to high intensity as the result of construction activities intruding the historic viewshed. Therefore, the construction impacts to visual resources under Alternative 3 are considered temporary and not significant.

Operations

Alternative 3 would not impact the waterfront views around the Southeast Loch. However, Alternative 3 would alter the important historic and landscape characteristic changing it from open space with historic importance to a modern three-story building and multi-story parking structure. Considering the historic importance of the affected resource, its permanence, and the medium to high intensity within its regional extent, the operational impacts of Alternative 3 to visual resources are considered significant. To offset the visual impacts of the loss of green open space, the site design would incorporate landscaped areas and replant the removed trees where possible. However, due to space constraints, landscaped areas are expected to be limited.

In summary, significant impacts to visual resources would likely occur with implementation of the Proposed Action under Alternative 3 without mitigation. However, these visual resources impacts could be mitigated to no significant impacts through façade design considerations, and post-construction landscaping.

3.5 Transportation

Transportation addresses ground transportation access to and from the alternative sites for the Proposed Action. For the purposes of this analysis, the ground transportation system consists of roadways, transit service, bicycle and pedestrian facilities.

This analysis is based on the appended TIAR conducted in support of the EA for the proposed ACC (Appendix B). The purpose of the TIAR is to assess the potential traffic impacts in the vicinity of the ACC for each alternative site. The TIAR shows that without mitigation (traffic improvements) there may be significant impacts associated with traffic and the intensity of the impacts vary among the alternatives. Traffic impacts are expected to be confined to JBPHH, and not extend off-base. The EA therefore analyzes several proposed traffic improvement measures that would reduce the on-base traffic impacts substantially, in all cases to a level below applicable significance thresholds. The TIAR includes recommendations for physical and operational improvements to mitigate potential transportation impacts. The following analyses describe ground transportation facilities and operations for calendar year (CY) 2019 and projected future (CY 2026) time frames. The TIAR analysis of morning, midday, and afternoon peak hour traffic operations at key intersections supports recommendations for physical and operational improvements to mitigate potential transportation impacts. These are summarized below as applicable as well as being summarized in Table 3-6.

Detailed descriptions of the transportation facilities in the ROI are included in the TIAR. In summary, ROI for transportation includes the physical boundary of each alternative site and associated feeder roads, key on-base congestion points, main access roads to each alternative site, on-base public transportation, and primary off-base roadways that lead to base access points.

As part of the TIAR, field data was collected and analyzed to assess potential impacts to traffic and circulation. Traffic counts conducted for 24-hour and morning, midday, and afternoon peak period time frames provide a baseline to establish existing transportation and traffic conditions immediately adjacent to the proposed alternative sites. The traffic volume counts were conducted using automatic traffic recorders (ATRs), which helped to verify the peak traffic periods. The 24-hour volumes counts, which also included pedestrian and bicycle traffic, were conducted in conjunction with peak period traffic turning movement counts at key intersections adjacent to the three alternative sites. The presence and condition of sidewalks, crosswalk and bike facilities were also documented to help evaluate project impacts.

3.5.1 Regulatory Setting

EO 13834 encourages government entities to ensure that new construction and major renovations conform to applicable building energy efficiency requirements and sustainable design principles; consider building efficiency when renewing or entering into leases; and implement space utilization and optimization practices. Other goals are to meet statutory requirements relating to the consumption of renewable energy and electricity, reduce potable and non-potable water consumption, and comply with stormwater management requirements.

3.5.2 Affected Environment

3.5.2.1 Access Points to Base

There are eight (8) points of access to JBPHH. The access points closest to the three alternative sites are the O'Malley Gate (Alternative 1: Tradewinds-Par 3 Site), the Kuntz Gate (Alternative 2: Kuntz Gate Site) and the Nimitz Gate, (Alternative 3: Bloch Arena Site) (Figure 3-2).

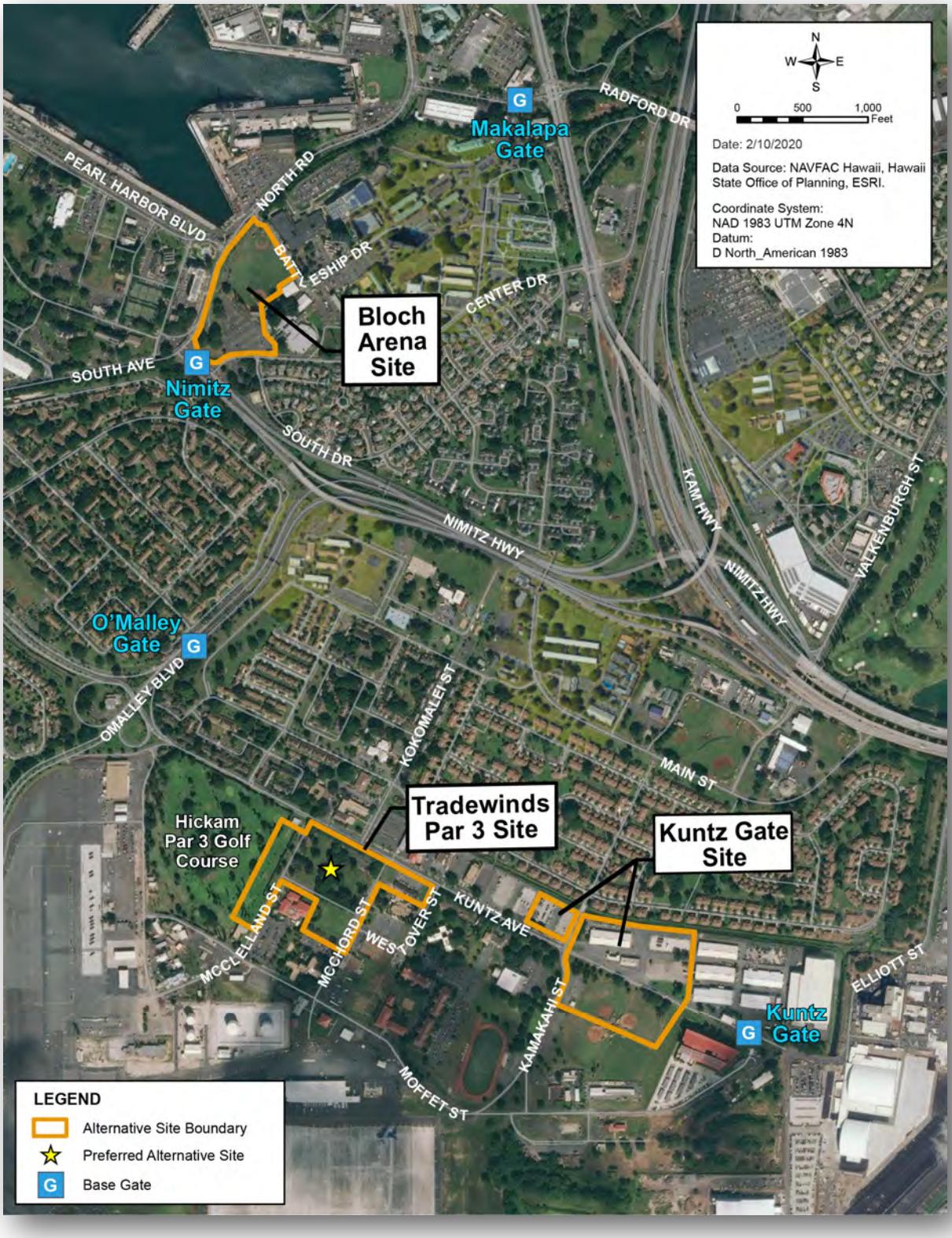

Figure 3-2 Proposed Site Locations and Gate Locations

The Nimitz Gate serves as the primary access point to the base providing direct access to the H-1 freeway in both directions. This gate also serves as the main and most direct entry for the substantial commuter workforce at the Pearl Harbor Naval Shipyard. The Nimitz Gate is located directly adjacent to the Bloch Arena Site. The O'Malley and Kuntz Gates primarily serve residential and work areas in and around the Hickam side of JBPHH. The O'Malley Gate is served by direct access ramps from H-1 as well while the Kuntz Gate provides a more circuitous route to JBPHH via Elliott Street, a two-lane road traversing near Daniel K. Inouye International Airport property and associated commercial and industrial facilities. All three gates are open for access 24 hours a day.

The Military SDDCTEA prepared a memorandum (Appendix E) on current gate conditions and their ability to handle changes in expected traffic volume. The memorandum has additional details on the existing gate volumes, lane count, and queue length. Section 3.5.2 contains memorandum conclusions regarding any recommended gate improvements per desired design standards.

3.5.2.2 Road Network

All three alternative sites are bounded by an existing arterial and collector road network system. The Bloch Arena area is adjacent to three major intersections where North Road meets South Avenue, Pearl Harbor Boulevard and Battleship Drive, respectively.

The Tradewinds-Par 3 and Kuntz Gate sites both front Kuntz Avenue, which serves as the primary road on the east side of the Hickam portion of JBPHH, between Kuntz Gate and the O'Malley Boulevard Interchange. Collector roads extend off Kuntz Avenue providing access to airfield and work facilities, recreational facilities, and the residential areas.

Descriptions of the roadway lane configurations, intersection traffic control, and existing (2019) traffic volumes adjacent to the project areas are documented in the TIAR report attached as Appendix B to this EA.

3.5.2.3 Pedestrian and Bicycle Facilities and Public Transportation

Pedestrian facilities such as sidewalks and marked crosswalks (including a signalized crossing at the intersection of North Road and Pearl Harbor Boulevard) are located along most of the roadways in the vicinity of the alternative sites. Some existing mid-block crosswalks have rectangular rapid flashing beacons (RRFB) installed to increase driver awareness. Most bicycle facilities consist of shared vehicular traffic lanes. Public transit options at JBPHH include municipal bus service (TheBus) and Navy Exchange shuttles.

3.5.3 Environmental Consequences

Impacts to ground traffic and transportation are analyzed by considering the possible changes to existing traffic conditions and the capacity of area roadways from proposed increases in commuter and construction traffic. Ground transportation Impacts are analyzed for the projected future horizon year (2027) for full occupancy of the ACC.

The TIAR documents the existing (2019) peak period traffic volumes and intersection operations, and forecasts future (2027) peak period traffic volumes and intersection operations at intersections immediately adjacent to the proposed alternative sites. Based on these analyses, recommendations are developed to mitigate transportation impacts related to the proposed ACC at the alternative sites.

Operational traffic impacts are identified primarily by level of service (LOS). LOS is a qualitative index based on quantitative measurements such as intersection vehicular delay and helps to portray the

relative quality of traffic operations at the intersections adjacent to the proposed ACC sites. LOS ranges from LOS A to LOS F, with LOS A through D indicating no significant impact and LOS E through F indicating significant impact. Operational results below LOS D triggered efforts to identify measures to mitigate issues with the goal of improving forecasted intersection operations to at least LOS D.

3.5.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to transportation. Therefore, no change from the existing operations are projected and no impacts would occur from the No Action Alternative.

3.5.3.2 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative) Potential Impacts

The proposed Alternative 1 conceptual site plan is illustrated in Figure 3-3. For this site plan, the patient access point would be located on Kuntz Avenue directly opposite the Kokomalei Street intersection. The proposed patient parking garage would be located adjacent to the proposed ACC building.

Figure 3-3 Proposed Conceptual Site Plan of Alternative 1: Tradewinds-Par 3 Site

Most patient vehicles would access the site via the Kuntz Avenue/Kokomalei Street intersection and would either stop at a designated drop-off/pick-up area or enter the parking garage directly. The parking garage would connect to the ACC building via a pedestrian bridge, reducing surface level pedestrian crossings. Outbound patient vehicles would travel from the parking garage to the Kuntz Avenue/Kokomalei Street intersection and could optionally stop at the drop-off/pick-up area first.

Staff would park in the surface parking lots located along McClelland Street and Mountain Home Street. The staff would either turn right from Kuntz Avenue onto McClelland Street or turn from Kuntz Avenue onto McChord Street and then onto Mountain Home Street to access the surface parking areas. This arrangement would separate patient and staff parking access completely. This would lower traffic demand at the intersections involved with access to and from the proposed ACC. It would also reduce potential pedestrian-vehicle conflicts.

Construction

Roadway lane closures to facilitate construction of the proposed ACC building and associated facilities are projected to have temporary impacts by disrupting traffic flow on roadways adjacent to the alternative project site such as Kuntz Avenue, McClelland Street, McChord Street, and Mountain Home Street. Best practices would be implemented to minimize disruption to traffic flow.

Construction workers arriving to and departing from the work site during the AM and PM peak hour time periods and construction supply vehicles throughout the work day are projected to create temporary impacts by increasing vehicle delay and queuing at the O'Malley JBPHH access gate. This traffic is also projected to impact traffic operations at intersections along Kuntz Avenue during the AM, Midday, and PM peak hour time periods.

To minimize the temporary construction impacts, roadway lane closures would be minimized on Kuntz Avenue and oriented when feasible to McClelland and McChord Streets that carry relatively low traffic volumes as opposed to Kuntz Avenue. When roadway closures are needed, appropriate roadway detours would be implemented consistent with best practices.

Construction traffic would be encouraged to use alternative access points to JBPHH such as Kuntz Gate instead of O'Malley Gate and divert to alternative paths such as Kamakahi Street to gain access to the construction site. The contractor would be directed to work with JBPHH to avoid arrival and departure of construction traffic during peak traffic periods at JBPHH.

With these actions, the temporary impacts associated with construction of the proposed ACC would be minimized.

Operations

Without additional traffic improvements, vehicular traffic generated by Alternative 1 is projected to have operational impacts at key intersections adjacent to the alternative project site. Analyses documented in the TIAR projected peak hour intersection LOS levels below LOS D for the AM, Midday, and PM peak hours at the following intersections:

- Kuntz Avenue/McClelland Street
- Kuntz Avenue/Kokomalei Street

Left-turn traffic movements from McClellan Street are projected to operate at LOS E during the AM peak hour and LOS F during the PM peak hour. Left-turn traffic movements from Kokomalei Street onto Kuntz Avenue are projected to operate at LOS F during the AM, Midday, and PM peak hours. Left-turn traffic movements from the proposed ACC driveway are projected to operate at LOS F during the midday and PM peak hours. These operational levels would result in significant delays to vehicles executing these maneuvers.

ACC-generated traffic from off-base locations are projected to increase traffic congestions and queuing at the O'Malley Gate to JBPHH. This increase in traffic congestion and queuing could potentially reach the level of significant impact.

To mitigate these projected operational impacts, the following intersection improvements would be implemented as part of the proposed ACC project:

- Kuntz Avenue/McClelland Street intersection
    - Prohibit westbound Kuntz to southbound McClelland left turns
    - Prohibit northbound McClelland to eastbound right turns
    - Implement new traffic signal at intersection
    - Implement appropriate crosswalks in conjunction with signalization of intersection
- Kuntz Avenue/Kokomalei Street intersection
    - Lengthen existing median eastbound left-turn lane
    - Restripe existing painted median to provide median westbound left-turn lane
    - Implement new traffic signal at intersection
    - Implement appropriate crosswalks in conjunction with signalization of intersection

With these recommended improvements, intersection operations at the Kuntz Avenue/McClelland Street and the Kuntz Avenue/Kokomalei Street intersections would be improved above the LOS D threshold which would mitigate the operational impacts to no significant impacts.

The Navy sought the expertise of the Military SDDCTEA to conduct a quantitative entry control facility (gate) impact analysis using available data sources. These data sources provide a summary of the projected impacts of ACC-generated traffic on entry control facilities. The SDDCTEA memo (Appendix E) applied the ACC's projected additional gate entry traffic demand to estimate future gate conditions for each alternative site for AM peak hour conditions. Alternative 1 is projected to affect O'Malley and Kuntz Gates entry operations. The SDDCTEA analyses recommended an increase in the number of entry lanes at the O'Malley Gate from four to five entry lanes in future Alternative 1 conditions. The SDDCTEA analysis also recommended a minimum entry lane length of 1,045 feet (319 meters). Currently, O'Malley Gate entry lanes have a length of over 1,500 feet (457 meters), well over the minimum length identified by SDDCTEA. If an additional entry lane is not added, there is adequate entry lane length to accommodate additional queueing that may occur without affecting roadways beyond the entry control facility. Kuntz Gate was determined to have sufficient capacity to accommodate the additional ACC gate entry demand.

Aside from adding entry lanes, other measures could be taken at the gates to increase throughput, including switching from manual to handheld processing and doubling the number of guards per lane during the AM peak. Additionally, outbound lanes can be used for in-processing. Based on the evaluation results in Table 3 of the SDDCTEA memo, tandem processing of entering traffic could

eliminate the need for an additional entry lane at the O'Malley Gate. The DHA would coordinate with JBPHH facility planners to develop solutions to increase gate throughput during the AM peak period. Based on these efforts, Alternative 1 would not have a significant impact at or beyond the entry control facilities.

In summary, with mitigation, no significant impacts to transportation resources would occur with implementation of the Proposed Action under Alternative 1.

3.5.3.3 Alternative 2: Kuntz Gate Site Potential Impacts

The proposed Alternative 2 conceptual site plan is illustrated in Figure 3-4. Patient access to the ACC would occur at the Halehaka Street/20th Street intersection.

Figure 3-4 Proposed Conceptual Site Plan of Alternative 2: Kuntz Gate Site

Inbound patient vehicles would access the site via Halehaka Street/20th Street intersection and either drop off patients in the drop-off/pick-up area in front of the ACC building or access the garage directly. Inbound vehicles using the drop-off/pick-up area would need to return to 20th Street and re-enter the site to access the parking garage. Outbound vehicles would either turn into the drop-off/pick-up area or directly exit the site onto 20th Street and then Halehaka Street.

Staff would park in the surface parking lots, one located west of Halehaka Street between Kuntz Avenue and 20th Street and one located east of the ACC building. The west lot would be accessed at the Halehaka Street/20th Street intersection, while the east lot would be accessed directly from Kuntz Avenue at a new driveway located approximately 400 feet (122 meters) east of the Kuntz Avenue/Halehaka Street/Kamakahi Street intersection.

Staff parking in the east lot would access the ACC building directly. Staff parking in the west lot would cross Halehaka Street and pass through the parking garage before crossing the on-site driveway to the ACC building.

Construction

Roadway lane closures to facilitate construction of the proposed ACC building and associated facilities are projected to have temporary impacts by disrupting traffic flow on roadways adjacent to the alternative project site such as Kuntz Avenue and Halehaka Street. When roadway closures are needed, appropriate roadway detours would be implemented consistent with best practices.

Construction workers arriving to and departing from the work site during the AM and PM peak hour time periods and construction supply vehicles throughout the work day are projected to create temporary impacts by increasing vehicle delay and queuing at the O'Malley JBPHH access gate. This traffic is also projected to impact traffic operations at intersections along Kuntz Avenue during the AM, Midday, and PM peak hour time periods.

To minimize the temporary construction impacts, roadway lane closures would be minimized on Kuntz Avenue and oriented when feasible to Halehaka Street and 20th Street. The proposed staff parking lot areas would also be used as staging areas to minimize road closures.

Construction traffic would be encouraged to use alternative access points to JBPHH such as Kuntz Gate instead of O'Malley Gate to gain access to the construction site. The contractor would be directed to work with JBPHH to avoid arrival and departure of construction traffic during peak traffic periods at JBPHH.

With these actions, the temporary impacts associated with construction of the proposed ACC would be minimized.

Operations

Without additional traffic improvements, vehicular traffic generated by Alternative 2 would have operational impacts at key intersections adjacent to the alternative project site.

Analyses documented in the TIAR projected peak hour intersection LOS levels below LOS D for the AM, Midday, and PM peak hours at the following intersection:

- Kuntz Avenue/Halehaka Street/Kamakahi Street

The left-turn traffic movements from Halehaka Street and Kamakahi Street onto Kuntz Avenue are projected to operate at LOS F, resulting in significant delay to vehicles executing this maneuver.

The analyses documented in the TIAR projected LOS C operation at the Halehaka Street/20th Street intersection. Although this would result in no significant impacts, leaving this intersection configuration in its existing state while using it as the key access into the proposed ACC would not be consistent with safe and efficient intersection design. Therefore, recommendations were made to improve the configuration of this intersection.

ACC-generated traffic from off-base locations are projected to increase traffic congestions and queuing at the O'Malley Gate to JBPHH. Without mitigation, this increase in traffic congestion and queuing could potentially reach the level of significant impact.

To mitigate these projected operational impacts, the following improvements would be implemented as part of the proposed ACC project:

- Kuntz Avenue/Halehaka Street/Kamakahi Street intersection
    - Widen Kuntz Avenue by 10 feet (3 meters) approximately 1,050 feet (320 meters) between Halehaka/Kamakahi Street and Kuntz Gate to create median area for westbound Kuntz Avenue to southbound Kamakahi Street left-turn and for eastbound Kuntz Avenue to northbound ACC staff parking driveway
    - Implement new traffic signal at intersection
    - Implement appropriate crosswalks in conjunction with signalization of intersection
- Halehaka Street/20th Street intersection
    - Widen Halehaka Street by 10 feet (3 meters) approximately 260 feet (79 meters) between Kuntz Avenue and 20th Street to provide northbound left-turn lane at 20th Street and separate southbound left/through lane at Kuntz Avenue
    - Implement appropriate crosswalks at intersection

With these recommended improvements, intersection operations at the Kuntz Avenue/Halehaka Street/Kamakahi Street, the Halehaka Street/20th Street, and the Kuntz Avenue/ACC Staff Parking Lot Driveway intersections would operate above the LOS D threshold which would mitigate the operational impacts to no significant impacts.

As described for Alternative 1, the SDDCTEA memo (Appendix E) applied the ACC's projected additional gate entry traffic demand to estimate future gate conditions for each alternative site for AM peak hour conditions. Alternative 2 was projected to affect O'Malley and Kuntz Gates entry operations. The SDDCTEA analyses recommended an increase in the number of entry lanes at the O'Malley Gate from four to five entry lanes under future Alternative 2 conditions. The SDDCTEA analysis also recommended a minimum entry lane length of 1,045 feet (319 meters). Currently, O'Malley Gate entry lanes have a length of over 1,500 feet (457 meters), well over the minimum length identified by SDDCTEA. If an additional entry lane is not added, there is adequate entry lane length to accommodate additional queueing that may occur without affecting roadways beyond the entry control facility. Kuntz Gate was determined to have sufficient capacity to accommodate the additional ACC gate entry demand.

Aside from adding entry lanes, other measures could be taken at the gates to increase throughput, including switching from manual to handheld processing and doubling the number of guards per lane during the AM peak. Additionally, outbound lanes can be used for in-processing. Based on the evaluation results in Table 3 of the SDDCTEA memo, tandem processing of entering traffic could eliminate the need for an additional entry lane at the O'Malley Gate. The DHA would coordinate with JBPHH facility planners to develop solutions to increase gate throughput during the AM peak period. Based on these efforts, Alternative 2 would not have a significant impact at or beyond the entry control facilities.

In summary, with mitigation, no significant impacts to transportation resources adjacent to the ACC would occur with implementation of the Proposed Action under Alternative 2. Downstream impacts may occur on Kuntz Avenue west of Halehaka Street in terms of increased delay to vehicles turning out of cross streets.

3.5.3.4 Alternative 3: Bloch Arena Site Potential Impacts

The proposed Alternative 3 conceptual site plan is illustrated in Figure 3-5. The primary site access would be located at the North Road and Pearl Harbor Boulevard intersection, adding a fourth leg to the current "T"-intersection. This new access would be used by patients and staff of the proposed ACC. Staff would also have another access to the surface parking lot via Battleship Drive.

Inbound patient vehicles would enter the site and either use the drop-off/pick-up area or proceed directly to the parking garage. The patients would directly access the proposed ACC from the parking garage. The outbound patient vehicles would depart via the driveway at the North Road and Pearl Harbor Boulevard intersection.

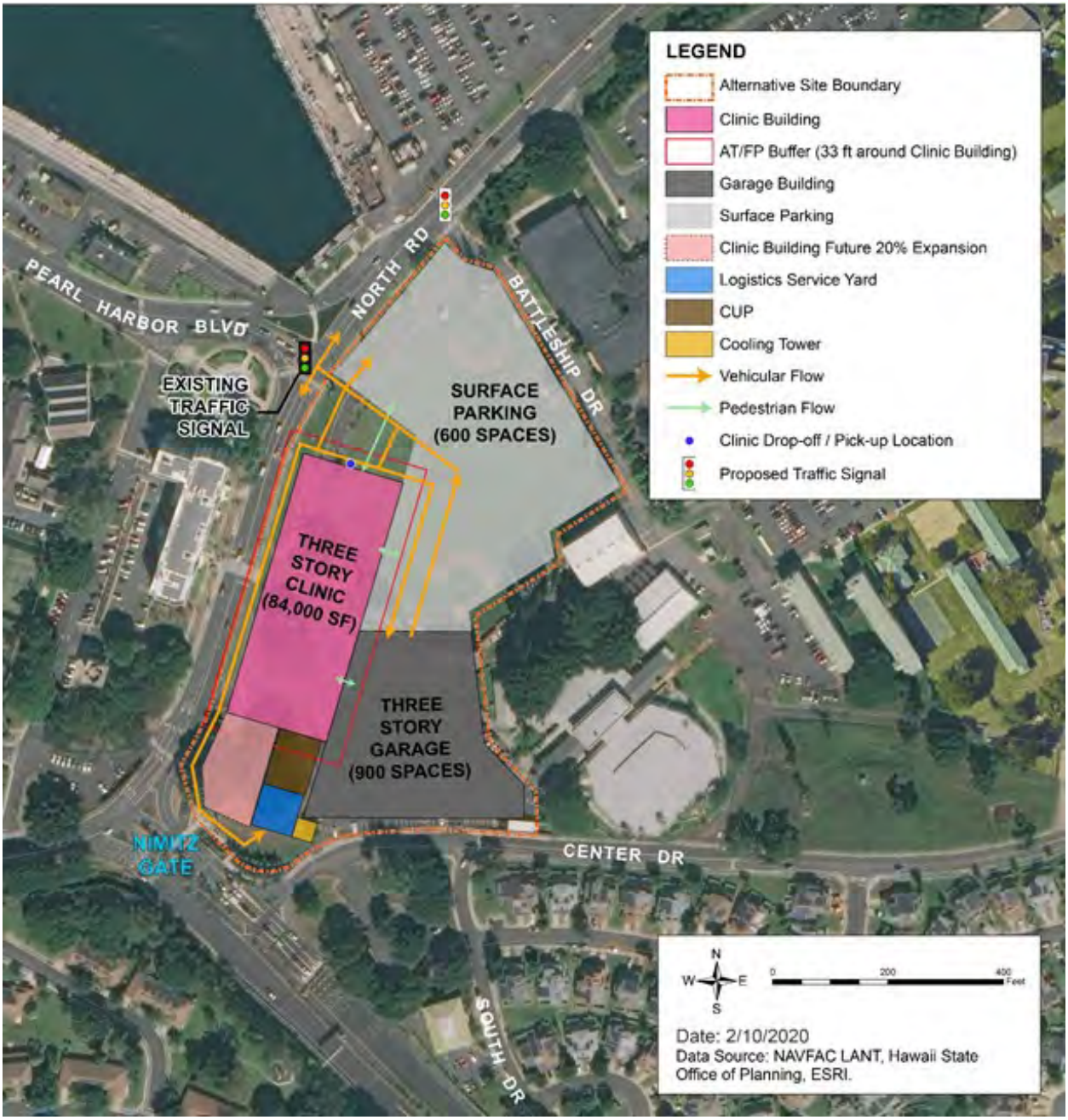

Figure 3-5 Proposed Conceptual Site Plan of Alternative 3: Bloch Arena Site

When accessing Alternative 3 from the North Road/Pearl Harbor Boulevard intersection, staff would travel toward the surface parking area, which wraps around the north and east sides of the proposed ACC building. When accessing the site from Battleship Drive, staff would drive directly into the surface parking area. Staff would cross the internal site driveway to access the proposed ACC building. Staff would have the option of leaving via either the North Road/Pearl Harbor Boulevard intersection or Battleship Drive.

Construction

Roadway lane closures to facilitate construction of the Proposed Action are projected to have temporary impacts by disrupting traffic flow on roadways adjacent to the alternative project site such as North

Road and Battleship Drive. When roadway closures are needed, appropriate roadway detours would be implemented consistent with best practices to minimize disruption.

Construction workers arriving to and departing from the work site during the AM and PM peak hour time periods and construction supply vehicles throughout the work day are projected to create temporary impacts by increasing vehicle delay and queuing at the Nimitz JBPHH access gate. This traffic is also projected to impact traffic operations at intersections along North Road during the AM, Midday, and PM peak hour time periods. Measures would be pursued to minimize this delay and queuing.

To minimize the temporary construction impacts, roadway lane closures would be minimized on North Avenue and Battleship Drive and construction staging would be kept on-site as much as feasible.

Construction traffic would be encouraged to use alternative access points to JBPHH. Both Nimitz Gate and Makalapa Gate are currently observed to be very congested with significant delays to entering vehicles, especially during the morning peak period. These gates would be the nearest access to the Alternative 3 site. Because of this congested morning peak period situation, alternative access during construction would be explored. Potential alternative access could include Center Drive, either accessed from Nimitz Highway or from Kamehameha Highway. The contractor would also be directed to work with JBPHH to avoid arrival and departure of construction traffic during peak traffic periods.

With these actions, the temporary impacts associated with construction of the proposed ACC would be minimized.

Operations

Without additional traffic improvements, vehicular traffic generated by the Bloch Arena alternative is projected to have operational impacts at key intersections adjacent to the alternative project site. Analyses documented in the TIAR projected peak hour intersection LOS levels below LOS D for the AM and PM peak hours at the following intersections:

- North Road/Battleship Drive
- North Road/Pearl Harbor Boulevard

Left-turn traffic movements from Battleship Drive onto North Road are projected to operate at LOS E during the AM peak hour and LOS F during the PM peak hour, resulting in delays to vehicles executing this maneuver.

Although the projected overall intersection LOS for the North Road/Pearl Harbor Boulevard intersection is LOS D, which would be considered no significant impacts, intersection modifications to accommodate the median eastbound left-turn lane into the proposed ACC driveway would reduce the lanes on the westbound approach to this intersection in a way that is projected to create a vehicular queue on this approach during the PM peak hour that would extend back to Nimitz Gate, potentially obstructing the main access into JBPHH. Without mitigation, this projected vehicular queuing would be considered a significant impact.

ACC-generated traffic from off-base locations is projected to increase traffic congestion and queuing entering the Nimitz Gate, especially during the AM peak hour. Given the existing level of congestion for traffic entering Nimitz Gate during the AM peak hour, the ACC-generated traffic from off-base locations would likely have a significant impact due to increasing this congestion.

To mitigate these projected significant impacts, the following intersection improvements would be implemented as part of the proposed ACC project:

- North Road/Battleship Drive Intersection
    - Install new median eastbound North Road to northbound Battleship Drive left-turn lane
    - Implement new traffic signal at intersection
    - Implement appropriate crosswalks in conjunction with signalization of intersection
- North Road/Pearl Harbor Boulevard Intersection
    - Install new median eastbound North Road to northbound ACC driveway left-turn lane
    - Convert existing westbound shared left/though lane on North Road to an exclusive westbound North Road to southbound Pearl Harbor Boulevard left-turn lane
    - Modify the outside existing northbound Pearl Harbor Boulevard left-turn lane to a shared through/right turn lane
    - Widen North Road by one lane width approximately 1,500 feet (457 meters) from Nimitz Gate to the Driveway into the Fitness Center (located north of Battleship Drive on North Road)
    - Implement traffic signal modifications to acknowledge new ACC Driveway and exclusive left-turn lane operation on North Road

Mitigating potential vehicular queuing at the Nimitz Gate would be difficult. Alternative access such as Makalapa Gate were also observed to be congested during the AM peak hour. Other mitigation such as delaying opening of the ACC until after the AM peak hour would detrimentally reduce its operating hours.

These recommended improvements are projected to mitigate traffic impacts from the proposed ACC at the intersections adjacent to the Bloch Arena site to a no significant impact level.

Additional ACC-generated traffic would add to existing congestion at Nimitz and Makalapa Gates, but would not increase the need for gate upgrades. The SDDCTEA memo (Appendix E) applied the ACC's projected additional gate entry traffic demand to estimate future gate conditions for each alternative site for AM peak hour conditions.

Alternative 3 was projected to affect the Nimitz and Makalapa Gates entry operations. However, both Nimitz and Makalapa Gates were determined by the SDDCTEA analysis to need an additional entry lane to adequately process existing entry demand. This would increase the Nimitz Gate entry lanes from four to five and the Makalapa Gate entry lanes from three to four. With these additional entry lanes, the Nimitz and Makalapa Gates would be able to accommodate the additional ACC entry demand. SDDCTEA recommended minimum lane entry lengths of 1,525 feet (465 meters) at Nimitz Gate and 1,000 feet (305 meters) at Makalapa Gate. The Nimitz Gate entry lanes are currently over 1,600 feet (488 meters) long and, if conditions demand it, can handle vehicle queues over 2,500 feet (762 meters). Makalapa Gate is more challenging with approximately 420 feet (128 meters) of lane entry length available before spilling onto Kamehameha Highway.

Aside from adding entry lanes, other measures could be taken at the gates to increase throughput, including switching from manual to handheld processing and doubling the number of guards per lane during the AM peak.

In summary, with recommended measures, traffic impacts to intersections adjacent to the Bloch Arena Site can be mitigated to no significant impacts. Added ACC traffic demand at the Nimitz and Makalapa Gates could be accommodated if the entry lane additions recommended by SDDCTEA to handle existing conditions were implemented.

3.6 Hazardous Materials and Wastes

This section discusses hazardous materials, hazardous waste, toxic substances, and contaminated sites.

The ROI for this analysis includes the alternative site footprints and adjacent/nearby areas of JBPHH. This area would be directly influenced by activities associated with constructing the Proposed Action. Operation of the Proposed Action under any of the alternatives would have no influence on hazardous and toxic materials and wastes (HTMW) outside of this ROI. Potential impacts are assessed based on review of Government furnished information provided by the Navy, including findings from site inspections (SIs) and remedial investigations (RIs).

The Proposed Action would be considered a significant impact on HTMW if:

- Alternative resulted in noncompliance with applicable federal and state regulations or the amounts generated or procured hazardous materials beyond current permitted capacities or management capabilities.
- Impacts to health, safety, and pollution prevention would be considered major if the Alternative results in worker, resident, or visitor exposure to hazardous substances at levels that could be expected to impact human health.
- Impacts to the ROI would be considered major if the Alternative disturbed or created a contaminated site resulting in adverse effects to human health or the environment or caused regulatory noncompliance.
- It would cause an increase in the amount of hazardous substances used, stored, or requiring disposal by a site user that could not be managed under existing permits and procedures.
- It would increase the risk of soil or groundwater contamination by hazardous substances; interrupt or impede any ongoing cleanup efforts; or create new or substantial human or environmental health risks.
- The alternative would be considered a beneficial impact if it would cause a substantial decrease in the amount of substances used, stored, or requiring disposal by the site that are hazardous at levels that could be expected to impact human health; or if it would require or facilitate cleaning up a contaminated site.

3.6.1 Regulatory Setting

Hazardous materials are defined by 49 CFR 171.8 as “hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table, and materials that meet the defining criteria for hazard classes and divisions in 49 CFR 173.” Transportation of hazardous materials is regulated by the U.S. Department of Transportation regulations.

Hazardous wastes are defined by the RCRA, as amended by the Hazardous and Solid Waste Amendments, as: “a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly

contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." Certain types of hazardous wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling of such materials. These are called universal wastes and their associated regulatory requirements are specified in 40 CFR 273. Four types of waste are currently covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs, hazardous waste thermostats, and hazardous waste lamps, such as fluorescent light bulbs.

Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances. Special hazards include asbestos-containing material (ACM), polychlorinated biphenyls (PCBs), and lead-based paint (LBP). USEPA is given authority to regulate special hazard substances by the Toxic Substances Control Act. Asbestos is also regulated by USEPA under the CAA, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The DoD established the Defense Environmental Restoration Program (DERP) to facilitate thorough investigation and cleanup of contaminated sites on military installations (active installations, installations subject to Base Realignment and Closure, and formerly used defense sites). The Installation Restoration Program and the Military Munitions Response Program are components of the DERP. The Installation Restoration Program requires each DoD installation to identify, investigate, and clean up hazardous waste disposal or release sites. The Military Munitions Response Program addresses nonoperational rangelands that are suspected or known to contain unexploded ordnance, discarded military munitions, or munitions constituent contamination. The Environmental Restoration Program is the Navy's initiative to address DERP.

3.6.2 Affected Environment

3.6.2.1 Hazardous Materials

Products containing hazardous materials are used to support a variety of services at JBPHH, including products like petroleum, oils, and lubricants; solvents and thinners; caustic cleaning compounds and surfactants; cooling fluids (antifreeze); adhesives; acids and corrosives; paints; and herbicides, pesticides, and fungicides. The Hazardous Materials Pharmacy (HAZMART), is located in Building 1070 on the Hickam side of JBPHH. The HAZMART is responsible for managing and tracking all hazardous substances at JBPHH.

Hazardous materials have been found in soil, subsurface soil, groundwater, and soil gas throughout JBPHH associated with previous land uses like vehicle fueling stations as well as underground storage tanks (USTs) and piping, fill soil, and buried debris layers (NAVFAC HI 2012). Several environmental investigations were conducted in the 1990s to evaluate potential petroleum releases at seven USTs. JBPHH maintains an Integrated Hazardous Materials Contingency Plan that provides guidance on minimizing the quantity and effects of hazardous materials releases, as well as the Spill Prevention, Control, and Countermeasures Plan (SPCCP), which describes proper handling of hazardous materials to minimize accidental releases. As a result of feasibility studies (FSs), SIs, and RIs, it was determined that there are chemicals of concern (COCs) present in the soil and subsurface soil at the Tradewinds-Par 3 and Kuntz Gate sites. No environmental investigations reports have been provided for review for this EA for the Bloch Arena Site.

The Navy has implemented a strict Hazardous Material Control and Management Program and a Hazardous Waste Minimization Program for all activities. These programs are governed Navy-wide by applicable Office of the Chief of Naval Operations instructions and at the installation by specific instructions issued by the Base Commander. The Navy continuously monitors its operations to find ways to minimize the use of hazardous materials and to reduce the generation of hazardous wastes.

SIs and a RI have been conducted at the Tradewinds-Par 3 Site, which is the location of a former Mess Hall, known as site CF023, to determine if there are unacceptable risks from contamination in soil, groundwater, and soil gas. Previous investigations of this site (CF023) indicated COCs were present in subsurface soils, including elevated levels of VOCs, polynuclear aromatic hydrocarbons, total petroleum hydrocarbons (TPH), diesel range organics, pesticides, dioxins/furans, and metals. It is believed that a buried debris layer is the primary source of metals and dioxins/furans contamination, while spills or leaks from the former USTs and piping may have contributed to the TPH contamination (NAVFAC HI 2012). The RI determined that elevated levels of dissolved metals are present in groundwater at this site. The human health risk evaluation in the RI indicates that the levels of contaminants are too low to pose unacceptable risks to occupational workers, excavation/construction workers, or hypothetical future residents (in this case, patients and clinic staff). The results of the ecological screening assessment indicate that there are no unacceptable risks posed by potential migration of contaminants from site groundwater to aquatic life in off-site surface water bodies.

However, concentrations of dioxins/furan toxicity equivalents, TPH, antimony, and lead in subsurface soil at the Preferred Alternative site exceed USEPA's regulatory threshold and may pose unacceptable risks to hypothetical future residents; therefore, a Feasibility Study (FS) was recommended for this site (NAVFAC HI 2012). The FS analyzed the results of the RI and proposed Land Use Controls (LUCs) as remedial alternatives for this site.

Given the controls placed on the site, the DOH would require that a construction Environmental Hazard Management Plan (EHMP) be developed for their review. The purpose of the plan would be to document and inform DOH of the plans for dealing with the contaminated soil during construction, including protection of employees and anyone that can potentially come into contact with the exposed materials, and would describe plans to control potential exposures after the project is completed. Developing the EHMP is the responsibility of the contractor and should be done prior to breaking ground. DOH would be given approximately 30-60 days to review the draft EHMP.

A limited SI was completed at area of concern (AOC) EA58/Site MY158, a former vehicle fuel dispensing facility, located in the Kuntz Gate Site boundary. AOC EA58 is located approximately 20 feet (6 meters) west of Building 1713. AOC EA58 was identified in 1996 as a motor pool; a subsequent historical data review does not fully support that observation and suggests it was actually a vehicle fueling station. Recommendations from this study were to sample runoff from the AOC to determine if the contaminants were discharging from the Manuwai canal and the Installation Restoration Program site. Based on data collected, it is possible the COCs may have been the result of soil vapors originating from neighboring areas of petroleum contamination. The screening-level risk evaluation from the SI of AOC EA58 located in the Kuntz Gate Site indicated that no unacceptable risks were identified at AOC EA58; no further response action documentation was recommended.

3.6.2.2 Hazardous Waste

The Base Hazardous Waste Management Plan details JBPHH's hazardous waste stream inventory and identifies all types of hazardous waste generated at specific authorized locations. The plan includes

operational procedures applicable to the collection and temporary storage of hazardous wastes at initial accumulation sites and outlines the respective roles and responsibilities of the Hazardous Material Minimization Center, Satellite Accumulation Points, and Waste Accumulation Points.

Navy Region Hawaii owns a permitted Treatment Storage Disposal Facility, referred to as the Conforming Storage Facility, at Building No. 1526 under the USEPA ID No. HI 117 002 4334. The Conforming Storage Facility is used as a central facility for the receipt and temporary storage of HW. Under the same USEPA ID No., the Region owns the Industrial Waste Treatment Facility (IWTC) at Building 1424 at JBPHH. Hickam is also registered in the PCB Activity Data System under ID 3068 and in the National Compliance Database under ID numbers I09#19880616049471 and C09#09-88216-02-WR.

3.6.2.3 Special Hazards (Asbestos-Containing Material, Lead-Based Paint, Polychlorinated Biphenyls)

JBPHH has two programs for managing special hazards: LBP Management Plan and the Asbestos Management and Operating Plan. Although LBP is no longer used at JBPHH, several older facilities were painted with these paint products. The LBP Plan focuses on the safe management of these materials and the elimination of potential hazards to the residents and environment. The Asbestos Management Plan provides guidance on and outlines procedures for asbestos related management and abatement programs. The Plan also calls for a current survey of all facilities with ACM in order to facilitate the location and removal of asbestos as well as protect the military and civilian community. Prior to renovations and demolition, structures are to be evaluated and hazardous materials removed in accordance with these programs and other applicable laws and regulations.

3.6.2.4 Defense Environmental Restoration Program

The DERP was created at JBPHH to identify areas on base that are cause of environmental concerns under federal laws (RCRA, CERCLA). The goal of the DERP is to identify, investigate, conduct research and development into, and clean up contamination from CERCLA hazardous substances or pollutants or contaminants. Other goals include to correct environmental damage with the potential to cause endangerment to the public and human health or the environment, and to demolish or remove unsafe buildings/structures. The DERP (DoD 2012) aims to "reduce risks to human health and the environment through implementation of effective, legally compliant, and cost-effective response actions."

3.6.3 Environmental Consequences

The hazardous materials and wastes analysis contained in the respective sections addresses issues related to the use and management of hazardous materials and wastes as well as the presence and management of specific cleanup sites at JBPHH. The Proposed Action has the potential to disturb surface soil, subsurface soil, groundwater, and soil gas.

3.6.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change associated with hazardous materials and wastes. Therefore, no impacts would occur from the No Action Alternative.

3.6.3.2 Alternative 1: Tradewinds-Par 3 Site (Preferred Alternative) Potential Impacts

The study area for the analysis of effects to hazardous materials associated with Alternative 1 includes an area within housing and community service areas adjacent (east) to the Hickam Par 3 Golf Course. The study area for the Alternative 1 is described in detail in Section 2 (Figure 2-1).

Construction

Hazardous materials are expected to be used during the construction phase, including diesel fuel, gasoline, and propane to fuel equipment; hydraulic fluids, oils, and lubricants; and batteries. The contractor performing the work would be responsible for properly managing, handling, and disposing of hazardous materials during and after completion of all work performed. Use of hazardous materials and generation of hazardous wastes during construction would be managed under existing laws and Navy regulations and management practices.

As a result of the FS described in the Affected Environment, it was determined that LUCs including land use restrictions would be implemented to guide any excavation, grading, and trenching activities at this site. The LUCs were developed upon guidance provided in the *Policy on Land Use Controls Associated with Environmental Restoration Activities* (DoD 2001). BMPs are described in Table 2-1.

The demolition and construction associated with implementing the Proposed Action under Alternative 1 would be consistent with LUCs resulting from the FS. Hazardous wastes generated by construction of the ACC would be handled and disposed of in accordance with the installation's Hazardous Waste Management Plan and the Navy's Regional Hazardous Material Control and Management Plan to prevent accidental spills and ensure proper handling of contaminated materials.

Operations

During operation of the ACC and on-going project activities including maintenance and repair or renovation, hazardous materials and wastes would be managed under existing laws and regulations. Medical supplies that contain hazardous materials would be used during operation of the ACC and specific medical waste procedures must be followed. All medical waste would be disposed of through off-site removal, as it currently is at existing JBPHH medical clinic locations. Although waste generation would be more consolidated than under the No Action Alternative, total waste generation is not expected to increase under the Preferred Alternative.

In summary, no impacts to hazardous materials or wastes would occur with implementation of the Proposed Action under Alternative 1.

3.6.3.3 Alternative 2: Kuntz Gate Site Potential Impacts

Construction

Impacts to hazardous materials and wastes for Alternative 2 include those stated above under Alternative 1 including impacts from the demolition of facilities and construction of the ACC. A notable difference between the Alternatives 1 and 2 is that LUCs are in place at the Tradewinds-Par 3 Site that do not apply to the Kuntz Gate Site. Additionally, the SI of AOC EA58 resulted in no further response action documentation or mitigation required at this site.

Operations

Impacts to hazardous materials and wastes from repair, renovation, and/or demolition as well as operation and maintenance under Alternative 2 are the same as impacts under Alternative 1 and are

described in the Alternative 1 Potential Impacts section. A Hazardous Waste Management Plan shall be followed and BMPs are described under Alternative 1. Although waste generation would be more consolidated than under the No Action Alternative, total waste generation is not expected to increase under Alternative 2.

In summary, no impacts to hazardous materials or wastes would occur with implementation of the Proposed Action under Alternative 2.

3.6.3.4 Alternative 3: Bloch Arena Site Potential Impacts

Construction

Studies on hazardous materials and waste for the Bloch Arena Site were not available through data research or GFI. Impacts to hazardous materials management associated with construction at the Bloch Arena Site include impacts described in the Alternative 1 Potential Impacts section.

Operations

Impacts on hazardous materials and wastes resulting from the repair, renovation, and/or demolition as well as operation and maintenance of the facility at the Bloch Arena Site are the same as impacts at the Alternative 1 and are described in the Alternative 1 Potential Impacts section. A Hazardous Waste Management Plan would be followed and BMPs are described under Alternative 1. Although waste generation would be more consolidated than under the No Action Alternative, total waste generation is not expected to increase under Alternative 3.

In summary, no impacts to hazardous materials or wastes would occur with implementation of the Proposed Action under Alternative 3.

3.7 Summary of Potential Impacts to Resource Areas

The following table provides a brief summary of impacts for each alternative by topic.

Table 3-5 Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1 – Tradewinds-Par 3 (Preferred Alternative)*	*Alternative 2 – Kuntz Gate*	*Alternative 3 – Bloch Arena*
Cultural Resources	The clinic would not be constructed and there would be no change in operations. No impacts to cultural or historical resources would occur.	Construction period ground-disturbing activities have a low probability to affect undiscovered subsurface cultural resources. Alternative 1 would not result in modifications or demolition of historic architectural resources. No TCPs are within the APE. Therefore, construction and operation of the new clinic would result in no significant, long-term, local impacts to cultural resources.	Construction period ground-disturbing activities have a low probability to affect undiscovered subsurface cultural resources. Several non-NRHP eligible buildings over 50 years old would be demolished. Therefore, construction and operation of the new clinic would result in no significant, long-term, local impacts to cultural resources.	Construction and operation of the new clinic would occur within a highly visible location inside the NHL district, on the site of an eligible historic facility (Ward Field), and in a location of high archaeological probability. Construction and operations would result in significant, long-term, local and regional impacts to cultural resources, which could be reduced to no significant impacts through mitigation.
Air Quality	The clinic would not be constructed and there would be no change in operations. There would be no impacts to air quality or global climate change.	Construction-related emissions would be minor and minimized with implementation of BMPs. Operations would shift localized commutes and related mobile source emissions to and from previous clinics to the proposed ACC, but would not result in significant air quality impacts. Operational GHG emissions would be less than the No Action Alternative. Therefore, there would be no significant impacts to air quality and climate change.	Construction-related emissions would be minor and minimized with implementation of BMPs. Operations would shift localized commutes and related mobile source emissions to and from previous clinics to the proposed ACC, with slightly higher mobile emissions than under Alternative 1 due to increased congestion, but would not result in significant air quality impacts. Operational GHG emissions would be equal to or less than the No Action Alternative. Therefore, there would be no significant impacts to air quality and climate change.	Construction-related emissions would be minor and minimized with implementation of BMPs. Operations would shift localized commutes and related mobile source emissions to and from previous clinics to the proposed ACC, comparable to Alternative 1, but would not result in significant air quality impacts. Operational GHG emissions would be equal to or less than the No Action Alternative. Therefore, there would be no significant impacts to air quality and climate change.

Table 3-5 Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1 – Tradewinds-Par 3 (Preferred Alternative)*	*Alternative 2 – Kuntz Gate*	*Alternative 3 – Bloch Arena*
Biological Resources	The clinic would not be constructed, and there would be no change in operations. No impacts to biological resources would occur.	There would be removal of existing vegetation to the degree needed for site development. Disturbance to terrestrial wildlife species during the site preparation and construction process could be avoided with the implementation of the suggested BMPs. Operation of the ACC at this site would have no impacts to biological resources. No significant impacts to biological resources would occur. No effect on ESA-listed species.	There would be removal of existing vegetation to the degree needed for site development. Disturbance to terrestrial wildlife during the site preparation and construction process could be avoided with the implementation of the suggested BMPs. Operation of the ACC at this site would have no impacts to biological resources. No significant impacts to biological resources would occur. No effect on ESA-listed species.	There would be removal of existing vegetation to the degree needed for site development. Disturbance to terrestrial wildlife species during the site preparation and construction process could be avoided with the implementation of the suggested BMPs. Operation of the ACC at this site would have no impacts to biological resources. No significant impacts to biological resources would occur. No effect on ESA-listed species.
Visual Resources	The clinic would not be constructed, and there would be no change to landscape character and visual resources. Therefore, no impacts would occur from the No Action Alternative.	Construction would have temporary non-significant impacts that are of local extent and in medium intensity to the common visual resources. Operational impacts to visual resources are not significant because of their local extent and medium intensity.	Construction would have temporary, non-significant impacts to common visual resources that are of local extent and medium intensity. Operational impacts to visual resources are not significant due to their local extent and low to medium intensity.	Visual resources are important due to the historic characteristics of the area. Temporary, less than significant impacts are expected from construction. Operations would lead to permanent, medium to high intensity impacts within its regional contexts. Operational impacts to visual resources could be reduced to no significant impacts through mitigation.

Table 3-5 Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1 – Tradewinds-Par 3 (Preferred Alternative)*	*Alternative 2 – Kuntz Gate*	*Alternative 3 – Bloch Arena*
Transportation	The clinic would not be constructed and there would be no change in operations. No impacts to transportation would occur.	Operation of the ACC replacement facility would result in a shift in traffic patterns from existing clinic areas to the alternative site. Traffic would decrease at existing clinic sites and increase around the Alternative 1 site. With implementation of recommended traffic mitigation measures, transportation impacts would not be significant.	Operation of the ACC replacement facility would result in a shift in traffic patterns from existing clinic areas to the alternative site. Traffic would decrease at existing clinic sites and increase around the Alternative 2 site. With implementation of recommended traffic mitigation measures, transportation impacts would not be significant.	Operation of the ACC replacement facility would result in a shift in traffic patterns from existing clinic areas to the alternative site. Traffic would decrease at existing clinic sites and increase around the Alternative 3 site. Recommended measures would mitigate traffic impacts at intersections adjacent to the ACC site. Increased traffic demand at the Nimitz and Makalapa Gates could be accommodated if entry lane additions recommended by SDDCTEA to handle existing conditions (prior to ACC) are implemented. With the recommended measures adjacent to the ACC site and implementation of SDDCTEA recommendations for existing conditions, transportation impacts would not be significant.
Hazardous Materials and Wastes	The clinic would not be constructed, and there would be no change in operations. Hazardous wastes and materials would continue to be generated at current levels and locations and would be managed under existing protocols. No impacts to hazardous materials and wastes would occur.	There would be some generation of hazardous materials and wastes during construction due to excavation of soil and disposal of construction materials. There would be no operational impacts of the ACC at this site. No significant impacts from hazardous materials and wastes would occur given implementation of existing LUCs, management plans and handling procedures.	There would be some generation of hazardous materials and wastes during construction due to excavation of soil and disposal of construction materials. There would be no operational impacts of the ACC at this site. No significant impacts from hazardous materials and wastes would occur given implementation of existing management plans and handling procedures.	There would be some generation of hazardous materials and wastes during construction due to excavation of soil and disposal of construction materials. There would be no operational impacts of the ACC at this site. No significant impacts from hazardous materials and wastes would occur given implementation of existing LUCs, management plans and handling procedures.

Notes: ACC = Ambulatory Care Center; BMP = best management practice; ESA = Endangered Species Act; GHG = greenhouse gas; HQ = headquarters; LUC = land use control; NHL = National Historic Landmark; NRHP = National Register of Historic Places; TBD = to be determined.

3.7.1 Impact Avoidance and Minimization Measures

For many of the above topics, impacts would not be significant, and are addressed through the implementation of standard BMPs as part of the Proposed Action, listed in Section 2 (Table 2-1). For those activities for which BMPs are not sufficient to mitigate impacts, additional avoidance and mitigation measures are identified in Table 3-6 below.

Table 3-6 Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit/Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Alternative 1: Tradewinds-Par 3 Site				
Signalize and install related intersection improvements as described in Section 3.5.3.2 at the Kuntz Ave/McClelland St and Kuntz Ave/McChord St intersections.	Mitigate projected LOS F operations at these intersections under unsignalized operations.	Measures would be included as part of the civil engineering design of the ACC.	ROICC would be responsible for overseeing proper implementation of improvements.	Completion of measures would occur when building construction is completed.
Encourage ACC staff to utilize Kuntz Gate instead of O'Malley Gate for access to JBPHH.	Mitigate potential vehicle congestion and delay at O'Malley Gate.	Measures would be implemented after ACC begins operations if needed based on observed congestion at the O'Malley Gate.	ACC management and JBPHH base command.	Measures would be implemented after ACC begins operations if needed.
Encourage ACC construction staff and construction deliveries to utilize Kuntz Gate instead of O'Malley Gate for access to JBPHH.	Mitigate temporary O'Malley Gate and Kuntz Avenue intersection impacts during construction.	Measure would be stipulated in construction contract and implemented as needed when determined by JBPHH base command.	ROICC would oversee construction and coordinate with JBPHH base command.	Measure applied during construction period as needed.
Minimize roadway closures of Kuntz Ave. Focus construction staging on McClelland and McChord Streets.	Mitigate temporary impacts to Kuntz Avenue traffic flow during construction.	Measure would be stipulated in construction contract and implemented as determined by ROICC.	ROICC would oversee construction and coordinate with JBPHH base command.	Measures applied during construction period.
Apply appropriate construction detouring per standards.	Avoid temporary traffic safety and operational issues through appropriate and efficient application of transportation detour measures.	Measure would be stipulated in construction contract and implemented as determined by ROICC.	ROICC would oversee construction and coordinate with JBPHH base command.	Measures applied during construction period.

Table 3-6 Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit/Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Alternative 2: Kuntz Gate Site				
Signalize and install related intersection improvements at the Kuntz Ave/Halehaka St/Kamakahi St intersection as described in Section 3.5.3.3.	Mitigate projected LOS F operations at this intersection under unsignalized operations.	Measures would be included as part of the civil engineering design of the ACC.	ROICC would be responsible for overseeing proper implementation of improvements.	Completion of measures would occur when building construction is completed.
Widen Kuntz Avenue one lane width by approximately 1,050 feet (320 meters) between Halehaka/Kamakahi intersection and Kuntz Gate to create painted median in Kuntz Avenue to accommodate left-turn lanes at driveway to proposed Staff Parking Lot and at Halehaka/Kamakahi intersection.	Part of mitigation of significant operational issues at the Halehaka/Kamakahi intersection. Provide safe traffic operations at the Staff Parking Lot driveway.	Measures would be included as part of the civil engineering design of the ACC.	ROICC would be responsible for overseeing proper implementation of improvements.	Completion of measures would occur when building construction is completed.
Widen Halehaka Street approximately one lane width approximately 260 feet (79 meters) from Kuntz Avenue to 20th Street to provide northbound left-turn lane at 20th Street and southbound left/through lane at Kuntz Avenue.	Part of mitigation of operational issues at the Halehaka/Kamakahi intersection. Provide safe traffic operations at the Halehaka Street/20th Street intersection that also functions as main access to ACC.	Measures would be included as part of the civil engineering design of the ACC.	ROICC would be responsible for overseeing proper implementation of improvements.	Completion of measures would occur when building construction is completed.
Encourage ACC staff to utilize Kuntz Gate instead of O'Malley Gate for access to JBPHH.	Mitigate potential vehicle congestion and delay at O'Malley Gate.	Measures would be implemented after ACC begins operations if needed based on observed congestion at the O'Malley Gate.	ACC management and JBPHH base command.	Measures would be implemented after ACC begins operations if needed.
Encourage ACC construction staff and construction deliveries to utilize Kuntz Gate instead of O'Malley Gate for access to JBPHH.	Mitigate temporary O'Malley Gate and Kuntz Avenue intersection impacts during construction.	Measure would be stipulated in construction contract and implemented as needed when determined by JBPHH base command.	ROICC would oversee construction and coordinate with JBPHH base command.	Measure applied during construction period as needed.

Table 3-6 Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit/Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Minimize roadway closures of Kuntz Ave. Focus construction staging on 20th Street and proposed parking lot areas.	Mitigate temporary impacts to Kuntz Avenue traffic flow during construction.	Measure would be stipulated in construction contract and implemented as determined by ROICC.	ROICC would oversee construction and coordinate with JBPHH base command.	Measures applied during construction period.
Apply appropriate construction detouring per standards.	Avoid temporary traffic safety and operational issues through appropriate and efficient application of transportation detour measures.	Measure would be stipulated in construction contract and implemented as determined by ROICC.	ROICC would oversee construction and coordinate with JBPHH base command.	Measures applied during construction period.
Alternative 3: Bloch Arena Site				
Mitigate impacts of new ACC facilities on visual and cultural resources within the NHL historic district by taking into account the historic architectural styles of JBPHH and recommended approaches for new construction in historic districts provided in *The Secretary of Interior Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (NPS 2017).	Minimizing the appearance of the new facility could reduce impacts from significant to not significant through keeping the building and parking profiles low, matching colors, massing, fenestration, and other aspects to nearby existing historic buildings, and keeping the building height lower than that of adjacent Building 150.	Measures would be implemented as part of the architectural design of the ACC. Design review and monitoring would be undertaken by a NAVFAC HI historical architect. The requirements and review and reporting processes would be developed as stipulations in an agreement document prepared to address effects on historic properties through the NHPA Section 106 process, in consultation with SHPD and other consulting parties.	Project architects: NAVFAC HI EV5 Cultural and Historic Resources staff.	Completion of measures would occur when building construction is completed.

Table 3-6 Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit/Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Mitigation to offset the loss of Ward Field could include documentation prior to demolition and preparation of interpretive exhibits for installation on-site, in coordination with any stipulations in applicable agreements that would be prepared under NHPA Section 106 consultation.	Documentation and interpretive exhibits are measures that could be considered to offset the impacts of losing the Ward Field ballfield area, which is within the NHL and is considered a historic facility.	Documentation and interpretive materials requirements would be developed as stipulations in an agreement document prepared to address effects on historic properties through the NHPA Section 106 process, in consultation with SHPO and other consulting parties.	NAVFAC HI EV5 Cultural and Historic Resources staff and Secretary of Interior qualified architectural historians.	Documentation would be implemented by Secretary of Interior qualified architectural historians prior to construction activities; interpretive materials would be developed by the same and installed after construction was completed.
Mitigate visual impacts from the loss of open green space and existing canopy trees by replanting the same amount and type of canopy trees on/off-site where possible. In addition, it is recommended to maximize landscaped areas within the footprint of the Bloch Arena Site.	Due to space constraints, landscaped areas are expected to be limited.	Measures would be implemented as part of the landscape architectural design of the ACC. Design review and monitoring would be undertaken by a NAVFAC HI landscape architect.	Project landscape architect	Completion of measures would occur when building and parking construction are completed.
Signalize and install related intersection improvements at the North Road/Battleship Drive intersection as described in Section 3.5.3.4.	Mitigate projected LOS F operations at this intersection under unsignalized operations.	Measures would be included as part of the civil engineering design of the ACC.	ROICC would be responsible for overseeing proper implementation of improvements.	Completion of measures would occur when building construction is completed.

Table 3-6 Impact Avoidance and Minimization Measures

Measure	*Anticipated Benefit/Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Install traffic signal modifications and related improvements at the North Road/Pearl Harbor Drive intersection as described in Section 3.5.3.4.	Accommodate proposed ACC access driveway as new leg at intersection.	Measures would be included as part of the civil engineering design of the ACC.	ROICC would be responsible for overseeing proper implementation of improvements.	Completion of measures would occur when building construction is completed.
Widen North Road by one lane width approximately 1,500 feet (457 meters) between Nimitz Gate and the Fitness Center driveway (north of Battleship Drive) to restore one westbound North Road through lane eliminated due to creation of exclusive median left-turn lanes at the North Road/Pearl Harbor Drive intersection.	Mitigate projected excessive westbound vehicle queue during PM peak hour. Queue has potential to interfere with access to JBPHH at Nimitz Gate.	Measures would be included as part of the civil engineering design of the ACC.	ROICC would be responsible for overseeing proper implementation of improvements.	Completion of measures would occur when building construction is completed.
Investigate use of Center Drive and temporary gate at Bloch Arena parking lot to provide construction access to ACC site.	Mitigate temporary worsening of existing vehicle congestion and delay at Nimitz Gate during the AM peak hour.	Measure would be stipulated in construction contract and implemented as needed when determined by JBPHH base command.	ROICC would oversee construction and coordinate with JBPHH base command.	Measure applied during construction period as needed.
Minimize roadway closures of North Rd. Focus construction staging within Bloch Arena site.	Mitigate temporary impacts to North Rd traffic flow during construction.	Measure would be stipulated in construction contract and implemented as determined by ROICC.	ROICC would oversee construction and coordinate with JBPHH base command.	Measures applied during construction period.
Apply appropriate construction detouring per standards.	Avoid temporary traffic safety and operational issues through appropriate and efficient application of transportation detour measures.	Measure would be stipulated in construction contract and implemented as determined by ROICC.	ROICC would oversee construction and coordinate with JBPHH base command.	Measures applied during construction period.

Notes: ACC = Ambulatory Care Center; Ave = avenue; JBPHH = Joint Base Pearl Harbor-Hickam; LOS = level of service; NAVFAC HI = Naval Facilities Engineering Command, Hawaii; NHL = National Historic Landmark; NHPA = National Historic Preservation Act; Rd = road; ROICC = resident officer in charge of construction SHPD = State Historic Preservation Division; St = street.

4 Cumulative Impacts

This section (1) defines cumulative impacts, (2) describes past, present, and reasonably foreseeable future actions relevant to cumulative impacts, (3) analyzes the incremental interaction the proposed action may have with other actions, and (4) evaluates cumulative impacts potentially resulting from these interactions.

4.1 Definition of Cumulative Impacts

The approach taken in the analysis of cumulative impacts follows the objectives of the NEPA, CEQ regulations, and CEQ guidance. Cumulative impacts are defined in 40 CFR 1508.7 as "the impact on the environment that results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

To determine the scope of environmental impact analyses, agencies shall consider cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact analysis document.

In addition, CEQ and USEPA have published guidance addressing implementation of cumulative impact analyses—*Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ 2005) and *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (USEPA 1999). CEQ guidance entitled *Considering Cumulative Impacts Under NEPA* (1997) states that cumulative impact analyses should "…determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative impacts of other past, present, and future actions…identify significant cumulative impacts…[and]…focus on truly meaningful impacts."

Cumulative impacts are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in close proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Similarly, relatively concurrent actions would tend to offer a higher potential for cumulative impacts. To identify cumulative impacts, the analysis needs to address the following three fundamental questions.

- Does a relationship exist such that affected resource areas of the proposed action might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
- If one or more of the affected resource areas of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by impacts of the other action?
- If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

4.2 Scope of Cumulative Impacts Analysis

The scope of the cumulative impacts analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this EA, the study area delimits the geographic extent of the cumulative impacts analysis. In general, the study area will include those areas previously identified in Section 3 for the respective resource areas. The time frame for cumulative impacts centers on the timing of the proposed action.

Another factor influencing the scope of cumulative impacts analysis involves identifying other actions to consider. Beyond determining that the geographic scope and time frame for the actions interrelate to the proposed action, the analysis employs the measure of "reasonably foreseeable" to include or exclude other actions. For the purposes of this analysis, public documents prepared by federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Documents used to identify other actions include notices of intent for EISs and EAs, management plans, land use plans, and other planning related studies.

4.3 Past, Present, and Reasonably Foreseeable Actions

This section will focus on past, present, and reasonably foreseeable future projects at and near the Proposed Action locale. In determining which projects to include in the cumulative impacts analysis, a preliminary determination was made regarding the past, present, or reasonably foreseeable action. Specifically, using the first fundamental question included in Section 4.1, it was determined if a relationship exists such that the affected resource areas of the Proposed Action included in this EA might interact with the affected resource area of a past, present, or reasonably foreseeable action. If no such potential relationship exists, the project was not carried forward into the cumulative impacts analysis. In accordance with CEQ guidance (CEQ 2005), these actions considered but excluded from further cumulative effects analysis are not catalogued here as the intent is to focus the analysis on the meaningful actions relevant to informed decision-making. Projects included in this cumulative impacts analysis are listed in Table 4-1 and briefly described in the following subsections.

While the term "past, present, and reasonably foreseeable future" projects is used in this analysis to describe all considered actions, the cumulative effects analysis focuses on on-going and reasonably foreseeable future projects. Past projects have been assessed in the establishment of the environmental baseline and are already considered in the Alternatives' impact analysis presented in Section 3 of this EA (Affected Environment and Environmental Impacts). Past projects are only considered in this cumulative analysis if their long-term and operational impacts would occur to similar resource areas at the same time as the Proposed Action, contributing to cumulative impacts.

Table 4-1 Cumulative Actions for Evaluation

Action	*Level of NEPA Analysis Completed*
Present and Reasonably Foreseeable Future Actions	
Honolulu Area Rapid Transit rail system. The City and County of Honolulu is currently constructing a 20-mile (32-kilometer) elevated urban rail transit system along the south shore of Oahu between East Kapolei and Ala Moana Center. The segment between East Kapolei and Aloha Stadium is expected to be open for operation by the end of 2020. The entire project may be completed as early as 2025. The Pearl Harbor Naval Base Rail Station is approximately 0.5-mile (0.8-kilometer) northeast of the Bloch Arena Site. The shortest distance between the proposed alternative sites and the rail construction (along Kamehameha and Nimitz Highway) is 0.35-0.45 mile (0.56-0.72 kilometer).	Final EIS (June 2010) and FSEIS (September 2013); ROD issued on January 18, 2011.
Naval Special Operations Training. The U.S. Naval Special Warfare Command proposes to conduct small unit intermediate and advanced land, maritime and air-based training activities for naval special operations personnel. Training would occur in nearshore waters and land-based areas on Oahu, Island of Hawaii and Kauai. Training was planned to start in 2019. The Bloch Arena Site (Alternative 3) is adjacent to the Special Operations training study area at JBPHH.	Draft EA (November 2018).
Bus Transit Center at Makalapa ECP (across from current Navy Clinic). A personnel gate and bus transit center have been planned to be placed across the Makalapa Gate. The intersection of Kamehameha Highway and Redford Drive would be improved for bus ingress and egress from the future Pearl Harbor Naval Base Rail Station. (Shaun Kagawa, NAVFAC Hawaii, personal communication, January 8, 2020)	None. Currently in planning phase. Construction timeline TBD.
DISA – Installation of a Communications Duct Bank along Kuntz Avenue. (Shaun Kagawa, NAVFAC Hawaii, personal communication, January 8, 2020)	None identified.
Aloha Stadium Site Redevelopment. The State of Hawaii Department of Accounting and General Services is proposing the construction of a new stadium facility in addition to related ancillary development that would serve to create a New Aloha Stadium Entertainment District on the grounds of the existing Aloha Stadium site in Halawa. The construction of a new stadium is expected to be completed by Fall 2023, with phased mixed-use precinct built out over time. The Aloha Stadium Rail Station at the site is already under construction. The 98-acre (40-hectare) Aloha Stadium site is bounded by Kamehameha Highway on the west and Salt Lake Boulevard on the south. H-1 Freeway on the east and Moanalua Freeway on the north. The Bloch Arena Site is approximately 1.6 mile (2.6 kilometers) southwest of the Aloha Stadium site.	EISPN (August 2019).
Submarine Dry Dock and Dry Dock Production Facility at Pearl Harbor Naval Shipyard. The Shipyard Infrastructure Optimization Program was requested by the Secretary of the Navy to assemble a budget estimate for a DDPF for PHNSY and IMF. The DDPF is a facility located near or above a dry dock which houses a large portion of the shop work that is associated with a ship availability. The primary benefit of the DDPF will be the reduction of time and motion of the shipyard workforce by locating the industrial spaces closer to a Dry Dock. Before the construction of a DDPF, a usable drydock that provides capacity for future blocks and classes of submarines must be constructed. This drydock must be certified for use by August 1, 2028. Given the mission need for a larger dry dock to support future blocks and classes of submarines, this effort refines the proposed alternative designs for a dry dock at PHNSY&IMF. The alternatives must be capable of meeting the stated requirements for docking and maintaining of the Navy's submarines and include the necessary design criteria to supporting the construction of a DDPF that would significantly improve productivity and shipyard capacity.	NOI to be published (project has been announced in press).

Table 4-1 Cumulative Actions for Evaluation

Action	*Level of NEPA Analysis Completed*
Replacement of Working Dog Treatment Facility. Commander, Joint Base Pearl Harbor-Hickam is proposing to construct a replacement for the Working Dog Treatment Facility. This facility would be for the prevention of zoonotic disease and to provide full preventive services to the privately-owned animals of service members on the installation. The replacement facility would be approximately 12,300 square feet (1,143 square meters) and would be located along Kuntz Avenue, next to the Hickam Memorial Theater (Building 1766H). The existing clinic (Building 1864H) was built in 1945, is deteriorated from termite damage, and would not be economically practical to repair. The project includes constructing a replacement Veterinary Treatment Facility supporting military working dogs. Supporting facilities include utilities, site improvements, parking, signage, antiterrorism force protection measures, and environmental protection measures.	CATEX (September 2018).

Notes:
CATEX = Categorical Exclusion
DDPF = Dry Dock Production Facility
DISA = Defense Information Systems Agency
ECP = entry control point
EA = environmental assessment
EIS = Environmental Impact Statement
EISPN = EIS Preparation Notice
FSEIS = Final Supplemental EIS
IMF = Intermediate Maintenance Facility
JBPHH = Joint Base Pearl Harbor-Hickam
NEPA = National Environmental Policy Act
PHNSY = Pearl Harbor Naval Shipyard
ROD = record of decision
TBD = to be determined
U.S. = United States
Source: USDOT 2010, 2013; DoN 2018; DAGS 2019; Commander, Joint Base Pearl Harbor-Hickam 2018.

4.4 Cumulative Impacts under the Proposed Action

Cumulative impacts from past, present, and reasonably foreseeable future projects are not expected to be significant to cultural resources, air quality, and transportation. No cumulative impacts are expected to visual resources, biological resources, or hazardous materials and wastes.

No significant cumulative impacts are expected from past, present, and reasonably foreseeable future projects to cultural resources. Projects with potential impacts to cultural resources include the Submarine Dry Dock and Dry Dock Production Facility at Pearl Harbor Naval Shipyard, Honolulu Area Rapid Transit (HART), Naval Special Operations Training, the Bus Transit Center at Makalapa entry control point, the Defense Information Systems Agency communications duct bank, and Aloha Stadium Site Redevelopment. Any of these projects may include ground disturbance that could affect known or unknown subsurface archaeological resources; the Dry Dock, HART, Navy Training, and Aloha Stadium are known to or are likely to result in changes to historic architectural resources and possibly to TCPs, and all are expected to include extensive mitigation measures. Cumulative impacts of the Proposed Action, together with these past, present, and reasonably foreseeable future actions would result in no significant impact to cultural resources. All DoD projects and other actions on installation land are required to be implemented using

the SOPs detailed in the 2008 ICRMPs, and the other projects would be required to undergo consultation and mitigation per the requirements of NHPA Section 106 and HRS Chapter 6E.

Development of past, present, and reasonably foreseeable future projects would result in no significant impacts on air quality due to emission increases from construction and operational activities. A minor increase in emissions during construction and/or operation of these projects is not expected to contribute significant adverse effects to overall air quality in the regional airshed, since the region is in attainment for ambient air quality standards. Actions that require air permits would comply with State air quality standards. Project proponents would be responsible for complying with local and regional air quality standards. There would be no significant short- and long-term, adverse cumulative effects on air quality in the ROI from the incremental effects of the Proposed Action when considered with impacts from past, present, and reasonably foreseeable future projects. Construction activities would generate temporary emissions, while long-term activities, such as vehicular use and changes in traffic patterns, would also contribute to an increase in emissions in the ROI. Individual past, present, and reasonably foreseeable future projects would not generate emissions at a level that would change the attainment status of the region and would comply with applicable laws regulating air quality standards, as noted above.

Impacts from GHG emissions are cumulative in nature, as individual emission sources are not large enough to have appreciable impact on global climate change. The other past, present, and reasonably foreseeable future projects would have an incremental contribution of GHG emissions to global climate change from the use of heavy equipment, gas- or diesel-powered vehicles, or ships or aircraft. Long-term reductions in GHG emissions would result from increased energy efficiencies in project operations and reductions in vehicle-miles travelled, such as would be achieved through the HART rail system. A minimal level of GHG emissions would result from the construction of the proposed project and the anticipated decrease in indirect GHG emissions associated with energy efficiencies that would be achieved by the proposed project. These GHG emissions, adding to the GHG emissions that would result from the other past, present, and reasonably foreseeable future projects, are not large enough to have an appreciable effect on GHG emissions and global climate change. Therefore, no cumulative impacts to global climate change would occur.

No cumulative impacts are expected from past, present, and reasonably foreseeable future projects to visual resources. The installation of communications duct bank may have low intensity, temporary, local impacts to common visual resource along Kuntz Avenue during the construction or installation phase, leading to no significant impact to the Tradewinds-Par 3 and Kuntz Gate sites. No cumulative impacts would occur because the project would run underground. The Naval Special Operations training would not have impact to visual resource within the ROI due to its small scale and short-term nature. The construction at the Dry Docks would be visible to visitors at the USS Missouri museum and other accessible locations on Ford Island. The short-term construction activities would not change the industrial appearance of the area, so no cumulative impacts to visual resources are expected. The Working Dog Treatment Facility replacement would not have cumulative impacts to visual resources because it would not alter the landscape characteristics of the site along Kuntz Avenue. The other past, present and reasonably foreseeable future projects are too far away from the visual resource ROI to be visually noticeable.

No significant cumulative impacts are expected from past, present, and reasonably foreseeable future projects to biological resources. Collective construction disturbance (e.g., noise) would affect wildlife species. As wildlife species at JBPHH are already accustomed to disturbance from construction and traffic noise, cumulative impacts would not be significant. Further, the Proposed Action in cumulation with past, present and future projects would not result in loss of prime or unique habitat for threatened or endangered species. No cumulative impacts to native plant species would occur.

No significant cumulative impacts are expected from past, present, and reasonably foreseeable future projects to transportation resources. While incremental cumulative impacts to transportation resources can be reasonably anticipated, additional transportation mitigation measures and BMPs would be implemented as all project proponents and JBPHH can be expected to strive to keep traffic within acceptable levels of service. Recommended mitigations for the Proposed Action would likely maintain existing traffic operations in the vicinity of the alternative sites and minimize cumulative impacts on transportation resources to the extent practicable.

No cumulative impacts are expected from past, present, and reasonably foreseeable future projects to hazardous materials and wastes. LUCs are in place following SI and RIs to determine the COCs to reduce the potential of an accidental release of COCs at a given site.

5 Other Considerations Required by NEPA

5.1 Consistency with Other Federal, State, and Local Laws, Plans, Policies, and Regulations

In accordance with 40 CFR 1502.16(c), analysis of environmental consequences shall include discussion of possible conflicts between the Proposed Action and the objectives of federal, regional, state and local land use plans, policies, and controls. Table 5-1 identifies the principal federal and state laws and regulations that are applicable to the Proposed Action and describes briefly how compliance with these laws and regulations would be accomplished.

Table 5-1 Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
National Environmental Policy Act; CEQ NEPA implementing regulations; Navy procedures for Implementing NEPA. This EA has been prepared in compliance with the provisions of the NEPA, CEQ Implementing regulations and Navy procedures for implementing NEPA including ASN Memorandum for NAVFAC Environmental Planning Streamlining and Process Improvement dated October 16, 2019.	C
Clean Air Act. The Proposed Action complies with the Clean Air Act and would not impact air quality or compromise Hawaii's status of compliance with the USEPA NAAQS criteria.	C
State of Hawaii Administrative Rules, Title 11, Chapter 59 (Ambient Air Quality Standards) and Chapter 60 (Air Pollution Control). The Proposed Action would not result in an exceedance of the standards adopted under the Hawaii Administrative Rules.	C
Clean Water Act. The Proposed Action complies with the Clean Water Act. Storm drain systems would be designed to incorporate low impact development features and a National Pollutant Discharge Elimination System permit would be obtained by the State of Hawaii Clean Water Branch if the project area disturbed exceeds one acre.	C-BMP
Rivers and Harbors Act. This act is not applicable to the Proposed Action because there are no natural water bodies or defined Waters of the United States within any of the proposed alternative sites.	n/a
Coastal Zone Management Act. The Navy informed the State of Hawaii Office of Planning – Coastal Zone Management Program that the Proposed Action constitutes and agreed *de minimis* activity under the Coastal Zone Management Act.	TBD
National Historic Preservation Act. This act is applicable to the Preferred Alternative and would be applied through the process of consultation with the State Historic Preservation Officer and other parties as outlined in National Historic Preservation Act Section 106.	C
Endangered Species Act. The Proposed Action complies with the ESA. Best management practices and monitoring conditions have been proposed in this EA to ensure compliance with provisions of the ESA. The Navy determined that the Proposed Action would have no effect on ESA-listed species.	C-BMP
Magnuson-Stevens Fishery Conservation and Management Reauthorization Act. This act is not applicable to the Proposed Action since there are no natural water bodies or defined Waters of the United States within any of the proposed alternative sites.	n/a
Marine Mammal Protection Act. This act is not applicable to the Proposed Action since there are no natural water bodies or defined Waters of the United States within any of the proposed alternative sites.	n/a
Migratory Bird Treaty Act. Impacts to migratory birds and their active nests would be avoided during construction. The Proposed Action is not expected to result in any intentional or unintentional taking of migratory birds, and would have no significant impact on migratory birds.	C
Bald and Golden Eagle Protection Act. This act is not applicable to the Proposed Action.	n/a
Comprehensive Environmental Response, Compensation, and Liability Act. Construction/renovation would be conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act.	C

Table 5-1 Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
Emergency Planning and Community Right-to-Know Act. This Proposed Action would be located on a military installation on federal lands and would adhere to security, mission, operational and notification requirements as applicable. This Act does not apply to the Proposed Action.	n/a
Federal Insecticide, Fungicide, and Rodenticide Act. This Proposed Action would not involve the application of insecticides, fungicides or rodenticides and is therefore not applicable.	n/a
Resource Conservation and Recovery Act. The proposed project areas have not been identified as Resource Conservation and Recovery Act sites.	C
Toxic Substances Control Act. Implementation of the Proposed Action would not involve the use of substances in violation of this act.	C
Farmland Protection Policy Act. This act is not applicable because the proposed project areas are not used or designated for agriculture.	n/a
Executive Order 11988, Floodplain Management. The Proposed Action would be designed and implemented in compliance with any applicable provision of flood and storm water management.	C-BMP
Executive Order 12088, Federal Compliance with Pollution Control Standards. The Proposed Action would be designed, implemented and operated in full compliance with all applicable provisions for pollution control standards including hazardous waste and hazardous materials.	C
Executive Order 12114, Environmental Effects Abroad of Major Federal Actions (Department of Navy implementing regulation 32 Code of Federal Regulations 287). The Proposed Action does not involve federal actions abroad and is therefore not applicable.	n/a
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations. This Proposed Action is wholly located on federal property and does not involve outside communities subject to Environmental Justice provisions.	n/a
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. This Proposed Action is wholly located on federal property and does not involve outside communities subject to Environmental Health Risks to Children provisions.	n/a
Executive Order 13089, Coral Reef Protection. The Proposed Action does not involve coral reefs or impacts to coral reefs.	n/a
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments. The Proposed Action does not involve lands or areas identified as culturally significant to Native Hawaiian groups or Hawaiian cultural practitioners.	n/a
Executive Order 13834. The Proposed Action would comply to the degree practicable to l prioritize actions that reduce waste, cut costs, enhance the resilience of Federal infrastructure and operations, and enable more effective accomplishment of its mission. as outlined throughout this EA.	C

Notes: ASN = Assistant Secretary of the Navy; C = Compliance; C-BMP = Compliance with BMP Measures; CEQ = Council on Environmental Quality; EA = Environmental Assessment; ESA = Endangered Species Act; n/a = not applicable; NAAQS = National Ambient Air Quality Standards; NAVFAC = Naval Facilities Engineering Command NC = Noncompliance; NEPA = National Environmental Policy Act; TBD = to be determined; USEPA = U.S. Environmental Protection Agency.

5.2 Irreversible or Irretrievable Commitments of Resources

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Implementation of the Proposed Action would involve human labor; the consumption of fuel, oil, and lubricants for construction vehicles; and loss of natural resources in the form of vegetation, ground cover and a reduction in open space. The Proposed Action would result in a commitment of irreversible and irretrievable fiscal resources to the construction and operation of the facility.

5.3 Unavoidable Adverse Impacts

This EA has determined that implementation of Alternative 3 would result in unavoidable adverse impacts to cultural and visual resources and transportation.

5.4 Relationship between Short-Term Use of the Environment and Long-Term Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development site reduces future flexibility in pursuing other options, or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

In the short term, effects to the human environment with implementation of the Proposed Action would primarily relate to the construction activity itself. However, the long-term productivity would vary by alternative.

Alternative 1: Tradewinds-Par 3 Site
The largely open and unused nature of this site offers future development flexibility. Implementation of Alternative 1 would permanently remove the open space and associated vegetation (including large canopy trees), essentially eliminating it from being used in the future for other purposes. However, the long-term productivity of the site would benefit users of the ACC.

Alternative 2: Kuntz Gate Site
Composed of somewhat underutilized light industrial facilities and open paved areas, this site offers future development flexibility. Implementation of Alternative 2 would permanently remove the existing facilities and most of the open paved areas essentially eliminating it from being used in the future for other purposes. However, the long-term productivity of the site would benefit users of the ACC.

Alternative 3: Bloch Arena Site
Composed of a large open paved parking lot and adjacent historic ballfield, this site offers future development flexibility. However, its development potential is constrained by its location within the NHL, historic ballfield, and potential archaeological resources, as well as its adjacency to the heavily used Nimitz Gate. Implementation of Alternative 3 would permanently remove the existing ballfield and open paved areas essentially eliminating it from being used in the future for other purposes. However, the long-term productivity of the site would benefit users of the ACC.

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Appendix A
National Historic Preservation Act Section 106 Documentation

NOTE TO REVIEWERS: NHPA Section 106 correspondence will be added to this Appendix in the Final EA.

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Appendix B
Final Transportation Impact Assessment Report

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FINAL

TRANSPORTATION IMPACT ASSESSMENT REPORT

for

AMBULATORY CARE CENTER REPLACEMENT

at

JOINT BASE PEARL HARBOR-HICKAM, OAHU, HAWAII

April 2020

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Transportation Impact Assessment Report

Ambulatory Care Center

Joint Base Pearl Harbor-Hickam, Oahu, Hawaii

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS VII
1 INTRODUCTION 1-1
2 EXISTING CONDITIONS 2-1
2.1 Site Description 2-1
2.2 Roadway Conditions 2-4
2.2.1 Roadway Descriptions 2-6
2.2.2 Intersection Conditions 2-13
2.3 Pedestrian and Bicycle Conditions 2-17
2.3.1 Pedestrian Facilities 2-17
2.3.2 Bicycle Facilities 2-19
2.4 Public Transit Conditions 2-19
2.4.1 TheBus 2-19
2.4.2 Navy Exchange Shuttles 2-24
2.5 Transportation Conditions 2-26
2.5.1 Existing 24-Hour Traffic Volumes 2-26
2.5.2 Existing Turning Movement Volumes 2-31
2.5.3 Existing Pedestrian and Bicycle Volumes 2-33
2.5.4 Existing Intersection Operations 2-35
3 FUTURE CONDITIONS 3-1
3.1 Proposed Development 3-1
3.1.1 Tradewinds-Par 3 Site 3-2
3.1.2 Kuntz Gate Site 3-4
3.1.1 Bloch Arena Site 3-6
3.2 Vehicular Trips Generated by the Ambulatory Care Center 3-8
3.3 Background Traffic Volumes 3-9
3.4 Projected Future Peak Hour Traffic Volumes for the Ambulatory Care Center 3-9
3.4.1 Trip Distribution and Assignment 3-9
3.4.2 Future Peak Hour Traffic Volumes 3-12

3.5 Projected Intersection Peak Hour Operations 3-14
3.5.1 Tradewinds-Par 3 Site 3-14
3.5.2 Kuntz Gate Site 3-16
3.5.3 Bloch Arena Site 3-18
3.6 Traffic Signal Warrant Analysis 3-19
3.7 Tradewinds-Par 3 Site 3-20
3.8 Kuntz Gate Site 3-20
3.9 Bloch Arena Site 3-20
4 PROPOSED ALTERNATIVES AND IMPACTS 4-1
4.1 Tradewinds-Par 3 Site Alternative 4-1
4.1.1 Internal Circulation and Parking 4-1
4.1.2 Site Access Impacts 4-1
4.1.3 Intersection Operational Impacts 4-1
4.1.4 Roadway Impacts 4-1
4.1.5 Pedestrian and Bicycle Impacts 4-2
4.1.6 Public Transit Impacts 4-2
4.2 Kuntz Gate Site Alternative 4-2
4.2.1 Internal Circulation and Parking Impacts 4-2
4.2.2 Site Access Impacts 4-2
4.2.3 Intersection Operational Impacts 4-3
4.2.4 Roadway Impacts 4-3
4.2.5 Pedestrian and Bicycle Impacts 4-3
4.2.6 Public Transit Impacts 4-3
4.3 Bloch Arena Site Alternative 4-3
4.3.1 Internal Circulation and Parking Impacts 4-4
4.3.2 Site Access Impacts 4-4
4.3.3 Intersection Operational Impacts 4-4
4.3.4 Roadway Impacts 4-4
4.3.5 Pedestrian and Bicycle Impacts 4-4
4.3.6 Public Transit Impacts 4-5
5 RECOMMENDED ACTIONS TO MITIGATE TRANSPORTATION IMPACTS 5-1
5.1 Overview of Recommended Actions 5-1
5.1.1 Site Access 5-1
5.1.2 Internal Circulation and Parking 5-1
5.1.3 Roadway Impacts 5-2
5.1.4 Pedestrian and Bicycle 5-2

5.1.5 Public Transit 5-2
5.1.6 Conceptual Order of Magnitude Costs of Recommended Mitigation Measures 5-3
5.2 Description of Recommended Improvements 5-4
5.2.1 Tradewinds-Par 3 Site 5-4
5.2.2 Kuntz Gate Site 5-6
5.2.3 Bloch Arena Site 5-8
6 REFERENCES 6-1

List of Figures

Figure 2-1 JBPHH ACC Alternative Site Locations 2-1
Figure 2-2 Proposed Bloch Arena Site 2-2
Figure 2-3 Proposed Tradewinds-Par 3 Site 2-3
Figure 2-4 Proposed Kuntz Gate Site 2-4
Figure 2-5 Proposed Site Locations and Gate Locations 2-5
Figure 2-6 View of North Road, looking south toward Building 150 at Ward Field 2-7
Figure 2-7 View of Kuntz Avenue looking east from its intersection with McClelland Street 2-9
Figure 2-8 View of McClelland Street looking north along the Par 3 golf course (at left) 2-10
Figure 2-9 View of Kokomalei Street looking north across Kuntz Avenue from the site 2-11
Figure 2-10 View of McChord Street looking south from the Kuntz Avenue intersection 2-12
Figure 2-11 View of Halehaka Street looking south towards Kuntz Avenue 2-13
Figure 2-12 View of the Kuntz Avenue and McClelland Street intersection, looking northeast 2-14
Figure 2-13 View of the Kuntz Avenue and McChord Street intersection, looking southwest 2-15
Figure 2-14 View of the Kuntz Avenue and Halehaka Street/Kamakahi Street Intersection in the Northeast Direction 2-16
Figure 2-15 TheBus Route 19 2-20
Figure 2-16 TheBus Route 9 2-21
Figure 2-17 TheBus express routes serving JBPHH 2-23
Figure 2-18 NEX Shuttle Route and Schedule 2-25
Figure 2-19 24-hour traffic volumes 2-27
Figure 2-20 Hourly volume variation on Kuntz Avenue, west of McClelland Street 2-28
Figure 2-21 Hourly volume variation on Kuntz Avenue, east of Halehaka Street/Kamakahi Street 2-28
Figure 2-22 Hourly volume variation on Halehaka Street 2-29
Figure 2-23 Hourly volume variation on McClelland Street 2-29
Figure 2-24 Hourly volume variation on North Road, north of Battleship Drive 2-30

Figure 2-25 Hourly volume variation on North Road, south of Pearl Harbor Boulevard....2-30
Figure 2-26 Year 2019 AM, Midday, and PM Peak Hour Vehicular Volumes at Kuntz Avenue Sites....2-32
Figure 2-27 Year 2019 AM, Midday, and PM Peak Hour Vehicular Volumes at Bloch Arena Site....2-33
Figure 2-28 Year 2019 AM, Midday, PM Peak Hour Pedestrian and Bicycle Volumes at Kuntz Avenue Site....2-34
Figure 2-29 Year 2019 AM, Midday, PM Peak Hour Pedestrian and Bicycle Volumes at Bloch Arena Site....2-35
Figure 3-1 Proposed Conceptual Site Plan of the Tradewinds-Par 3 Site....3-3
Figure 3-2 Proposed Conceptual Site Plan of the Kuntz Gate Site....3-5
Figure 3-3 Proposed Conceptual Site Plan of the Bloch Arena Site....3-7
Figure 3-4 Projected AM, midday, and PM peak hour traffic volumes along Kuntz Avenue for the Tradewinds-Par 3 site....3-12
Figure 3-5 Projected AM, midday, and PM peak hour traffic volumes along Kuntz Avenue for the Kuntz Gate site....3-13
Figure 3-6 Projected AM, midday, and PM peak hour traffic volumes for the Bloch Arena site....3-13

List of Tables

Table 3-1 Arrival and Departure of Patients During Peak Periods....3-8
Table 3-2 Arrivals and Departures of Staff during Peak Periods....3-9
Table 3-3 Trip distribution during the AM peak hour (6:00-7:00 AM)....3-10
Table 3-4 Trip distribution during the AM peak hour (7:00-8:00 AM)....3-10
Table 3-5 Trip distribution during the midday peak hour (11:00 AM-12:00 PM)....3-11
Table 3-6 Trip distribution during the midday peak hour (12:00-1:00 PM)....3-11
Table 3-7 Trip distribution during the PM peak hour (3:00-4:00 PM)....3-11
Table 3-8 Future Intersection Operations for the Tradewinds-Par 3 Alternative with No Mitigation....3-15
Table 3-9 Future Intersection Operations for the Kuntz Gate Alternative with No Mitigation....3-17
Table 3-10 Future Intersection Operations for Bloch Arena Site Alternative with No Mitigation....3-19
Table 5-1 Recommended Mitigation Actions for Each Site Alternative....5-3
Table 5-2 Future Intersection Operations for the Tradewinds-Par 3 Alternative with Mitigation Measures....5-6
Table 5-3 Future Intersection Operations for the Kuntz Gate Alternative with Mitigation Measures....5-7
Table 5-4 Future Intersection Operations for the Bloch Arena Site Alternative with Mitigation Measures....5-9

Appendices

Appendix A Turning Movement Count Worksheets
Appendix B 24-Hour Traffic Volume Worksheets
Appendix C Synchro Analysis Worksheets
Appendix D Intersection Level of Service Definitions
Appendix E Extracts from Planning Study and Traffic Study Data Request
Appendix F Trip Distribution
Appendix G Traffic Signal Warrant Analysis
Appendix H Itemization of Conceptual ROM Costs of Recommended Mitigation Improvements

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Abbreviations and Acronyms

Acronym	Definition
%	percent
ACC	Ambulatory Care Center
ADFM	Active Duty Family Member
ADSM	Active Duty Service Member
ATR	automatic traffic recorder
Ave	avenue
Blvd	boulevard
Dr	drive
EB	eastbound
IDP	Installation Development Plan
JBPHH	Joint Base Pearl Harbor-Hickam
LED	light-emitting diode
LOS	level of service
LT	left turn
mph	mile per hour
MUTCD	Manual on Uniform Traffic Control Devices
Navy	Department of the Navy, United States
NB	northbound
NEX	Navy Exchange
no.	number
Rd	road
RET	Retired Service Member
RET/OTHER	Retiree Family Member/Other
ROM	rough order of magnitude
RRFB	rectangular rapid flashing beacon
RT	right turn
SB	southbound
sec/veh	second per vehicle
St	street
TIAR	transportation impact assessment report
WB	Westbound

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1 Introduction

The United States Department of the Navy (Navy) proposes to construct and operate a new Ambulatory Care Center (ACC) at Joint Base Pearl Harbor-Hickam (JBPHH) on the island of Oahu, Hawaii. The new ACC would provide tri-service, comprehensive primary care, and dental, behavioral health, occupational, and preventive special medicine services to active duty service members and beneficiaries. It serves to replace several of the existing facilities on JBPHH and selected services at Tripler Army Medical Clinic.

The Navy has prepared an Environmental Assessment in accordance with the National Environmental Policy Act, as implemented by the Council on Environmental Quality Regulations and Navy regulations for implementing National Environmental Policy Act to evaluate the potential environmental impacts associated with the proposed construction and operation of the new facility.

This transportation impact assessment report (TIAR) was conducted in support of the Environmental Assessment for the proposed ACC. It serves to assess the potential traffic impacts around the ACC for each alternative site.

The TIAR documents the existing peak period transportation conditions, forecasted peak period vehicular traffic generated by the proposed ACC, and forecasted peak period traffic operations at intersections immediately adjacent to the proposed alternative sites. The TIAR also documents recommendations for physical and operational measures to address transportation impacts related to the proposed alternative sites.

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2 Existing Conditions

2.1 Site Description

Three alternative site locations are proposed for the JBPHH ACC. The three alternative site locations are the Bloch Arena site, the Tradewinds-Par 3 site, and the Kuntz Gate site (Figure 2-1).

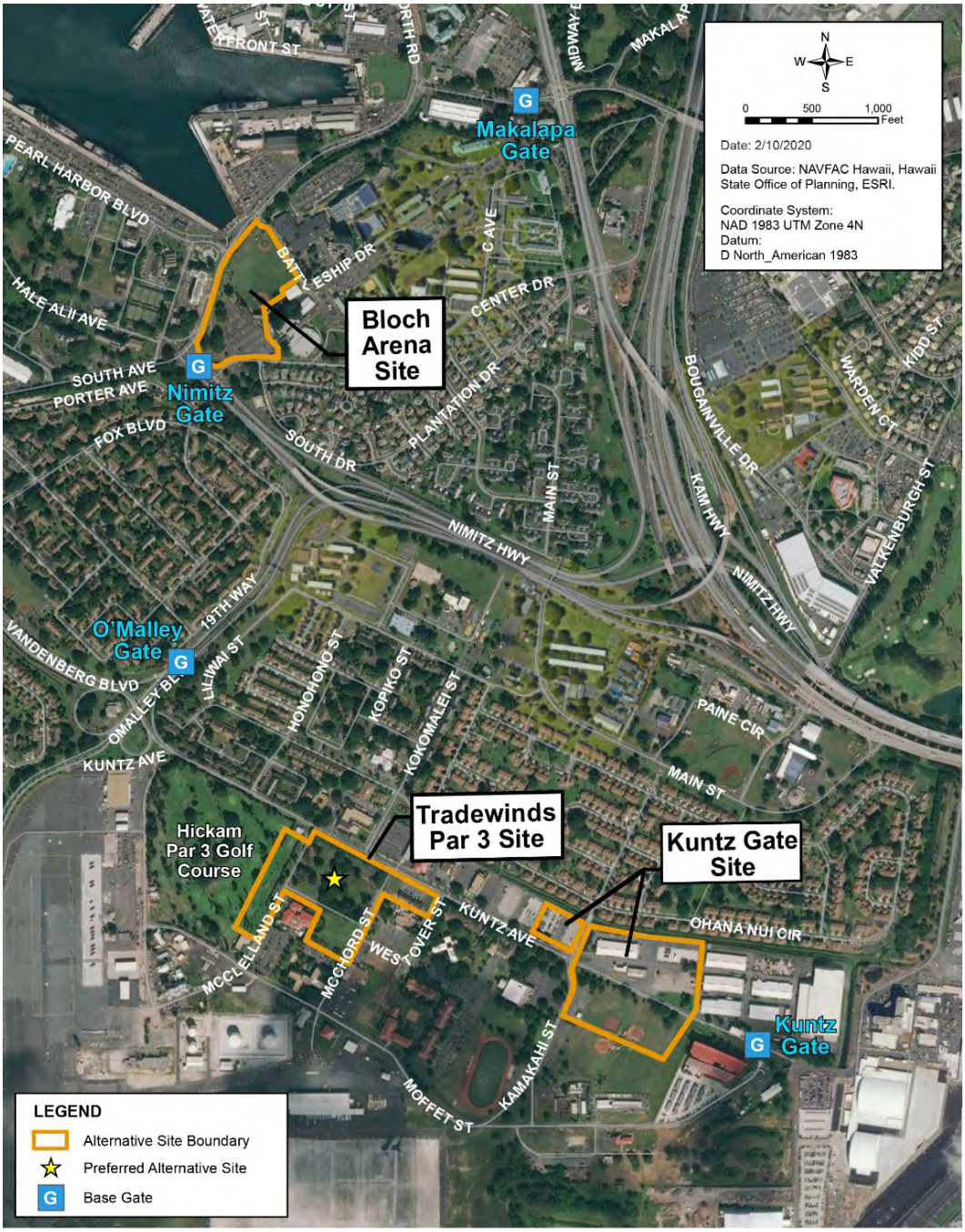

Figure 2-1 JBPHH ACC Alternative Site Locations

The Bloch Arena site (Figure 2-2) is located near the Southeast Loch of Pearl Harbor. The site encompasses the current Ward Field and adjacent surface parking lot. West of the site is the Navy Region Hawaii Administration Building (Building 150). To the northeast and east are facilities including dormitories, a laundromat and the JBPHH Fitness Center. The Bloch Arena, to the southeast, hosts events and activities. The installation boundary lies along the southern side of the site, and to the southwest, Nimitz Gate serves as the main secure entry point to the Pearl Harbor side of JBPHH.

Figure 2-2 Proposed Bloch Arena Site

The Tradewinds-Par 3 site (Figure 2-3) is located on the Hickam Air Force Base side of the installation, fronting Kuntz Avenue, and includes a parking lot, open park-like area and grass field, and the edge of the adjacent Hickam Par 3 Golf Course, which continues outside the site to the west. To the north, across Kuntz Avenue, are the Hickam Chapel and a small retail complex. To the east is the Hale Aina dining facility, sports courts, and the Hickam Makai Recreation Center. To the south are the Tradewinds clubhouse, surface parking lot, and a dormitory.

Figure 2-3 Proposed Tradewinds-Par 3 Site

The Kuntz Gate site (Figure 2-4) is also located along Kuntz Avenue on Hickam Air Force Base. The site includes a warehouse, several concrete pads used for parking, the Hickam Car Wash and Flight Crew Motorcycle Repair, and two of the four ballfields south of Kuntz Avenue. Outside the site to the west is a parking area planned as the future location of the Veterinary Treatment Facility, and the Hickam Bowling Center to the southwest. To the east are several warehouse buildings, and to the southeast is the Senator Daniel K. Inouye Defense POW/MIA Accounting Agency Center of Excellence building. North of the site across a drainage ditch is a residential area. To the south are the other two ballfields.

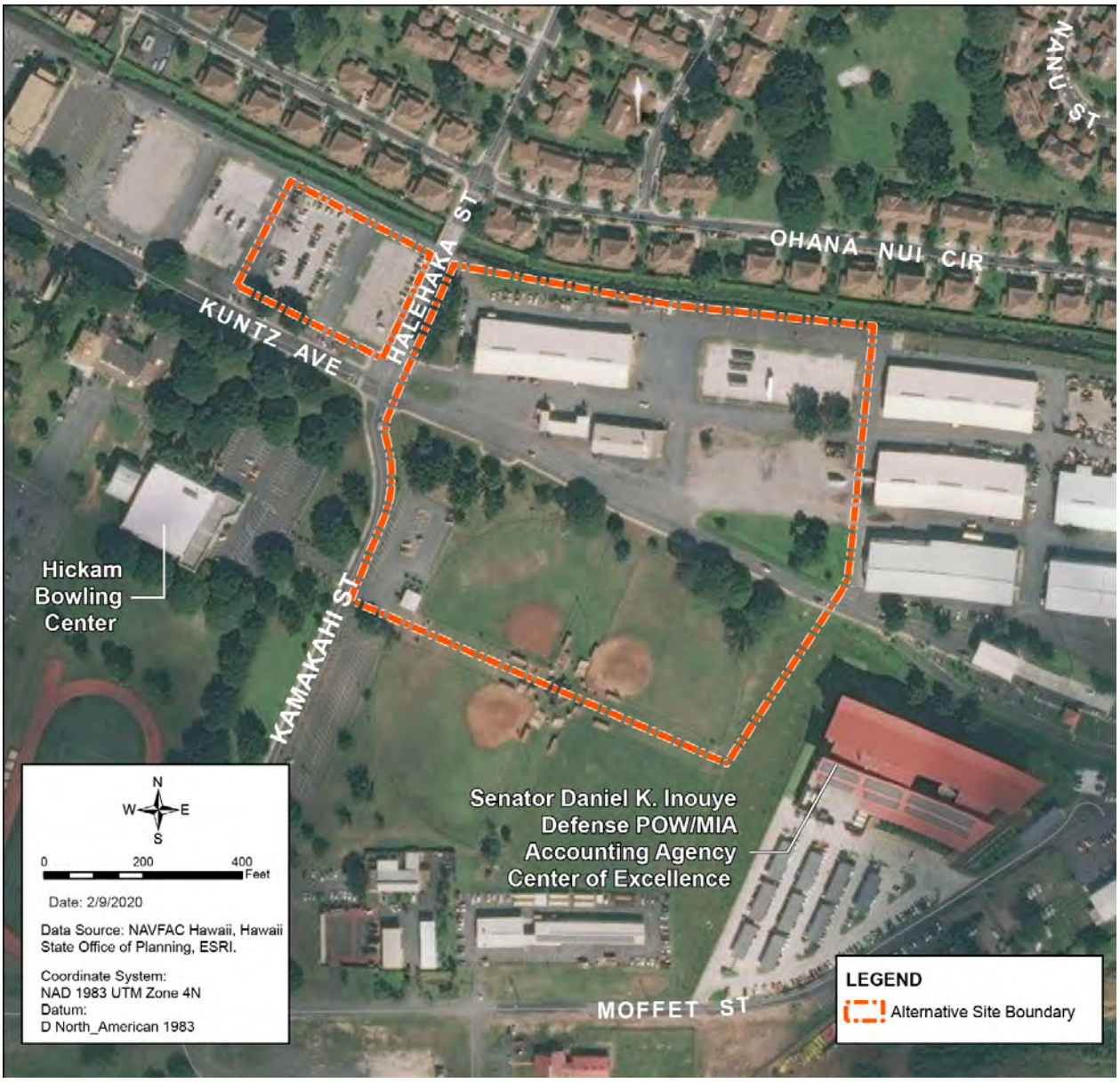

Figure 2-4 Proposed Kuntz Gate Site

2.2 Roadway Conditions

There are eight (8) points of access to JBPHH. The access points closest to the three sites are the Nimitz Gate, the Makalapa Gate, the O'Malley Gate, and the Kuntz Gate. The Nimitz Gate is the main gate into Pearl Harbor and is accessed from Nimitz Highway. The Makalapa Gate is accessed via Radford Drive. The O'Malley Gate is the main gate into Hickam Air Force Base and is accessed via O'Malley Boulevard. The Kuntz Gate is accessed via Elliot Street. Figure 2-5 below highlights the locations of each of these four gates.

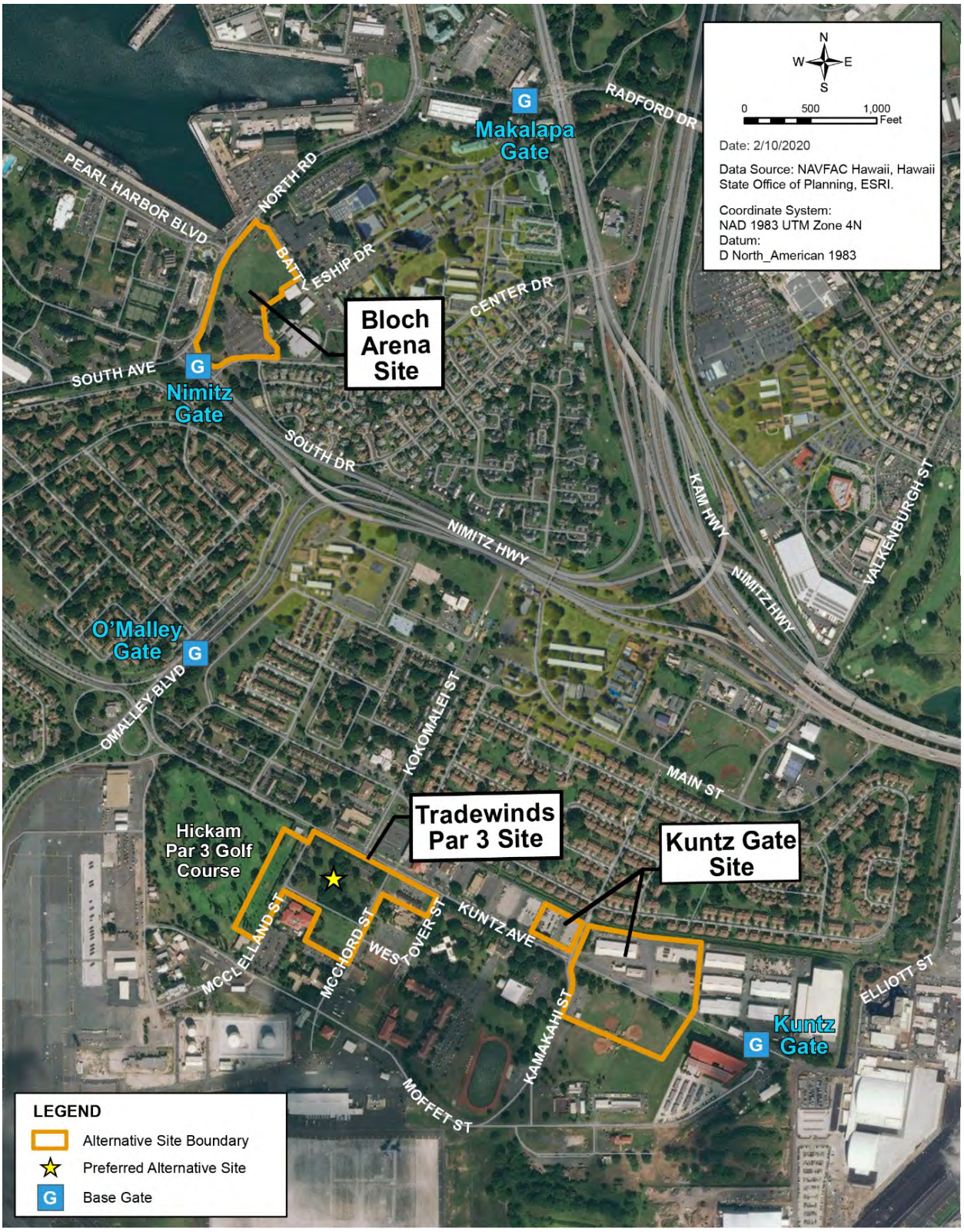

Figure 2-5 Proposed Site Locations and Gate Locations

Roadways in the immediate vicinity of the Bloch Arena site include North Road, a driveway that serves the surface parking lot, Battleship Drive, Center Drive, and Nimitz Highway. North Road borders the west and north sides of the site, and Battleship Drive accesses the dormitories, service facilities, and parking on its east side. To the south of the site, outside Nimitz Gate and the installation boundary, are Center Drive and Nimitz Highway.

At the Tradewinds-Par 3 site, roadways in the immediate vicinity are Kuntz Avenue, McClelland Street, McChord Street, Mountain Home Street, and Kokomalei Street. Kuntz Avenue runs along the north side of the site and is the major roadway in the area. Both McClelland Street on the west and McChord Street on the east are partially within, and partially along the boundary of the site. Kokomalei Street intersects Kuntz Avenue directly across Kuntz from the site, about halfway between McClelland Street and McChord Street intersections with Kuntz Avenue. Mountain Home Street connects McClelland and McChord through the southern portion of the site.

The roadways in the immediate vicinity of the Kuntz Gate site include Kuntz Avenue, 20th Street, and Halehaka Street/Kamakahi Street. Halehaka Street bisects the western third of the site and transitions into Kamakahi Street south of Kuntz Avenue. West of Halehaka Street, the site is bounded by 20th Street on its north side and Kuntz Avenue on the south side. East of Halehaka Street, Kuntz Avenue bisects the site, with the ballfields and their access drive to the south. This portion of the site is bounded by Kamakahi Street on its west side.

All roadways described in this section are under the jurisdiction of JBPHH, unless otherwise noted.

2.2.1 Roadway Descriptions

2.2.1.1 Bloch Arena Site

North Road is a minor arterial roadway oriented north-south, connecting Nimitz Gate to Makalapa Gate to the north. South of the Nimitz Gate, North Road splits and transitions into Hale Alii Avenue and South Avenue. Near the proposed site, the roadway is a four-lane, undivided highway (two lanes in each direction) with curbs and paved shoulders on both sides of the road. Detached sidewalks are located on both sides of the road between the Nimitz Gate and Pearl Harbor Boulevard. North of Pearl Harbor Boulevard, the west side of the road has an attached sidewalk. On the east side of the road, the detached sidewalk continues to Battleship Drive, where it then transitions into an attached sidewalk. Figure 2-6 shows North Road between Nimitz Gate and its intersection with Pearl Harbor Boulevard. The posted speed limit in the vicinity is 25 miles per hour (mph).

Figure 2-6 View of North Road, looking south toward Building 150 at Ward Field

Battleship Drive runs southward from North Avenue along the east side of the site, turning east towards the dormitory areas. It is a two-lane, undivided roadway with one lane in each direction. Both sides of the road have curbs and attached sidewalks. On the south side of the road, the curb and attached sidewalk begin after the intersection with the Bloch Arena driveway and Battleship Drive. The posted speed limit is 15 mph.

Between the proposed site and North Road is an unnamed access drive into the existing Bloch Arena surface parking lot north of the Nimitz Gate. The access to this roadway is from Battleship Drive, south of the North Road/Battleship Drive intersection. It is a two-lane, undivided roadway with one lane in each direction and a curb on both sides of the road. The east of the road has an attached sidewalk. Parking stalls are located west of the roadway closer to the Nimitz Gate. The posted speed limit is 15 mph.

North Nimitz Highway (State Route 92) is a principal arterial that runs east-west, terminating at Nimitz Gate. Approaching Nimitz Gate, the six-lane, divided roadway has a concrete central barrier separating the directions and paved shoulders; at the gate, it expands to an eight-lane, undivided roadway with four lanes in each direction. No sidewalks are along the roadway in the vicinity of the proposed site. When approaching inbound to JBPHH at the Nimitz Gate, the posted speed limit reduces incrementally

from 35 mph to 5 mph. North Nimitz Highway is under the jurisdiction of the State of Hawaii Department of Transportation.

Center Drive is an east-west road connecting North Nimitz Highway just before the gate with Radford Drive to the east. It is a two-lane, undivided roadway with one lane in each direction. Near the Bloch Arena site, both sides of the road have curb and gutters, as well as attached sidewalks along most of its length. On the east side of the road, the sidewalk begins after the access into the JBPHH Pass and ID office parking lot. The posted speed limit is 20 mph. Although this roadway is under JBPHH jurisdiction and is adjacent to the Bloch Arena site, it is outside of the JBPHH boundary fence and does not provide any direct access into JBPHH.

2.2.1.2 Tradewinds-Par 3 and Kuntz Gate Sites

Kuntz Avenue is a key collector roadway on the Hickam side of JBPHH. Oriented east-west, this road transitions from Vandenberg Boulevard to Kuntz Avenue at O'Malley Boulevard. Outside of the base at the Kuntz Gate, Kuntz Avenue then transitions to Elliot Street intersecting Nimitz Highway. Kuntz Avenue is a two-lane roadway with one lane in each direction that provides access to commercial and residential areas. Along Kuntz Avenue, most of the intersections are "T"-intersections that include a left-turn lane. It is a mostly undivided roadway, but some intersections include a segment of painted median to indicate that vehicles cannot drive through while in the left-turn lanes. The road edges of Kuntz Avenue have curb and gutters along both sides of the road. East of Halehaka Street is a wide driveway area on the north side. Figure 2-7 shows the view of Kuntz Avenue looking east from its intersection with McClelland Street.

Figure 2-7 View of Kuntz Avenue looking east from its intersection with McClelland Street

There are both detached and attached sidewalks along Kuntz Avenue. The posted speed limit along Kuntz Avenue is 25 mph.

McClelland Street is a north-south road connecting Kuntz Avenue and Moffet Street. McClelland Street currently forms the eastern boundary of the Hickam Par 3 Golf Course. Along the side of the north end of the road is a set of ten 90-degree parking stalls. The proposed Tradewinds-Par 3 ACC alternative site lies mostly to the east of the road, but also includes a portion of the golf course to the west. South of McClelland Street's intersection with Mountain Home Street, the Tradewinds Club stands on the east side of the road and the golf course clubhouse on the west side of the road. McClelland Street is a two-lane, undivided roadway with one lane in each direction. Both sides of the road have curbs. The west side of the road has no sidewalk, while the east side of the road has a detached sidewalk that begins at Kuntz Avenue and transitions to an attached sidewalk south of the Tradewinds Club. Figure 2-8 shows the view looking north along McClelland Street.

Figure 2-8 View of McClelland Street looking north along the Par 3 golf course (at left)

Kokomalei Street is a north-south-oriented street. It provides access between Kuntz Avenue and the residential areas to the north, as well as the Hickam Chapel and nearby retail complex. It is mostly a two-lane, undivided roadway with one lane in each direction. Near the intersection with Kuntz Avenue, the southbound Kokomalei Street approach is channelized into two lanes for right-turn and left-turn movements. Eight on-street parallel parking stalls are located on the west side of the road between Kuntz Avenue and 20th Street. In this segment of Kokomalei Street, there is an attached sidewalk on the west side of the road and a detached sidewalk on the east side. Both sides of the road have curbs. Figure 2-9 shows a view of Kokomalei Street looking north from the site, across Kuntz Avenue. The posted speed limit is 15 mph.

Figure 2-9 View of Kokomalei Street looking north across Kuntz Avenue from the site

McChord Street is a north-south road similar to McClelland Street, connecting Kuntz Avenue with Moffet Street to the south. It is a two-lane, undivided roadway with one lane in each direction. A detached sidewalk is located on the west side of the street. Most of its east side is occupied by 90-degree parking stalls. The only sidewalk on the east side of McChord is a short segment of attached sidewalk adjacent to the Hale Aina dining facility. Both sides of the road have curbs where appropriate. Figure 2-10 shows a view of McChord Street looking in the south direction.

Figure 2-10 View of McChord Street looking south from the Kuntz Avenue intersection

Mountain Home Street runs parallel to and south of Kuntz Avenue in the east-west direction through the site. It provides a connection between McClelland Street and McChord Street. It is a two-lane, undivided roadway with one lane in each direction. An attached sidewalk on the south side of the road begins approximately at the Tradewinds clubhouse. Both sides of the road have curbs.

Halehaka Street/Kamakahi Street is a north-south roadway. Halehaka Street transitions to Kamakahi Street south of Kuntz Avenue. It is a two-lane, undivided roadway with one lane in each direction. The west side of the road has an attached sidewalk and both sides of the road have curbs. Figure 2-11 shows a view of Halehaka Street looking south. The posted speed limit is 15 mph.

Figure 2-11 View of Halehaka Street looking south towards Kuntz Avenue

20th Street runs parallel to and north of Kuntz Avenue between Halehaka Street and Kokomalei Street. Its cross-section and function are similar to a driveway, and it provides access to parking lots for the various commercial facilities along Kuntz Avenue between Kokomalei Street and Halehaka Street. It is a two-lane, undivided roadway with one lane in each direction. However, vehicles are often parallel-parked alongside the road, which narrows the driving lane. There is an intermittent curb along its south side.

2.2.2 Intersection Conditions

The following intersections are directly adjacent or around the proposed sites:

- Kuntz Avenue and McClelland Street
- Kuntz Avenue and Kokomalei Street
- Kuntz Avenue and McChord Street
- Kuntz Avenue and Halehaka Street/Kamakahi Street
- McClelland Street and Mountain Home Street
- McChord Street and Mountain Home Street
- North Road and Battleship Drive
- North Road and Pearl Harbor Boulevard

2.2.2.1 Tradewinds-Par 3 and Kuntz Gate Sites

The Kuntz Avenue and McClelland Street intersection is an unsignalized "T"-intersection with a STOP-sign control on the McClelland Street approach. On Kuntz Avenue, the eastbound approach has a shared through/right-turn lane and a painted median. The westbound approach has a through lane and a median left-turn lane. The McClelland Street approach has a shared left-turn/right-turn lane. A crosswalk is located across the McClelland Street approach. Figure 2-12 shows a view of this intersection looking northeast.

Figure 2-12 View of the Kuntz Avenue and McClelland Street intersection, looking northeast

The Kuntz Avenue and Kokomalei Street intersection is an unsignalized "T"-intersection with STOP-sign control on the Kokomalei Street approach. On Kuntz Avenue, the eastbound approach has a through lane and a left-turn lane, and the westbound approach has a shared through/right-turn lane and a painted median. Kokomalei Street has exclusive right-turn and exclusive left-turn lanes. A crosswalk is located across the Kokomalei Street approach.

The Kuntz Avenue and McChord Street intersection is an unsignalized "T"-intersection with STOP-sign control on the McChord Street approach. On Kuntz Avenue, the eastbound approach has a shared through/right-turn lane and a painted median, and the westbound approach has a through lane and a left-turn lane. McChord Street has a shared right-turn/left-turn lane configuration. Crosswalks are located across the Kuntz Avenue westbound and the McChord Street approaches. Figure 2-13 shows the Kuntz Avenue and McChord Street intersection.

Figure 2-13 View of the Kuntz Avenue and McChord Street intersection, looking southwest

McClelland Street and Mountain Home Street meet at an unsignalized "T"-intersection with STOP-sign control on the Mountain Home Street approach. The McClelland Street northbound approach has a shared through/right-turn lane while its southbound approach has a shared through/left-turn lane. The Mountain Home Street approach has a shared right-turn/left-turn lane.

Mountain Home Street intersects McChord Street at an unsignalized "T"-intersection with STOP-sign control on the Mountain Home Street approach. The McChord Street northbound approach has a shared through/left-turn lane while its southbound approach has a shared through/right-turn lane. The Mountain Home Street approach has a shared right-turn/left-turn lane.

The Kuntz Avenue and Halehaka Street/Kamakahi Street intersection is an unsignalized, four-legged intersection with STOP-sign control on the Halehaka Street/Kamakahi Street approaches. On Kuntz Avenue, the eastbound approach has a shared through/right-turn lane and a left-turn lane and the westbound approach has a shared through/right-turn/left-turn lane. The eastbound approach lanes have pavement markings that indicate exclusive left-turn and exclusive through lanes on that approach, which is inconsistent with the actual operations where the right lane functions as a shared through/right-turn lane. The Halehaka Street approach has a shared through/right-turn/left-turn lane. Because of the wide width of this approach, it was observed that the Halehaka Street approach operates as a shared through/left-turn lane and an exclusive right-turn lane. The Kamakahi Street approach has a shared through/right-turn/left-turn lane. However, there is also an inconsistency with the pavement

markings that indicate that the lane is to be used as a shared through/right-turn lane. Crosswalks are located across the Kuntz Avenue eastbound approach and the Kamakahi Street approach. Figure 2-14 shows a view of this intersection looking in the northeast direction.

Figure 2-14 View of the Kuntz Avenue and Halehaka Street/Kamakahi Street Intersection in the Northeast Direction

A closely spaced driveway intersection is located on Halehaka Street immediately north of its intersection with Kuntz Avenue. One driveway provides egress from a parking lot to the west of Halehaka Street and the opposite driveway provides access to the Hickam Car Wash and Flight Crew Motorcycle Repair shops to the east. These driveways have STOP-sign control. On Halehaka Street, the northbound approach has a shared through/right-turn lane and the southbound approach has a shared through/left-turn lane. Both driveways are single-lane approaches. A crosswalk is located across the parking lot exit and another crosswalk across the Halehaka Street southbound approach.

The Halehaka Street and 20th Street intersection is an unsignalized, four-legged intersection with STOP-sign control on both approaches of 20th Street to Halehaka Street. On Halehaka Street, both approaches have a shared through/right-turn/left-turn lane. The 20th Street approaches are one lane serving shared through/right-turn/left-turn lane movements.

2.2.2.2 Bloch Arena Site

The North Road and Battleship Drive intersection is an unsignalized "T"-intersection with STOP-sign control on the Battleship Drive approach. On the North Road northbound approach are two lanes: one through lane and a shared through/right-turn lane. On the North Road southbound approach is one through lane and a shared through/left-turn lane. On the Battleship Drive approach is one shared right-turn/left-turn lane. Crosswalks are located across the North Road northbound and the Battleship Drive approaches.

The North Road and Pearl Harbor Boulevard intersection is a signalized "T"-intersection. On North Road's northbound approach, the lane configuration includes one shared through/left-turn lane and one through lane. On North Road's southbound approach, the lane configuration includes one through lane and one channelized exclusive right-turn lane that operates as a free-right into its own lane on Pearl Harbor Boulevard. This channelized right-turn lane has a pedestrian traffic signal activated via a pedestrian call button. On the Pearl Harbor Boulevard approach, the lane configuration includes two left-turn lanes and a channelized right-turn lane. This channelized right-turn lane is similar to the channelized right-turn on the southbound North Road approach. It operates as a free-right into its own lane on North Road except when the channelized right-turn lane pedestrian traffic signal is activated. Crosswalks are located across the North Road northbound and the Pearl Harbor Boulevard approaches. Crosswalks also connect the sidewalks to "pork chop" islands for the channelized right-turn lanes.

2.3 Pedestrian and Bicycle Conditions

2.3.1 Pedestrian Facilities

2.3.1.1 Tradewinds-Par 3 and Kuntz Gate Sites

Sidewalks

Kuntz Avenue has a combination of detached and attached sidewalks. In the immediate vicinity of the Tradewinds-Par 3 site, the sidewalks are detached. McClelland Street has no sidewalk on its west side, while the east side of the road has a detached sidewalk that begins at Kuntz Avenue and transitions to an attached sidewalk south of the Tradewinds Club.

Kokomalei Street between Kuntz Avenue and 20th Street has an attached sidewalk on the west side of the road and a detached sidewalk on the east side.

McChord Street has a detached sidewalk on the west side of the street. Except for a short, attached sidewalk adjacent to the Hale Aina dining facility, there are no sidewalks on the east side of McChord Street. No sidewalks are located along Mountain Home Street or 20th Street.

Halehaka Street and Kamakahi Street have attached sidewalks on the west side of the road.

Crosswalks

Crosswalks are located across McClelland Street, Kokomalei Street, and McChord Street at their respective intersections with Kuntz Avenue.

There is a mid-block crosswalk on Kuntz Avenue approximately 140 feet east of McClelland Street. There is a pedestrian warning sign (R1-6a) located in the center of Kuntz Avenue to increase driver awareness of the crossing.

A crosswalk is located on Kuntz Avenue at the unsignalized McChord Street intersection, with a pedestrian warning sign (R-16a) in the center of Kuntz Avenue.

A crosswalk on Kuntz Avenue at its unsignalized intersection with Westover Street also has a pedestrian warning sign (R-16a) in the center of Kuntz Avenue.

A mid-block crosswalk on Kuntz Avenue is located to the east of the driveway to the Arts and Crafts center, with a pedestrian warning sign (R1-6) in the center of Kuntz Avenue.

A crosswalk on Kuntz Avenue is located on the eastbound approach to the unsignalized intersection with Halehaka/Kamakahi, with pedestrian crossing signs (W11-2) and pedestrian-activated RRFBs intended to increase driver awareness.

A crosswalk is provided across the northbound approach to the Kuntz Avenue and Halehaka/Kamakahi intersection.

The closely spaced driveway intersection located north of Kuntz Avenue on Halehaka Street has crosswalks on the southbound and the eastbound approaches.

2.3.1.2 Bloch Arena Site

Sidewalks

Detached sidewalks are located on both sides of North Road between Nimitz Gate and Pearl Harbor Boulevard. North of Pearl Harbor Boulevard, the west side of the road, has an attached sidewalk. On the east side, the detached sidewalk continues to Battleship Drive, where it transitions into an attached sidewalk. In this area, there is also a detached sidewalk on the west side of the road.

Attached sidewalks are located along both sides of Pearl Harbor Boulevard, Battleship Drive, and Center Drive. The attached sidewalk on Center Drive begins north of the JBPHH Pass and ID office parking lot.

The driveway into the Bloch Arena parking lot has an attached sidewalk on the east side of the roadway.

No sidewalks are located along North Nimitz Highway as it approaches the Nimitz Gate.

Crosswalks

There is a crosswalk immediately north of the Nimitz Gate as it approaches the North Road intersection. The crosswalk is enhanced with pedestrian crossing signs (W11-2) and has pedestrian-activated rectangular rapid flashing beacons (RRFBs) intended to increase driver awareness.

There is a mid-block crosswalk on North Road between Nimitz Gate and Pearl Harbor Boulevard in the vicinity of the Administration Building (Building 150). This crosswalk is identified by pedestrian crossing signs (W11-2) with flashing LED lights to increase driver awareness.

At the signalized North Road and Pearl Harbor Boulevard intersection, there are crosswalks across the northbound North Road and Pearl Harbor Boulevard approaches and crosswalks that cross the right-turn lanes. There are pedestrian-activated traffic signals that stop traffic in the right-turn lanes to allow pedestrians to cross to the pork-chop channelization islands at the intersection.

At the unsignalized North Road and Battleship Drive intersection, there are crosswalks across the northbound North Road and Battleship Drive approaches. The crosswalk across North Road is identified by pedestrian crossing signs (W11-2) and has pedestrian-activated RRFBs intended to increase driver awareness of pedestrians crossing North Road at this location. There are also pedestrian crossing signs

(W11-2) with flashing LED lights around the perimeter of the signs before and after the crosswalk facing traffic in the northbound direction.

2.3.2 Bicycle Facilities

2.3.2.1 Tradewinds-Par 3 and Kuntz Gate Sites

No exclusive bicycle facilities are located in the vicinity of the Kuntz Avenue sites. Bicyclists were observed to ride on Kuntz Avenue. Bicycle volumes are discussed in Section 2.5.

2.3.2.2 Bloch Arena Site

No exclusive bicycle facilities are located in the vicinity of the Bloch Arena site. During traffic data collection, bicyclists were observed to ride in traffic or on the sidewalk. Bicycle volumes are discussed in Section 2.5.

2.4 Public Transit Conditions

On JBPHH, public transit options include municipal bus service (TheBus) and Navy Exchange (NEX) shuttles.

2.4.1 TheBus

2.4.1.1 Tradewinds-Par 3 and Kuntz Gate Sites

The municipal bus route serving the Tradewinds-Par 3 and Kuntz Gate sites is Route 19 (Waikiki – Airport – Hickam), which provides transit service to and from Waikiki, through Downtown Honolulu and the Daniel K. Inouye International Airport, and to the Hickam portion of JBPHH. It serves JBPHH daily from 6:00 AM to 1:00 AM (span of 19 hours), entering through Kuntz Gate, traveling along Kuntz Avenue, and continuing to the MAC Terminal. From approximately 9:00 PM to 1:00 AM, this route enters through the O'Malley Gate, only serves the western side of Hickam, and does not travel along Kuntz Avenue.

Several bus stops are located in the vicinity of the Tradewinds-Par 3 and Kuntz Gate sites. Near the Tradewinds-Par 3 site is a stop on the west side of McClelland Street (Stop No. 924). A stop west of McChord Street (Stop No. 923) is on the north side of Kuntz Avenue and a stop east of McChord Street (Stop No. 965) is on the south side of Kuntz Avenue. Also, along Kuntz Avenue near the Halehaka Street/Kamakahi Street intersection are two stops, one the north side (Stop No. 921) and one on the south side (Stop No. 967). In between the two alternative sites are two additional stops on Kuntz Avenue, one on the north side near the Hickam Memorial Theater (Stop No. 922) and one on the south side at the Hickam Arts & Crafts Center (Stop No. 966). Figure 2-15 illustrates TheBus Route 19.

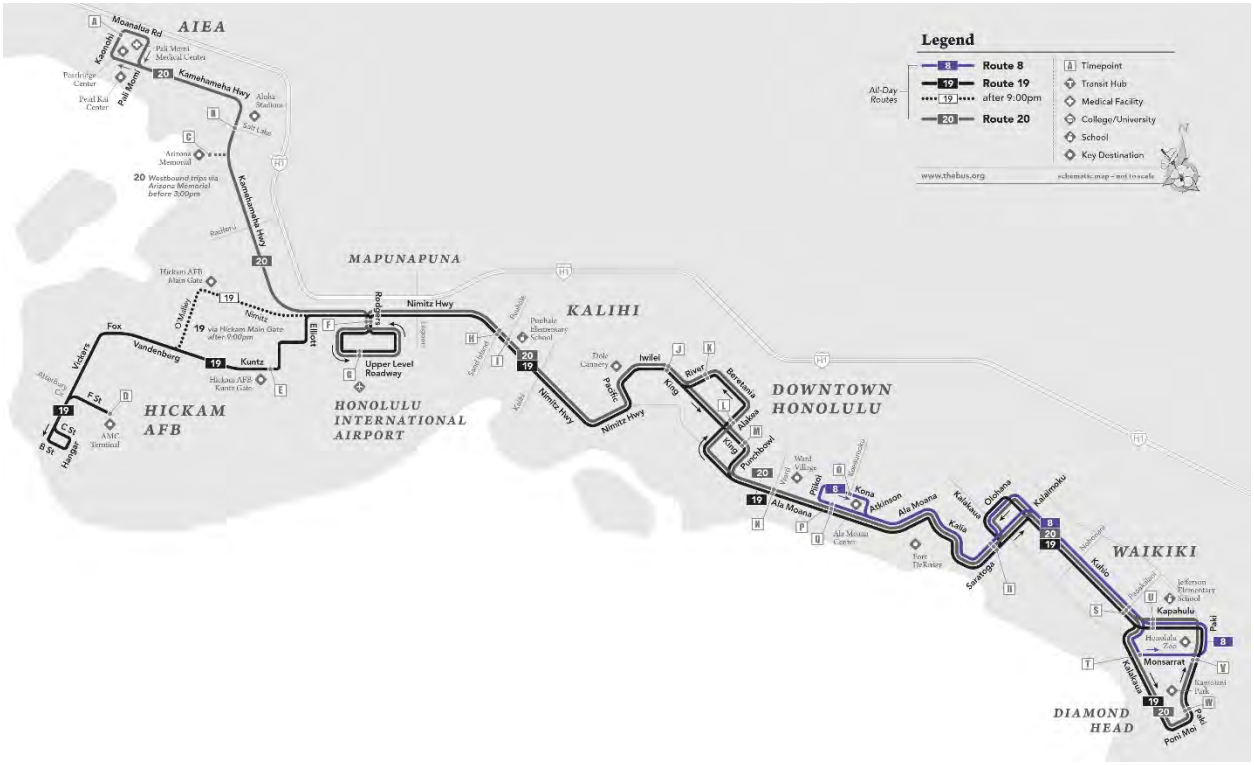

Figure 2-15 TheBus Route 19

2.4.1.2 Bloch Arena Site

The municipal bus routes that serve the Bloch Arena site vicinity are Routes 9, PH1, PH2, PH3, PH4, PH6, and PH7.

Route 9 (Kaimuki – Pearl Harbor) provides local service between Kaimuki and JBPHH Nimitz Gate. Several variants of this route provide service to different areas of JBPHH. This route travels through Ala Moana, downtown Honolulu, Kalihi, and Mapunapuna as it travels between Kaimuki and JBPHH. Route 9 variants that enter JBPHH do so at the Nimitz Gate and operate primarily during the morning and afternoon commuter periods. These commuter periods run from approximately 6:00 AM to 9:00 AM and from 3:30 PM to 7:30 PM (span of 7 hours: 3 hours during the morning commuter peak and 4 hours during the afternoon commuter peak). Figure 2-16 illustrates TheBus Route 9.

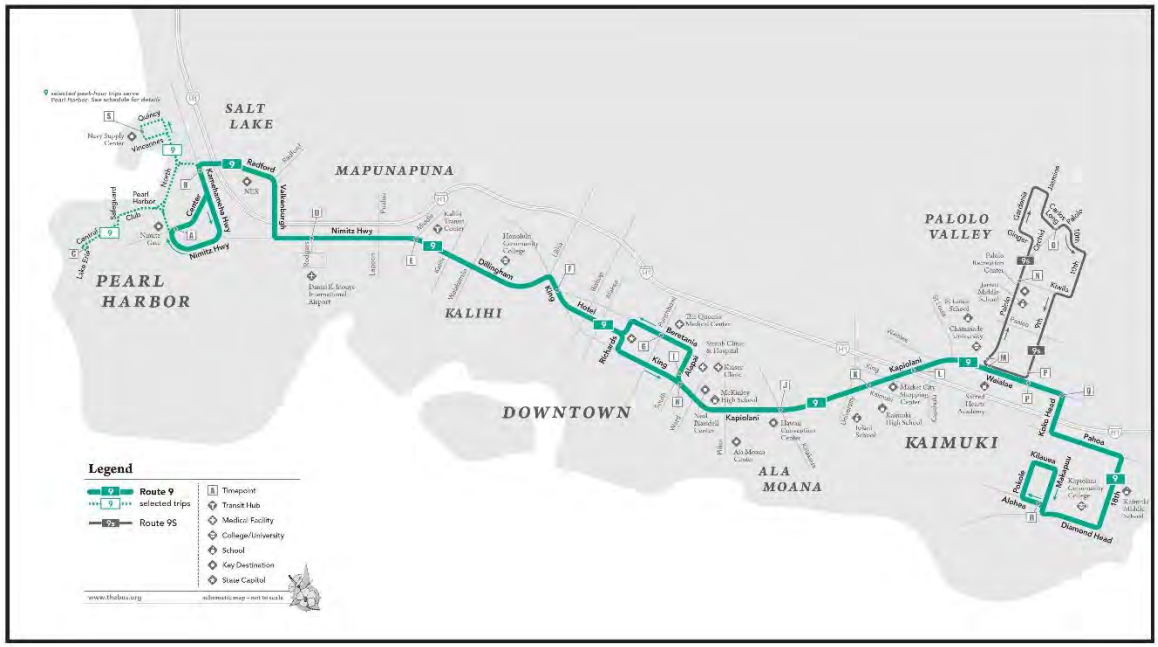

Figure 2-16 TheBus Route 9

Several express routes service JBPHH. These routes travel between Pearl Harbor and various areas of Oahu during the morning and afternoon commuter peak hours. All express routes enter JBPHH at the Arizona Gate and exit at the O'Malley Gate, and run along the same route through JBPHH. The express routes that serve JBPHH are as follows:

- **Route PH1 (Waianae Coast to Pearl Harbor Express):** Provides service from the Waianae Coast area. It runs from approximately 4:30 AM to 6:00 AM and from 3:00 PM to 5:00 PM (span of 3.5 hours: 1.5 hour during the morning commuter peak and 2 hours during the afternoon commuter peak).
- **Route PH2 (Mililani Town – Pearl Harbor Express):** Provides service from the Mililani area. It runs from approximately 5:00 AM to 6:30 AM and from 3:00 PM to 4:30 PM (span of 3 hours: 1.5 hours during the morning commuter peak and 1.5 hours during the afternoon commuter peak).
- **Route PH3 (Wahiawa Heights – Pearl Harbor Express):** Provides service from the Wahiawa area. It runs from approximately 5:15 AM to 6:15 AM and from 3:15 PM to 4:15 PM (span of 2 hours: 1 hour in the morning commuter peak and 1 hour in the afternoon commuter peak).
- **Route PH4 (Kailua – Kahaluu – Pearl Harbor Express):** Provides service from the windward areas of Oahu such as Kahaluu, Ahuimanu, Kaneohe, and Kailua. It runs from approximately 4:30 AM to 6:00 AM and 3:00 PM to 5:00 PM (span of 3.5 hours: 1.5 hours in the morning commuter peak and 2 hours in the afternoon commuter peak).

- **Route PH6 (Hawaii Kai Pearl Harbor Express):** Provides service from the Hawaii Kai area. It runs from approximately 5:00 AM to 6:00 AM and from 3:15 PM to 4:45 PM (span of 2.5 hours: 1 hour in the morning commuter peak and 1.5 hours in the afternoon commuter peak).
- **Route PH7 (Ewa Beach – Pearl Harbor Express):** Provides service to JBPHH from the Ewa areas. It runs from approximately 5:00 AM to 6:00 AM and 3:15 PM to 4:15 PM (span of 2 hours: 1 hour in the morning commuter peak and 1 hour in the afternoon commuter peak).

The municipal bus stop closest to the Bloch Arena site is north and west of the North Road and Battleship Drive intersection (Stop Number [No.] 4277). Additional bus stops are along Pearl Harbor Boulevard. In the eastbound direction is a bus stop at a McDonald's restaurant (Stop No. 3377); in the westbound direction, a bus stop is located on the opposite side of the street (Stop No. 3360). Route 9 is the only municipal bus route that serves all three of these stops. Further west, after Pearl Harbor Boulevard transitions to Safeguard Street, is the bus stop that all routes on JBPHH serve (Stop No. 3362). Figure 2-17 illustrates selected express routes (all express routes have the same route through JBPHH).

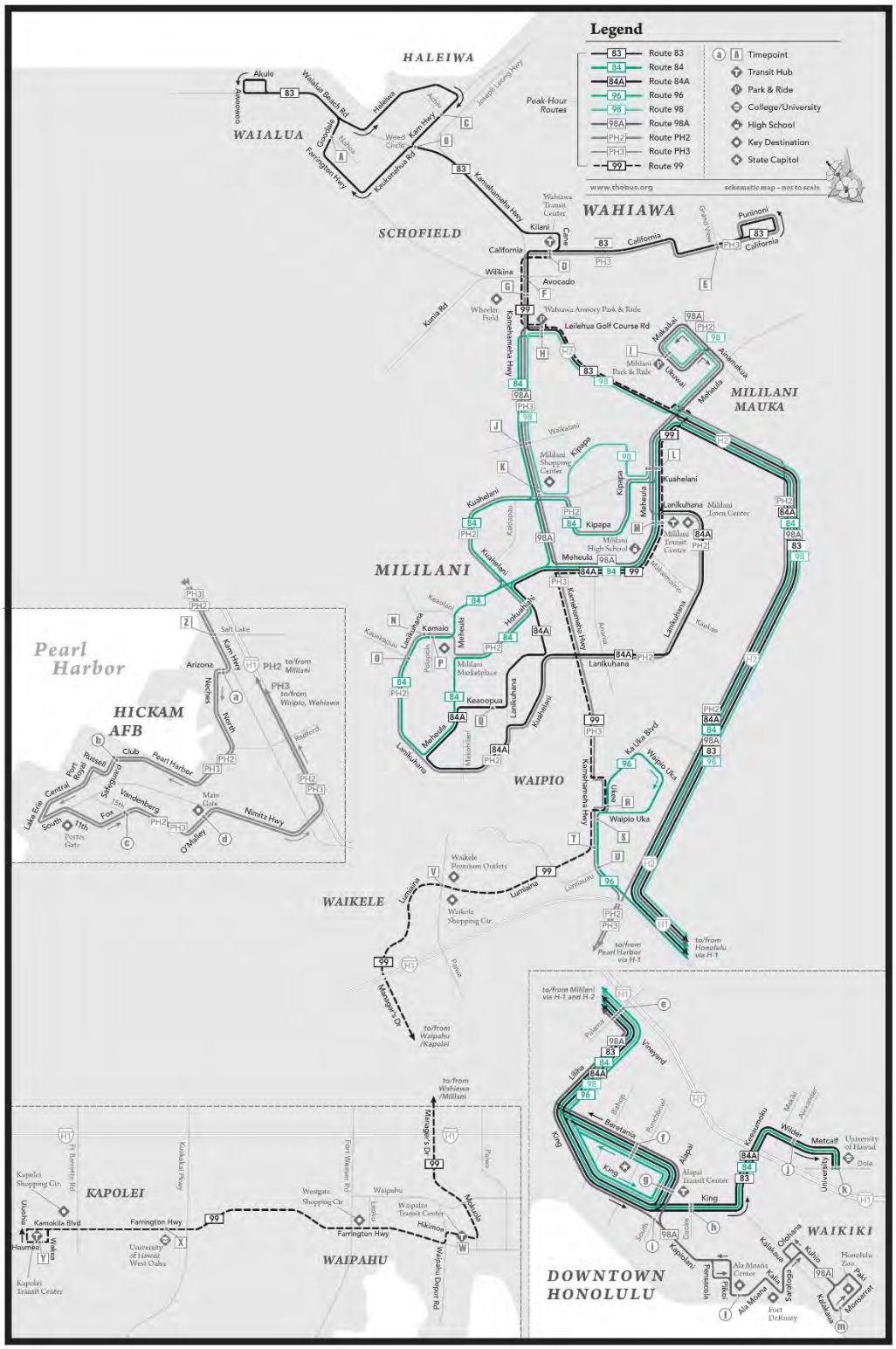

Figure 2-17 TheBus express routes serving JBPHH

2.4.2 Navy Exchange Shuttles

The NEX shuttle provides service between JBPHH and The Mall at Pearl Harbor (NEX) on Radford Drive. According to the 2018 NEX Shuttle route (Figure 2-18), it begins its route at NEX, enters JBPHH through Kuntz Gate, circulates through JBPHH, and exits via Makalapa Gate. Its route takes approximately an hour to complete. It operates from 10:00 AM to 9:00 PM. Figure 2-18 illustrates the route and approximate schedule of the NEX shuttles.

2.4.2.1 Bloch Arena Site

In the vicinity of the Bloch Arena site, the NEX shuttle travels along Pearl Harbor Boulevard, turning left onto North Road. A NEX shuttle stop is located north of the intersection of North Road and Battleship Drive. This stop is also used by TheBus (Stop No. 4277).

2.4.2.2 Tradewinds-Par 3 and Kuntz Gate Sites

In the vicinity of the two proposed sites along Kuntz Avenue, the NEX shuttle travels west along Kuntz Avenue, turns left onto McChord Street, right onto Moffet Street, right onto McClelland Street, and then left back onto Kuntz Avenue.

Figure 2-18 NEX Shuttle Route and Schedule

2.5 Transportation Conditions

Twenty-four-hour traffic volume counts and peak period intersection traffic turning movement counts were conducted for this TIAR. Data collection occurred between November 18 and 21, 2019. This week was selected because it was representative of typical traffic conditions not affected by holidays or special events.

2.5.1 Existing 24-Hour Traffic Volumes

The 24-hour traffic volume counts were conducted using automatic traffic recorders (ATRs) installed along roadways in the vicinity of the sites. The ATRs counted for a period slightly longer than 24 hours at each location before being moved to a new location. The ATRs were installed on Monday, November 18, 2019, and were removed from the last location on Thursday, November 21, 2019. The 24-hour traffic volume counts were conducted at the following six roadways:

- Kuntz Avenue, west of McClelland Street (November 19 to 20, 2019)
- Kuntz Avenue, east of Halehaka Street/Kamakahi Street (November 18 to 19, 2019)
- Halehaka Street (November 18 to 19, 2019)
- McClelland Street (November 19 to 20, 2019)
- North Road, north of Battleship Drive (November 20 to 21, 2019)
- North Road, south of Pearl Harbor Boulevard (November 20 to 21, 2019)

The 24-hour traffic volume summary worksheets are included in Appendix B.

Figure 2-19 illustrates the total 24-hour vehicular traffic volume at each location. Figure 2-20 to Figure 2-25 display the hourly variation of traffic volumes over a 24-hour period at each ATR count location by direction of travel.

Figure 2-19 24-hour traffic volumes

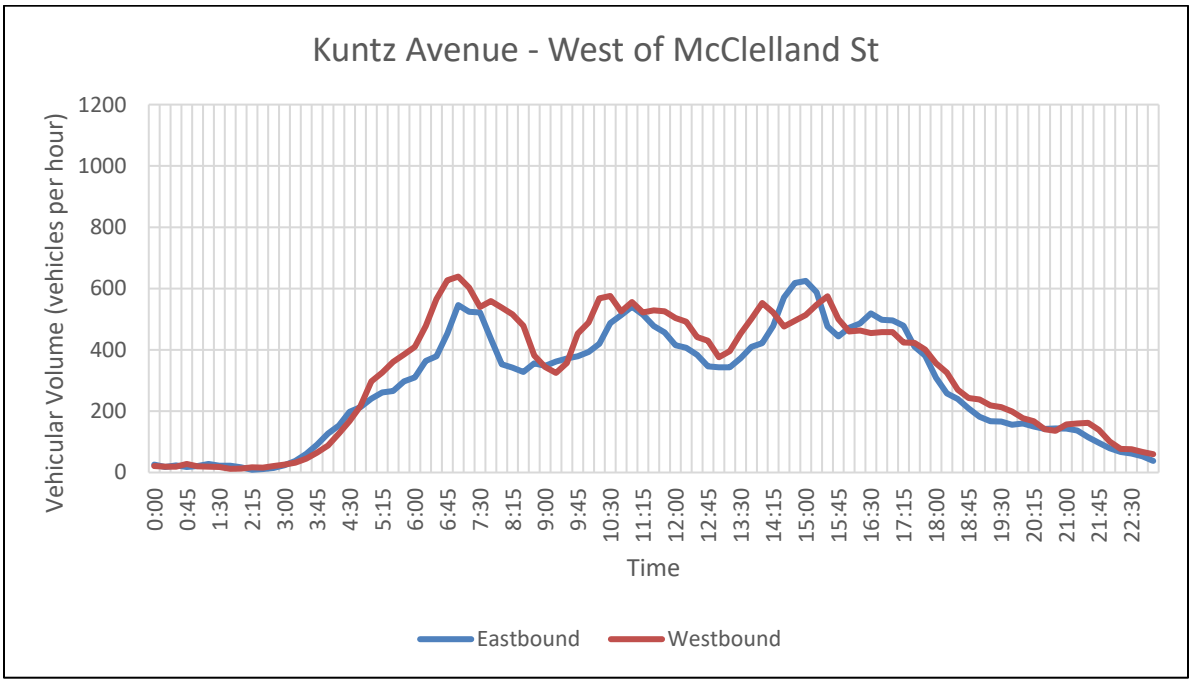

Figure 2-20 Hourly volume variation on Kuntz Avenue, west of McClelland Street

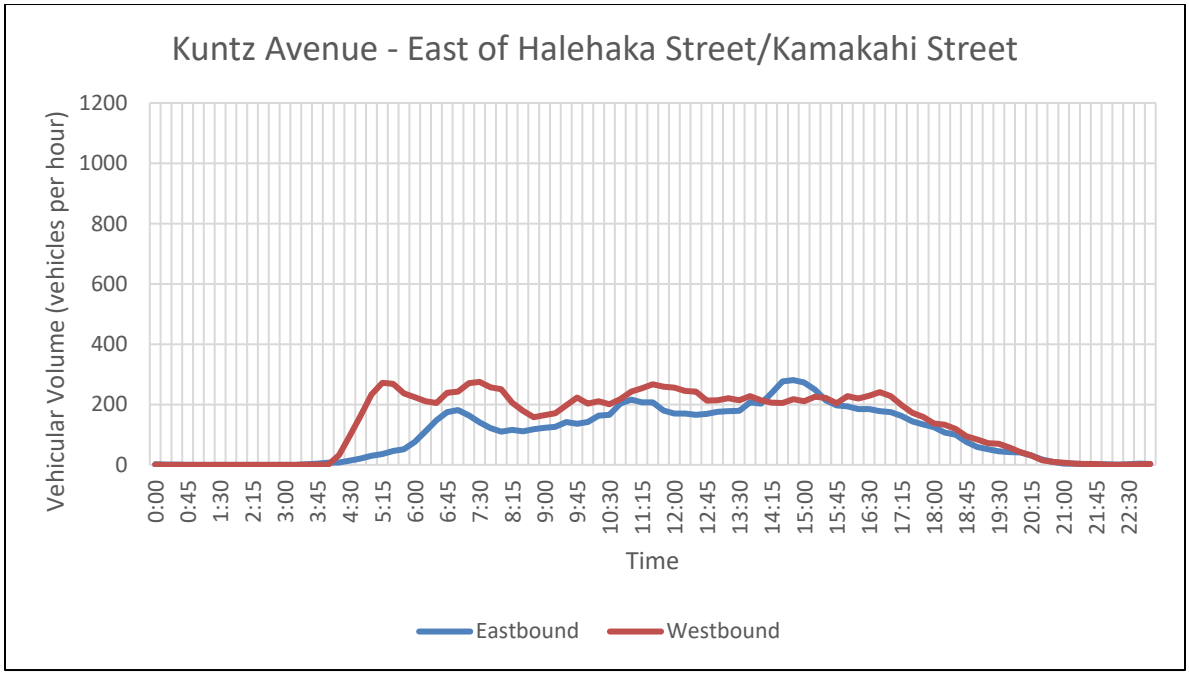

Figure 2-21 Hourly volume variation on Kuntz Avenue, east of Halehaka Street/Kamakahi Street

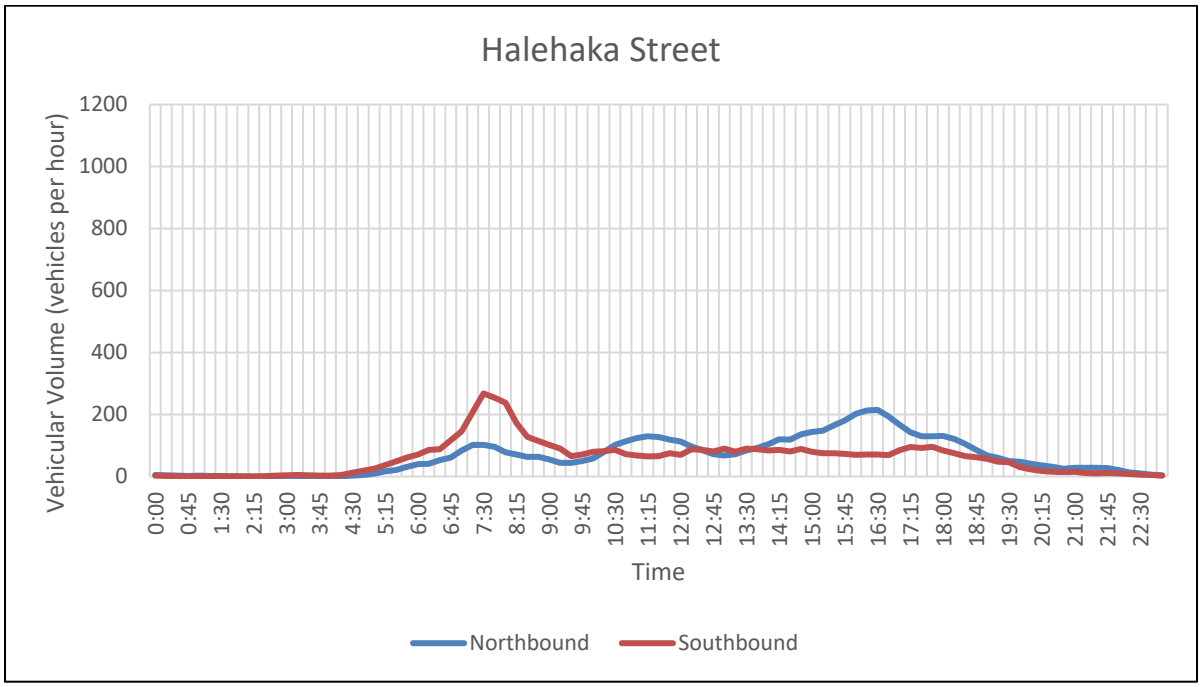

Figure 2-22 Hourly volume variation on Halehaka Street

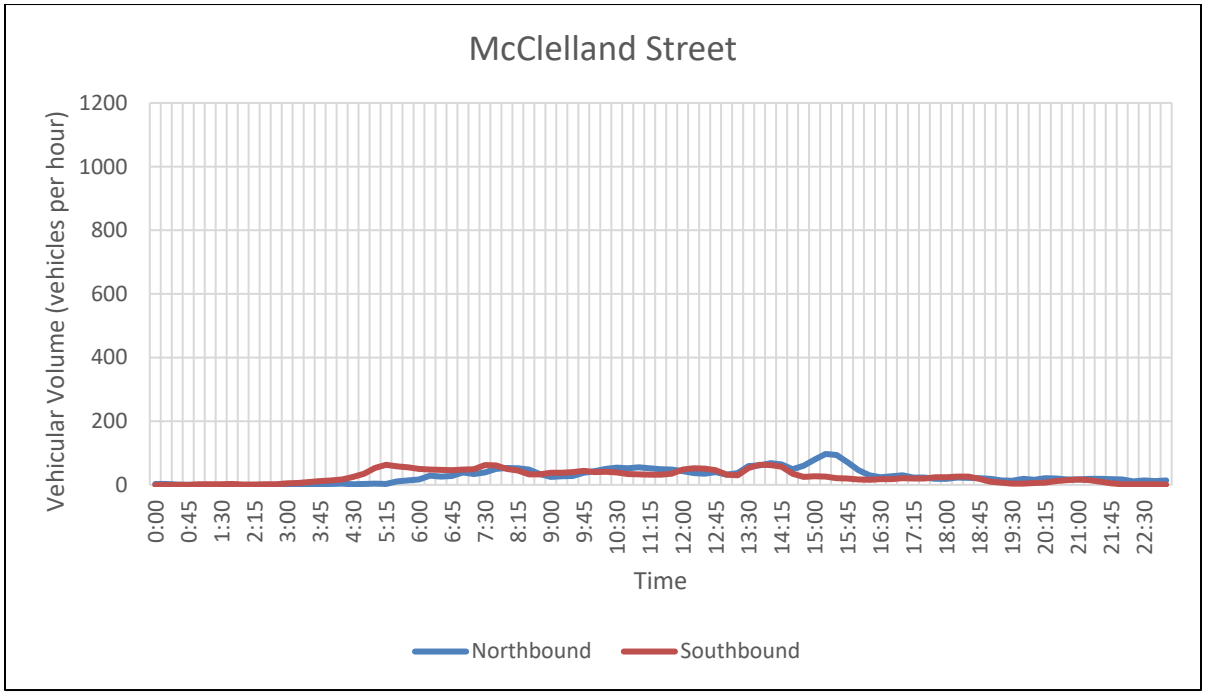

Figure 2-23 Hourly volume variation on McClelland Street

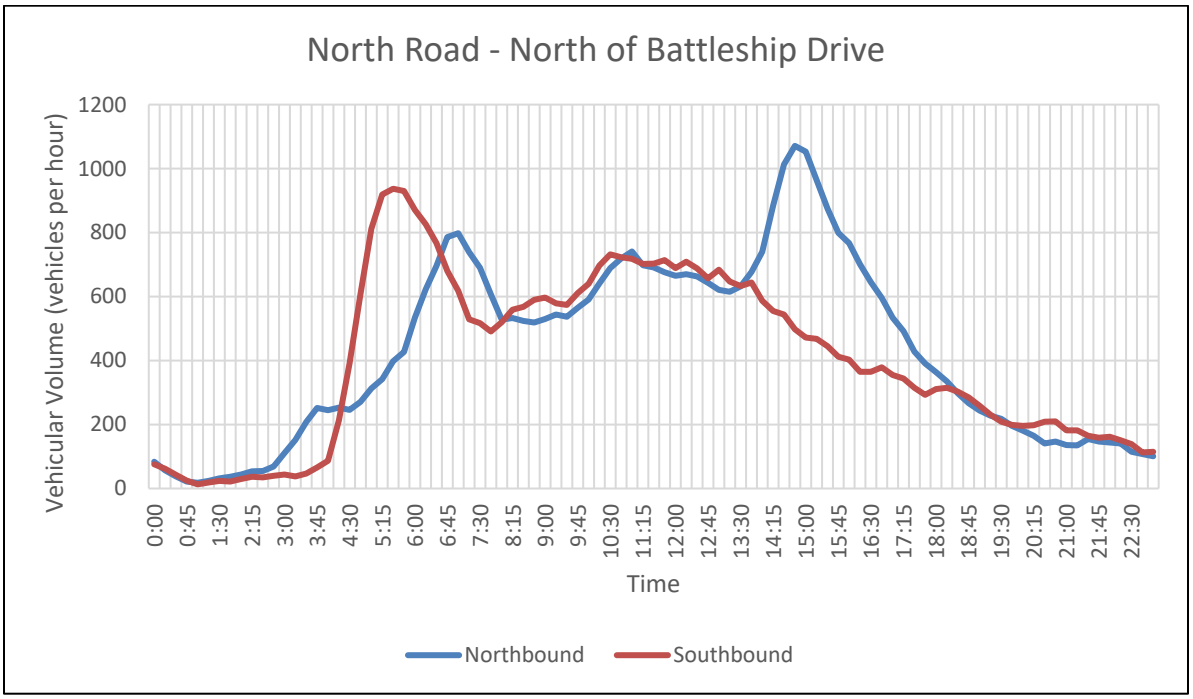

Figure 2-24 Hourly volume variation on North Road, north of Battleship Drive

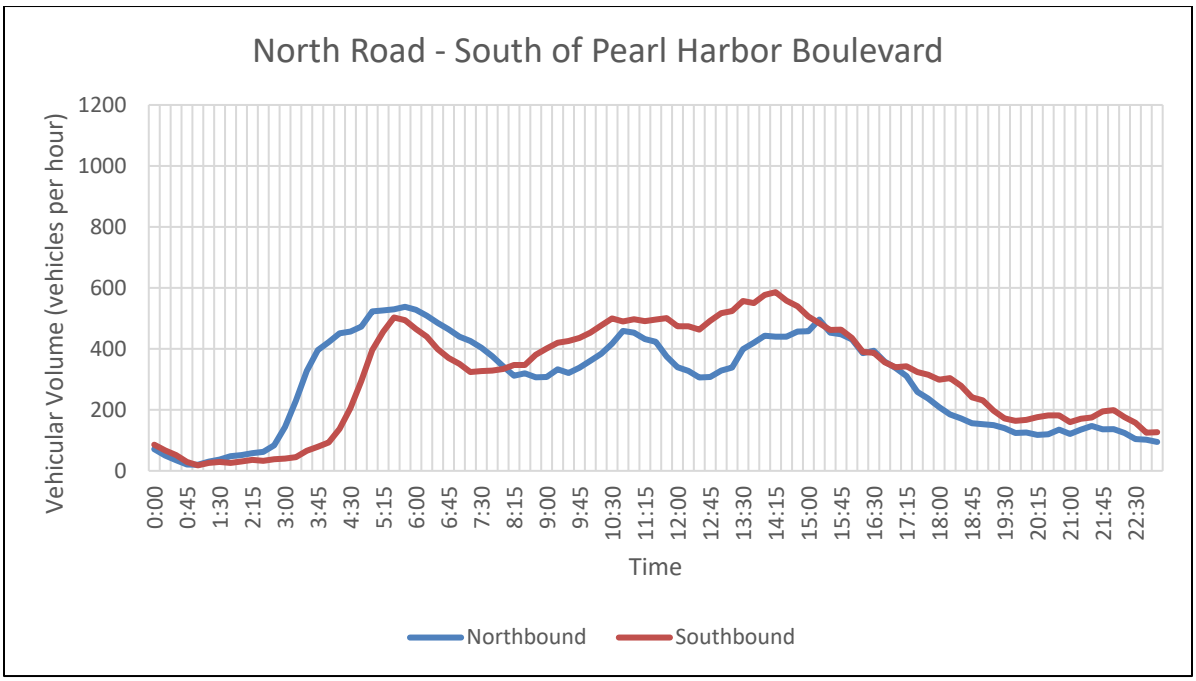

Figure 2-25 Hourly volume variation on North Road, south of Pearl Harbor Boulevard

2.5.2 Existing Turning Movement Volumes

Pedestrian, bicycle, and vehicular turning movement counts were conducted for the AM, midday, and PM peak hour periods on Tuesday, November 19, 2019, Wednesday, November 20, 2019, and Thursday, November 21, 2019. The turning movement counts were conducted at the following six intersections:

- Kuntz Avenue and McClelland Street
- Kuntz Avenue and Kokomalei Street
- Kuntz Avenue and McChord Street
- Kuntz Avenue and Halehaka Street/Kamakahi Street
- North Road and Pearl Harbor Boulevard
- North Road and Battleship Drive

The pedestrian, bicycle, and vehicle turning movement count summary sheets are included in Appendix A.

The traffic study periods were from 6:00 AM to 8:00 AM for the AM peak period, 11:00 AM to 1:00 PM for the midday peak period, and 2:00 PM to 4:00 PM for the PM peak period.

2.5.2.1 Tradewinds-Par 3 and Kuntz Gate Sites

At the two sites along Kuntz Avenue, the AM peak hour is from 7:00 AM to 8:00 AM, the midday peak is from 12:00 PM to 1:00 PM, and the PM peak hour is from 3:00 PM to 4:00 PM. Figure 2-26 illustrates the vehicular counts for all three peak hour periods.

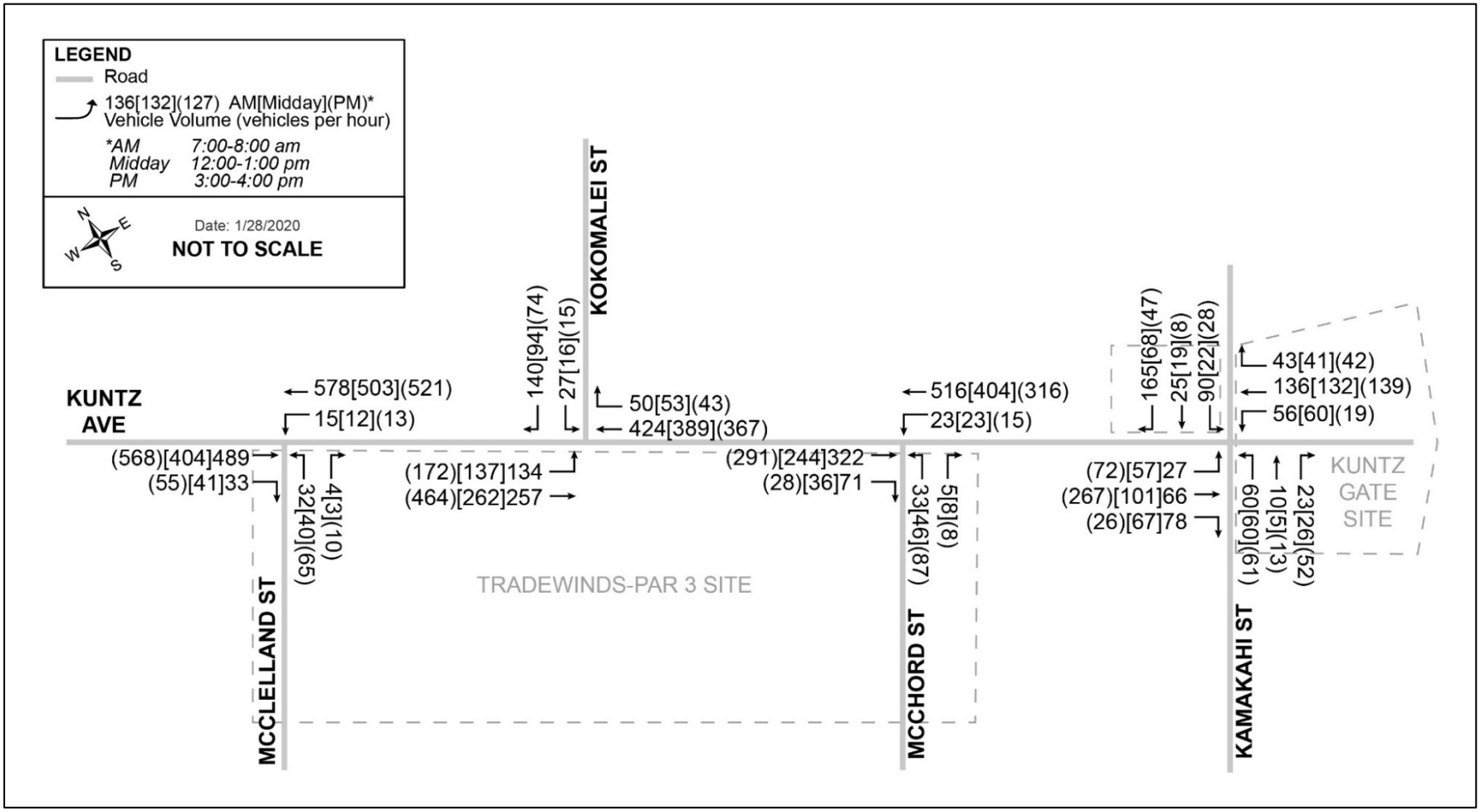

Figure 2-26 Year 2019 AM, Midday, and PM Peak Hour Vehicular Volumes at Kuntz Avenue Sites

2.5.2.2 Bloch Arena Site

At the Bloch Arena site, the weekday AM peak hour is from 6:15 AM to 7:15 AM, the midday peak hour is from 11:00 AM to 12:00 PM, and the PM peak hour is from 2:45 PM to 3:45 PM. Figure 2-27 illustrates the vehicular counts for all three peak hour periods.

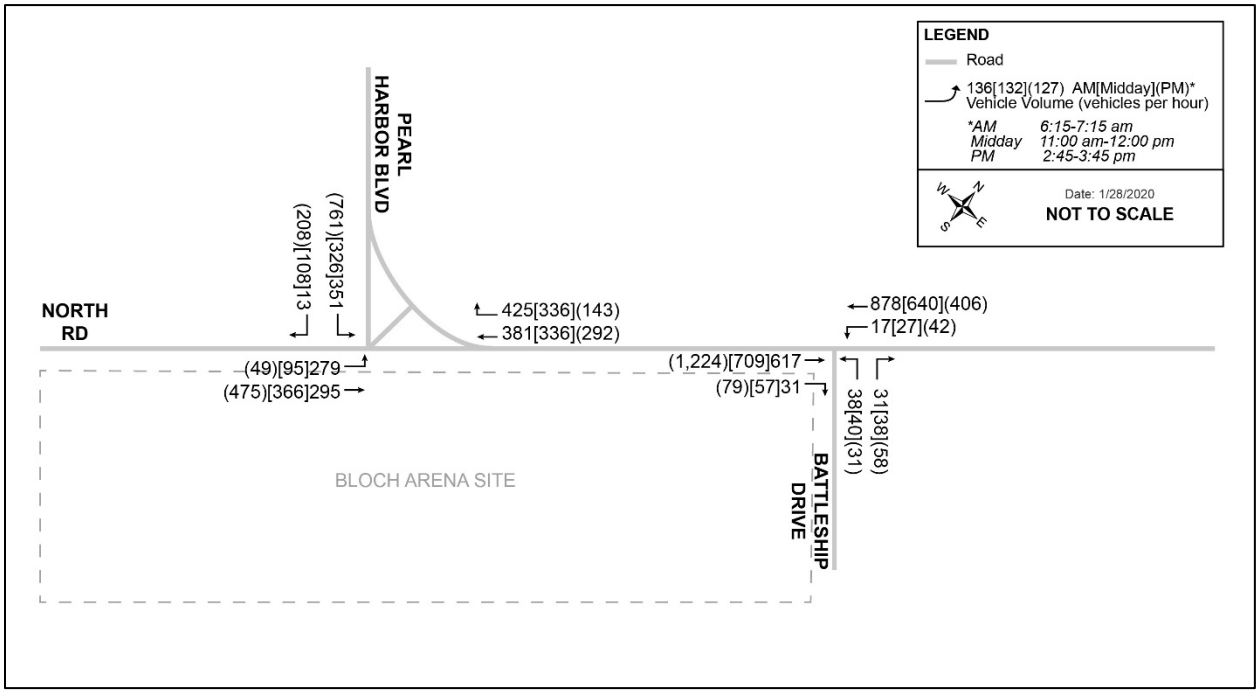

Figure 2-27 Year 2019 AM, Midday, and PM Peak Hour Vehicular Volumes at Bloch Arena Site

2.5.3 Existing Pedestrian and Bicycle Volumes

The pedestrian and bicycle volumes were counted during the data collection process. The pedestrian and bicycle volumes observed during the vehicular peak hours at the Kuntz Avenue sites and the Bloch Arena site are illustrated on Figure 2-28 and Figure 2-29, respectively.

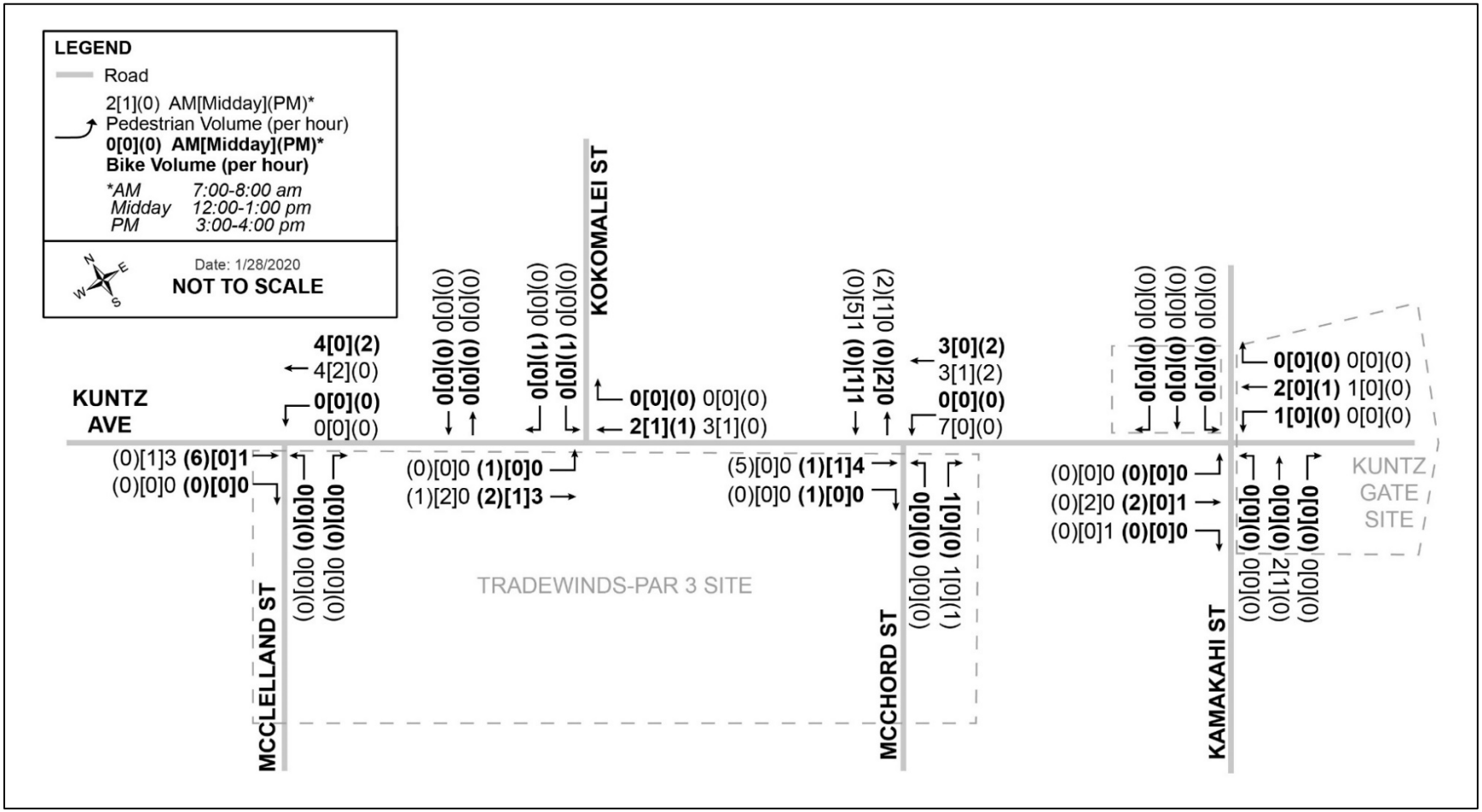

Figure 2-28 Year 2019 AM, Midday, PM Peak Hour Pedestrian and Bicycle Volumes at Kuntz Avenue Site

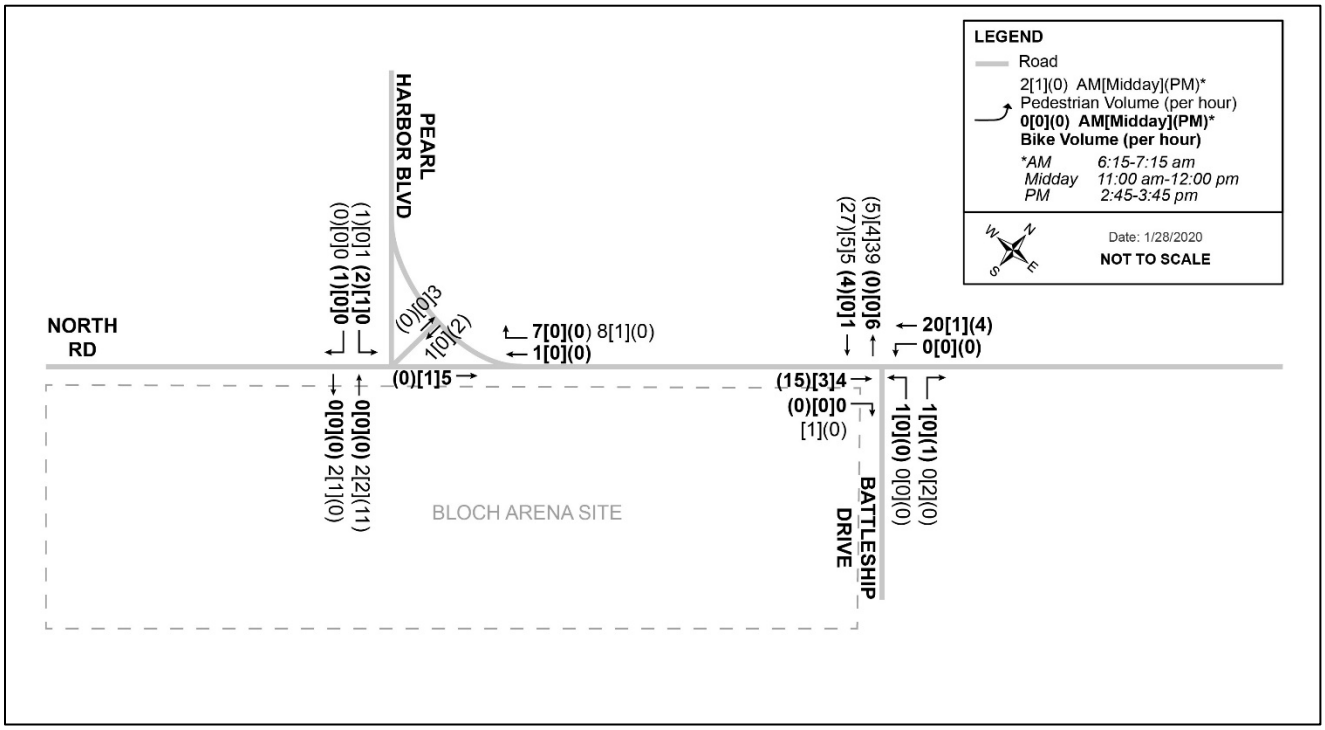

Figure 2-29 Year 2019 AM, Midday, PM Peak Hour Pedestrian and Bicycle Volumes at Bloch Arena Site

2.5.3.1 Tradewinds-Par 3 and Kunz Gate Sites

At the Tradewinds-Par 3 and Kuntz Gate sites, little to no pedestrian and bicycle activity was observed, as shown on Figure 2-28.

2.5.3.2 Bloch Arena Site

At the Bloch Arena site, pedestrian and bicycle activity was observed at the North Road and Battleship Drive intersection as shown on Figure 2-29.

The pedestrian volumes at the crosswalk across North Road were 44 pedestrians per hour, 9 pedestrians per hour, and 32 pedestrians per hour during the AM, midday, and PM vehicular peak hours, respectively. The pedestrian volumes at the crosswalk across Battleship Drive were 45 pedestrians per hour, 33 pedestrians per hour, and 40 pedestrians per hour during the AM, midday, and PM vehicular peak hours, respectively.

The bicycle volumes on North Road were 24 bicycles per hour, 4 bicycles per hour, and 19 bicycles per hour during the AM, midday, and PM peak hours, respectively. The bicycle volumes along Battleship Drive were 9 bicycles per hour and 10 bicycles per hour during the AM and PM vehicular peak hours, respectively.

2.5.4 Existing Intersection Operations

The six intersections noted in Section 2.2.2 were analyzed using 2019 existing conditions based on the peak hour traffic turning movement volumes and intersection configurations. Table 2-1 summarizes the weekday AM, midday, and PM peak hour operations at each of the intersections.

The six intersections were analyzed using the appropriate signalized or unsignalized intersection capacity methods described in the 2010 Highway Capacity Manual (TRB 2010) as implemented through Synchro/Sim Traffic software. For the analysis of existing conditions, existing traffic signal timing and phasing were used as input into Synchro. The Synchro analysis worksheets are included in Appendix C.

Analysis results are expressed as vehicular delay and level of service (LOS). LOS for signalized and unsignalized intersections is a qualitative index that references a performance measure such as intersection delay to show the relative quality of the traffic services. Definitions for LOS are included in Appendix D. A LOS D indicates heavy but functional operations at the intersection and is usually considered acceptable for peak hour conditions.

2.5.4.1 Tradewinds-Par 3 and Kuntz Gate Sites

As shown in Table 2-1, these unsignalized intersections were found to operate relatively well during the peak periods.

During initial data collection efforts at the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection, a queue was observed forming on Kuntz Avenue eastbound during the PM peak hour. Subsequent observations on multiple days did not find recurrence of this queuing and the initial observation was considered to be an atypical occurrence.

2.5.4.2 Bloch Arena Site

As shown in Table 2-1, the signalized intersection of North Road and Pearl Harbor Boulevard operates with a LOS C or better during the morning, midday, and afternoon peak hours. It was observed that the shared northbound through/left-turn lane on North Road operates as a de facto left-turn lane. The protected left-turn phase typically clears the queue of vehicles turning left, leaving the lane open to service through traffic. However, there are periods during peak hours where higher volumes of left-turning vehicles arrive during the permissive phase and wait longer to make the turn, preventing through vehicles from using the lane and effectively causing the lane to operate as a left-turn lane. This does not occur during non-peak hours.

The unsignalized intersection of North Road and Battleship Drive has constrained traffic movements during the afternoon (PM) peak hour. The left-turning movement out of Battleship Drive has a LOS F during the PM peak hour due to the difficulty in finding sufficient gaps in the through volume along North Road and due to conflicts with vehicles turning left into Battleship Drive from North Road. Turning operations at this intersection benefit from gaps caused by signal phase transitions at the signalized North Road and Pearl Harbor Boulevard intersection.

Table 2-1 Existing Intersection Operations Summary

Intersection/ Traffic Movements	*AM Peak Hour*		*Midday Peak Hour*		*PM Peak Hour*	
	Delay (sec/veh)	*LOS*	*Delay (sec/veh)*	*LOS*	*Delay (sec/veh)*	*LOS*
Kuntz Ave/McClelland St						
WB Kuntz Ave LT	8.6	A	8.4	A	9.0	A
McClelland St LT/RT	25.5	D	21.5	C	33.5	D
Kuntz Ave/Kokomalei St						
EB Kuntz Ave LT	9.0	A	8.9	A	8.9	A
LT from Kokomalei St	24.5	C	22.6	C	32.3	D
RT from Kokomalei St	13.4	B	12.1	B	11.5	B
Kuntz Ave/McChord St						
WB Kuntz Ave LT	8.3	A	7.9	A	8.0	A
McChord St LT/RT	19.6	C	16.2	C	16.6	C
Kuntz Ave/Halehaka St/Kamakahi St						
EB Kuntz Ave LT	7.7	A	7.7	A	7.8	A
Halehaka St LT/RT	16	C	12.3	B	14.3	B
WB Kuntz Ave LT	7.6	A	7.7	A	7.9	A
Kamakahi Ave LT/RT	17.2	C	15.7	C	18.3	C
North Rd/Battleship Dr						
SB North Rd LT	9.1	A	9.7	A	13.3	B
Battleship Dr LT/RT	25.1	D	26.0	D	60.6	F
North Rd/Pearl Harbor Dr*						
Signalized-Overall LOS	16.9	B	16.6	B	23.6	C

Notes:
* North Rd/Pearl Harbor Drive is a signalized intersection. LOS is overall LOS. All other intersections in Table 2-1 are unsignalized, two-way STOP controlled.
Ave = avenue
Dr = drive
EB = eastbound
LOS = level of service
LT = left-turn
Rd = road
RT = right-turn
SB = southbound
sec = seconds
St = street
veh = vehicle
WB = westbound

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3 Future Conditions

3.1 Proposed Development

The proposed development of the ACC would include a multi-story health/dental care center facility, space to accommodate 10-20 percent (%) future growth, and surface and/or garage parking areas. The building itself would occupy approximately 250,000 square feet over multiple stories. The parking facilities would be able to accommodate approximately 1,200 parking stalls.

The ACC would offer comprehensive primary care, dental, behavioral health, occupational, and preventive special medicine services to active duty service members and beneficiaries. The hours of operations for the clinic are expected to extend from 7:00 AM to 6:00 PM. According to the *AE-0 Planning Study/Joint Base Pearl Harbor-Hickam Ambulatory Care Center Replacement* document (Planning Study) (SS&A Page 2019; Appendix E of this report), it is assumed that the facility would have 699 employees. This TIAR assumes that approximately 80% of the employees will arrive to the clinic before the 7:00 AM opening time and the remaining 20% will arrive between the hours of 9:00 AM and 10:00 AM. Similarly, it was also assumed that approximately 80% of the staff will depart from the site between the hours of 3:00 PM and 4:00 PM and the remaining 20% will depart from the site between the hours of 5:00 PM and 6:00 PM.

From the Planning Study, the parking calculations indicate that not all staff would park on site. The Planning Study indicates a reduction of 25% when calculating required parking for staff. This reduction may be attributed to several reasons such as the use of carpooling or other modes of transportation.

The Planning Study indicates that there would be approximately 2,208 appointments per day at the ACC, based on estimates from several beneficiary groups that would be using the clinic.

Based on the amount of traffic generated by the proposed ACC, it was assumed that the ACC would have two access points into the site: one primarily oriented toward patients and the other oriented toward staff. It is assumed that the staff would park on the surface lots and the patients would park in the garage. Figure 3-1, Figure 3-2, and Figure 3-3 illustrate the conceptual site plans for the Tradewinds-Par 3, Kuntz Gate sites, and Bloch Arena, respectively.

An excerpt from the Planning Study that was used to make these assumptions is included in Appendix E.

3.1.1 Tradewinds-Par 3 Site

The proposed Tradewinds-Par 3 alternative conceptual site plan is illustrated in Figure 3-1. For this site plan, the patient access point would be located at the Kuntz Avenue/Kokomalei Street intersection directly opposite Kokomalei Street. The proposed patient parking garage would be located adjacent to the proposed ACC building to the left of the access drive.

Patient vehicles would access the site via the Kuntz Avenue/Kokomalei Street intersection and would either stop at a designated drop-off/pick-up area or enter the parking garage directly. The parking garage would connect to the ACC building via a pedestrian bridge, reducing surface level pedestrian crossings. Outbound patient vehicles would travel from the parking garage to the Kuntz Avenue/Kokomalei Street intersection and could optionally stop at the drop-off/pick-up area first.

Staff would park in the surface parking lots located along McClelland Street and Mountain Home Street. The staff would either turn right from Kuntz Avenue onto McClelland Street or turn from Kuntz Avenue onto McChord Street and then onto Mountain Home Street to access the surface parking areas. This arrangement would separate patient and staff parking access completely. This would lower traffic demand at the intersections involved with access to and from the proposed ACC. It would also reduce potential pedestrian-vehicle conflicts.

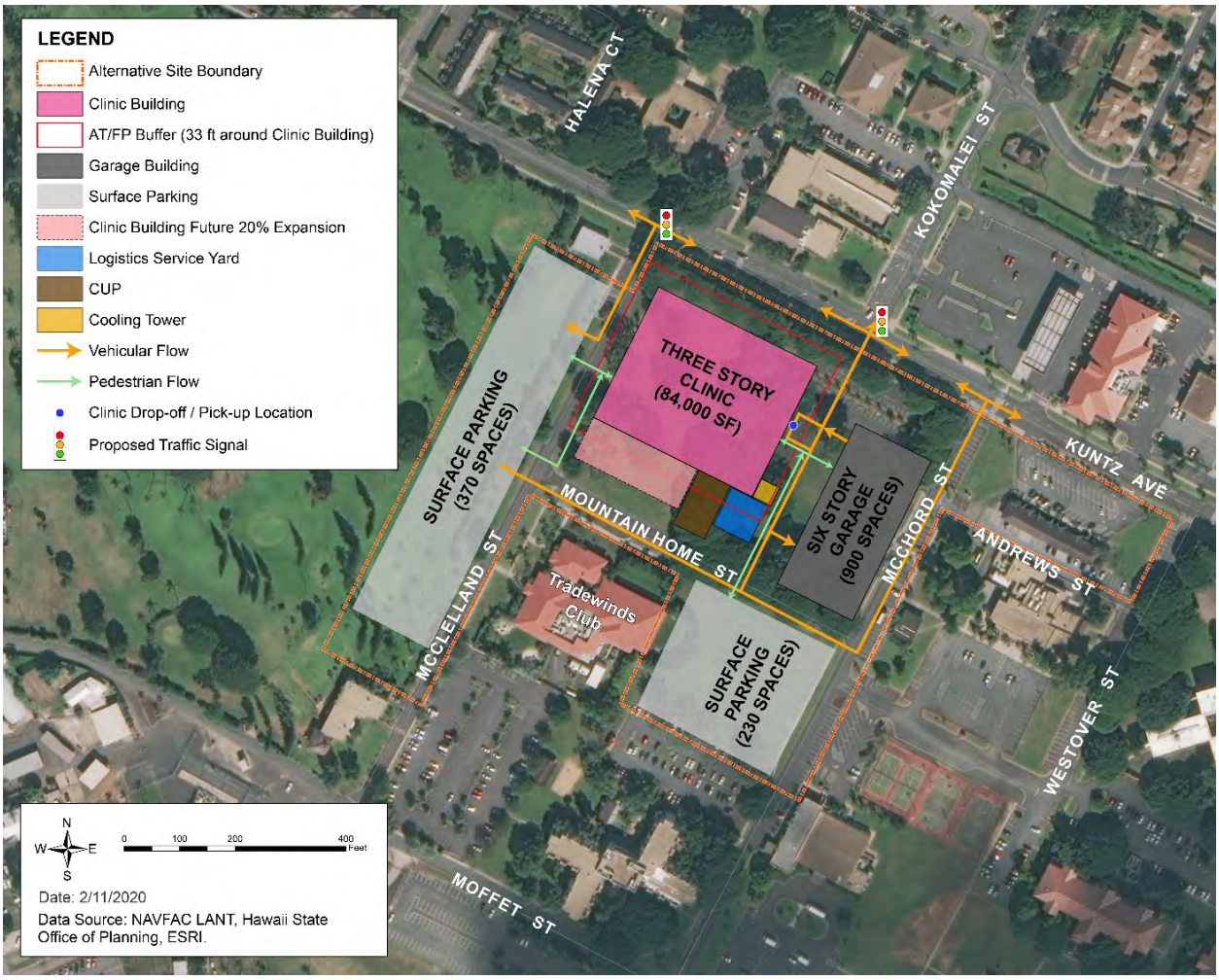

Figure 3-1 Proposed Conceptual Site Plan of the Tradewinds-Par 3 Site

3.1.2 Kuntz Gate Site

The proposed Kuntz Gate alternative conceptual site plan is illustrated in Figure 3-2. Patient access to the ACC would occur at the Halehaka Street/20th Street intersection.

Inbound patient vehicles would access the site via Halehaka Street and either drop off patients in the drop-off/pick-up area east of the parking garage or access the garage directly. Vehicles using the drop-off/pick-up area would loop around the proposed ACC building and then turn into the parking garage. The patients would not often encounter the inbound/outbound traffic flow when traveling between the parking garage and proposed ACC building. The outbound patient vehicles would either turn into the drop-off/pick-up area or directly exit the site onto Halehaka Street. Patients would cross a non-through driveway between the parking garage and the ACC building.

Staff would park in the surface parking lots, one located west of Halehaka Street between Kuntz Avenue and 20th Street and one east of the ACC building. The western lot would be accessed from Halehaka Street via 20th Street, while the eastern lot would be accessed directly from Kuntz Avenue at a new driveway located approximately 400 feet east of the Kuntz Avenue/Halehaka Street/Kamakahi Street intersection.

Staff parking in the eastern lot would access the ACC building directly. Staff parking in the western lot would cross Halehaka Street and pass through the parking garage before crossing the non-through driveway to the ACC building.

Figure 3-2 Proposed Conceptual Site Plan of the Kuntz Gate Site

3.1.1 Bloch Arena Site

The proposed Bloch Arena alternative conceptual site plan is illustrated in Figure 3-3. The primary site access would be located at the North Road and Pearl Harbor Boulevard intersection, adding a fourth leg to the current "T"-intersection. This new access would be used by patients and staff of the proposed ACC. Staff would also have another access to the surface parking lot via Battleship Drive.

Inbound patient vehicles would enter the site and either use the drop-off/pick-up area or proceed directly to the parking garage. The patients would directly access the proposed ACC from the parking garage. The outbound patient vehicles would depart via the driveway at the North Road and Pearl Harbor Boulevard intersection.

When accessing the ACC site from the North Road/Pearl Harbor Boulevard intersection, staff would travel toward the surface parking area, which wraps around the north and east sides of the proposed ACC building. When accessing the ACC site from Battleship Drive, staff would drive directly into the surface parking area. Staff would cross the internal site driveway to access the proposed ACC building. Staff would have the option of leaving via either the North Road/Pearl Harbor Boulevard intersection or Battleship Drive.

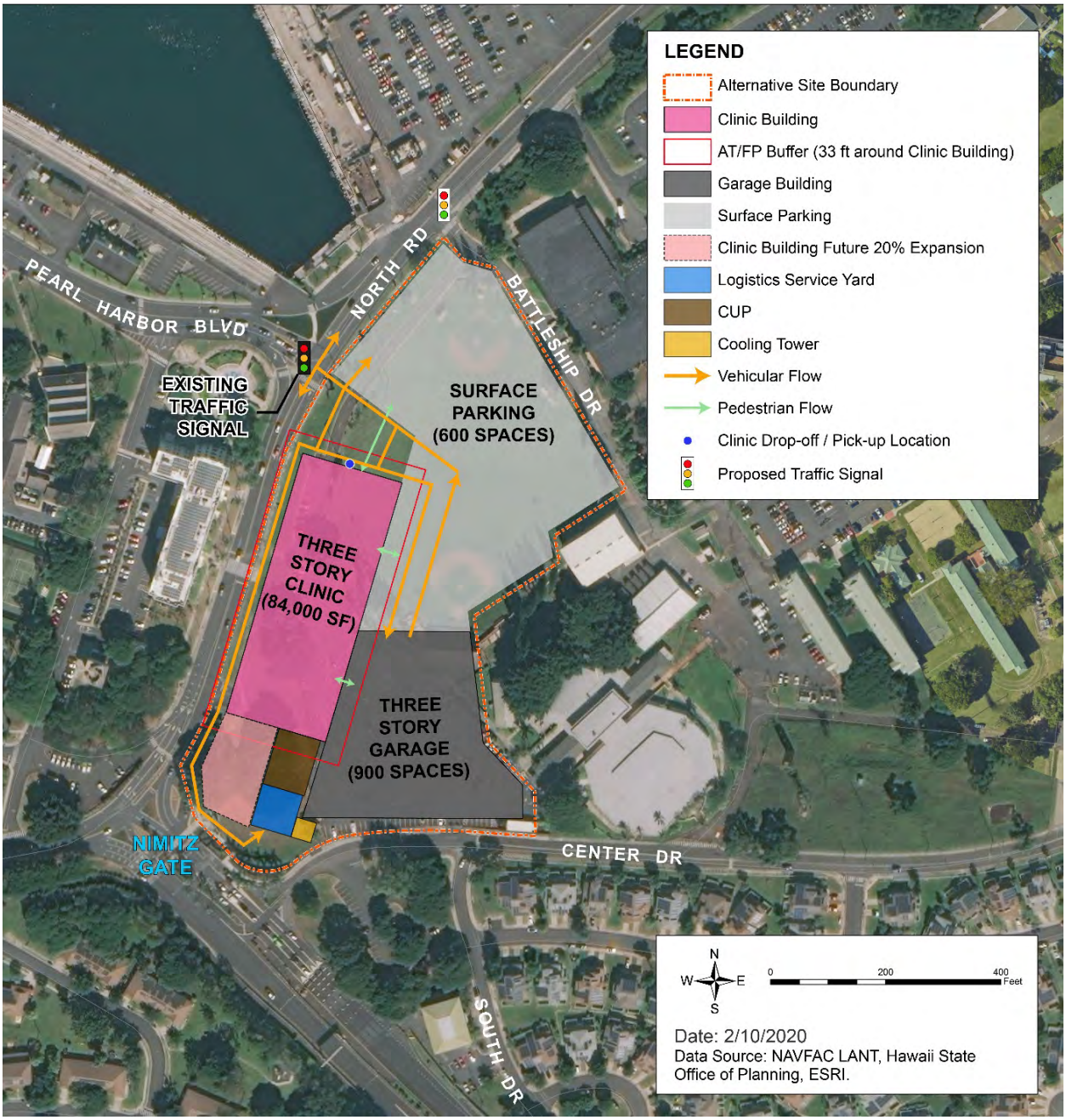

Figure 3-3 Proposed Conceptual Site Plan of the Bloch Arena Site

3.2 Vehicular Trips Generated by the Ambulatory Care Center

To estimate the vehicular volume generated by the ACC, the approximate number of staff and appointments per day from the Planning Study and the assumptions and approximations in the *Hawaii Enhanced Multi-Service Market JBPHH Traffic Study Data Request* presentation (Military Health System 2020) were used. The Traffic Study Data Request presentation estimates the population that will be using the ACC, their housing location (whether it is on-base or off-base), the overall appointment volume and schedule at the ACC, and appointment distribution by beneficiary group.

The Traffic Study Data Request presentation is included in Appendix E along with an excerpt from the Planning Study.

Using the average number of appointments per day, the appointment distribution by beneficiary group, and the overall appointment utilization, the number of patients arriving at and departing from the ACC were estimated. In addition to the data from the Traffic Study Data Request, two assumptions were made on times of arrival and departure of the patients for their appointments. It was assumed that the patients would arrive approximately 30 minutes prior to the scheduled appointments, and that each scheduled appointment would last approximately one hour. Table 3-1 summarizes the distribution of patient arrivals and departures during peak periods.

Table 3-1 Arrival and Departure of Patients During Peak Periods

	ADFM		*ADSM*		*RET*		*RET/OTHER*		*Total*	
Time of Day	***In***	***Out***	***In***	***Out***	***In***	***Out***	***In***	***Out***	***In***	***Out***
6:00 – 7:00	33	0	115	0	6	0	49	0	203	0
7:00 – 8:00	83	0	218	0	10	0	49	0	360	0
11:00 – 12:00	11	88	77	192	3	11	37	50	128	341
12:00 – 13:00	72	44	179	90	9	5	31	9	291	148
15:00 – 16:00	6	66	13	141	1	6	0	19	20	232

Notes:
Assumes patients arrive approximately 30 minutes prior to scheduled appointment.
Assumes appointments take approximately 1 hour to complete.
ADFM = Active Duty Family Member
ADSM = Active Duty Service Member
RET = Retired Service Member
RET/OTHER = Retiree Family Member/Other

The number of staff members arriving and departing during the peak periods were also estimated based on the assumptions in Section 3.1. Table 3-2 details the trips generated by the staff arriving and departing during the peak periods. The complete distribution for the staff is included in Appendix F.

Table 3-2 Arrivals and Departures of Staff during Peak Periods

Time of Day	*In*	*Out*
6:00 – 7:00	168	0
7:00 – 8:00	251	0
11:00 – 12:00	0	0
12:00 – 13:00	0	0
15:00 – 16:00	0	168

Note: Assumes 32% of staff arrive/depart first, 48% of staff arrive/depart next, and then remaining 20% arrive/depart 2 hours later.
% = percent

3.3 Background Traffic Volumes

Background traffic is the traffic in the area surrounding the proposed development that is unrelated to the proposed project. A growth rate is applied to the background traffic to account for the future general growth of the area. However, given that the areas around the site are located on JBPHH, the growth of the surrounding area may be different from typical civilian/commercial areas. The year 2027 was used as the future projection year. Based on discussions with JBPHH planning staff, no growth in background traffic volumes was assumed for the background traffic around the three proposed alternative sites within the 2027 projection time frame.

3.4 Projected Future Peak Hour Traffic Volumes for the Ambulatory Care Center

3.4.1 Trip Distribution and Assignment

The vehicular traffic volumes generated by the ACC that are summarized in Table 3-3 and Table 3-4 were distributed based on the general housing area from which patients were coming, and assigned to the surrounding roadway network. The assumptions made for the distributions are included in the Hawaii Military Health System Traffic Study Data Request results shown in Appendix E.

From the Traffic Study Data Request, the vehicular volume was first distributed among two groups: the on-base population and the off-base population. The on-base population was then further subdivided into four groups. These four groups are the Navy barracks, the Air Force barracks, other Navy housing, and Hickam housing. The Hickam housing was further subdivided into two categories: the larger residential area to the west of Kuntz Avenue and the smaller residential area to the north of Kuntz Avenue.

The Traffic Study Data Request results indicate that approximately 80% of future patients are located off-base and the remaining 20% are located on-base. For the housing area of the staff, it was assumed that approximately 50% would be located on-base and 50% would be located off-base. The on-base volumes were then further distributed to the Navy barracks, Air Force barracks, other Navy housing, and Hickam housing areas. For the vehicular trips headed to and from Hickam housing areas, trips were proportioned based on the approximate area of the two housing areas. Table 3-3 to Table 3-7 detail the projected trip distribution for the future staff and appointments based on the peak periods and housing locations. Not all of the projected off-base vehicle trips are new trips. The ACC would replace existing facilities that are currently located within JBPHH. Some of these projected off-base trips are already among the current off-base trips using JBPHH gates to access these existing facilities. However, a worst-case scenario assuming no reduction in off-base trips at the JBPHH gates was used for evaluation of gate impacts.

A quantitative evaluation of gate impacts was beyond the scope of this TIAR. However, the EA interdisciplinary team sought the support and expertise of the Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA) to quantify potential gate impacts in an Entry Control Facility (ECF) Lane Assessment. The purpose of the ECF Lane Assessment was to calculate the number of ID check lanes needed at each of the four ECFs given additional traffic demand generated by the three ACC alternatives. The methodology and results of the SDDCTEA report are included in full as Appendix E in the EA.

Traffic volumes at intersections adjacent to the proposed alternative sites would be new trips directly overlaid over existing traffic volumes. The traffic impacts at the alternative sites' intersections would be based on the resulting projected traffic volumes.

Table 3-3 Trip distribution during the AM peak hour (6:00-7:00 AM)

	Staff				*Appointment*			
Location	***In***	***Out***	***Total***	***Percentage***	***In***	***Out***	***Total***	***Percentage***
Off-base	84	0	84	50.0%	162	0	162	80.0%
Navy Barracks	18	0	18	10.9%	9	0	9	4.3%
Other Navy Housing	1	0	1	0.6%	1	0	1	0.2%
Air Force Barracks	3	0	3	1.9%	2	0	2	0.8%
Hickam West	39	0	39	23.1%	18	0	18	9.2%
Hickam North	23	0	23	13.6%	11	0	11	5.4%
Total	168	0	168	100.0%	203	0	203	100.0%

Note:
% = percent

Table 3-4 Trip distribution during the AM peak hour (7:00-8:00 AM)

	Staff				*Appointment*			
Location	***In***	***Out***	***Total***	***Percentage***	***In***	***Out***	***Total***	***Percentage***
Off-base	126	0	126	50.0%	288	0	288	80.0%
Navy Barracks	27	0	27	10.9%	15	0	15	4.3%
Other Navy Housing	1	0	1	0.6%	1	0	1	0.2%
Air Force Barracks	5	0	5	1.9%	3	0	3	0.8%
Hickam West	58	0	58	23.1%	33	0	33	9.2%
Hickam North	34	0	34	13.6%	20	0	20	5.4%
Total	251	0	251	100.0%	360	0	360	100.0%

Note:
% = percent

Table 3-5 Trip distribution during the midday peak hour (11:00 AM-12:00 PM)

	Staff				Appointment			
Location	In	Out	Total	Percentage	In	Out	Total	Percentage
Off-base	0	0	0	50.0%	102	273	375	80.0%
Navy Barracks	0	0	0	10.9%	6	14	20	4.3%
Other Navy Housing	0	0	0	0.6%	0	1	1	0.2%
Air Force Barracks	0	0	0	1.9%	1	3	4	0.8%
Hickam West	0	0	0	23.1%	12	32	44	9.2%
Hickam North	0	0	0	13.6%	7	18	25	5.4%
Total	0	0	0	100.0%	128	341	469	100.0%

Note:
% = percent

Table 3-6 Trip distribution during the midday peak hour (12:00-1:00 PM)

	Staff				Appointment			
Location	In	Out	Total	Percentage	In	Out	Total	Percentage
Off-base	0	0	0	50.0%	233	118	351	80.0%
Navy Barracks	0	0	0	10.9%	13	6	19	4.3%
Other Navy Housing	0	0	0	0.6%	1	0	1	0.2%
Air Force Barracks	0	0	0	1.9%	2	1	3	0.8%
Hickam West	0	0	0	23.1%	26	13	39	9.2%
Hickam North	0	0	0	13.6%	16	8	24	5.4%
Total	0	0	0	100.0%	291	148	437	100.0%

Note:
% = percent

Table 3-7 Trip distribution during the PM peak hour (3:00-4:00 PM)

	Staff				Appointment			
Location	In	Out	Total	Percentage	In	Out	Total	Percentage
Off-base	0	84	84	50.0%	16	186	202	80.0%
Navy Barracks	0	18	18	10.9%	1	10	11	4.3%
Other Navy Housing	0	1	1	0.6%	0	0	0	0.2%
Air Force Barracks	0	3	3	1.9%	0	2	2	0.8%
Hickam West	0	39	39	23.1%	2	21	23	9.2%
Hickam North	0	23	23	13.6%	1	13	14	5.4%
Total	0	168	168	100.0%	20	232	252	100.0%

Note:
% = percent

After the projected ACC-generated trip distribution was determined for peak hours, the vehicular volume was distributed across the roadway network in the vicinity of the sites, with the assumption of vehicles returning to each of the housing areas. The ACC-generated traffic destined for off-base

locations was distributed to the nearest JBPHH gates. It was assumed that the off-base traffic could use any of the JBPHH gates to access the clinic. The projected ACC-generated traffic was distributed to account for potential use of all available access points.

3.4.2 Future Peak Hour Traffic Volumes

The projected ACC-generated traffic volumes were combined with existing traffic volumes to create a total projected peak hour traffic volume calculation. Based on discussions with JBPHH planning staff, existing traffic volumes were not projected to grow appreciably within the 2027 projection time frame. The projected total traffic volumes generated for the Tradewinds-Par 3, Kuntz Gate, and Bloch Arena alternative sites are shown in Figure 3-4, Figure 3-5, and Figure 3-6, respectively.

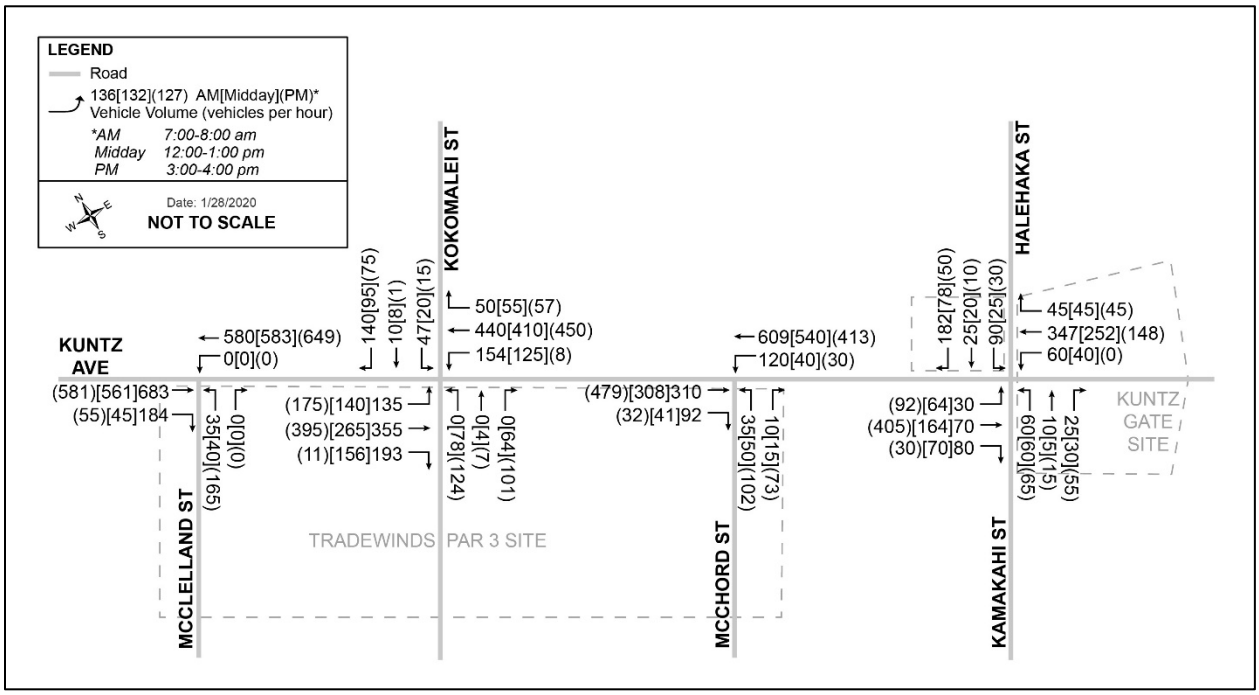

Figure 3-4 Projected AM, midday, and PM peak hour traffic volumes along Kuntz Avenue for the Tradewinds-Par 3 site

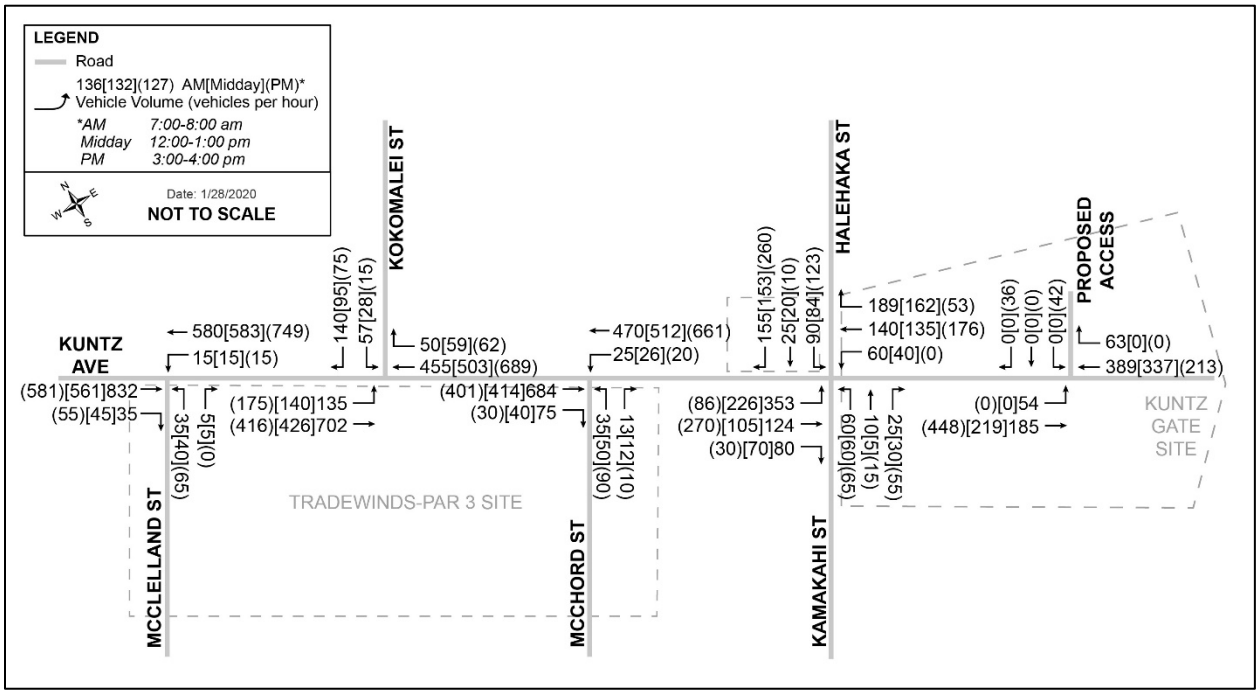

Figure 3-5 Projected AM, midday, and PM peak hour traffic volumes along Kuntz Avenue for the Kuntz Gate site

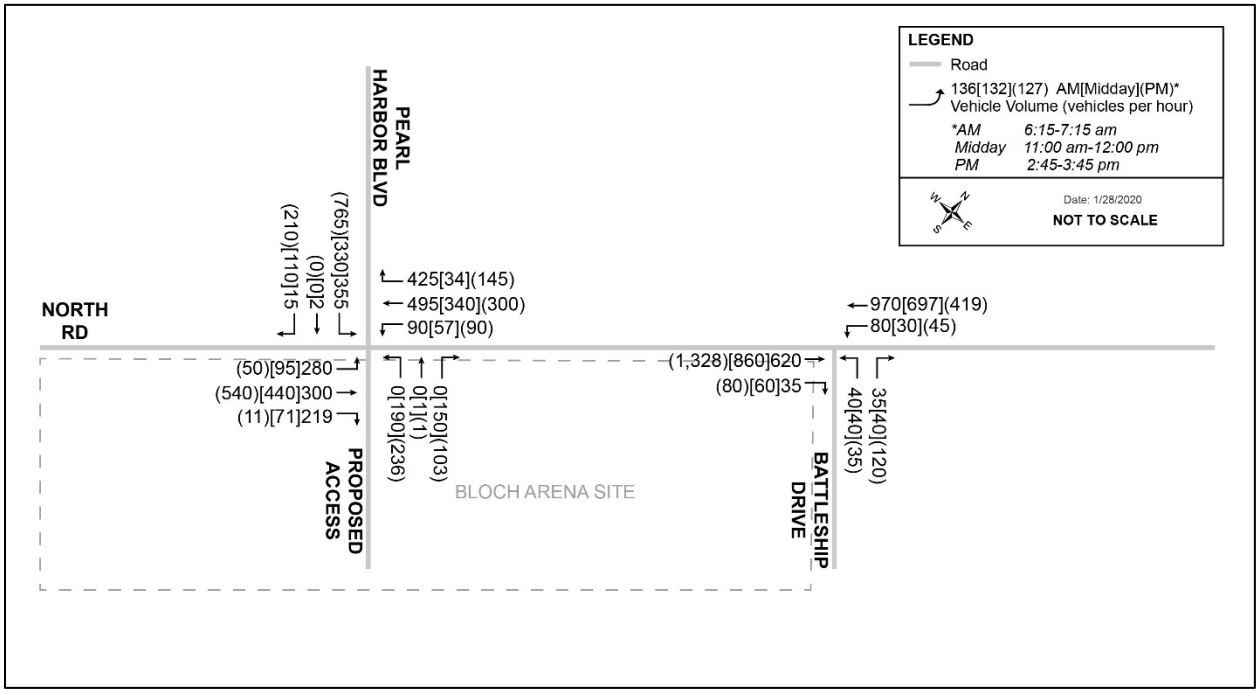

Figure 3-6 Projected AM, midday, and PM peak hour traffic volumes for the Bloch Arena site

3.5 Projected Intersection Peak Hour Operations

The projected 2027 AM, midday, and PM peak hour traffic volumes for the proposed ACC were evaluated using both the unsignalized and signalized Highway Capacity Manual methods (TRB 2010) as implemented by the Synchro analysis software for all three alternative sites. The Synchro analysis worksheets are included in Appendix C. Aside from including new access driveways, the existing roadway geometry and traffic control were maintained as much as possible for this analysis. These analysis findings are labeled as "No Mitigation" in the Synchro analysis worksheets.

3.5.1 Tradewinds-Par 3 Site

Table 3-8 details the future operations for the intersections along the Kuntz Avenue corridor. The intersections and lane geometry would remain the same, with modifications at the Kuntz Avenue and Kokomalei Street intersection to provide a fourth leg for the driveway to the proposed ACC.

Table 3-8 Future Intersection Operations for the Tradewinds-Par 3 Alternative with No Mitigation

Intersection/ Traffic Movements	*AM Peak Hour*		*Midday Peak Hour*		*PM Peak Hour*	
	Delay (sec/veh)	*LOS*	*Delay (sec/veh)*	*LOS*	*Delay (sec/veh)*	*LOS*
Kuntz Ave/McClelland St						
WB Kuntz Ave LT	10.1	B	8.9	A	9.1	A
McClelland St LT/RT	41.2	E	30.8	D	>300	F
Kuntz Ave/Kokomalei St						
WB Kuntz Ave LT	9.0	A	8.9	A	8.9	A
LT/TH from ACC Driveway	0.0	A	>300	F	>300	F
RT from ACC Driveway	0.0	A	13.6	B	15.1	B
EB Kuntz Ave LT	9.1	A	9.0	A	9.4	A
LT/TH from Kokomalei St	231.8	F	81.0	F	66.9	F
RT from Kokomalei St	13.9	C	12.6	B	12.8	B
Kuntz Ave/McChord St						
WB Kuntz Ave LT	8.6	A	8.1	A	7.9	A
McChord St LT/RT	31.8	D	21.8	C	24.5	D
Kuntz Ave/Halehaka St/Kamakahi St						
EB Kuntz Ave LT	8.3	A	8.1	A	7.9	A
Halehaka St LT/TH/RT	31.4	D	22.3	C	28.7	D
WB Kuntz Ave LT	7.7	A	7.8	A	8.4	A
Kamakahi Ave LT/TH/RT	31.7	D	15.6	C	18.6	C

Notes:
ACC = Ambulatory Care Center
Ave = avenue
Dr = drive
EB = eastbound
LT = left-turn
Rd = road
RT = right-turn
sec = seconds
St = street
TH = through
veh = vehicle
WB = westbound

The majority of the ACC-generated traffic would be oriented to Kuntz Avenue. The increase in traffic along Kuntz Avenue and at streets accessing the ACC affects left-turning movements throughout the vicinity, particularly on McClelland Street and Kokomalei Street. As shown in Table 3-8, both left turns from these unsignalized intersections operate with a LOS F during the PM peak hour with a delay that exceeds 300 seconds per vehicle, indicating substantial vehicular queuing. With no mitigations implemented around this site, the traffic exiting from the side streets would have difficulty turning onto Kuntz Avenue. This would affect the staff and patients of the proposed ACC. The increased traffic on Kuntz Avenue would increase delays to movements at the Kuntz Avenue/Halehaka Street/Kamakahi Street intersection, although these would still be in the acceptable peak hour operational range. Section 5 of this TIAR documents recommendations to mitigate these impacts.

3.5.2 Kuntz Gate Site

Although existing roadway configurations would be maintained as much as possible if the ACC were constructed at this site, access would require some physical modifications. A new driveway would be added on Kuntz Avenue, east of the Halehaka Street/Kamakahi Street intersection, for staff access to a surface parking lot. The existing driveways between Kuntz Avenue and 20th Street on Halehaka Street would be closed, and primary site access would occur on 20th Street, turning east for the ACC building and eastern parking lot and west for the western parking lot.

Table 3-9 details the results from the traffic analysis for intersections adjacent to the Kuntz Gate site and along the Kuntz Avenue corridor.

Similar to the Tradewinds-Par 3 alternative, the majority of traffic for the Kuntz Gate Site alternative would be oriented to Kuntz Avenue. As shown in Table 3-9, at the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection, left turns from Halehaka Street/Kamakahi Street would be projected to operate at LOS F during all peak hour time periods. The proposed access on Kuntz Avenue for the staff parking lot and the main ACC building access on Halehaka Street at 20th Street would be projected to operate acceptably for peak hour conditions.

Traffic generated by this alternative would travel along Kuntz Avenue, affecting other intersections, especially those to the west of the Kuntz Gate site. The additional traffic would increase the difficulty for traffic turning out of cross streets and driveways onto Kuntz Avenue. As shown in Table 3-9, the left turn from Kokomalei Street and the turning movements out of McClelland Street are projected to operate at a LOS F during the PM peak hour, indicating substantial delay and excessive vehicle queuing at these approaches.

Table 3-9 Future Intersection Operations for the Kuntz Gate Alternative with No Mitigation

Intersection/ Traffic Movements	*AM Peak Hour*		*Midday Peak Hour*		*PM Peak Hour*	
	Delay (sec/veh)	*LOS*	*Delay (sec/veh)*	*LOS*	*Delay (sec/veh)*	*LOS*
Kuntz Ave/McClelland St						
WB Kuntz Ave LT	10.1	B	8.9	A	9.1	A
McClelland St LT/RT	47.9	E	30.8	D	57.8	F
Kuntz Ave/Kokomalei St						
EB Kuntz Ave LT	9.1	A	9.4	A	10.8	B
LT from Kokomalei St	82.6	F	37.4	E	55.7	F
RT from Kokomalei St	13.9	B	13.7	B	16.5	C
Kuntz Ave/McChord St						
WB Kuntz Ave LT	9.6	A	8.5	A	73.0	A
McChord St LT/RT	31.8	D	21.8	C	24.5	D
Kuntz Ave/Halehaka St/Kamakahi St						
EB Kuntz Ave LT	8.3	A	8.1	A	7.9	A
Halehaka St LT/TH/RT	31.4	D	22.3	C	28.7	D
WB Kuntz Ave LT	7.7	A	7.8	A	8.4	A
Kamakahi Ave LT/TH/RT	31.7	D	15.6	C	18.6	C
Kuntz Ave/Proposed Access						
EB Kuntz Ave LT	8.6	A	0	A	0.0	A
Proposed Access LT/RT	0.0	A	0.0	A	13.3	B

Notes:
Ave = avenue
EB = eastbound
LOS = level of service
LT = left-turn
RT = right-turn
sec = seconds
St = street
TH = through
veh = vehicle
WB = westbound

3.5.3 Bloch Arena Site

Table 3-10 summarizes the projected future operations for the intersections in the immediate vicinity of the Bloch Arena site.

The North Road/Pearl Harbor Boulevard intersection would be modified from a signalized "T"-intersection to a signalized four-legged intersection to accommodate the access driveway for the proposed ACC, located opposite of the terminus of Pearl Harbor Boulevard. Lane configuration at the intersection would be modified to add a southbound left-turn lane and to change the outside eastbound left-turn lane into a through/left-turn lane for traffic accessing the ACC. Traffic signal control would be modified to a split-phase operation to accommodate the shared eastbound through/left-lane on the Pearl Harbor Boulevard approach. These geometric changes would require widening North Road by one lane from Pearl Harbor Boulevard to Battleship Drive to provide room for the southbound left-turn lane.

The North Road/Battleship Drive intersection and associated lane configurations would not be modified from the existing unsignalized "T"-intersection with STOP-sign control on the Battleship Drive approach.

As shown in Table 3-10, overall peak hour operations at the North Road/Pearl Harbor Boulevard intersection would be at a typically accepted level of LOS D. However, further evaluation of the analysis worksheets indicate that vehicle queuing would be an issue. The vehicle queue for North Road in the northbound direction during the PM peak hour is projected to back up as far as Nimitz Gate. The ACC driveway approach is also projected to have a long vehicle queue during this time period, creating internal circulation issues within the Bloch Arena site.

Delays at the North Road/Battleship Drive intersection would be projected to increase for vehicles exiting Battleship Drive, with LOS for this movement declining from LOS D operation in the existing condition to LOS E operation during the AM peak hour for the Bloch Arena site alternative. During the midday and PM peak periods, existing and projected future LOSs would be similar, although the already congested condition during the PM peak hour would be expected to worsen. Section 5 of this TIAR identifies recommended improvements to mitigate these conditions.

Table 3-10 Future Intersection Operations for Bloch Arena Site Alternative with No Mitigation

Intersection/ Traffic Movements	*AM Peak Hour*		*Midday Peak Hour*		*PM Peak Hour*	
	Delay (sec/veh)	*LOS*	*Delay (sec/veh)*	*LOS*	*Delay (sec/veh)*	*LOS*
North Rd/Battleship Dr						
SB North Rd LT	9.5	A	9.8	A	14.4	B
Battleship Dr LT/RT	36.6	E	26.6	D	131.8	F
North Rd/Pearl Harbor Dr*						
Signalized-Overall LOS	17.5	B	37.2	D	43.8	D

Notes:
* North Rd/Pearl Harbor Dr is a signalized intersection. LOS is overall LOS. All other intersections in Table 3-10 are unsignalized, two-way STOP controlled.
Dr = drive
LOS = level of service
LT = left-turn
Rd = road
RT = right-turn
SB = southbound
sec = seconds
veh = vehicle

3.6 Traffic Signal Warrant Analysis

In preparation for the evaluation of actions to mitigate the issues identified in the initial traffic analyses, a preliminary traffic signal warrant analysis was conducted for the intersections in the vicinity of the proposed alternative sites. With the exception of the North Road/Pearl Harbor Boulevard intersection, most of the evaluated intersections are unsignalized. The increase in traffic volumes that would occur with the addition of the ACC on each potential site are projected to overwhelm the unsignalized operation at some of these unsignalized locations. The most obvious remedy for this situation is to signalize the intersections, but to do so requires that the conditions at these intersections satisfy traffic signal warrants as documented in the Manual on Uniform Traffic Control Devices (MUTCD) (USDOT 2009).

Preliminary traffic signal warrant evaluations were conducted at unsignalized intersections where it was determined that projected operations would benefit from signalization. The following intersections were evaluated:

- Tradewinds-Par 3: Kuntz Avenue and McClelland Street, Kuntz Avenue and Kokomalei Street, and Kuntz Avenue and McChord Street
- Kuntz Gate: Kuntz Avenue and Halehaka Street/Kamakahi Street and Kuntz Avenue and proposed staff parking lot access on Kuntz Avenue
- Bloch Arena: North Road and Battleship Drive

There are nine traffic signal warrants listed in Chapter 4C, *Traffic Control Signal Needs Studies* of the MUTCD (USDOT 2009). Six out of the nine traffic signal warrants are based on factors other than the vehicular volume at the intersection. Warrant 4, Pedestrian Volume, would not apply at any of the intersections. At the North Road and Battleship Drive intersection, there were approximately 44 pedestrians per hour during the AM peak hour and 32 pedestrians per hour during the PM peak hour, which were the largest pedestrian volumes observed during data collection. These pedestrian volumes are not large enough to meet the minimum requirements of the Pedestrian Peak Hour component of Warrant 4 (133 pedestrians per hour). Warrant 5, School Crossing, is not applicable at any of the three alternative sites. Warrant 6, Coordinated Signal System, is not applicable for this analysis. Warrant 7, Crash Experience, was not evaluated. Warrant 8, Roadway Network, is not applicable for this analysis. Warrant 9, Intersection Near a Grade Crossing (Railroad), is not applicable at any of the intersections at the three proposed sites.

The remaining three warrants are volume-based: Warrant 1, Eight-Hour Vehicular Volume; Warrant 2, Four-Hour Vehicular Volume; and Warrant 3, Peak Hour.

The approach used in this analysis was to evaluate Warrant 3, Peak Hour, using the projected peak hour traffic volumes to identify whether signalization would be potentially justified at the intersections evaluated. Warrant 3, Peak Hour, is usually the easiest to satisfy out of the three volume warrants. If the peak hour warrant is not satisfied, it is unlikely the other volume warrants also would be satisfied and a traffic signal would be considered as not warranted at the intersection. If the peak hour warrant is satisfied, it is assumed that a traffic signal would be warranted for the purposes of this TIAR.

3.7 Tradewinds-Par 3 Site

From the criteria listed under Warrant 3, Peak Hour from Chapter 4C, *Traffic Control Signal Needs Studies* of the MUTCD (USDOT 2009), the Kuntz Avenue/McClelland Street and Kuntz Avenue/Kokomalei Street/proposed ACC access are projected to satisfy the requirements for Warrant 3. The Kuntz Avenue/McChord Street intersection does not satisfy the requirements for Warrant 3. The worksheets for the analysis at these three intersections are included in Appendix G.

3.8 Kuntz Gate Site

From the criteria listed under Warrant 3, Peak Hour from Chapter 4C, *Traffic Control Signal Needs Studies* of the MUTCD (USDOT 2009), the Kuntz Avenue/Halehaka Street/Kamakahi Street intersection is projected to satisfy the requirements for Warrant 3. The Kuntz Avenue/proposed staff lot access intersection does not satisfy the requirements for Warrant 3. The worksheets for this analysis are included in Appendix G.

3.9 Bloch Arena Site

From the criteria listed under Warrant 3, Peak Hour from Chapter 4C, *Traffic Control Signal Needs Studies* of the MUTCD (USDOT 2009), the North Road/Battleship Drive intersection is projected to satisfy the requirements for Warrant 3 with the projected volumes. The worksheets for the analysis for all three peak periods are included in Appendix G.

4 Proposed Alternatives and Impacts

4.1 Tradewinds-Par 3 Site Alternative

The conceptual site plan assumed in this analysis for the Tradewinds-Par 3 alternative is illustrated on Figure 3-1. The site plan shows the general conceptual location of the clinic building, parking facilities, and pedestrian and vehicle circulation.

4.1.1 Internal Circulation and Parking

The patient traffic would enter through the access opposite Kokomalei Street and have internal circulation that would enable drop-off/pick-up and access to the parking garage. The surface lots for the ACC staff are located along McClelland Street and Mountain Home Street. The staff would need to cross either road to arrive at the ACC from the surface parking areas.

The Tradewinds-Par 3 alternative also would be partially located on an existing surface parking lot. Several other surface parking areas are in the vicinity of the site that would be used to utilize the other facilities in the area.

4.1.2 Site Access Impacts

The major site access impact for the Tradewinds-Par 3 alternative is the new patient access point along Kuntz Avenue and opposite of Kokomalei Street, which changes the "T"-intersection to a four-legged intersection. This addition would increase the complexity of this intersection and require the addition of a westbound median left-turn lane on Kuntz Avenue. Staff would be directed to McClelland Street and McChord Street for access to the surface parking lots, increasing the congestion at the intersections of these roadways with Kuntz Avenue.

4.1.3 Intersection Operational Impacts

As shown in Table 3-8, the Tradewinds-Par 3 alternative will primarily impact the McClelland Street and Kokomalei Street intersections on Kuntz Avenue. Additional traffic approaching the site from the west along Kuntz Avenue increases the delay experienced by vehicles exiting from the north-south streets such as Kokomalei Street. The increased delay would inhibit the patient and staff of the ACC departing from the proposed facility. As detailed in Table 3-8, the left-turn movement from McClelland Street and Kokomalei Street are projected to operate at LOS F during the peak periods.

As documented in Section 3.6, both the McClelland Street and Kokomalei Street intersections with Kuntz Avenue would satisfy Warrant 3, Peak Hour from Chapter 4C, *Traffic Control Signal Needs Studies* in the MUTCD (USDOT 2009) suggesting signalization as a potential mitigating action.

4.1.4 Roadway Impacts

The Tradewinds-Par 3 alternative would impact the surrounding roadways with the introduction of the additional leg at the Kuntz Avenue and Kokomalei Street intersection. This addition of this leg would also involve the addition of a left-turn lane into the proposed ACC site. However, Kuntz Avenue currently has sufficient width to add a new left-turn lane. Between Kokomalei Street and McChord Street is a painted median separating the two travel lanes opposite of the two left-turn lanes at their respective intersections with Kuntz Avenue. Part of this median could be converted into a new left-turn lane for this alternative.

4.1.5 Pedestrian and Bicycle Impacts

The installation of the proposed ACC would not affect existing sidewalks and could potentially improve sidewalk coverage in the vicinity of the proposed Tradewinds-Par 3 site. Signalization of the Kuntz Avenue/Kokomalei Street and Kuntz Avenue/McClelland Street intersections has the potential to increase safety for pedestrians crossing Kuntz Avenue.

The Tradewinds-Par 3 alternative would have minimal impacts on the bicycle facilities. As stated in Section 2.3.1.2, there are no existing bicycle facilities along Kuntz Avenue. The JBPHH Installation Development Plan (IDP) identifies plans for a marked bike lane along Kuntz Avenue and shared bike lanes along McClelland Street, Mountain Home Street, and McChord Street. According to the JBPHH IDP, a moderate shared bike lane is defined as a portion of the roadway within the shoulder that has been designated for shared use between bicycles and street parking. The installation of the proposed ACC at this site should not impact the potential for these planned bicycle lanes to be installed in the future.

4.1.6 Public Transit Impacts

The Tradewinds-Par 3 site alternative would not have a large impact on the public transit facilities. The roadway impacts would not impact TheBus or the NEX shuttle services. It is also compatible with bus stop locations in the vicinity (Stops No. 923, 924, and 965).

4.2 Kuntz Gate Site Alternative

The conceptual site plan for the Kuntz Gate alternative that was used for this analysis is illustrated on Figure 3-2. The site plan shows the general conceptual location of the clinic building, parking facilities, and pedestrian and vehicle circulation.

4.2.1 Internal Circulation and Parking Impacts

The vehicular circulation for the Kuntz Gate site proposes that patients and approximately half of the staff would enter at the Halehaka Street/20th Street intersection while the other half of the staff would enter at a newly created access on Kuntz Avenue, east of Halehaka Street. The patient vehicles would need to be able to drop off and pick up at the front of the clinic while still providing convenient access to the parking garage.

Half of the staff would need to cross Halehaka Street to access the ACC from the surface lot to the west of Halehaka Street. The remaining staff would approach the ACC from the east without crossing the roadway.

The Kuntz Gate alternative would also partially displace an existing parking area, but similar to the Tradewinds-Par 3 alternative, there are several other parking areas in the vicinity that could be used for the other facilities.

4.2.2 Site Access Impacts

The Kuntz Gate alternative would have two access points. The primary site access would be located on Halehaka Street at the existing 20th Street intersection. The staff would access the surface parking lot at 20th Street, to the west of Halehaka Street. The second access into the site would be located on Kuntz Avenue approximately 800 feet from the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection. It would provide access to a second surface parking lot for the staff. The existing driveways on Halehaka Street located immediately north of Kuntz Avenue would be closed.

4.2.3 Intersection Operational Impacts

As shown in Table 3-9, the Kuntz Gate site alternative would affect the Kuntz Avenue/Halehaka Street/Kamakahi Street intersection. The increase of peak period traffic volumes with the addition of the ACC-generated traffic would cause measurable increases in delay for the Halehaka Street and Kamakahi Street approaches. Both approaches are calculated to operate at LOS F during the morning peak hour with large delays.

As mentioned in Section 3.6, the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection is projected to satisfy MUTCD Warrant 3, Peak Hour based on the additional traffic generated by the proposed JBPHH-ACC which suggests that signalization could be a mitigation measure.

4.2.4 Roadway Impacts

For the Kuntz Gate alternative, the majority of the roadway improvements would occur around the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection and the new access point from Kuntz Avenue into the surface parking lot area. The Kuntz Avenue and Halehaka Street/Kamakahi Street intersection would need to be modified to mitigate the increase in delay at that intersection.
The segments along Kuntz Avenue east of Halehaka Street and a portion of Kamakahi Street would need to be widened to accommodate a median left-turn lane for traffic turning into the proposed staff parking lot to the east.

4.2.5 Pedestrian and Bicycle Impacts

The Kuntz Gate alternative would have no adverse impacts on the pedestrian facilities and could enhance the existing facilities. On Halehaka Street, north of Kuntz Avenue where the proposed ACC would be located, there is currently no existing sidewalk. The addition of the ACC could provide the opportunity to add a sidewalk for pedestrian circulation around the site. The potential for a signalized Kuntz Avenue/Halehaka Street/Kamakahi Street intersection could also increase pedestrian crossing safety.

The Kuntz Gate alternative also would have no impact on the bicycle facilities because there are no bicycle facilities in the vicinity of the site. According to the JBPHH IDP, there are current plans for a marked bicycle lane along Kuntz Avenue and Halehaka Street. There are plans for a moderate shared bike lane along Kamakahi Street. The installation of the proposed ACC and the modifications to the roadway are not expected to prevent the implementation of these bicycle facilities in the future.

4.2.6 Public Transit Impacts

The Kuntz Gate site alternative would not impact TheBus and NEX shuttle services. Near the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection on the westbound Kuntz Avenue approach is a bus stop (Stop No. 921) approximately 50 feet from the intersection. Depending on the modifications to the roadway and site, it may need to be relocated.

4.3 Bloch Arena Site Alternative

The Bloch Arena alternative conceptual site plan is shown on Figure 3-3. The site plan shows the general conceptual location of the clinic building, parking facilities, and pedestrian and vehicle circulation.

4.3.1 Internal Circulation and Parking Impacts

In the Bloch Arena site alternative, the vehicular and pedestrian circulation would all occur on one parcel without the need to cross any of the surrounding roadways after accessing the site. Due to the location of the patient parking garage, pedestrians may need to cross the path of traffic entering/exiting the site via the main driveway.

The parking impacts would involve the loss of the surface parking for the Bloch Arena. The ACC and its parking facilities would encompass most of the existing surface lot that is currently used by the Bloch Arena and its surrounding facilities.

4.3.2 Site Access Impacts

To access the proposed ACC on the Bloch Arena site, a new access would need to be created opposite of the Pearl Harbor Boulevard intersection. This new access would change the intersection from a "T"-intersection to a four-legged intersection. This access is critical in the operation of the ACC as it provides the path for both the patients and staff parking facilities on the site. Another access would also be created along Battleship Drive that the staff may use to enter and exit from the surface parking areas.

4.3.3 Intersection Operational Impacts

As shown in Table 3-10, this alternative would have operational impacts to traffic along North Road, exiting the ACC driveway, and exiting Battleship Drive.

With an unsignalized intersection at North Road and Battleship Drive, the turning movement from Battleship Drive to North Road remains at LOS F and worsens during the PM peak hour. As discussed in Section 3.6, the North Road and Battleship Drive intersection is projected to satisfy requirements for Warrant 3, Peak Hour from the Chapter 4C, *Traffic Control Signal Needs Studies* in the MUTCD (USDOT 2009), which suggests that a signal could be installed as potential mitigation at this location.

At the North Road/Pearl Harbor Boulevard intersection, it was projected that specific turning movements into and exiting the proposed ACC site would encounter delay with the current configuration of North Road. As an example, the southbound left-turn movement on North Road into the proposed ACC site operates at LOS F during the AM peak hour, which are shown in the Synchro analysis worksheets in Appendix C. This suggests that physical roadway geometric changes may be needed to address this issue.

4.3.4 Roadway Impacts

The roadway impacts for the Bloch Arena site alternative involve the modification of North Road and potentially Pearl Harbor Boulevard. With the addition of a leg at the North Road and Pearl Harbor Boulevard intersection, North Road would need to be widened to accommodate the southbound left-turn lane for traffic turning into the proposed ACC site.

4.3.5 Pedestrian and Bicycle Impacts

Changes in traffic control at the North Road intersections at Pearl Harbor Boulevard and Battleship Drive may require modifications to existing crosswalk locations and operations. The potential addition of a traffic signal at the Battleship Drive intersection would be considered as an improvement in pedestrian crossing safety.

The Bloch Arena site alternative would have minimal impacts to the bicycle facilities. As discussed in Section 2.3.1.2, there are no existing bicycle facilities in the vicinity and bicyclists currently share the road with vehicles. The JBPHH IDP indicates that there are plans to install marked bike lanes in the vicinity of the site along North Road and Pearl Harbor Boulevard. Roadway improvements for this alternative would not prevent the installation of marked bike lanes in the future.

4.3.6 Public Transit Impacts

The Bloch Arena site alternative would have a limited impact on either TheBus or the NEX shuttle services. The proposed ACC location is compatible with the existing bus stop north of Battleship Drive (Stop No. 4277).

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5 Recommended Actions to Mitigate Transportation Impacts

5.1 Overview of Recommended Actions

This TIAR identified transportation impacts associated with three alternative sites for the ACC: Bloch Arena, Tradewinds-Par 3, and Kuntz Gate site alternatives. The addition of additional traffic associated with the ACC created a need for recommended improvements at all three site alternative locations. These improvements ranged from restriping of the roadway to new traffic signals and roadway widening. The following writeup provides an overview of recommended improvements to mitigate projected transportation impacts.

5.1.1 Site Access

Tradewinds-Par 3 site access is proposed to be located opposite existing Kokomalei St at its intersection with Kuntz Ave. This would require the modification of the existing "T"-intersection to a four-legged intersection. Access to the staff parking lots would be through McClelland St and McChord St.

The Kuntz Gate site main access is proposed on the east leg of the Halehaka St/20th St intersection. Access to one of the two staff parking lots would use the west leg of this intersection. Access to the other staff parking lot would be directly from Kuntz Ave between the Halehaka/Kamakahi intersection and Kunz Gate.

The Bloch Arena site access is proposed to be located opposite existing Pearl Harbor Blvd at its intersection with North Rd. This would require modifying the existing "T"-intersection to a four-legged configuration to accommodate the ACC driveway. Traffic signal equipment and operational modifications would also be required to provide acceptable traffic operations. Secondary access for the staff parking lot is proposed from Battleship Dr.

5.1.2 Internal Circulation and Parking

The Tradewinds-Par 3 site contains all patient circulation within the primary site, but staff would need to cross McClelland Street and Mountain Home Street to access the ACC.

The Kuntz Gate site, patients would be contained on site. Staff that park in the proposed lot north of Halehaka St would need to cross Halehaka St to access the ACC. Staff that park in the proposed lot directly accessed from Kuntz Ave would access ACC directly.

The Bloch Arena site circulation would require patients and staff to only cross internal driveways, since the entire site is proposed to be contained within a block bounded by non-site roadways.

All alternatives displace existing parking lots, but the Tradewinds-Par 3 and Kuntz Gate site alternatives have vacant nearby parking that has the potential to be reassigned to accommodate the displaced existing parking. The Bloch Arena site displaces the existing Bloch Arena parking and there would need to be a discussion of how to replace that parking. One potential idea is to construct a larger parking garage that would serve both ACC and Bloch Arena uses. Intersection Operations

Intersections at all three sites are recommended for traffic signalization or traffic signal modification. The Tradewinds-Par 3 site requires signalization of the McClelland St and Kokomalei St intersections on Kuntz Ave. Additionally, left-turns into McClelland St and right turn out of McClelland St are recommended to be prohibited to reduce traffic delay on McClelland and to allow maximization of the EB median left-turn lane length on Kuntz Ave at Kokomalei Street.

The Kuntz Gate site traffic impacts require a new traffic signal at the Kuntz Ave/Halehaka St/Kamakahi St intersection. It is noted that actions recommended at the Tradewinds-Par 3 site can mitigate the operational issues identified along the Kuntz Ave corridor. Actions recommended at the Kuntz Gate site mitigate the issues identified at the Kuntz Gate site but do not mitigate traffic impacts on Kuntz Ave further west on Kuntz Ave. These operational issues are currently considered in this TIAR as negative consequences of the Kuntz Gate site alternative.

The Bloch Arena site traffic impacts require signal modifications on North Road at the Pearl Harbor Blvd intersection and a new traffic signal at the Battleship Dr intersection.

5.1.3 Roadway Impacts

The Tradewinds-Par 3 site would require restriping of the existing painted median to add a westbound left-turn lane into the proposed ACC driveway and to lengthen the existing EB left-turn lane at the Kuntz Ave/Kokomalei St intersection.

The Kuntz Gate site would require widening of Kuntz Ave between the Halehaka/Kamakahi intersection and Kuntz Gate to accommodate a new eastbound median left-turn lane into the new staff parking lot access. This widening would be approximately 1,050 feet long. Additionally, Halehaka St is recommended to be widened between 20th Street and Kuntz Ave to accommodate separate southbound left-through and right-turn lanes. This widening would be approximately 260 feet long.

The Bloch Arena site requires widening of one northbound lane in North Road from Nimitz Gate to the Fitness Center Driveway located north of Battleship Drive. The widening would accommodate a median left-turn into the proposed ACC driveway at the Pearl Harbor Blvd intersection while maintaining two northbound through lanes on North Road. The total distance of this widening is approximately 1,500 feet.

5.1.4 Pedestrian and Bicycle

The Tradewinds-Par 3 and Kuntz Gate sites could potentially enhance the pedestrian facilities if a traffic signal is implemented by providing an opportunity for a signalized crossing across Kuntz Avenue.

The Bloch Arena site alternative would primarily affect the existing crosswalks across North Road at the Pearl Harbor Boulevard and Battleship Drive intersections. With the intersection being updated and the site-generated traffic traveling in and out of those intersections, it may be desirable to relocate the crosswalk to enhance pedestrian safety. Signalization of the North Road/Battleship Drive intersection has the potential to increase pedestrian crossing safety.

While there are no existing bicycle facilities on roadways in the vicinity of the proposed ACC sites, modifications and improvements are not expected to prevent the implementation of bicycle facility improvements in the future.

5.1.5 Public Transit

No actions are required for the Tradewinds/Par 3 site. The recommended widening of Kuntz Ave between the Halehaka/Kamakahi intersection and Kuntz Gate will require minor relocation of Bus Stop 921.

Only minor transit stop modifications are required. The recommended widening of North Rd would require minor relocation of Bus Stop 4277 located north of Battleship Drive.

5.1.6 Conceptual Order of Magnitude Costs of Recommended Mitigation Measures

Table 5-1 summarizes recommended actions to mitigate projected transportation impacts for each of the site alternatives. Rough order of magnitude (ROM) conceptual costs were developed for the recommended mitigation measures for each site alternative and are included in Table 5-1. Appendix H contains more details itemization of the ROM costs for each alternative site.

Table 5-1 Recommended Mitigation Actions for Each Site Alternative

Impact	*Alternative Sites*		
	Tradewinds-Par 3	***Kuntz Gate***	***Bloch Arena***
Internal Circulation and Parking	Provide pedestrian crossings on McClelland St between staff parking lot and ACC and on Mountain Home St between staff parking lot and ACC. Appropriate vacant parking areas for displaced existing parking.	Provide pedestrian crossing on Halehaka St between staff parking lot and ACC. Appropriate additional parking on sites near ACC for parking displaced by staff parking lot.	Provide pedestrian crossing on main ACC driveway between staff parking lot and ACC. Explore options for replacing existing Bloch Arena parking displaced by ACC site.
Site Access	Add additional leg at Kuntz Ave/ Kokomalei St intersection for new ACC access driveway. Staff parking lots accessed via McClelland St and McChord St.	Main access for ACC at east leg of Halehaka St/20th St intersection. Staff parking lot access at west leg of Halehaka St/20 St intersection and second staff parking lot access directly from Kuntz Ave, east of Halehaka St/Kamakahi St/Kuntz Ave intersection.	Add additional leg at North Rd/Pearl Harbor Blvd intersection for new ACC access driveway. Provide secondary access to staff parking lot from Battleship Dr.
Intersection Operations	Signalize McClelland St and Kokomalei St intersections on Kuntz Ave. Prohibit left turn into and right turn out of McClelland St at Kuntz Ave.	Signalize Kuntz Ave/Halehaka St/Kamakahi St intersection.	Modify North Rd/Pearl Harbor Blvd intersection into split-phase operation for Pearl Harbor Blvd-ACC approaches. Signalize North Rd/Battleship Dr intersection.
Roadway	Restripe painted median on Kuntz Ave to provide WB left-turn lane and to extend EB left-turn lane at Kokomalei St.	Widen Kuntz Ave approximately 1,050 feet between Halehaka St/ Kamakahi St intersection and Kuntz Gate to provide median left-turn lane into proposed ACC staff parking driveway. Widen Halehaka St approximately 260 feet between Kuntz Ave and 20th St to provide separate SB left/through and right turn lanes.	Widen northbound North Rd one lane between Nimitz Gate and Entrance to Fitness Center Driveway approximately 1,500 feet to provide exclusive NB and SB left-turn lanes at Pearl Harbor Blvd/ACC Access and SB left-turn lane at Battleship Dr.
Pedestrian	Enhance facilities with signalized crossing at traffic signal.	Enhance facilities with signalized crossing at traffic signal and sidewalk north of Kuntz Ave in vicinity of site.	Relocate crosswalk from south leg to north leg of North Rd/ Battleship Dr intersection.

Table 5-1 Recommended Mitigation Actions for Each Site Alternative

Impact	*Alternative Sites*		
	Tradewinds-Par 3	*Kuntz Gate*	*Bloch Arena*
Bicycle	Continue shared bike operation	Continue shared bike operation	Continue shared bike operation
Public Transit	No changes.	Maintain Stop No. 921.	Maintain Stop No. 4277.
ROM Costs for Recommended Mitigations*	$1,150,000	$1,860,000	$2,600,000

Notes:
* ROM costs for gate modifications are not included in the totals. For details on ROM cost estimates, see Appendix H of this TIAR.
ACC = Ambulatory Care Center
Ave = avenue
Blvd = boulevard
Dr = drive
EB = eastbound
No. = number
Rd = road
ROM = rough order of magnitude
St = street
WB = westbound

5.2 Description of Recommended Improvements

The following describes the recommended improvements in more detail.

5.2.1 Tradewinds-Par 3 Site

The following recommendations are for the Tradewinds-Par 3 site:

- Modifications at the Kuntz Avenue and Kokomalei Street intersection:
  - Convert the existing median striping into a left-turn lane for the Kuntz Avenue westbound traffic into the proposed site.
- Prohibit the left turns into McClelland Street from Kuntz Avenue:
  - Convert the existing westbound left-turn lane into additional storage length for the Kuntz Avenue eastbound left-turn lane at Kokomalei Street.
- Prohibit the right turns out of McClelland Street to Kuntz Avenue.
- Install a new traffic signal at the Kuntz Avenue/Kokomalei Street and Kuntz Avenue/McClelland Street intersections:
  - At the Kuntz Avenue/Kokomalei Street/ACC access driveway intersection, the phasing for the left-turns from Kuntz Avenue to Kokomalei Street and the ACC access driveway should be protected-permissive while the phasing for left-turns from Kokomalei Street and the proposed access should be protected.
- Add a new crosswalk across Kuntz Avenue to the east leg of the signalized Kuntz Avenue/McClelland Street intersection and new crosswalks across Kuntz Avenue at the signalized Kuntz Avenue/Kokomalei Street intersection.

The proposed ACC access driveway opposite of Kokomalei Street would be primarily for patients. A new westbound left-turn lane on Kuntz Avenue would be created by restriping the existing painted median. The existing left-turn lane on the Kokomalei Street approach would be modified to a through/left lane.

Access to the staff parking lot would be accommodated at the McClelland Street and McChord Street intersections on Kuntz Avenue. At the McClelland intersection, westbound left turns would be prohibited to allow lengthening of the eastbound left-turn lane at Kokomalei Street. The left-turns currently using McClelland would be redirected to McChord Street. Right turns from McClelland Street to Kuntz Avenue would also be prohibited and redirected to McChord Street. This action is projected to improve the ability of McClelland Street to handle staff traffic generated by the ACC by distributing ACC staff traffic demand more evenly between McClelland and McChord.

The additional traffic generated by the ACC is projected to allow both McClelland and Kokomalei intersections on Kuntz Avenue to warrant traffic signalization. The installation of new traffic signals at the two intersections would improve the ability of vehicles exiting McClelland Street and Kokomalei Street to access Kuntz Avenue. As shown in Table 3-8, if the intersections remain as STOP-sign controlled, the delay on the left-turning vehicles out of the McClelland Street and the ACC Driveway would be very lengthy. The new traffic signals would reduce this delay and mitigate the operational issue. The two recommended signals are closely spaced and should be coordinated to optimize operation.

The proposed new traffic signals also improve pedestrian safety at these intersections by providing a protected pedestrian crossing of Kuntz Avenue. The addition of a crosswalk to the east side of the signal-controlled intersection would provide pedestrians a signalized crossing across Kuntz Avenue. It is recommended to implement a crosswalk only on the east side of McClelland Street to avoid conflict with the projected traffic volumes turning left out of McClelland.

Table 5-2 details the intersection operation with the mitigation measures implemented at the McClelland Street and Kokomalei Street intersections.

With implementation of the recommended traffic mitigations, the intersections in the vicinity of the Tradewinds-Par 3 site alternative would maintain LOSs acceptable for peak hour conditions.

Table 5-2 Future Intersection Operations for the Tradewinds-Par 3 Alternative with Mitigation Measures

Intersection/ Traffic Movements	*AM Peak Hour Delay (sec/veh)*	*LOS*	*Midday Peak Hour Delay (sec/veh)*	*LOS*	*PM Peak Hour Delay (sec/veh)*	*LOS*
Kuntz Ave/McClelland St*	1.3	A	0.8	A	0.9	A
Kuntz Ave/Kokomalei St*	18.3	B	26.9	C	24.9	C
Kuntz Ave/McChord St						
WB Kuntz Ave LT	8.6	A	8.2	A	8.7	A
McChord St LT/RT	30.8	D	21.3	C	32.4	D
Kuntz Ave/Halehaka St/Kamakahi St						
EB Kuntz Ave LT	8.3	A	8.1	A	7.9	A
Halehaka St LT/TH/RT	31.4	D	22.3	C	28.7	D
WB Kuntz Ave LT	7.7	A	7.8	A	8.4	A
Kamakahi Ave LT/TH/RT	31.7	D	15.6	C	18.6	C

Notes:
* Signalized intersection. LOS is overall LOS.
Ave = avenue
EB = eastbound
LOS = level of service
LT = left-turn
Rd = road
RT = right-turn
sec = seconds
St = street
TH = through
veh = vehicle
WB = westbound

5.2.2 Kuntz Gate Site

The following recommendations for the Kuntz Gate alternative:

- Modify the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection:
    - Provide left-turn lanes along Halehaka Street, Kamakahi Street, and the westbound Kuntz Avenue.
    - Close the existing driveway accesses on Halehaka Street into the existing surface parking lot and the area with the automobile facilities.
- Widen Kuntz Avenue between Halehaka/Kamakahi intersection and Kuntz Gate to accommodate a median eastbound left-turn lane for the proposed ACC staff parking lot driveway. The driveway is proposed to be approximately 800 feet east of the Kuntz Avenue and Halehaka Street/ Kamakahi Street intersection. Total length of the widening would be approximately 1,050 feet.
- Widen Halehaka Street to provide separate southbound through/left and right-turn lanes between Kuntz Avenue and 20th Street. The widening would be approximately 260 feet long.
- Install a new traffic signal at the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection.

- Add sidewalk along the north side of Kuntz Avenue, adjacent to the ACC site.
- Relocate Bus Stop 921 to accommodate the widening of Kuntz Avenue.

The additional traffic generated by the proposed ACC will require modifications to the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection. The Halehaka Street approach would be modified to provide a separate left/through and right-turn lanes. This would require widening Halehaka Street approximately 260 feet between Kuntz Avenue and 20th Street. The Kamakahi Street approach would be widened to provide a left/through lane. The westbound Kuntz Avenue approach would be widened to provide a width for a left-turn lane. The additional traffic generated by the ACC also allows the intersection to warrant a traffic signal and a new traffic signal is recommended. These actions would address the operational issues identified in Table 3-9.

Table 5-3 below summarizes the intersection operations if mitigation measures implemented.

Table 5-3 Future Intersection Operations for the Kuntz Gate Alternative with Mitigation Measures

	AM Peak Hour		*Midday Peak Hour*		*PM Peak Hour*	
Intersection/ Traffic Movements	***Delay (sec/veh)***	***LOS***	***Delay (sec/veh)***	***LOS***	***Delay (sec/veh)***	***LOS***
Kuntz Ave/McClelland St						
WB Kuntz Ave LT	10.1	B	8.9	A	9.1	A
McClelland St LT/RT	47.9	E	30.8	D	57.8	F
Kuntz Ave/Kokomalei St						
EB Kuntz Ave LT	9.1	A	9.4	A	10.8	B
LT from Kokomalei St	82.6	F	37.4	E	55.7	F
RT from Kokomalei St	13.9	B	13.7	B	16.5	C
Kuntz Ave/McChord St						
WB Kuntz Ave LT	9.6	A	8.5	A	8.4	A
McChord St LT/RT	30.8	D	23.2	C	39.2	E
Kuntz Ave/ Halehaka St/Kamakahi St*	32.2	C	32.2	C	32.2	C
Kuntz Ave/Proposed Access						
EB Kuntz Ave LT	8.6	A	0	A	0.0	A
Proposed Access LT/RT	0.0	A	0.0	A	13.3	B

Notes:
* Signalized intersection. LOS is overall LOS.
Ave = avenue
EB = eastbound
LOS = level of service
LT = left-turn
Rd = road
RT = right-turn
sec = seconds
St = street
veh = vehicle
WB = westbound

With implementation of the recommended traffic mitigations, the intersections in the vicinity of the Kuntz Gate site alternative would maintain LOSs acceptable for peak hour conditions.

A driveway to the ACC staff parking lot is recommended at a location approximately 800 feet east of the Kuntz Avenue and Halehaka Street/Kamakahi Street intersection. To accommodate the median left-turn lane for this driveway, Kuntz Avenue is recommended to be widened between Halehaka/Kamakahi and Kuntz Gate.

To provide appropriate pedestrian access a sidewalk on the north side of Kuntz Avenue is recommended.

5.2.3 Bloch Arena Site

The recommendations for the Bloch Arena site are as follows:

- Modify the lane geometry and roadway at the North Road and Pearl Harbor Boulevard intersection:
    - Add a new approach to access the ACC site with a single left-turn lane and a shared through/right-turn lane on the approach to the intersection
    - Widen North Road by approximately 10 feet to add left-turn lanes on both NB and SB approaches. This requires widening North Rd between Pearl Harbor Blvd and the Fitness Center driveway (north of Battleship Dr)
    - On the North Road NB approach, provide a through lane and a shared through/right-turn lane. This requires continuing the North Rd widening south to the Nimitz Gate
    - Modify the existing traffic signal operation to a split-phase operation for the Pearl Harbor Boulevard and ACC Driveway approaches
- Provide secondary access into the staff parking area from Battleship Drive.
- Install a new traffic signal at the North Road/Battleship Drive intersection.
- Relocate the crosswalk across North Road at the Battleship Dr intersection from south of the intersection to north of the intersection.

North Road would need to be widened to add exclusive left-turn lanes at both NB and SB approaches at Pearl Harbor Dr. For the northbound approach, making the existing left/through lane an exclusive left-turn lane would formalize the de-facto operation of this lane during existing peak period conditions. The opposing SB left-turn lane would provide access to the ACC. To provide the required lane transitions and left-turn storage length North Road would need to be widened from Pearl Harbor Dr to the Fitness Center Driveway located north of Battleship Drive, a distance of approximately 700 feet.

The added traffic volume due to the ACC require that two NB lanes be maintained at the NB approach to the North Rd/Pearl Harbor Blvd intersection during the PM peak period. This would require further widening of North Rd between Pearl Harbor Boulevard and Nimitz Gate, a distance of approximately 800 feet.

An additional access point for the staff from Battleship Drive would provide the staff another point of entry into the staff parking lot. Traffic to and from the proposed ACC using the Battleship Drive access would need to be accommodated at the existing North Road/Battleship Drive intersection. The existing unsignalized intersection operates with substantial delay during peak hours for traffic turning left out of

Battleship Drive. With the added traffic from the ACC, this delay is projected to get worse. The added traffic does allow the intersection to satisfy traffic signal warrants, and it is, therefore recommended to install a new traffic signal at this intersection. The installation of a traffic signal is projected to reduce delay to vehicles existing Battleship Drive.

Table 5-4 summarizes intersection operations after these improvements have been implemented.

Table 5-4 Future Intersection Operations for the Bloch Arena Site Alternative with Mitigation Measures

Intersection/ Traffic Movements	*AM Peak Hour*		*Midday Peak Hour*		*PM Peak Hour*	
	Delay (sec/veh)	*LOS*	*Delay (sec/veh)*	*LOS*	*Delay (sec/veh)*	*LOS*
North Rd/Battleship Dr*	13.8	B	10.3	B	17.7	B
North Rd/Pearl Harbor Dr*	14.5	B	34.5	C	36.4	C

Notes:
* Signalized intersection. LOS is overall LOS.
Dr = drive
LOS = level of service
Rd = road
sec = seconds
St = street
veh = vehicle

The recommend traffic signal is also expected to improve safety of pedestrians crossing North Road at Battleship Drive, since they would do so with the protection of a traffic signal phase. In implementing the traffic signal, it is recommended to relocate the existing crosswalk located south of the intersection to north of the intersection to reduce conflicts between vehicles turning out of Battleship Drive and pedestrians crossing North Road.

With implementation of the recommended traffic mitigations, the intersections in the vicinity of the Bloch Arena site alternative would maintain LOSs acceptable for peak hour conditions.

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6 References

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Sherlock, Smith & Adams/Page (SS&A Page). 2019. *AE-0 Planning Study/Joint Base Pearl Harbor-Hickam Ambulatory Care Center Replacement Corrected Final Submittal*. Southerland Page JV. JBPHH HI: Defense Health Agency. October 18.

Transportation Research Board (TRB). 2010. *Highway Capacity Manual 2010*. Washington, DC: Transportation Research Board.

United States Department of Transportation (USDOT). 2009. *Manual on Uniform Traffic Control Devices for Streets and Highways*. Federal Highway Administration. December.

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Appendix A
Turning Movement Count Worksheets

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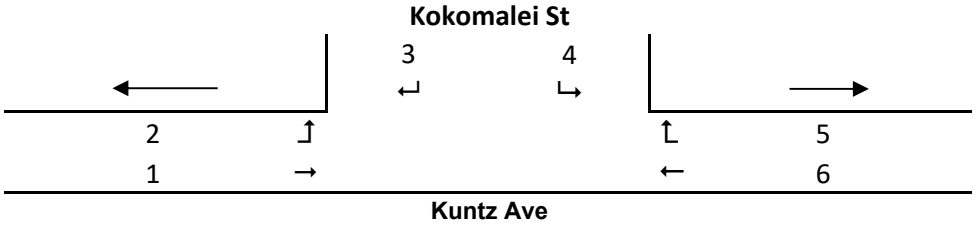
JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Kokomalei St
DATE: 11/19/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: JY

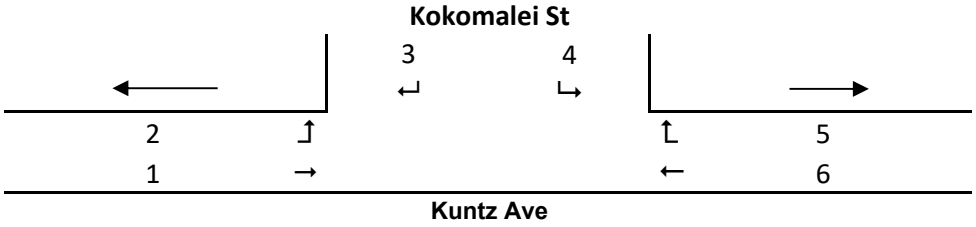


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
6:00-6:15a	65	24	14	2	15	66
6:15-6:30a	37	14	14	2	11	119
6:30-6:45a	37	29	10	8	7	55
6:45-7:00a	41	29	29	3	21	110
7:00-7:15a	43	34	31	7	12	103
7:15-7:30a	38	27	40	3	12	142
7:30-7:45a	79	32	46	6	16	122
7:45-8:00a	97	41	23	11	10	57
Peak Hour: 7:00-8:00a	257	134	140	27	50	424

Notes: Was pulled over around 7:55 AM to talk with the military police

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Kokomalei St
DATE: 11/19/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: JY

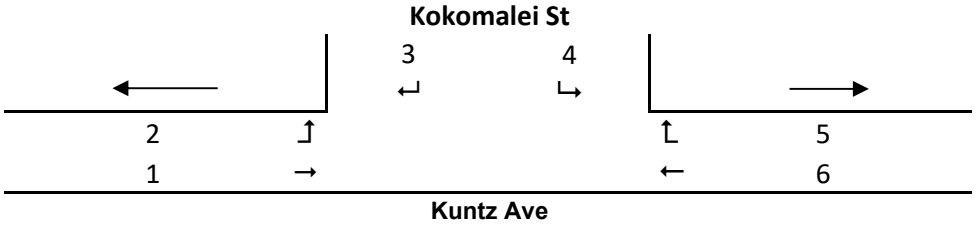


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
11:00-11:15a	73	54	21	4	18	122
11:15-11:30a	97	48	18	6	12	93
11:30-11:45a	80	50	17	10	14	108
11:45-12:00p	75	38	32	10	16	118
12:00-12:15p	66	29	24	2	19	85
12:15-12:30p	68	43	25	8	16	100
12:30-12:45p	70	38	28	2	9	97
12:45-1:00p	58	27	17	4	9	107
Peak Hour: 12:00p-1:00p	262	137	94	16	53	389

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Kokomalei St
DATE: 11/19/2019
TIME: 2:00-4:00p
WEATHER: Cloudy/Rain
RECORDER: JY

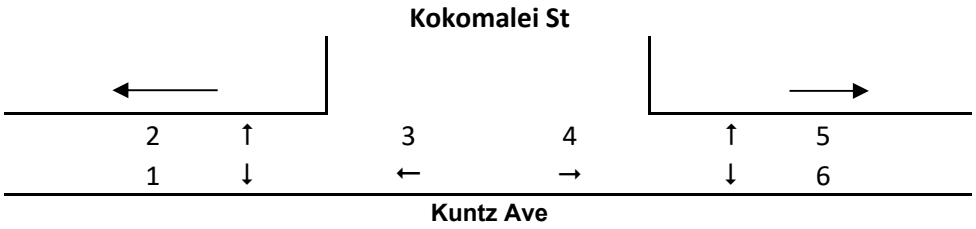


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
2:00-2:15p	56	23	18	7	15	83
2:15-2:30p	50	41	20	8	13	87
2:30-2:45p	65	41	18	7	13	135
2:45-3:00p	76	34	16	4	13	106
3:00-3:15p	86	51	14	3	9	74
3:15-3:30p	186	34	19	4	10	57
3:30-3:45p	112	49	22	4	17	131
3:45-4:00p	80	38	19	4	7	105
Peak Hour: 3:00-4:00p	464	172	74	15	43	367

Notes: Began raining around 2:45 PM and continued until the end of the counts.

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/Kokomalei St
DATE: 11/19/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: JY

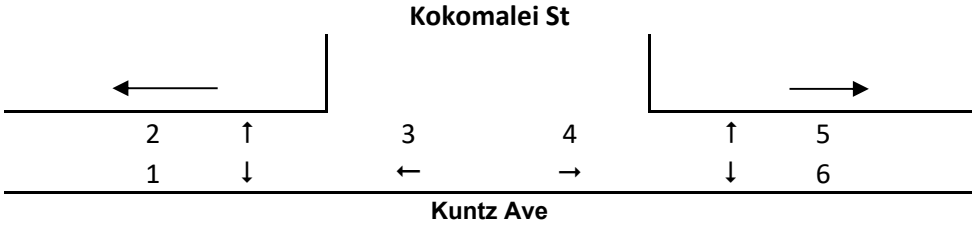


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
6:00-6:15a	0	0	0	1	0	0
6:15-6:30a	0	0	4	3	0	0
6:30-6:45a	0	0	1	0	0	0
6:45-7:00a	0	0	0	1	0	0
7:00-7:15a	0	0	1	2	0	0
7:15-7:30a	0	0	0	0	0	0
7:30-7:45a	0	0	2	0	0	0
7:45-8:00a	0	0	0	0	0	0
Peak Hour: 7:00-8:00a	0	0	3	2	0	0

Notes: Was pulled over around 7:55 AM to talk with the military police

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/Kokomalei St
DATE: 11/19/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: JY

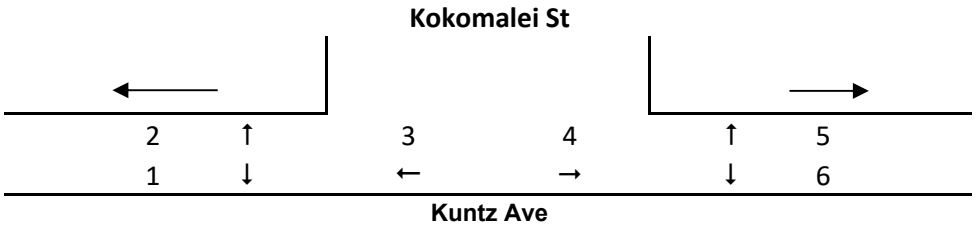


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
11:00-11:15a	0	0	0	0	0	0
11:15-11:30a	0	0	0	0	0	0
11:30-11:45a	0	0	0	0	0	0
11:45-12:00p	0	0	1	1	0	0
12:00-12:15p	0	0	1	0	0	0
12:15-12:30p	0	0	0	0	0	0
12:30-12:45p	0	0	0	0	0	0
12:45-1:00p	0	0	0	0	0	0
Peak Hour: 12:00p-1:00p	0	0	1	0	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/Kokomalei St
DATE: 11/19/2019
TIME: 2:00-4:00p
WEATHER: Cloudy/Rain
RECORDER: JY

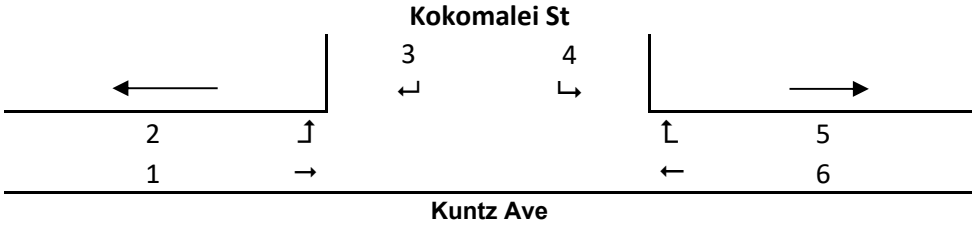


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
2:00-2:15p	0	0	0	1	0	0
2:15-2:30p	0	0	0	0	0	0
2:30-2:45p	0	0	0	0	0	0
2:45-3:00p	0	0	0	0	0	0
3:00-3:15p	0	0	0	0	0	0
3:15-3:30p	0	0	0	0	0	0
3:30-3:45p	0	0	0	0	0	0
3:45-4:00p	0	0	0	1	0	0
Peak Hour: 3:00-4:00p	0	0	0	1	0	0

Notes: Began raining around 2:45 PM and continued until the end of the counts.

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Kokomalei St
DATE: 11/19/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: JY

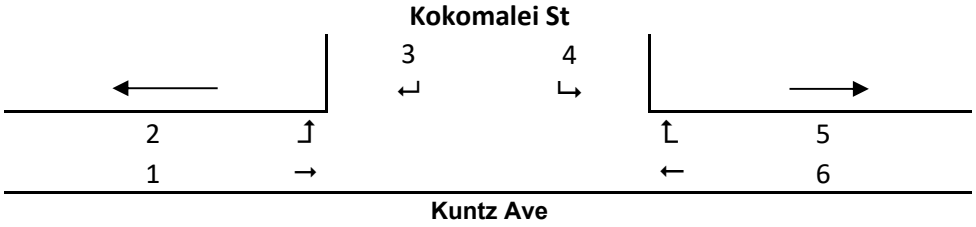


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
6:00-6:15a	0	0	0	0	0	0
6:15-6:30a	0	0	1	0	0	1
6:30-6:45a	0	0	0	0	0	1
6:45-7:00a	0	0	0	0	0	0
7:00-7:15a	0	0	0	0	0	2
7:15-7:30a	0	0	0	0	0	0
7:30-7:45a	0	0	0	0	0	0
7:45-8:00a	0	0	0	0	0	0
Peak Hour: 7:00-8:00a	0	0	0	0	0	2

Notes: Was pulled over around 7:55 AM to talk with the military police

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Kokomalei St
DATE: 11/19/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: JY

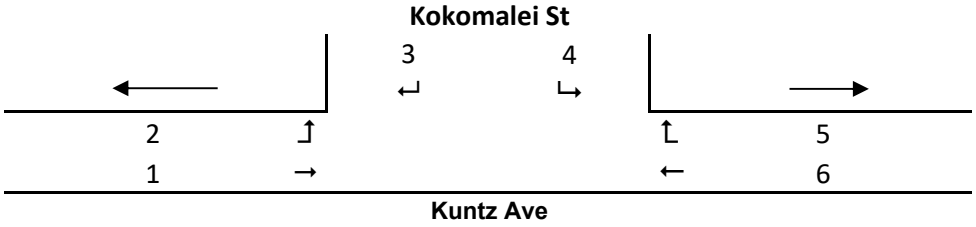


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
11:00-11:15a	0	0	0	0	0	0
11:15-11:30a	0	0	0	0	0	0
11:30-11:45a	1	0	0	0	0	1
11:45-12:00p	1	0	0	0	0	0
12:00-12:15p	0	0	0	0	0	0
12:15-12:30p	0	0	0	0	0	0
12:30-12:45p	0	0	0	0	0	0
12:45-1:00p	0	0	0	0	0	1
Peak Hour: 12:00p-1:00p	0	0	0	0	0	1

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Kokomalei St
DATE: 11/19/2019
TIME: 2:00-4:00p
WEATHER: Cloudy/Rain
RECORDER: JY

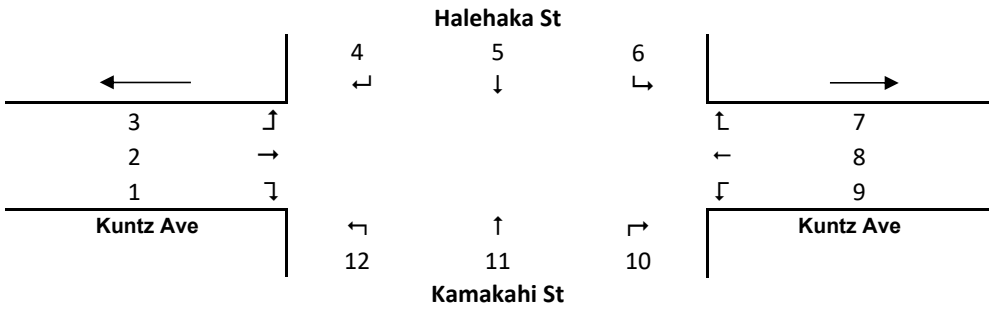


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
2:00-2:15p	0	0	0	0	0	0
2:15-2:30p	0	0	0	0	0	0
2:30-2:45p	0	0	0	0	0	0
2:45-3:00p	0	0	0	0	0	0
3:00-3:15p	1	0	0	0	0	0
3:15-3:30p	0	0	0	0	0	0
3:30-3:45p	0	0	0	0	0	1
3:45-4:00p	1	1	1	0	0	0
Peak Hour: 3:00-4:00p	2	1	1	0	0	1

Notes: Began raining around 2:45 PM and continued until the end of the counts.

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Halehaka St
DATE: 11/19/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: WYY

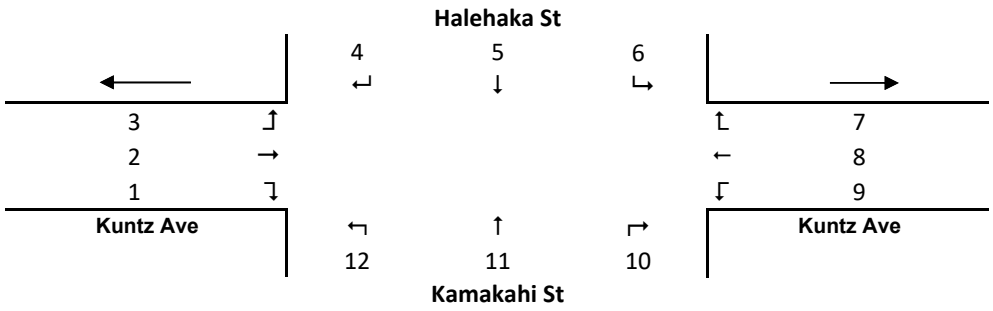


TIME PERIOD	MOVEMENT NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
6:00-6:15a	32	4	8	12	5	1	0	47	20	1	0	4
6:15-6:30a	25	5	2	20	4	6	2	41	10	4	0	28
6:30-6:45a	9	7	7	9	1	3	1	13	9	0	1	2
6:45-7:00a	15	15	6	27	4	20	4	38	14	2	2	13
7:00-7:15a	15	13	4	29	4	18	8	31	15	8	2	11
7:15-7:30a	8	14	6	58	7	34	6	38	12	9	3	21
7:30-7:45a	26	15	3	50	10	26	13	43	12	1	4	19
7:45-8:00a	29	24	14	18	4	12	16	24	17	5	1	9
Peak Hour: 7:00-8:00a	78	66	27	155	25	90	43	136	56	23	10	60

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Halehaka St
DATE: 11/19/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: WYY

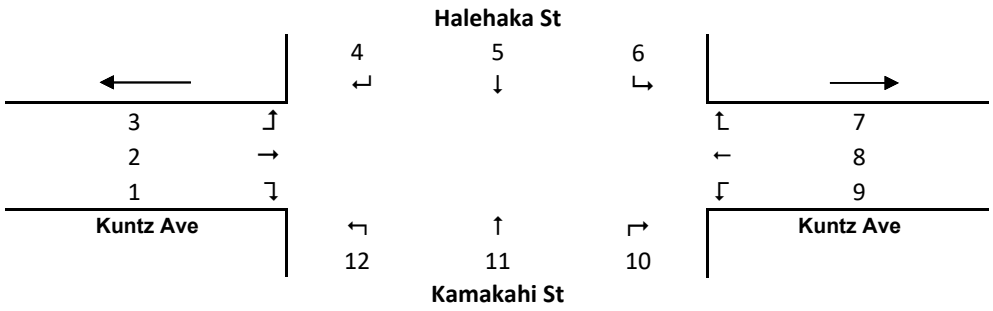


TIME PERIOD	MOVEMENT NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
11:00-11:15a	11	33	13	8	3	14	5	37	3	11	2	20
11:15-11:30a	7	29	24	11	3	5	11	37	7	7	1	12
11:30-11:45a	9	21	22	7	7	6	8	36	7	8	5	28
11:45-12:00p	18	15	16	15	6	9	9	28	7	14	3	24
12:00-12:15p	10	27	16	13	3	4	13	39	10	8	0	19
12:15-12:30p	15	21	20	15	4	2	9	37	10	11	3	20
12:30-12:45p	19	25	10	17	7	7	9	27	9	0	0	14
12:45-1:00p	23	28	11	23	5	9	10	29	11	7	2	7
Peak Hour: 12:00p-1:00p	67	101	57	68	19	22	41	132	40	26	5	60

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Halehaka St
DATE: 11/19/2019
TIME: 2:00-4:00p
WEATHER: Cloudy/Rain
RECORDER: WYY

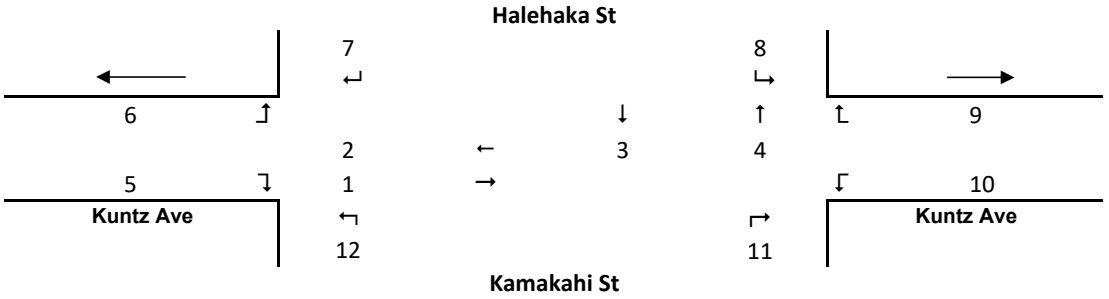


TIME PERIOD	MOVEMENT NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
2:00-2:15p	18	25	12	18	1	13	13	33	3	12	2	28
2:15-2:30p	10	31	10	11	1	11	33	34	3	11	1	17
2:30-2:45p	4	40	12	19	2	10	16	30	0	18	6	20
2:45-3:00p	7	41	16	11	1	9	10	33	5	11	4	13
3:00-3:15p	4	53	20	5	4	12	11	20	10	19	4	20
3:15-3:30p	9	98	13	7	1	7	4	29	7	14	3	10
3:30-3:45p	8	73	21	19	3	4	13	45	0	11	2	18
3:45-4:00p	5	43	18	16	0	5	14	45	2	8	4	13
Peak Hour: 3:00-4:00p	26	267	72	47	8	28	42	139	19	52	13	61

Notes: Began raining around 2:45 PM. Continued until end of counts. Noticed queueing of vehicles around 3:00-3:30 PM on Kuntz Avenue.

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/Halehaka St
DATE: 11/19/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: WYY

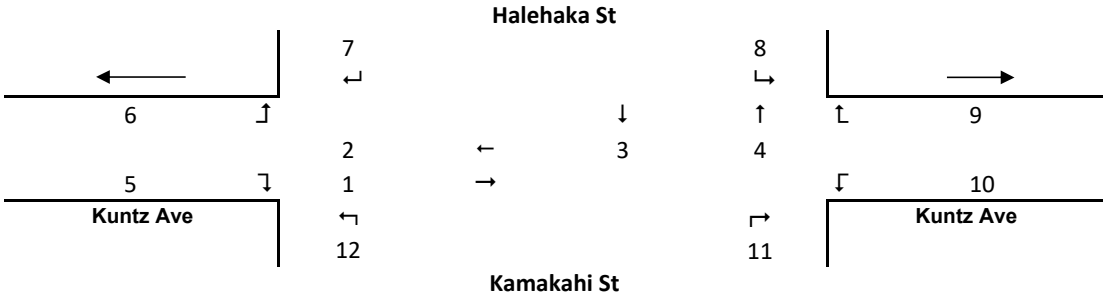


TIME PERIOD	MOVEMENT NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
6:00-6:15a	0	0	0	0	0	0	0	0	0	0	0	0
6:15-6:30a	0	0	0	0	0	0	0	0	0	0	0	0
6:30-6:45a	0	0	0	0	0	0	0	0	0	0	0	0
6:45-7:00a	0	0	1	0	1	0	0	0	0	0	0	0
7:00-7:15a	0	0	0	2	0	0	0	0	0	0	0	0
7:15-7:30a	0	0	0	0	1	0	0	0	0	0	0	0
7:30-7:45a	0	1	0	0	0	0	0	0	0	0	0	0
7:45-8:00a	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour: 7:00-8:00a	0	1	0	2	1	0	0	0	0	0	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/Halehaka St
DATE: 11/19/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: WYY

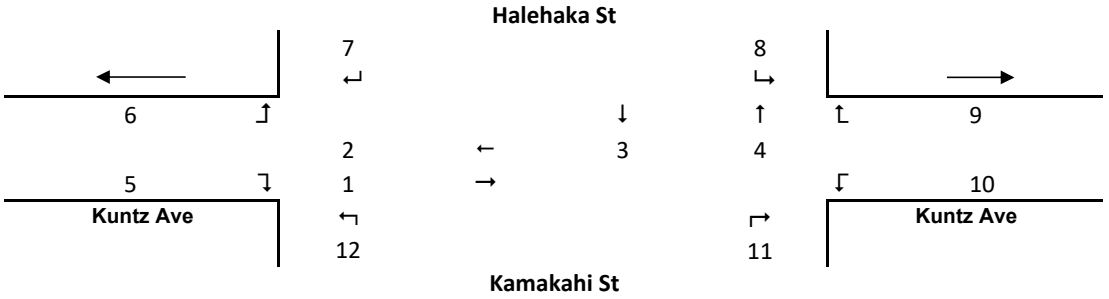


TIME PERIOD	MOVEMENT NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
11:00-11:15a	0	0	0	0	0	0	0	0	0	0	0	0
11:15-11:30a	0	0	0	0	0	0	0	0	0	0	0	0
11:30-11:45a	0	0	0	0	0	0	0	0	0	0	0	0
11:45-12:00p	0	1	0	0	0	0	0	0	0	0	0	0
12:00-12:15p	0	0	0	0	0	0	0	0	0	0	0	0
12:15-12:30p	0	0	0	0	0	0	0	0	0	0	0	0
12:30-12:45p	2	0	0	1	0	0	0	0	0	0	0	0
12:45-1:00p	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour: 12:00p-1:00p	2	0	0	1	0	0	0	0	0	0	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/Halehaka St
DATE: 11/19/2019
TIME: 2:00-4:00p
WEATHER: Cloudy/Rain
RECORDER: WYY

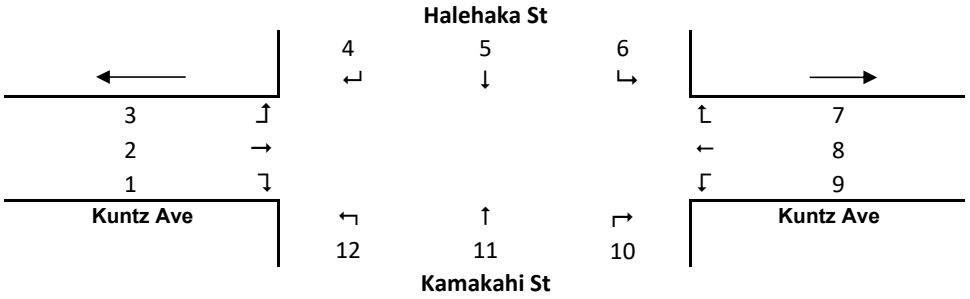


TIME PERIOD	MOVEMENT NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
2:00-2:15p	0	0	0	0	0	0	0	0	0	0	0	0
2:15-2:30p	0	0	0	0	0	0	0	0	0	0	0	0
2:30-2:45p	0	0	0	0	0	0	0	0	0	0	0	0
2:45-3:00p	0	0	0	0	0	0	0	0	0	0	0	0
3:00-3:15p	0	0	0	0	0	0	0	0	0	0	0	0
3:15-3:30p	0	0	0	0	0	0	0	0	0	0	0	0
3:30-3:45p	0	0	0	0	0	0	0	0	0	0	0	0
3:45-4:00p	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour: 3:00-4:00p	0	0	0	0	0	0	0	0	0	0	0	0

Notes: Began raining around 2:45 PM. Continued until end of counts. Noticed queueing of vehicles around 3:00-3:30 PM on Kuntz Avenue.

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Halehaka St
DATE: 11/19/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: WYY

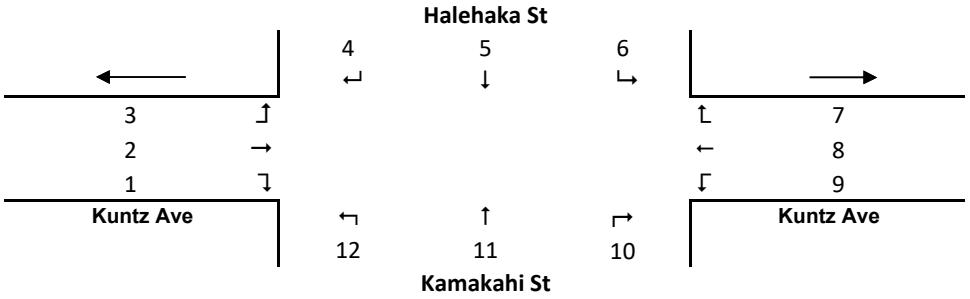


TIME PERIOD	MOVEMENT NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
6:00-6:15a	0	0	0	0	0	0	0	0	0	0	0	0
6:15-6:30a	0	0	0	0	0	0	0	0	0	0	0	0
6:30-6:45a	0	1	0	0	0	0	0	0	0	0	0	0
6:45-7:00a	0	0	0	0	0	0	0	1	0	0	0	0
7:00-7:15a	0	0	0	0	0	0	0	1	1	0	0	0
7:15-7:30a	0	1	0	0	0	0	0	0	0	0	0	0
7:30-7:45a	0	0	0	0	0	0	0	1	0	0	0	0
7:45-8:00a	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour: 7:00-8:00a	0	1	0	0	0	0	0	2	1	0	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Halehaka St
DATE: 11/19/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: WYY

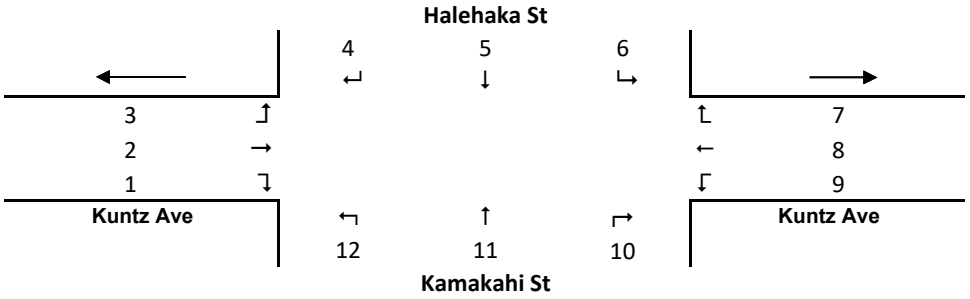


TIME PERIOD	MOVEMENT NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
11:00-11:15a	0	0	0	0	0	0	0	0	0	0	0	0
11:15-11:30a	0	0	0	0	0	0	0	1	0	0	0	0
11:30-11:45a	0	0	0	0	0	0	0	0	0	0	0	0
11:45-12:00p	0	0	0	0	0	0	0	0	0	0	1	0
12:00-12:15p	0	0	0	0	0	0	0	0	0	0	0	0
12:15-12:30p	0	0	0	0	0	0	0	0	0	0	0	0
12:30-12:45p	0	0	0	0	0	0	0	0	0	0	0	0
12:45-1:00p	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour: 12:00p-1:00p	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/Halehaka St
DATE: 11/19/2019
TIME: 2:00-4:00p
WEATHER: Cloudy/Rain
RECORDER: WYY

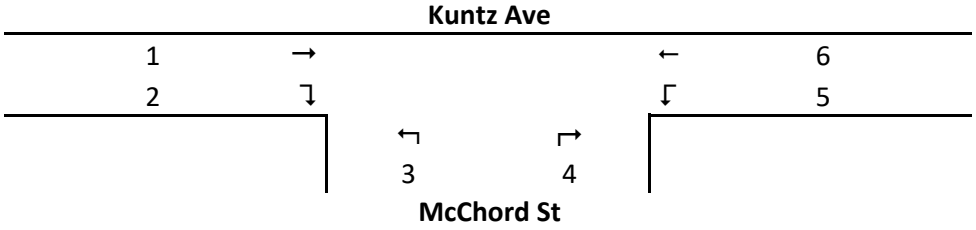


TIME PERIOD	MOVEMENT NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
2:00-2:15p	0	0	0	0	0	0	0	0	0	0	0	0
2:15-2:30p	0	0	0	0	0	0	0	0	0	0	0	0
2:30-2:45p	0	0	0	0	0	0	0	0	0	0	0	0
2:45-3:00p	0	0	0	0	0	0	0	0	0	0	0	0
3:00-3:15p	0	1	0	0	0	0	0	0	0	0	0	0
3:15-3:30p	0	0	0	0	0	0	0	0	0	0	0	0
3:30-3:45p	0	0	0	0	0	0	0	1	0	0	0	0
3:45-4:00p	0	1	0	0	0	0	0	0	0	0	0	0
Peak Hour: 3:00-4:00p	0	2	0	0	0	0	0	1	0	0	0	0

Notes: Began raining around 2:45 PM. Continued until end of counts. Noticed queueing of vehicles around 3:00-3:30 PM on Kuntz Avenue.

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McChord St
DATE: 11/20/2019
TIME: 6:00-8:00a
WEATHER: Clear
RECORDER: JY

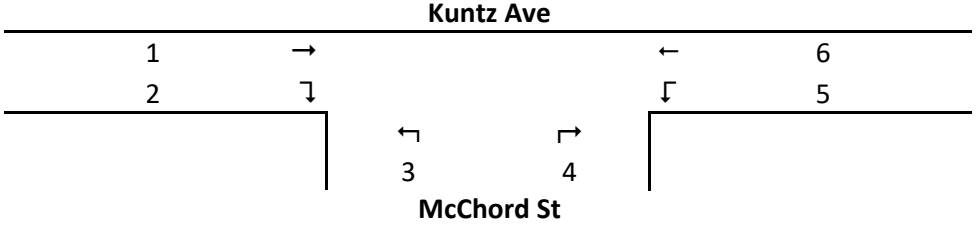


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
6:00-6:15a	39	7	1	0	5	84
6:15-6:30a	43	16	3	1	5	88
6:30-6:45a	42	12	6	0	4	91
6:45-7:00a	39	17	7	0	5	124
7:00-7:15a	58	29	11	2	8	118
7:15-7:30a	56	12	5	0	4	147
7:30-7:45a	100	10	4	1	4	144
7:45-8:00a	108	20	13	2	7	107
Peak Hour: 7:00-8:00a	322	71	33	5	23	516

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McChord St
DATE: 11/19/2019
TIME: 11:15a-1:00p
WEATHER: Clear
RECORDER: JY

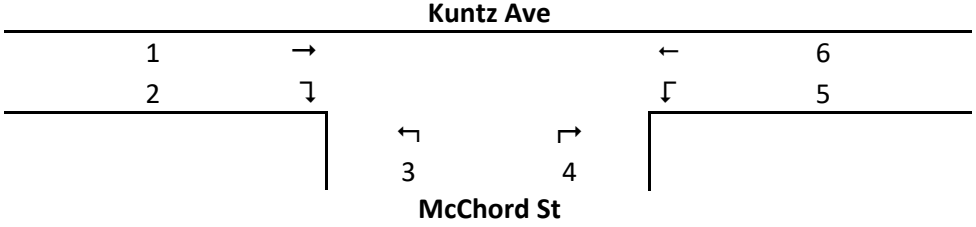


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
11:15-11:30a	54	17	7	2	16	94
11:30-11:45a	65	20	24	3	7	90
11:45-12:00p	69	17	19	3	8	81
12:00-12:15p	52	8	15	1	4	95
12:15-12:30p	52	13	8	7	6	106
12:30-12:45p	73	5	12	0	5	123
12:45-1:00p	67	10	11	0	8	100
Peak Hour: 12:00p-1:00p	244	36	46	8	23	424

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McChord St
DATE: 11/19/2019
TIME: 2:00-4:00p
WEATHER: Clear
RECORDER: JY

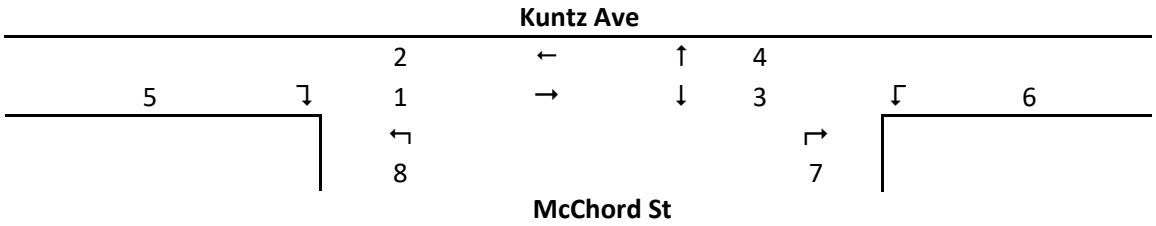


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
2:00-2:15p	64	4	19	0	2	83
2:15-2:30p	47	7	9	2	4	84
2:30-2:45p	57	1	9	1	3	114
2:45-3:00p	65	6	19	5	2	88
3:00-3:15p	93	7	60	6	4	88
3:15-3:30p	105	9	13	1	4	80
3:30-3:45p	61	5	8	1	5	107
3:45-4:00p	32	7	6	0	2	41
Peak Hour: 3:00-4:00p	291	28	87	8	15	316

Notes: Was pulled over to talk to the military police around 3:40 PM

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/McChord St
DATE: 11/20/2019
TIME: 6:00-8:00a
WEATHER: Clear
RECORDER: JY

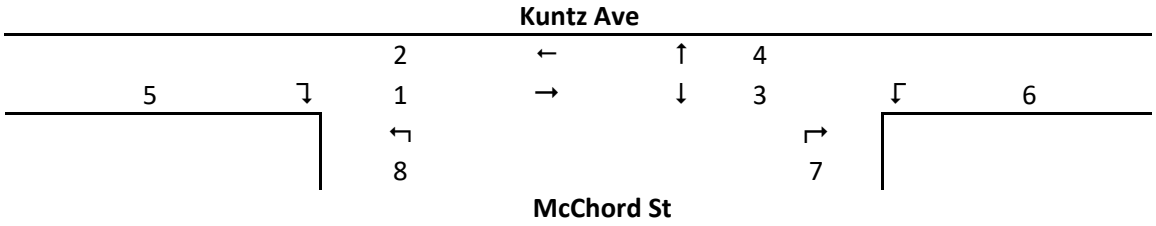


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
6:00-6:15a	0	4	0	0	0	0	0	0
6:15-6:30a	1	3	1	0	0	0	0	1
6:30-6:45a	3	5	1	0	1	0	0	0
6:45-7:00a	1	1	0	0	1	0	0	0
7:00-7:15a	1	1	0	0	0	0	1	0
7:15-7:30a	2	1	0	1	0	6	0	0
7:30-7:45a	1	1	0	0	0	1	0	0
7:45-8:00a	0	0	0	0	0	0	0	0
Peak Hour: 7:00-8:00a	4	3	0	1	0	7	1	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/McChord St
DATE: 11/19/2019
TIME: 11:15a-1:00p
WEATHER: Clear
RECORDER: JY

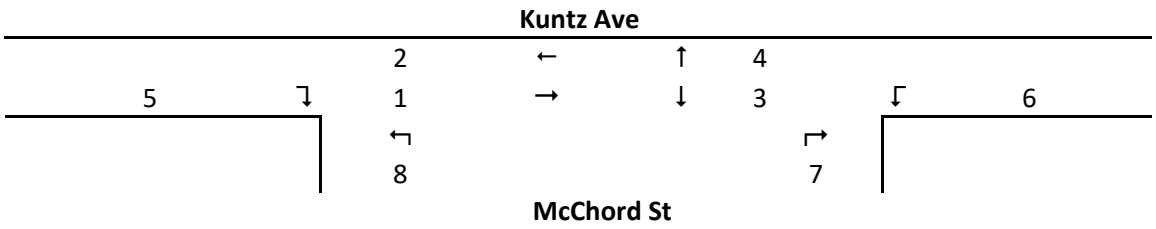


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
11:15-11:30a	0	1	1	0	0	0	0	0
11:30-11:45a	2	1	0	1	0	0	1	0
11:45-12:00p	0	1	1	0	0	0	0	0
12:00-12:15p	0	0	1	2	0	0	0	0
12:15-12:30p	0	1	0	3	0	0	0	0
12:30-12:45p	1	0	0	0	0	0	0	0
12:45-1:00p	0	0	1	0	0	0	0	0
Peak Hour: 12:00p-1:00p	1	1	2	5	0	0	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/McChord St
DATE: 11/19/2019
TIME: 2:00-4:00p
WEATHER: Clear
RECORDER: JY

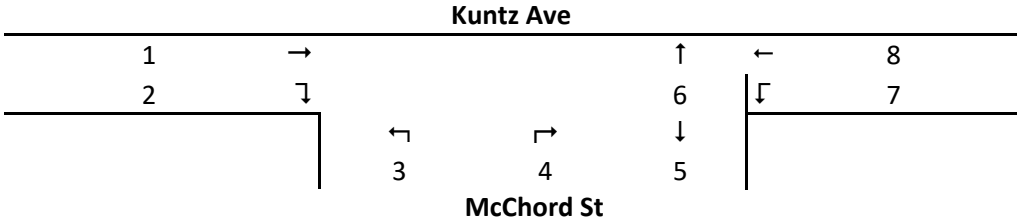


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
2:00-2:15p	0	0	1	4	0	0	0	0
2:15-2:30p	1	1	4	1	0	0	0	0
2:30-2:45p	0	0	0	0	0	0	0	0
2:45-3:00p	0	1	0	0	0	0	0	0
3:00-3:15p	1	1	0	0	0	0	1	0
3:15-3:30p	0	0	0	0	0	0	0	0
3:30-3:45p	0	0	0	0	0	0	0	0
3:45-4:00p	0	1	2	0	0	0	0	0
Peak Hour: 3:00-4:00p	1	2	2	0	0	0	1	0

Notes: Was pulled over to talk to the military police around 3:40 PM

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McChord St
DATE: 11/20/2019
TIME: 6:00-8:00a
WEATHER: Clear
RECORDER: JY

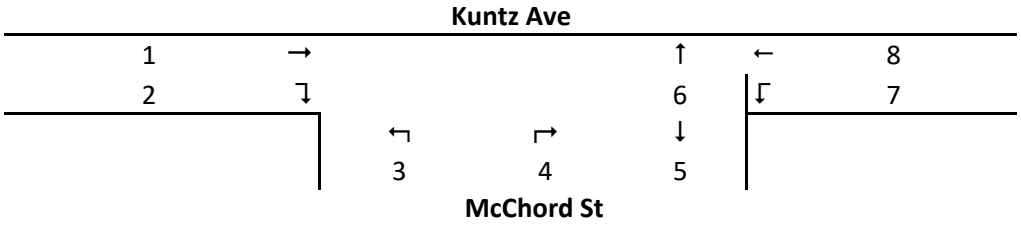


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
6:00-6:15a	0	0	0	0	0	0	0	1
6:15-6:30a	0	0	0	0	0	0	0	0
6:30-6:45a	1	0	0	0	0	0	0	0
6:45-7:00a	0	0	0	0	0	0	0	2
7:00-7:15a	0	0	0	0	0	0	0	1
7:15-7:30a	0	0	0	1	0	1	0	1
7:30-7:45a	0	0	0	0	0	0	0	0
7:45-8:00a	0	0	0	0	0	0	0	1
Peak Hour: 7:00-8:00a	0	0	0	1	0	1	0	3

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McChord St
DATE: 11/19/2019
TIME: 11:15a-1:00p
WEATHER: Clear
RECORDER: JY

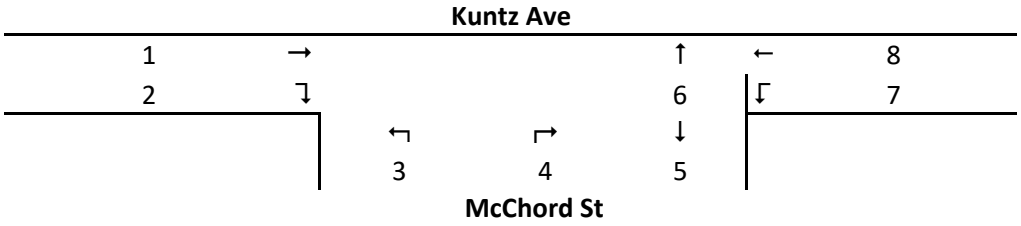


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
11:15-11:30a	0	0	0	0	0	0	0	0
11:30-11:45a	0	0	0	0	0	0	0	0
11:45-12:00p	0	0	0	0	0	0	0	0
12:00-12:15p	0	0	0	0	0	1	0	0
12:15-12:30p	0	0	0	0	1	0	0	0
12:30-12:45p	0	0	0	0	0	0	0	0
12:45-1:00p	0	0	0	0	0	0	0	0
Peak Hour: 12:00p-1:00p	0	0	0	0	1	1	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McChord St
DATE: 11/19/2019
TIME: 2:00-4:00p
WEATHER: Clear
RECORDER: JY

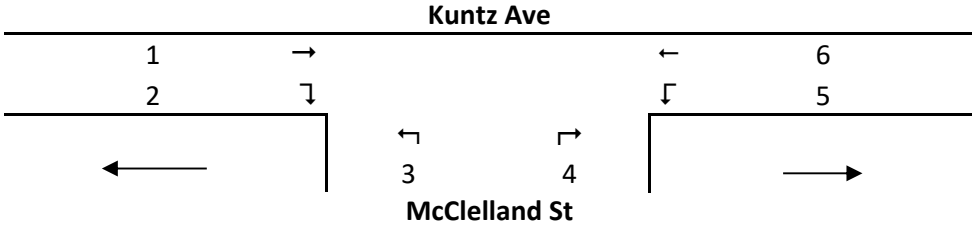


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
2:00-2:15p	0	0	0	0	0	0	0	1
2:15-2:30p	0	0	0	0	0	0	0	0
2:30-2:45p	0	0	0	0	0	0	0	0
2:45-3:00p	0	0	0	0	0	0	0	0
3:00-3:15p	1	0	0	0	0	0	0	0
3:15-3:30p	2	0	0	0	0	0	0	0
3:30-3:45p	2	0	0	0	0	0	0	2
3:45-4:00p	0	0	0	0	0	0	0	0
Peak Hour: 3:00-4:00p	5	0	0	0	0	0	0	2

Notes: Was pulled over to talk to the military police around 3:40 PM

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McClelland St
DATE: 11/20/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: WYY

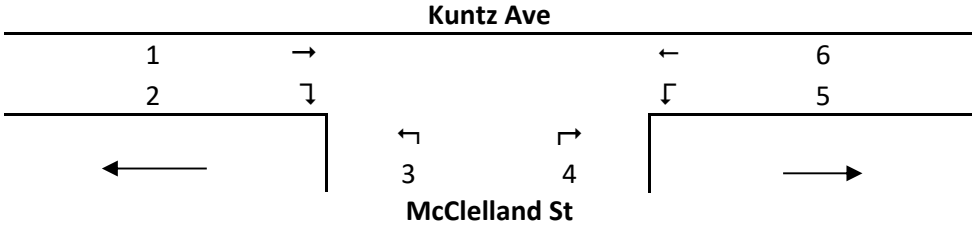


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
6:00-6:15a	55	7	0	0	7	78
6:15-6:30a	56	8	4	4	2	70
6:30-6:45a	59	6	3	0	4	75
6:45-7:00a	77	9	2	0	4	110
7:00-7:15a	107	9	11	2	4	130
7:15-7:30a	82	5	4	1	1	165
7:30-7:45a	141	7	6	0	3	159
7:45-8:00a	159	12	11	1	7	124
Peak Hour: 7:00-8:00a	489	33	32	4	15	578

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McClelland St
DATE: 11/20/2019
TIME: 11:30a-1:00p
WEATHER: Cloudy
RECORDER: WYY

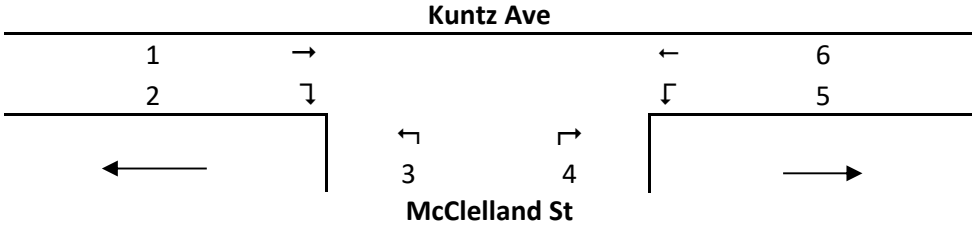


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
11:30-11:45a	111	11	15	4	1	120
11:45-12:00p	100	3	11	6	2	114
12:00-12:15p	102	10	10	2	0	119
12:15-12:30p	111	2	9	0	4	112
12:30-12:45p	98	12	9	0	3	153
12:45-1:00p	93	17	12	1	5	119
Peak Hour: 12:00-1:00p	404	41	40	3	12	503

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McClelland St
DATE: 11/20/2019
TIME: 2:15-4:00p
WEATHER: Cloudy
RECORDER: WYY

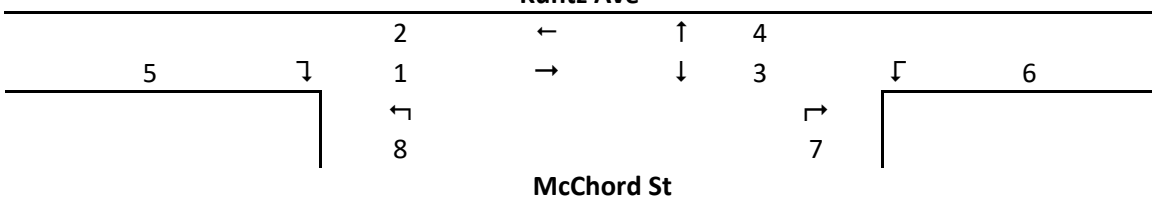


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
2:15-2:30p	80	6	20	1	4	102
2:30-2:45p	74	3	15	1	3	113
2:45-3:00p	105	11	9	3	3	113
3:00-3:15p	165	10	15	5	5	139
3:15-3:30p	170	24	7	1	4	92
3:30-3:45p	114	17	40	2	3	145
3:45-4:00p	119	4	3	2	1	145
Peak Hour: 3:00-4:00p	568	55	65	10	13	521

Notes: Tradewinds opened at 3:30p

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/McClelland St
DATE: 11/20/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: WYY

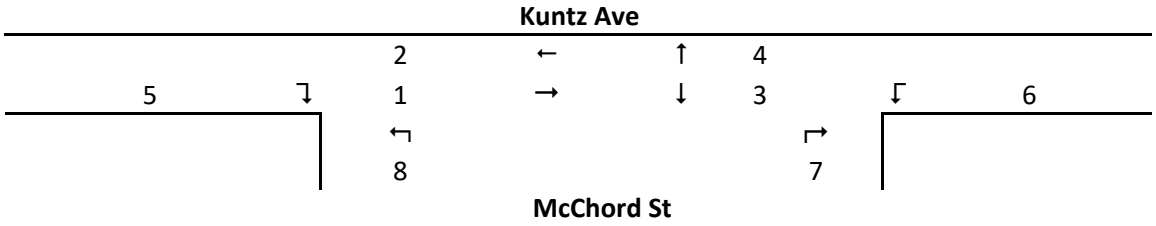


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
6:00-6:15a	1	2	0	0	0	0	0	0
6:15-6:30a	0	3	0	0	0	0	0	0
6:30-6:45a	0	1	0	0	0	4	1	0
6:45-7:00a	3	0	0	0	1	0	0	0
7:00-7:15a	2	2	0	0	0	0	0	0
7:15-7:30a	1	1	0	0	0	0	0	0
7:30-7:45a	0	1	0	0	0	0	0	0
7:45-8:00a	0	0	0	0	0	0	0	0
Peak Hour: 7:00-8:00a	3	4	0	0	0	0	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/McClelland St
DATE: 11/20/2019
TIME: 11:30a-1:00p
WEATHER: Cloudy
RECORDER: WYY

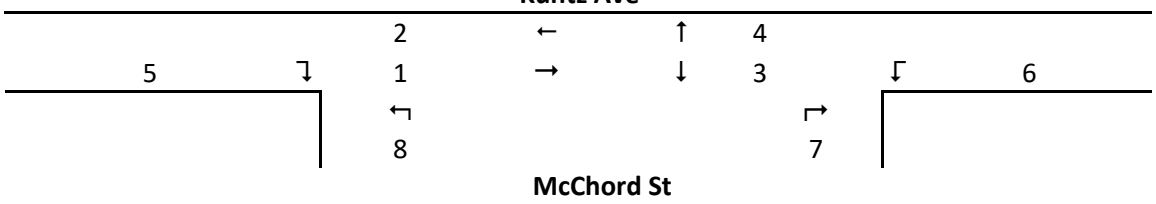


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
11:30-11:45a	0	0	0	0	0	0	0	0
11:45-12:00p	0	1	0	0	0	0	0	0
12:00-12:15p	0	0	0	0	0	0	0	0
12:15-12:30p	0	1	0	0	0	0	0	0
12:30-12:45p	1	0	0	0	0	0	0	0
12:45-1:00p	0	1	0	0	0	0	0	0
Peak Hour: 12:00-1:00p	1	2	0	0	0	0	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: Kuntz Ave/McClelland St
DATE: 11/20/2019
TIME: 2:15-4:00p
WEATHER: Cloudy
RECORDER: WYY

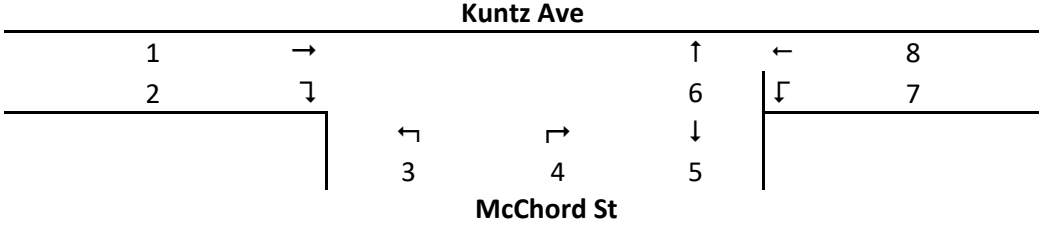


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
2:15-2:30p	0	1	0	0	0	0	0	0
2:30-2:45p	0	0	0	0	0	0	0	0
2:45-3:00p	0	0	0	0	0	0	0	0
3:00-3:15p	0	0	0	0	0	0	0	0
3:15-3:30p	0	0	0	0	0	0	0	0
3:30-3:45p	0	0	0	0	0	0	0	0
3:45-4:00p	0	0	0	0	0	0	0	0
Peak Hour: 3:00-4:00p	0	0	0	0	0	0	0	0

Notes: Tradewinds opened at 3:30p

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McClelland St
DATE: 11/20/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: WYY

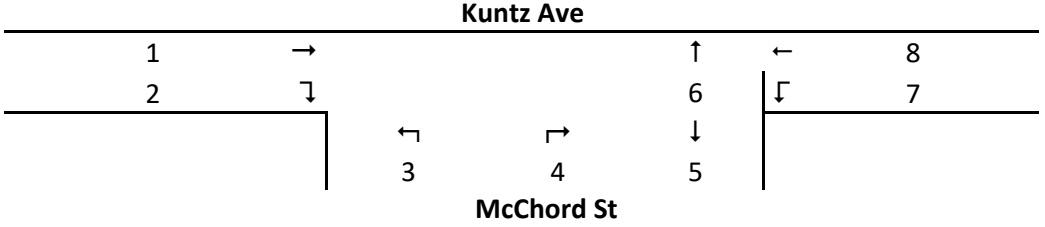


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
6:00-6:15a	0	0	0	0	0	0	0	1
6:15-6:30a	0	0	0	0	0	0	0	0
6:30-6:45a	0	0	0	0	0	0	0	0
6:45-7:00a	1	0	0	0	0	0	0	1
7:00-7:15a	1	0	0	0	0	0	0	1
7:15-7:30a	0	0	0	0	0	0	0	2
7:30-7:45a	0	0	0	0	0	0	0	0
7:45-8:00a	0	0	0	0	0	0	0	1
Peak Hour: 7:00-8:00a	1	0	0	0	0	0	0	4

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McClelland St
DATE: 11/20/2019
TIME: 11:30a-1:00p
WEATHER: Cloudy
RECORDER: WYY

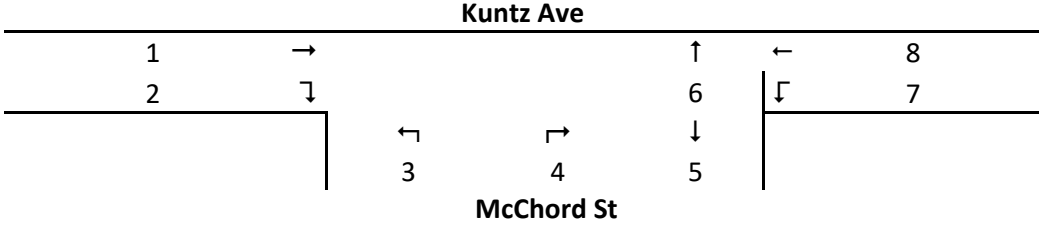


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
11:30-11:45a	0	0	0	0	0	0	0	0
11:45-12:00p	0	0	0	0	0	0	0	0
12:00-12:15p	0	0	0	0	0	0	0	0
12:15-12:30p	0	0	0	0	0	0	0	0
12:30-12:45p	0	0	0	0	0	0	0	0
12:45-1:00p	0	0	0	0	0	0	0	0
Peak Hour: 12:00-1:00p	0	0	0	0	0	0	=	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: Kuntz Ave/McClelland St
DATE: 11/20/2019
TIME: 2:15-4:00p
WEATHER: Cloudy
RECORDER: WYY

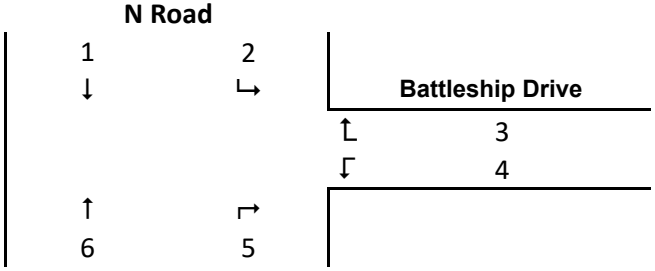


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
2:15-2:30p	0	0	0	0	0	0	0	0
2:30-2:45p	0	0	0	0	0	0	0	0
2:45-3:00p	0	0	0	0	0	0	0	0
3:00-3:15p	1	0	0	0	0	0	0	0
3:15-3:30p	2	0	0	0	0	0	0	0
3:30-3:45p	3	0	0	0	0	0	0	1
3:45-4:00p	0	0	0	0	0	0	0	1
Peak Hour: 3:00-4:00p	6	0	0	0	0	0	0	2

Notes: Tradewinds opened at 3:30p

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: N Rd/Battleship Dr
DATE: 11/21/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: JY

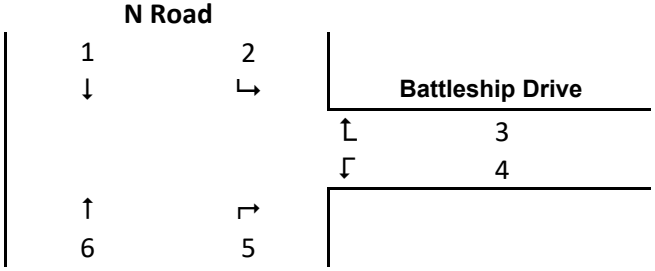


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
6:00-6:15a	270	3	7	6	4	101
6:15-6:30a	259	2	10	15	6	107
6:30-6:45a	246	9	6	12	4	120
6:45-7:00a	165	4	7	8	9	179
7:00-7:15a	208	2	8	3	12	211
7:15-7:30a	148	2	9	5	6	188
7:30-7:45a	129	5	14	5	13	188
7:45-8:00a	102	5	13	4	6	211
Peak Hour: 6:15-7:15a	878	17	31	38	31	617

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: N Rd/Battleship Dr
DATE: 11/21/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: JY

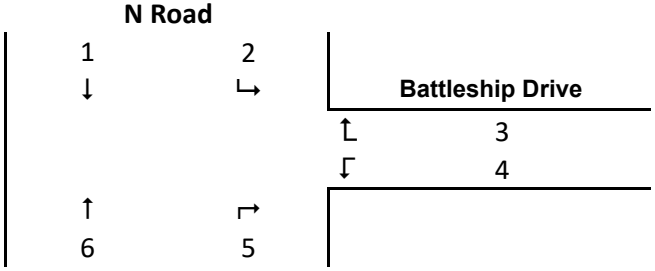


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
11:00-11:15a	176	8	9	8	15	203
11:15-11:30a	162	6	6	11	16	167
11:30-11:45a	135	3	12	12	11	176
11:45-12:00p	167	10	11	9	15	163
12:00-12:15p	165	9	14	9	7	148
12:15-12:30p	180	7	7	11	13	167
12:30-12:45p	151	8	6	5	15	147
12:45-1:00p	140	8	7	6	6	129
Peak Hour: 11:00a-12:00p	640	27	38	40	57	709

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: N Rd/Battleship Dr
DATE: 11/21/2019
TIME: 2:00-4:00p
WEATHER: Cloudy
RECORDER: JY

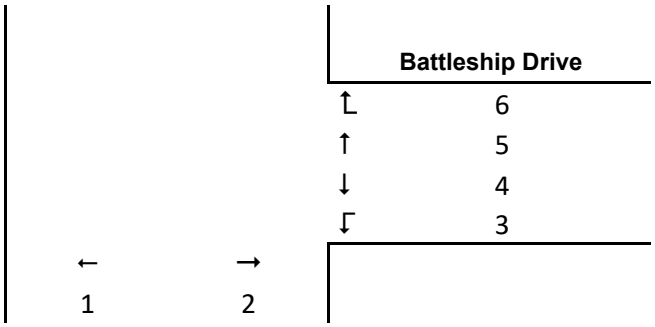


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
2:00-2:15p	147	10	17	3	11	176
2:15-2:30p	156	16	12	9	8	192
2:30-2:45p	151	10	11	11	7	235
2:45-3:00p	104	8	13	11	28	236
3:00-3:15p	112	13	14	6	14	355
3:15-3:30p	104	10	15	8	17	347
3:30-3:45p	86	11	16	6	20	286
3:45-4:00p	97	15	11	11	21	211
Peak Hour: 2:45-3:45p	406	42	58	31	79	1224

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: N Rd/Battleship Dr
DATE: 11/21/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: JY

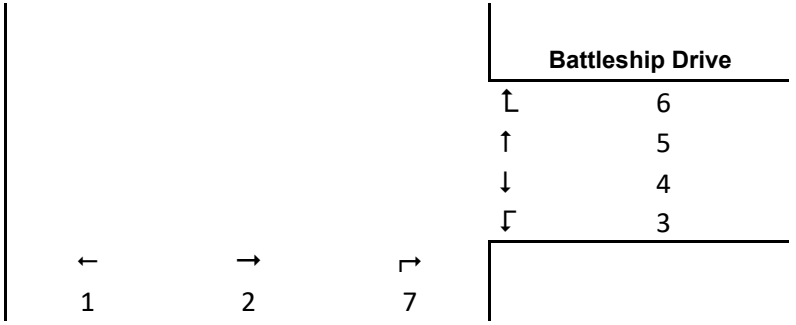


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
6:00-6:15a	11	0	0	11	1	0
6:15-6:30a	14	0	0	17	2	0
6:30-6:45a	14	0	0	4	2	0
6:45-7:00a	9	1	0	5	5	0
7:00-7:15a	2	4	0	5	5	0
7:15-7:30a	1	0	0	3	0	1
7:30-7:45a	0	1	0	3	3	0
7:45-8:00a	0	1	0	0	2	0
Peak Hour: 6:15-7:15a	39	5	0	31	14	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: N Rd/Battleship Dr
DATE: 11/21/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: JY

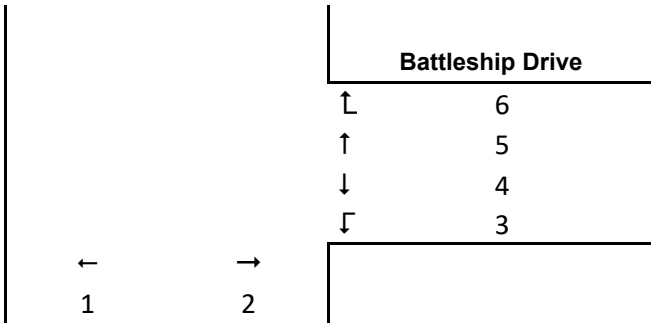


TIME PERIOD	MOVEMENT NUMBER						
	1	2	3	4	5	6	7
11:00-11:15a	4	2	0	6	6	0	0
11:15-11:30a	0	2	0	2	8	0	0
11:30-11:45a	0	1	0	1	3	1	0
11:45-12:00p	0	0	0	3	4	1	1
12:00-12:15p	3	2	0	4	5	0	0
12:15-12:30p	4	3	0	1	8	0	0
12:30-12:45p	3	2	0	3	3	1	0
12:45-1:00p	2	2	0	0	2	0	0
Peak Hour: 11:00a-12:00p	4	5	0	12	21	2	1

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: N Rd/Battleship Dr
DATE: 11/21/2019
TIME: 2:00p-4:00p
WEATHER: Clear
RECORDER: JY

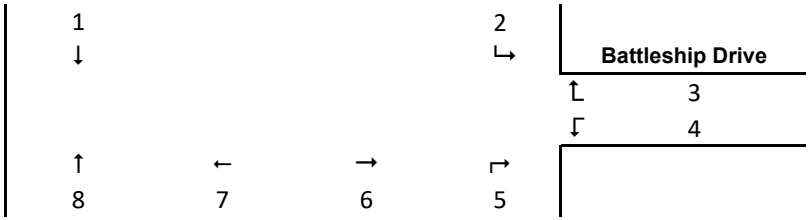


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
2:00-2:15p	0	5	0	2	8	2
2:15-2:30p	0	3	0	1	4	0
2:30-2:45p	0	4	0	0	1	0
2:45-3:00p	0	2	0	2	1	0
3:00-3:15p	3	4	0	2	7	0
3:15-3:30p	1	10	0	1	11	0
3:30-3:45p	1	11	0	2	14	0
3:45-4:00p	1	6	0	1	12	0
Peak Hour: 2:45-3:45p	5	27	0	7	33	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: N Rd/Battleship Dr
DATE: 11/21/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: JY

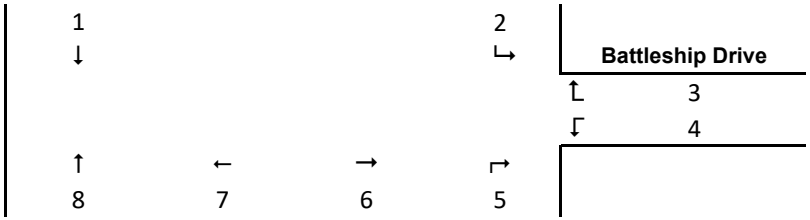


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
6:00-6:15a	7	0	0	0	0	1	1	0
6:15-6:30a	7	0	0	0	0	0	2	0
6:30-6:45a	8	0	0	0	0	0	2	3
6:45-7:00a	4	0	1	1	0	1	1	0
7:00-7:15a	1	0	0	0	0	0	1	1
7:15-7:30a	1	0	0	0	0	1	1	3
7:30-7:45a	3	0	0	0	0	0	1	2
7:45-8:00a	4	0	0	0	0	0	0	2
Peak Hour: 6:15-7:15a	20	0	1	1	0	1	6	4

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: N Rd/Battleship Dr
DATE: 11/21/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: JY

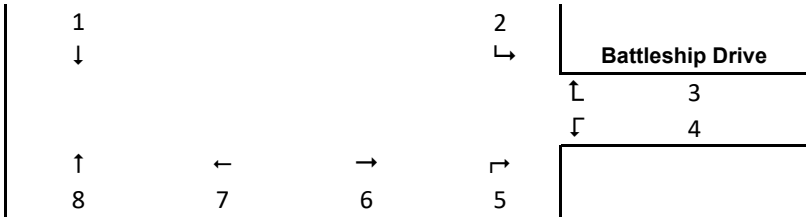


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
11:00-11:15a	0	0	0	0	0	0	0	1
11:15-11:30a	1	0	0	0	0	0	0	2
11:30-11:45a	0	0	0	0	0	0	0	0
11:45-12:00p	0	0	0	0	0	0	0	0
12:00-12:15p	0	0	0	0	0	0	0	0
12:15-12:30p	1	0	0	0	0	0	0	0
12:30-12:45p	0	0	0	0	0	0	0	0
12:45-1:00p	0	0	0	0	0	0	0	0
Peak Hour: 11:00a-12:00p	1	0	0	0	0	0	0	3

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: N Rd/Battleship Dr
DATE: 11/21/2019
TIME: 2:00p-4:00p
WEATHER: Clear
RECORDER: JY

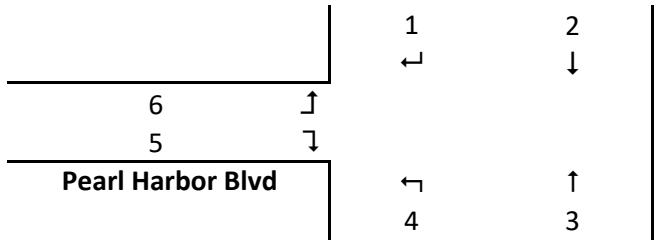


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
2:00-2:15p	1	0	0	0	0	0	0	1
2:15-2:30p	1	0	0	0	0	1	0	1
2:30-2:45p	0	0	0	0	0	0	0	5
2:45-3:00p	0	0	0	0	0	2	0	3
3:00-3:15p	2	0	0	0	0	2	0	5
3:15-3:30p	0	0	1	0	0	0	0	3
3:30-3:45p	2	0	0	0	0	0	0	4
3:45-4:00p	3	0	0	0	0	1	0	2
Peak Hour: 2:45-3:45p	4	0	1	0	0	4	0	15

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: N Rd/Pearl Harbor Blvd
DATE: 11/21/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: WYY

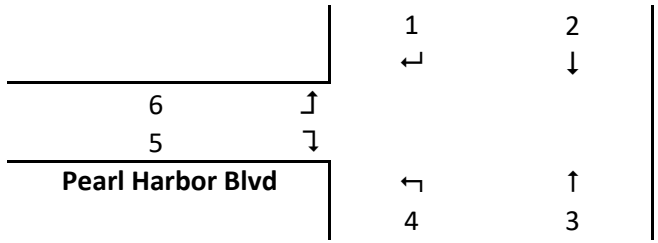


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
6:00-6:15a	122	114	57	99	5	39
6:15-6:30a	127	102	59	100	4	56
6:30-6:45a	105	100	57	76	1	72
6:45-7:00a	110	90	94	55	4	93
7:00-7:15a	83	89	85	48	4	130
7:15-7:30a	68	82	105	22	4	88
7:30-7:45a	78	66	94	31	6	114
7:45-8:00a	60	48	100	36	12	126
Peak Hour: 6:15-7:15a	425	381	295	279	13	351

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: N Rd/Pearl Harbor Blvd
DATE: 11/21/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: WYY

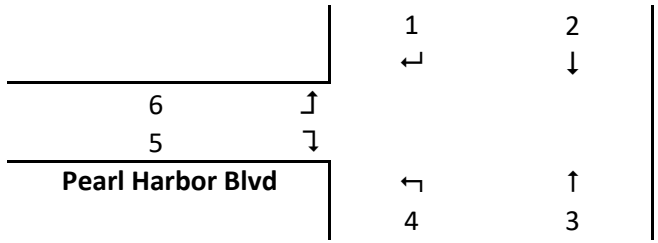


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
11:00-11:15a	98	95	90	24	32	101
11:15-11:30a	79	85	82	16	19	81
11:30-11:45a	77	71	107	31	27	67
11:45-12:00p	82	85	87	24	30	77
12:00-12:15p	30	40	51	13	19	46
12:15-12:30p	106	97	87	31	26	103
12:30-12:45p	79	83	68	21	34	84
12:45-1:00p	76	70	57	12	26	88
Peak Hour: 11:00a-12:00p	336	336	366	95	108	326

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS VEHICLE COUNT WORKSHEETS

LOCATION: N Rd/Pearl Harbor Blvd
DATE: 11/21/2019
TIME: 2:00-4:00p
WEATHER: Cloudy
RECORDER: WYY

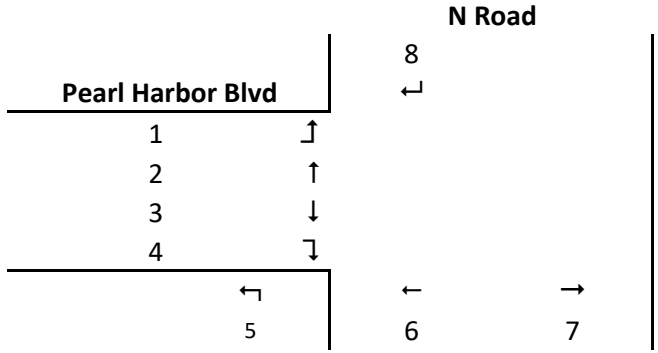


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
2:00-2:15p	54	100	83	24	43	106
2:15-2:30p	57	104	105	30	31	73
2:30-2:45p	35	116	70	16	63	145
2:45-3:00p	27	81	107	15	51	135
3:00-3:15p	35	71	101	10	95	240
3:15-3:30p	50	62	136	10	32	202
3:30-3:45p	31	78	131	14	30	184
3:45-4:00p	45	77	108	14	38	121
Peak Hour: 2:45-3:45p	143	292	475	49	208	761

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: N Rd/Pearl Harbor Blvd
DATE: 11/21/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: WYY

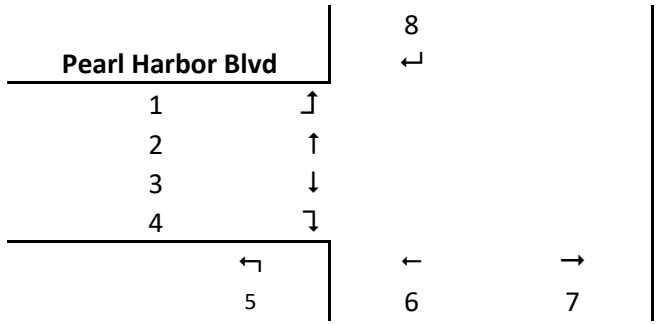


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
6:00-6:15a	0	0	0	0	0	0	0	0
6:15-6:30a	0	0	0	0	0	0	2	1
6:30-6:45a	1	1	0	0	0	0	0	5
6:45-7:00a	0	0	0	0	0	0	0	2
7:00-7:15a	0	2	1	0	0	2	0	0
7:15-7:30a	0	0	1	0	0	0	0	0
7:30-7:45a	1	1	0	0	0	0	0	0
7:45-8:00a	0	1	1	0	0	2	0	2
Peak Hour: 6:15-7:15a	1	3	1	0	0	2	2	8

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: N Rd/Pearl Harbor Blvd
DATE: 11/21/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: WYY

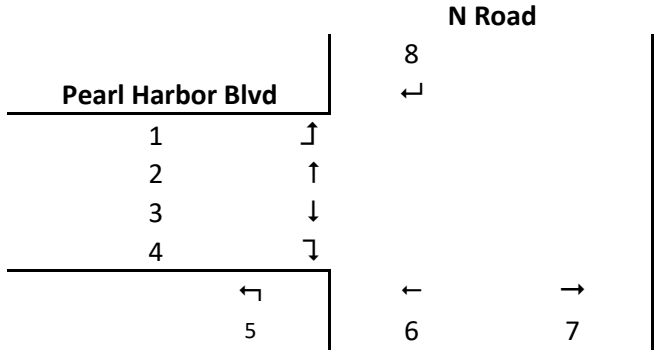


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
11:00-11:15a	0	0	0	0	0	0	0	0
11:15-11:30a	0	0	0	0	0	0	0	0
11:30-11:45a	0	0	0	0	0	0	1	1
11:45-12:00p	0	0	0	0	0	1	1	0
12:00-12:15p	0	0	0	0	0	0	0	0
12:15-12:30p	0	0	0	0	0	0	1	0
12:30-12:45p	0	0	0	0	0	0	0	0
12:45-1:00p	0	0	0	0	0	0	0	0
Peak Hour: 11:00a-12:00p	0	0	0	0	0	1	2	1

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS PEDESTRIAN COUNT WORKSHEETS

LOCATION: N Rd/Pearl Harbor Blvd
DATE: 11/21/2019
TIME: 2:00-4:00p
WEATHER: Cloudy
RECORDER: WYY

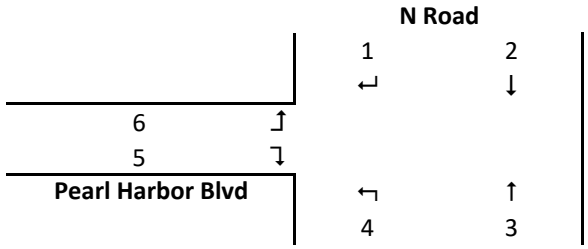


TIME PERIOD	MOVEMENT NUMBER							
	1	2	3	4	5	6	7	8
2:00-2:15p	3	0	1	0	0	0	2	0
2:15-2:30p	0	0	0	0	0	0	0	0
2:30-2:45p	1	0	0	0	0	0	0	0
2:45-3:00p	0	0	0	0	0	0	0	0
3:00-3:15p	0	0	0	0	0	0	2	0
3:15-3:30p	1	0	1	0	0	0	4	0
3:30-3:45p	0	0	1	0	0	0	5	0
3:45-4:00p	9	1	0	0	0	1	2	5
Peak Hour: 2:45-3:45p	1	0	2	0	0	0	11	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: N Rd/Pearl Harbor Blvd
DATE: 11/21/2019
TIME: 6:00-8:00a
WEATHER: Cloudy
RECORDER: WYY

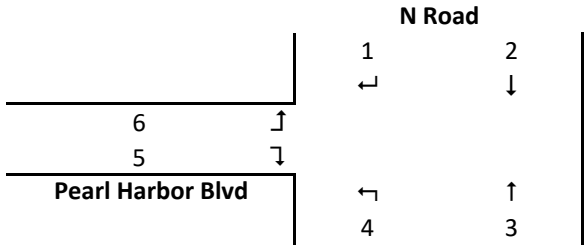


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
6:00-6:15a	1	0	0	0	0	0
6:15-6:30a	1	1	1	0	0	0
6:30-6:45a	5	0	3	0	0	0
6:45-7:00a	1	0	0	0	0	0
7:00-7:15a	0	0	1	0	0	0
7:15-7:30a	0	0	0	0	0	1
7:30-7:45a	0	0	1	0	0	0
7:45-8:00a	1	1	1	0	0	0
Peak Hour: 6:15-7:15a	7	1	5	0	0	0

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: N Rd/Pearl Harbor Blvd
DATE: 11/21/2019
TIME: 11:00a-1:00p
WEATHER: Clear
RECORDER: WYY

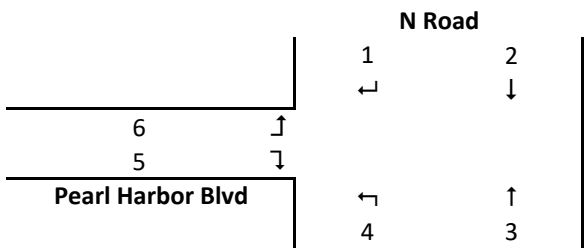


TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
11:00-11:15a	0	0	0	0	0	1
11:15-11:30a	0	0	1	0	0	0
11:30-11:45a	0	0	0	0	0	0
11:45-12:00p	0	0	0	0	0	0
12:00-12:15p	0	0	0	0	0	0
12:15-12:30p	1	0	0	0	0	0
12:30-12:45p	1	0	0	0	0	0
12:45-1:00p	0	0	0	0	0	0
Peak Hour: 11:00a-12:00p	0	0	1	0	0	1

Notes:

JBPHH AMBULATORY CARE CENTER EA TRANSPORTATION ANALYSIS BICYCLE COUNT WORKSHEETS

LOCATION: N Rd/Pearl Harbor Blvd
DATE: 11/21/2019
TIME: 2:00-4:00p
WEATHER: Cloudy
RECORDER: WYY



TIME PERIOD	MOVEMENT NUMBER					
	1	2	3	4	5	6
2:00-2:15p	1	0	0	0	0	1
2:15-2:30p	0	1	0	0	0	0
2:30-2:45p	0	0	0	0	0	2
2:45-3:00p	0	0	0	0	0	1
3:00-3:15p	0	0	0	0	0	0
3:15-3:30p	0	0	0	0	0	1
3:30-3:45p	0	0	0	0	1	0
3:45-4:00p	1	0	0	0	0	4
Peak Hour: 2:45-3:45p	0	0	0	0	1	2

Notes:

Appendix B
24-Hour Traffic Volume Worksheets

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MetroCount Traffic Executive
Vehicle Counts

VehicleCount-150 -- English (ENU)

Datasets:

Site:	**[Halehaka Street] Halehaka St north of 20th Street**
Attribute:	November 18, 2019
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	13:46 Sunday, November 17, 2019 => 13:07 Tuesday, November 19, 2019,
Zone:	
File:	Halehaka Street 0 2019-11-19 1307.EC0 (Regular)
Identifier:	R090852E MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**10:00 Monday, November 18, 2019 => 13:07 Tuesday, November 19, 2019 (1.13023)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 0-1
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 3400 / 3418 (99.47%)

* Monday, November 18, 2019 - Total=1961 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**50**	**199**	**194**	**156**	**193**	**217**	**271**	**263**	**193**	**98**	**55**	**39**	**26**	**7**	
-	-	-	-	-	-	-	-	-	-	0	52	53	46	46	53	54	**81**	45	30	15	11	10	0	2
-	-	-	-	-	-	-	-	-	-	0	46	61	39	53	47	65	**77**	55	30	15	6	4	2	1
-	-	-	-	-	-	-	-	-	-	20	52	42	39	42	59	**75**	51	42	21	16	9	6	1	2
-	-	-	-	-	-	-	-	-	-	30	49	38	32	52	58	**77**	54	51	17	9	13	6	4	0

PM Peak 1630 - 1730 (310), PM PHF=0.96

* Tuesday, November 19, 2019 - Total=1439 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
5	**4**	**3**	**5**	**20**	**70**	**157**	**338**	**193**	**126**	**132**	**164**	**198**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
2	1	0	1	1	7	25	55	**57**	37	35	32	45	24	-	-	-	-	-	-	-	-	-	-	-
1	1	0	2	3	17	36	**110**	44	24	26	45	53	-	-	-	-	-	-	-	-	-	-	-	-
2	1	1	0	8	22	34	**102**	52	29	39	45	45	-	-	-	-	-	-	-	-	-	-	-	-
0	1	2	2	8	24	62	**71**	40	36	32	42	55	-	-	-	-	-	-	-	-	-	-	-	-

AM Peak 0715 - 0815 (340), AM PHF=0.77

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-151 -- English (ENU)

Datasets:

Site:	**[Halehaka Street] Halehaka St north of 20th Street (Northbound)**
Attribute:	November 18, 2019
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	13:46 Sunday, November 17, 2019 => 13:07 Tuesday, November 19, 2019,
Zone:	
File:	Halehaka Street 0 2019-11-19 1307.EC0 (Regular)
Identifier:	R090852E MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**10:00 Monday, November 18, 2019 => 13:07 Tuesday, November 19, 2019 (1.13023)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 0
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 1793 / 3418 (52.46%)

* Monday, November 18, 2019 - Total=1243 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**28**	**124**	**113**	**68**	**104**	**144**	**202**	**167**	**131**	**68**	**41**	**28**	**21**	**4**	
-	-	-	-	-	-	-	-	-	-	0	30	36	20	24	40	44	**55**	31	21	13	8	8	0	2
-	-	-	-	-	-	-	-	-	-	0	33	30	18	30	29	46	**48**	35	19	9	4	4	1	1
-	-	-	-	-	-	-	-	-	-	11	34	26	13	21	38	**54**	33	33	14	12	6	5	1	2
-	-	-	-	-	-	-	-	-	-	17	27	21	17	29	37	**58**	31	32	14	7	10	4	2	0

PM Peak 1630 - 1730 (215), PM PHF=0.93

* Tuesday, November 19, 2019 - Total=550 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
5	**3**	**0**	**2**	**1**	**9**	**40**	**84**	**78**	**55**	**58**	**106**	**99**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
2	1	0	0	0	0	8	9	27	20	9	20	**28**	10	-	-	-	-	-	-	-	-	-	-	-
1	0	0	1	0	2	6	18	18	10	10	**32**	32	-	-	-	-	-	-	-	-	-	-	-	-
2	1	0	0	1	3	13	21	15	16	22	**31**	18	-	-	-	-	-	-	-	-	-	-	-	-
0	1	0	1	0	4	13	36	18	9	17	**23**	21	-	-	-	-	-	-	-	-	-	-	-	-

AM Peak 1115 - 1215 (114), AM PHF=0.89

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-152 -- English (ENU)

Datasets:

Site:	**[Halehaka Street] Halehaka St north of 20th Street (Southbound)**
Attribute:	November 18, 2019
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	13:46 Sunday, November 17, 2019 => 13:07 Tuesday, November 19, 2019,
Zone:	
File:	Halehaka Street 0 2019-11-19 1307.EC0 (Regular)
Identifier:	R090852E MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**10:00 Monday, November 18, 2019 => 13:07 Tuesday, November 19, 2019 (1.13023)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 1
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 1607 / 3418 (47.02%)

* Monday, November 18, 2019 - Total=718 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**22**	**75**	**81**	**88**	**89**	**73**	**69**	**96**	**62**	**30**	**14**	**11**	**5**	**3**	
-	-	-	-	-	-	-	-	-	-	0	22	17	26	22	13	10	**26**	14	9	2	3	2	0	0
-	-	-	-	-	-	-	-	-	-	0	13	31	21	23	18	19	**29**	20	11	6	2	0	1	0
-	-	-	-	-	-	-	-	-	-	9	18	16	26	21	21	21	**18**	9	7	4	3	1	0	0
-	-	-	-	-	-	-	-	-	-	13	22	17	15	23	21	19	**23**	19	3	2	3	2	2	0

PM Peak 1700 - 1800 (96), PM PHF=0.83

* Tuesday, November 19, 2019 - Total=889 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
0	**1**	**3**	**3**	**19**	**61**	**117**	**254**	**115**	**71**	**74**	**58**	**99**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
0	0	0	1	1	7	17	**46**	30	17	26	12	17	14	-	-	-	-	-	-	-	-	-	-	-
0	1	0	1	3	15	30	**92**	26	14	16	13	21	-	-	-	-	-	-	-	-	-	-	-	-
0	0	1	0	7	19	21	**81**	37	13	17	14	27	-	-	-	-	-	-	-	-	-	-	-	-
0	0	2	1	8	20	**49**	35	22	27	15	19	34	-	-	-	-	-	-	-	-	-	-	-	-

AM Peak 0645 - 0745 (268), AM PHF=0.73

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-149 -- English (ENU)

Datasets:

Site:	**[Kuntz Avenue] Kuntz Ave at Halehaka Street**
Attribute:	November 18, 2019
Direction:	8 - East bound A>B, West bound B>A. **Lane:** 0
Survey Duration:	13:36 Sunday, November 17, 2019 => 9:49 Tuesday, November 19, 2019,
Zone:	
File:	Kuntz Avenue 0 2019-11-19 0949.EC0 (Regular)
Identifier:	R186JWT5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**9:00 Monday, November 18, 2019 => 9:49 Tuesday, November 19, 2019 (1.03453)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = East, Lane = 0-1
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 5524 / 5539 (99.73%)

* Monday, November 18, 2019 - Total=3951 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**98**	**345**	**459**	**426**	**390**	**417**	**484**	**422**	**403**	**262**	**143**	**83**	**11**	**2**	**6**	
-	-	-	-	-	-	-	-	-	0	79	108	110	99	108	**135**	126	109	66	44	25	4	1	0	2
-	-	-	-	-	-	-	-	-	0	103	96	109	103	97	**135**	96	105	62	41	32	3	0	2	0
-	-	-	-	-	-	-	-	-	1	80	134	99	72	114	**131**	96	101	77	29	13	0	0	3	1
-	-	-	-	-	-	-	-	-	97	83	121	108	116	**98**	83	104	88	57	29	13	4	1	1	0

PM Peak 1445 - 1545 (499), PM PHF=0.92

* Tuesday, November 19, 2019 - Total=1573 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
3	**0**	**0**	**0**	**8**	**263**	**300**	**425**	**361**	**213**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
2	0	0	0	0	32	77	99	109	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	0	0	0	3	74	81	112	93	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	0	0	0	2	76	50	111	74	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	0	0	0	3	81	92	103	85	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-147 -- English (ENU)

Datasets:

Site:	**[Kuntz Avenue] Kuntz Ave at Halehaka Street (Eastbound)**
Attribute:	November 18, 2019
Direction:	8 - East bound A>B, West bound B>A. **Lane:** 0
Survey Duration:	13:36 Sunday, November 17, 2019 => 9:49 Tuesday, November 19, 2019,
Zone:	
File:	Kuntz Avenue 0 2019-11-19 0949.EC0 (Regular)
Identifier:	R186JWT5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**9:00 Monday, November 18, 2019 => 9:49 Tuesday, November 19, 2019 (1.03453)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = East, Lane = 0
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 2324 / 5539 (41.96%)

* Monday, November 18, 2019 - Total=1820 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**37**	**142**	**216**	**170**	**176**	**203**	**273**	**194**	**175**	**125**	**59**	**41**	**4**	**2**	**3**	
-	-	-	-	-	-	-	-	-	0	33	54	45	45	47	**82**	58	49	36	18	11	1	1	0	1
-	-	-	-	-	-	-	-	-	0	43	46	46	42	43	**82**	47	47	29	22	15	2	0	1	0
-	-	-	-	-	-	-	-	-	1	24	61	34	37	65	**69**	52	45	35	11	8	0	0	2	1
-	-	-	-	-	-	-	-	-	36	42	55	45	52	**48**	40	37	34	25	8	7	1	1	0	0

PM Peak 1445 - 1545 (281), PM PHF=0.86

* Tuesday, November 19, 2019 - Total=504 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
2	**0**	**0**	**0**	**7**	**30**	**76**	**182**	**110**	**97**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
1	0	0	0	0	1	7	42	24	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	0	0	0	2	8	18	55	32	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	0	0	0	2	9	15	42	23	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	0	0	0	3	12	36	43	31	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-148 -- English (ENU)

Datasets:

Site:	**[Kuntz Avenue] Kuntz Ave at Halehaka Street (Westbound)**
Attribute:	November 18, 2019
Direction:	8 - East bound A>B, West bound B>A. **Lane:** 0
Survey Duration:	13:36 Sunday, November 17, 2019 => 9:49 Tuesday, November 19, 2019,
Zone:	
File:	Kuntz Avenue 0 2019-11-19 0949.EC0 (Regular)
Identifier:	R186JWT5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**9:00 Monday, November 18, 2019 => 9:49 Tuesday, November 19, 2019 (1.03453)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = East, Lane = 1
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 3200 / 5539 (57.77%)

* Monday, November 18, 2019 - Total=2131 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**61**	**203**	**243**	**256**	**214**	**214**	**211**	**228**	**228**	**137**	**84**	**42**	**7**	**0**	**3**	
-	-	-	-	-	-	-	-	-	0	46	54	**65**	54	61	53	68	60	30	26	14	3	0	0	1
-	-	-	-	-	-	-	-	-	0	60	50	**63**	61	54	53	49	58	33	19	17	1	0	1	0
-	-	-	-	-	-	-	-	-	0	56	73	**65**	35	49	62	44	56	42	18	5	0	0	1	0
-	-	-	-	-	-	-	-	-	61	41	66	**63**	64	50	43	67	54	32	21	6	3	0	1	0

PM Peak 1200 - 1300 (256), PM PHF=0.98

* Tuesday, November 19, 2019 - Total=1069 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
1	**0**	**0**	**0**	**1**	**233**	**224**	**243**	**251**	**116**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
1	0	0	0	0	31	70	57	85	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	0	0	0	1	66	63	57	61	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	0	0	0	0	67	35	69	51	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	0	0	0	0	69	56	60	54	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-153 -- English (ENU)

Datasets:

Site:	**[Kuntz Avenue] Kuntz Ave at McClelland**
Attribute:	November 19, 2019
Direction:	6 - West bound A>B, East bound B>A. **Lane:** 0
Survey Duration:	10:03 Tuesday, November 19, 2019 => 10:26 Wednesday, November 20, 2019,
Zone:	
File:	Kuntz Avenue_McClelland 0 2019-11-20 1027.EC0 (Regular)
Identifier:	R186JWT5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**10:04 Tuesday, November 19, 2019 => 10:26 Wednesday, November 20, 2019 (1.01588)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = East, Lane = 0-16
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 14052 / 14084 (99.77%)

* Tuesday, November 19, 2019 - Total=9454 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**719**	**1097**	**919**	**719**	**975**	**1139**	**932**	**954**	**665**	**420**	**337**	**300**	**180**	**98**	
-	-	-	-	-	-	-	-	-	-	6	275	215	195	215	**240**	236	253	202	121	87	67	64	28	17
-	-	-	-	-	-	-	-	-	-	198	273	243	170	257	**304**	220	245	176	102	95	61	41	35	8
-	-	-	-	-	-	-	-	-	-	288	263	239	189	275	**341**	234	216	164	106	82	79	38	20	10
-	-	-	-	-	-	-	-	-	-	227	286	222	165	228	**254**	242	240	123	91	73	93	37	15	12

PM Peak 1500 - 1600 (1139), PM PHF=0.84

* Wednesday, November 20, 2019 - Total=4598 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
47	**41**	**30**	**50**	**215**	**538**	**720**	**1185**	**891**	**692**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
17	7	13	9	29	94	143	265	207	174	169	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	13	6	7	43	129	169	272	207	156	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	14	8	17	67	131	186	321	254	185	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	7	3	17	76	184	222	327	223	177	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-155 -- English (ENU)

Datasets:

Site:	**[Kuntz Avenue] Kuntz Ave at McClelland (Eastbound)**
Attribute:	November 19, 2019
Direction:	6 - West bound A>B, East bound B>A. **Lane:** 0
Survey Duration:	10:03 Tuesday, November 19, 2019 => 10:26 Wednesday, November 20, 2019,
Zone:	
File:	Kuntz Avenue_McClelland 0 2019-11-20 1027.EC0 (Regular)
Identifier:	R186JWT5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**10:04 Tuesday, November 19, 2019 => 10:26 Wednesday, November 20, 2019 (1.01588)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = East, Lane = 1
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 6644 / 14084 (47.17%)

* Tuesday, November 19, 2019 - Total=4527 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**302**	**541**	**415**	**343**	**422**	**625**	**472**	**496**	**309**	**182**	**160**	**143**	**79**	**38**	
-	-	-	-	-	-	-	-	-	-	6	124	98	90	90	**146**	109	123	106	55	40	30	24	12	11
-	-	-	-	-	-	-	-	-	-	86	153	116	93	123	**216**	104	137	69	51	50	42	20	15	3
-	-	-	-	-	-	-	-	-	-	106	132	111	73	110	**157**	125	104	74	43	33	35	17	8	8
-	-	-	-	-	-	-	-	-	-	104	132	90	87	99	**106**	134	132	60	33	37	36	18	3	4

PM Peak 1500 - 1600 (625), PM PHF=0.72

* Wednesday, November 20, 2019 - Total=2117 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
26	**21**	**17**	**24**	**127**	**241**	**310**	**546**	**353**	**348**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
11	3	10	2	16	42	62	116	94	83	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	8	2	4	27	72	77	92	90	76	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	3	3	7	37	52	83	157	71	99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	7	2	11	47	75	88	181	98	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-155 -- English (ENU)

Datasets:

Site:	**[Kuntz Avenue] Kuntz Ave at McClelland (Westbound)**
Attribute:	November 19, 2019
Direction:	6 - West bound A>B, East bound B>A. **Lane:** 0
Survey Duration:	10:03 Tuesday, November 19, 2019 => 10:26 Wednesday, November 20, 2019,
Zone:	
File:	Kuntz Avenue_McClelland 0 2019-11-20 1027.EC0 (Regular)
Identifier:	R186JWT5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**10:04 Tuesday, November 19, 2019 => 10:26 Wednesday, November 20, 2019 (1.01588)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = East, Lane = 0
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 7408 / 14084 (52.60%)

* Tuesday, November 19, 2019 - Total=4927 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**417**	**556**	**504**	**376**	**553**	**514**	**460**	**458**	**356**	**238**	**177**	**157**	**101**	**60**	
-	-	-	-	-	-	-	-	-	-	0	151	117	105	125	94	**127**	130	96	66	47	37	40	16	6
-	-	-	-	-	-	-	-	-	-	112	120	127	77	134	88	**116**	108	107	51	45	19	21	20	5
-	-	-	-	-	-	-	-	-	-	182	131	128	116	165	**184**	109	112	90	63	49	44	21	12	2
-	-	-	-	-	-	-	-	-	-	123	154	132	78	129	**148**	108	108	63	58	36	57	19	12	8

PM Peak 1530 - 1630 (575), PM PHF=0.78

* Wednesday, November 20, 2019 - Total=2481 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
21	**20**	**13**	**26**	**88**	**297**	**410**	**639**	**538**	**344**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
6	4	3	7	13	52	81	149	113	91	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	5	4	3	16	57	92	180	117	80	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	11	5	10	30	79	103	164	183	86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	0	1	6	29	109	134	146	125	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-154 -- English (ENU)

Datasets:

Site:	**[McClelland St] McClelland St**
Attribute:	November 19, 2019
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	13:09 Tuesday, November 19, 2019 => 13:17 Wednesday, November 20, 2019,
Zone:	
File:	McClelland St 0 2019-11-20 1318.EC0 (Regular)
Identifier:	R090852E MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**13:10 Tuesday, November 19, 2019 => 13:17 Wednesday, November 20, 2019 (1.00513)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 1243 / 1243 (100.00%)

* Tuesday, November 19, 2019 - Total=558 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**46**	**130**	**106**	**63**	**51**	**43**	**29**	**22**	**34**	**19**	**15**	
-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	12	29	12	4	10	2	8	8	2	0
-	-	-	-	-	-	-	-	-	-	-	-	-	12	57	20	12	8	8	7	3	7	2	5	2
-	-	-	-	-	-	-	-	-	-	-	-	-	22	34	35	11	14	14	6	12	12	6	4	1
-	-	-	-	-	-	-	-	-	-	-	-	-	12	18	39	11	17	17	6	5	7	3	4	0

* Wednesday, November 20, 2019 - Total=685 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
3	**2**	**1**	**5**	**17**	**57**	**67**	**87**	**103**	**63**	**83**	**88**	**91**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
0	0	0	0	1	5	14	24	**20**	14	16	24	20	18	-	-	-	-	-	-	-	-	-	-	-
2	0	0	1	6	12	15	11	**29**	13	16	18	15	-	-	-	-	-	-	-	-	-	-	-	-
1	0	1	1	5	16	16	17	**27**	13	27	20	22	-	-	-	-	-	-	-	-	-	-	-	-
0	2	0	3	5	24	22	**35**	27	23	24	26	34	-	-	-	-	-	-	-	-	-	-	-	-

AM Peak 0745 - 0845 (111), AM PHF=0.79

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-154 -- English (ENU)

Datasets:

Site:	**[McClelland St] McClelland St (Northbound)**
Attribute:	November 19, 2019
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	13:09 Tuesday, November 19, 2019 => 13:17 Wednesday, November 20, 2019,
Zone:	
File:	McClelland St 0 2019-11-20 1318.EC0 (Regular)
Identifier:	R090852E MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**13:10 Tuesday, November 19, 2019 => 13:17 Wednesday, November 20, 2019 (1.00513)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 0
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 642 / 1243 (51.65%)

* Tuesday, November 19, 2019 - Total=351 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**26**	**68**	**79**	**46**	**30**	**19**	**19**	**16**	**17**	**17**	**14**	
-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	7	25	9	2	6	1	6	8	2	0
-	-	-	-	-	-	-	-	-	-	-	-	-	6	28	13	10	4	4	3	2	1	1	4	2
-	-	-	-	-	-	-	-	-	-	-	-	-	16	18	29	6	9	5	4	10	7	6	4	1
-	-	-	-	-	-	-	-	-	-	-	-	-	4	11	30	5	8	8	6	3	3	2	4	0

* Wednesday, November 20, 2019 - Total=291 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
3	**0**	**0**	**0**	**3**	**4**	**17**	**39**	**53**	**25**	**43**	**55**	**43**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
0	0	0	0	0	1	0	12	7	6	8	**15**	12	6	-	-	-	-	-	-	-	-	-	-	-
2	0	0	0	2	0	8	5	10	6	7	**11**	8	-	-	-	-	-	-	-	-	-	-	-	-
1	0	0	0	1	2	5	7	18	4	14	**12**	11	-	-	-	-	-	-	-	-	-	-	-	-
0	0	0	0	0	1	4	15	18	9	14	**17**	12	-	-	-	-	-	-	-	-	-	-	-	-

AM Peak 1100 - 1200 (55), AM PHF=0.81

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-154 -- English (ENU)

Datasets:

Site:	**[McClelland St] McClelland St (Southbound)**
Attribute:	November 19, 2019
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	13:09 Tuesday, November 19, 2019 => 13:17 Wednesday, November 20, 2019,
Zone:	
File:	McClelland St 0 2019-11-20 1318.EC0 (Regular)
Identifier:	R090852E MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**13:10 Tuesday, November 19, 2019 => 13:17 Wednesday, November 20, 2019 (1.00513)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 1
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 601 / 1243 (48.35%)

* Tuesday, November 19, 2019 - Total=207 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**20**	**62**	**27**	**17**	**21**	**24**	**10**	**6**	**17**	**2**	**1**	
-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	5	4	3	2	4	1	2	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	6	29	7	2	4	4	4	1	6	1	1	0
-	-	-	-	-	-	-	-	-	-	-	-	-	6	16	6	5	5	9	2	2	5	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	8	7	9	6	9	9	0	2	4	1	0	0

* Wednesday, November 20, 2019 - Total=394 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
0	**2**	**1**	**5**	**14**	**53**	**50**	**48**	**50**	**38**	**40**	**33**	**48**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
0	0	0	0	1	4	**14**	12	13	8	8	9	8	12	-	-	-	-	-	-	-	-	-	-	-
0	0	0	1	4	**12**	7	6	19	7	9	7	7	-	-	-	-	-	-	-	-	-	-	-	-
0	0	1	1	4	**14**	11	10	9	9	13	8	11	-	-	-	-	-	-	-	-	-	-	-	-
0	2	0	3	5	**23**	18	20	9	14	10	9	22	-	-	-	-	-	-	-	-	-	-	-	-

AM Peak 0515 - 0615 (63), AM PHF=0.68

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-157 -- English (ENU)

Datasets:

Site:	**[N Road] N Road north of Battleship Drive**
Attribute:	November 20, 2019
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	10:29 Wednesday, November 20, 2019 => 19:01 Thursday, November 21, 2019,
Zone:	
File:	N Road_North of Battleship 0 2019-11-21 1846.EC0 (Regular)
Identifier:	R186JWT5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**10:30 Wednesday, November 20, 2019 => 18:00 Thursday, November 21, 2019 (1.3125)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 28092 / 28466 (98.69%)

* Wednesday, November 20, 2019 - Total=11424 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1459**	**1354**	**1305**	**1327**	**1525**	**1170**	**889**	**675**	**503**	**377**	**318**	**306**	**216**	
-	-	-	-	-	-	-	-	-	-	-	385	326	351	308	**420**	327	223	170	145	101	87	86	72	49
-	-	-	-	-	-	-	-	-	-	-	352	346	318	321	**439**	327	271	178	129	97	84	87	49	43
-	-	-	-	-	-	-	-	-	-	0	356	352	301	357	**369**	260	225	166	117	85	92	78	45	45
-	-	-	-	-	-	-	-	-	-	139	366	330	335	**341**	297	256	170	161	112	94	55	55	50	23

PM Peak 1445 - 1545 (1569), PM PHF=0.89

* Thursday, November 21, 2019 - Total=16529 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
160	**31**	**74**	**155**	**332**	**1125**	**1405**	**1416**	**1048**	**1127**	**1231**	**1389**	**1225**	**1149**	**1403**	**1524**	**1179**	**556**	**-**	**-**	**-**	**-**	**-**	**-**	
49	8	20	37	72	206	342	**386**	238	282	278	377	318	280	340	434	336	223	-	-	-	-	-	-	-
43	5	18	17	82	254	328	**342**	281	281	269	343	336	277	354	422	309	218	-	-	-	-	-	-	-
45	11	14	33	96	337	359	**362**	253	270	335	337	299	298	377	353	264	115	-	-	-	-	-	-	-
23	7	22	68	82	328	**376**	326	276	294	349	332	272	294	332	315	270	0	-	-	-	-	-	-	-

AM Peak 0645 - 0745 (1466), AM PHF=0.95

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-157 -- English (ENU)

Datasets:

Site:	**[N Road] N Road north of Battleship Drive (Northbound)**
Attribute:	November 20, 2019
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	10:29 Wednesday, November 20, 2019 => 19:01 Thursday, November 21, 2019,
Zone:	
File:	N Road_North of Battleship 0 2019-11-21 1846.EC0 (Regular)
Identifier:	R186JWT5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**10:30 Wednesday, November 20, 2019 => 18:00 Thursday, November 21, 2019 (1.3125)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 0
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 14967 / 28466 (52.58%)

* Wednesday, November 20, 2019 - Total=6291 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**741**	**665**	**621**	**740**	**1053**	**767**	**534**	**364**	**244**	**181**	**136**	**144**	**101**	
-	-	-	-	-	-	-	-	-	-	-	197	154	159	153	**297**	208	142	100	71	55	39	38	35	31
-	-	-	-	-	-	-	-	-	-	-	174	167	160	177	**306**	217	161	97	60	50	26	46	20	23
-	-	-	-	-	-	-	-	-	-	0	183	168	148	193	**251**	175	126	89	58	36	42	34	27	22
-	-	-	-	-	-	-	-	-	-	68	187	176	154	**217**	199	167	105	78	55	40	29	26	19	8

PM Peak 1445 - 1545 (1071), PM PHF=0.88

* Thursday, November 21, 2019 - Total=8608 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
84	**18**	**44**	**111**	**245**	**313**	**534**	**798**	**528**	**530**	**591**	**696**	**582**	**591**	**814**	**1047**	**761**	**321**	**-**	**-**	**-**	**-**	**-**	**-**	
31	4	10	20	61	69	98	**187**	128	133	147	191	151	158	178	303	233	140	-	-	-	-	-	-	-
23	4	12	13	69	62	118	**191**	142	133	126	163	160	133	197	300	190	124	-	-	-	-	-	-	-
22	6	11	25	69	94	123	**213**	130	125	153	182	142	149	217	249	177	57	-	-	-	-	-	-	-
8	4	11	53	46	88	195	**207**	128	139	165	160	129	151	222	195	161	0	-	-	-	-	-	-	-

AM Peak 0700 - 0800 (798), AM PHF=0.94

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-157 -- English (ENU)

Datasets:

Site:	**[N Road] N Road north of Battleship Drive (Southbound)**
Attribute:	November 20, 2019
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	10:29 Wednesday, November 20, 2019 => 19:01 Thursday, November 21, 2019,
Zone:	
File:	N Road_North of Battleship 0 2019-11-21 1846.EC0 (Regular)
Identifier:	R186JWT5 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**10:30 Wednesday, November 20, 2019 => 18:00 Thursday, November 21, 2019 (1.3125)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 1
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 13125 / 28466 (46.11%)

* Wednesday, November 20, 2019 - Total=5133 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**718**	**689**	**684**	**587**	**472**	**403**	**355**	**311**	**259**	**196**	**182**	**162**	**115**	
-	-	-	-	-	-	-	-	-	-	-	188	172	**192**	155	123	119	81	70	74	46	48	48	37	18
-	-	-	-	-	-	-	-	-	-	-	178	**179**	158	144	133	110	110	81	69	47	58	41	29	20
-	-	-	-	-	-	-	-	-	-	0	173	**184**	153	164	118	85	99	77	59	49	50	44	18	23
-	-	-	-	-	-	-	-	-	-	71	179	**154**	181	124	98	89	65	83	57	54	26	29	31	15

PM Peak 1215 - 1315 (709), PM PHF=0.92

* Thursday, November 21, 2019 - Total=7921 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
76	**13**	**30**	**44**	**87**	**812**	**871**	**618**	**520**	**597**	**640**	**693**	**643**	**558**	**589**	**477**	**418**	**235**	**-**	**-**	**-**	**-**	**-**	**-**	
18	4	10	17	11	137	**244**	199	110	149	131	186	167	122	162	131	103	83	-	-	-	-	-	-	-
20	1	6	4	13	192	**210**	151	139	148	143	180	176	144	157	122	119	94	-	-	-	-	-	-	-
23	5	3	8	27	**243**	236	149	123	145	182	155	157	149	160	104	87	58	-	-	-	-	-	-	-
15	3	11	15	36	**240**	181	119	148	155	184	172	143	143	110	120	109	0	-	-	-	-	-	-	-

AM Peak 0530 - 0630 (937), AM PHF=0.96

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-156 -- English (ENU)

Datasets:

Site:	**[N Road] South of Signalized Intersection**
Attribute:	November 20, 2019
Direction:	5 - South bound A>B, North bound B>A. **Lane:** 0
Survey Duration:	16:45 Wednesday, November 20, 2019 => 18:46 Thursday, November 21, 2019,
Zone:	
File:	N Road_South of Pearl Harbor Blvd 0 2019-11-21 1846.EC0 (Regular)
Identifier:	R090852E MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**16:46 Wednesday, November 20, 2019 => 18:00 Thursday, November 21, 2019 (1.05139)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 14841 / 15740 (94.29%)

* Wednesday, November 20, 2019 - Total=2701 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**677**	**508**	**384**	**293**	**281**	**336**	**222**	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160	137	118	81	82	107	71	46
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	206	135	97	62	70	86	48	39
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	137	83	59	74	83	48	51
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175	143	99	86	91	55	60	55	21

* Thursday, November 21, 2019 - Total=11965 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
157	**38**	**83**	**184**	**515**	**919**	**993**	**791**	**677**	**709**	**814**	**950**	**814**	**846**	**1020**	**964**	**867**	**624**	**-**	**-**	**-**	**-**	**-**	**-**	
46	6	24	35	126	200	**263**	219	178	160	204	251	224	212	229	235	251	170	-	-	-	-	-	-	-
39	9	19	20	139	213	**264**	199	180	188	182	238	234	201	294	266	201	178	-	-	-	-	-	-	-
51	14	22	49	130	**235**	234	184	158	179	206	238	195	226	240	239	235	178	-	-	-	-	-	-	-
21	9	18	80	120	**271**	232	189	161	182	222	223	161	207	257	224	180	98	-	-	-	-	-	-	-

AM Peak 0530 - 0630 (1033), AM PHF=0.95

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-156 -- English (ENU)

Datasets:

Site:	**[N Road] South of Signalized Intersection (Northbound)**
Attribute:	November 20, 2019
Direction:	5 - South bound A>B, North bound B>A. **Lane:** 0
Survey Duration:	16:45 Wednesday, November 20, 2019 => 18:46 Thursday, November 21, 2019,
Zone:	
File:	N Road_South of Pearl Harbor Blvd 0 2019-11-21 1846.EC0 (Regular)
Identifier:	R090852E MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**16:46 Wednesday, November 20, 2019 => 18:00 Thursday, November 21, 2019 (1.05139)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 1
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 7217 / 15740 (45.85%)

* Wednesday, November 20, 2019 - Total=1178 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**337**	**209**	**153**	**126**	**121**	**137**	**95**	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87	61	37	34	26	40	27	23
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	103	51	38	28	30	42	22	22
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	79	57	41	25	40	29	27	20
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	82	68	40	37	39	25	26	19	6

* Thursday, November 21, 2019 - Total=5957 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
71	**20**	**52**	**144**	**422**	**523**	**528**	**440**	**343**	**308**	**361**	**453**	**340**	**329**	**443**	**458**	**431**	**291**	**-**	**-**	**-**	**-**	**-**	**-**	
23	2	12	18	104	133	**136**	117	103	72	97	120	99	87	97	94	132	79	-	-	-	-	-	-	-
22	7	14	18	116	122	**126**	102	80	88	76	109	100	78	138	138	95	87	-	-	-	-	-	-	-
20	6	17	39	107	123	**131**	110	82	69	86	128	80	82	103	120	115	79	-	-	-	-	-	-	-
6	5	9	69	95	**145**	135	111	78	79	102	96	61	82	105	106	89	46	-	-	-	-	-	-	-

AM Peak 0545 - 0645 (538), AM PHF=0.93

MetroCount Traffic Executive
Vehicle Counts

VehicleCount-156 -- English (ENU)

Datasets:

Site:	**[N Road] South of Signalized Intersection (Southbound)**
Attribute:	November 20, 2019
Direction:	5 - South bound A>B, North bound B>A. **Lane:** 0
Survey Duration:	16:45 Wednesday, November 20, 2019 => 18:46 Thursday, November 21, 2019,
Zone:	
File:	N Road_South of Pearl Harbor Blvd 0 2019-11-21 1846.EC0 (Regular)
Identifier:	R090852E MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**16:46 Wednesday, November 20, 2019 => 18:00 Thursday, November 21, 2019 (1.05139)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Speed range:	5 - 100 mph.
Direction:	North, East, South, West (bound), P = North, Lane = 0
Separation:	Headway > 0 sec, Span 0 - 300 ft
Name:	Default Profile
Scheme:	Vehicle classification (Scheme F3)
Units:	Non metric (ft, mi, ft/s, mph, lb, ton)
In profile:	Vehicles = 7624 / 15740 (48.44%)

* Wednesday, November 20, 2019 - Total=1523 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**340**	**299**	**231**	**167**	**160**	**199**	**127**	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73	76	81	47	56	67	44	23
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	103	84	59	34	40	44	26	17
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	89	80	42	34	34	54	21	31
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	93	75	59	49	52	30	34	36	15

* Thursday, November 21, 2019 - Total=6008 (Incomplete) , 15 minute drops

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
86	**18**	**31**	**40**	**93**	**396**	**465**	**351**	**334**	**401**	**453**	**497**	**474**	**517**	**577**	**506**	**436**	**333**	**-**	**-**	**-**	**-**	**-**	**-**	
23	4	12	17	22	67	**127**	102	75	88	107	131	125	125	132	141	119	91	-	-	-	-	-	-	-
17	2	5	2	23	91	**138**	97	100	100	106	129	134	123	156	128	106	91	-	-	-	-	-	-	-
31	8	5	10	23	**112**	103	74	76	110	120	110	115	144	137	119	120	99	-	-	-	-	-	-	-
15	4	9	11	25	**126**	97	78	83	103	120	127	100	125	152	118	91	52	-	-	-	-	-	-	-

AM Peak 0530 - 0630 (503), AM PHF=0.91

Appendix C
Synchro Analysis Worksheets

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Synchro Analysis Worksheets

Existing Conditions

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	351	13	279	295	381	425
Future Volume (veh/h)	351	13	279	295	381	425
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	382	0	303	321	414	0
Adj No. of Lanes	2	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	486	224	722	1411	1157	984
Arrive On Green	0.14	0.00	0.09	0.76	0.62	0.00
Sat Flow, veh/h	3442	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	382	0	303	321	414	0
Grp Sat Flow(s),veh/h/ln	1721	1583	1774	1863	1863	1583
Q Serve(g_s), s	10.6	0.0	5.6	5.0	10.7	0.0
Cycle Q Clear(g_c), s	10.6	0.0	5.6	5.0	10.7	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	486	224	722	1411	1157	984
V/C Ratio(X)	0.79	0.00	0.42	0.23	0.36	0.00
Avail Cap(c_a), veh/h	1217	560	1286	1411	1157	984
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.1	0.0	5.6	3.5	9.1	0.0
Incr Delay (d2), s/veh	2.9	0.0	0.4	0.4	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	0.0	2.7	2.6	5.7	0.0
LnGrp Delay(d),s/veh	43.9	0.0	6.0	3.9	10.0	0.0
LnGrp LOS	D		A	A	A	
Approach Vol, veh/h	382			624	414	
Approach Delay, s/veh	43.9			4.9	10.0	
Approach LOS	D			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		80.0		19.0	13.5	66.5		
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0		
Max Green Setting (Gmax), s		75.0		35.0	40.0	30.0		
Max Q Clear Time (g_c+I1), s		7.0		12.6	7.6	12.7		
Green Ext Time (p_c), s		5.8		1.4	1.0	4.5		

Intersection Summary	
HCM 2010 Ctrl Delay	16.9
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	326	108	95	366	336	336
Future Volume (veh/h)	326	108	95	366	336	336
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	354	0	103	398	365	0
Adj No. of Lanes	2	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	457	210	751	1425	1241	1055
Arrive On Green	0.13	0.00	0.05	0.77	0.67	0.00
Sat Flow, veh/h	3442	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	354	0	103	398	365	0
Grp Sat Flow(s),veh/h/ln	1721	1583	1774	1863	1863	1583
Q Serve(g_s), s	9.7	0.0	1.6	6.3	8.0	0.0
Cycle Q Clear(g_c), s	9.7	0.0	1.6	6.3	8.0	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	457	210	751	1425	1241	1055
V/C Ratio(X)	0.77	0.00	0.14	0.28	0.29	0.00
Avail Cap(c_a), veh/h	1229	565	1390	1425	1241	1055
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.1	0.0	4.2	3.4	6.8	0.0
Incr Delay (d2), s/veh	2.9	0.0	0.1	0.5	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.0	0.8	3.4	4.3	0.0
LnGrp Delay(d),s/veh	43.9	0.0	4.3	3.9	7.4	0.0
LnGrp LOS	D		A	A	A	
Approach Vol, veh/h	354			501	365	
Approach Delay, s/veh	43.9			4.0	7.4	
Approach LOS	D			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		80.0		18.0	9.7	70.3		
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0		
Max Green Setting (Gmax), s		75.0		35.0	40.0	30.0		
Max Q Clear Time (g_c+I1), s		8.3		11.7	3.6	10.0		
Green Ext Time (p_c), s		6.0		1.3	0.3	5.0		

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	761	208	49	475	292	143
Future Volume (veh/h)	761	208	49	475	292	143
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	827	0	53	516	317	0
Adj No. of Lanes	2	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	970	446	597	1149	983	835
Arrive On Green	0.28	0.00	0.04	0.62	0.53	0.00
Sat Flow, veh/h	3442	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	827	0	53	516	317	0
Grp Sat Flow(s),veh/h/ln	1721	1583	1774	1863	1863	1583
Q Serve(g_s), s	22.5	0.0	1.3	14.5	9.6	0.0
Cycle Q Clear(g_c), s	22.5	0.0	1.3	14.5	9.6	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	970	446	597	1149	983	835
V/C Ratio(X)	0.85	0.00	0.09	0.45	0.32	0.00
Avail Cap(c_a), veh/h	1706	785	654	1149	983	835
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	33.6	0.0	9.4	10.0	13.3	0.0
Incr Delay (d2), s/veh	2.2	0.0	0.1	1.3	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	0.0	0.6	7.9	5.2	0.0
LnGrp Delay(d),s/veh	35.8	0.0	9.5	11.3	14.2	0.0
LnGrp LOS	D		A	B	B	
Approach Vol, veh/h	827			569	317	
Approach Delay, s/veh	35.8			11.1	14.2	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		66.0		32.9	8.8	57.2		
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0		
Max Green Setting (Gmax), s		61.0		49.0	7.0	49.0		
Max Q Clear Time (g_c+I1), s		16.5		24.5	3.3	11.6		
Green Ext Time (p_c), s		6.8		3.4	0.0	6.6		

Intersection Summary	
HCM 2010 Ctrl Delay	23.6
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	38	31	617	31	17	878
Future Vol, veh/h	38	31	617	31	17	878
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	41	34	671	34	18	954

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1201	353	0	0	705	0
Stage 1	688	-	-	-	-	-
Stage 2	513	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	177	643	-	-	889	-
Stage 1	460	-	-	-	-	-
Stage 2	566	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	169	643	-	-	889	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	460	-	-	-	-	-
Stage 2	542	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.1	0	0.4
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	253	889	-
HCM Lane V/C Ratio	-	-	0.296	0.021	-
HCM Control Delay (s)	-	-	25.1	9.1	0.2
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	1.2	0.1	-

Intersection	
Int Delay, s/veh	1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	40	38	709	57	27	640
Future Vol, veh/h	40	38	709	57	27	640
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	41	771	62	29	696

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1208	417	0	0	833	0
Stage 1	802	-	-	-	-	-
Stage 2	406	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	176	585	-	-	796	-
Stage 1	402	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	166	585	-	-	796	-
Mov Cap-2 Maneuver	166	-	-	-	-	-
Stage 1	402	-	-	-	-	-
Stage 2	603	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26	0	0.7
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	255	796	-
HCM Lane V/C Ratio	-	-	0.332	0.037	-
HCM Control Delay (s)	-	-	26	9.7	0.3
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	1.4	0.1	-

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	31	58	1224	79	42	406
Future Vol, veh/h	31	58	1224	79	42	406
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	63	1330	86	46	441

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1686	708	0	0	1416	0
Stage 1	1373	-	-	-	-	-
Stage 2	313	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	85	377	-	-	477	-
Stage 1	200	-	-	-	-	-
Stage 2	715	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	74	377	-	-	477	-
Mov Cap-2 Maneuver	74	-	-	-	-	-
Stage 1	200	-	-	-	-	-
Stage 2	623	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	60.6	0	1.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	155	477	-
HCM Lane V/C Ratio	-	-	0.624	0.096	-
HCM Control Delay (s)	-	-	60.6	13.3	0.7
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	3.4	0.3	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	489	33	15	578	32	4
Future Vol, veh/h	489	33	15	578	32	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	532	36	16	628	35	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	568	0	1210	550
Stage 1	-	-	-	-	550	-
Stage 2	-	-	-	-	660	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1004	-	202	535
Stage 1	-	-	-	-	578	-
Stage 2	-	-	-	-	514	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1004	-	199	535
Mov Cap-2 Maneuver	-	-	-	-	199	-
Stage 1	-	-	-	-	578	-
Stage 2	-	-	-	-	506	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	25.5
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	214	-	-	1004	-
HCM Lane V/C Ratio	0.183	-	-	0.016	-
HCM Control Delay (s)	25.5	-	-	8.6	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	134	257	424	50	27	140
Future Vol, veh/h	134	257	424	50	27	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	146	279	461	54	29	152

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	515	0	-	0	1059	488
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	571	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1051	-	-	-	249	580
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	565	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1051	-	-	-	214	580
Mov Cap-2 Maneuver	-	-	-	-	214	-
Stage 1	-	-	-	-	531	-
Stage 2	-	-	-	-	565	-

Approach	EB	WB	SB
HCM Control Delay, s	3.1	0	15.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1051	-	-	-	214	580
HCM Lane V/C Ratio	0.139	-	-	-	0.137	0.262
HCM Control Delay (s)	9	-	-	-	24.5	13.4
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.5	1

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	322	71	23	516	33	5
Future Vol, veh/h	322	71	23	516	33	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	350	77	25	561	36	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	427	0	1000	389
Stage 1	-	-	-	-	389	-
Stage 2	-	-	-	-	611	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1132	-	270	659
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	542	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1132	-	264	659
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	530	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	19.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	287	-	-	1132	-
HCM Lane V/C Ratio	0.144	-	-	0.022	-
HCM Control Delay (s)	19.6	-	-	8.3	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Intersection	
Int Delay, s/veh	8.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	66	78	56	136	43	60	10	23	90	25	155
Future Vol, veh/h	27	66	78	56	136	43	60	10	23	90	25	155
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	72	85	61	148	47	65	11	25	98	27	168

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	195	0	0	157	0	0	564	490	115	485	509	172
Stage 1	-	-	-	-	-	-	173	173	-	294	294	-
Stage 2	-	-	-	-	-	-	391	317	-	191	215	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1378	-	-	1423	-	-	436	479	937	492	467	872
Stage 1	-	-	-	-	-	-	829	756	-	714	670	-
Stage 2	-	-	-	-	-	-	633	654	-	811	725	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1378	-	-	1423	-	-	318	446	937	446	435	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	318	446	-	446	435	-
Stage 1	-	-	-	-	-	-	812	740	-	699	638	-
Stage 2	-	-	-	-	-	-	465	623	-	761	710	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	1.8	17.2	16
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	395	1378	-	-	1423	-	-	618
HCM Lane V/C Ratio	0.256	0.021	-	-	0.043	-	-	0.475
HCM Control Delay (s)	17.2	7.7	-	-	7.6	0	-	16
HCM Lane LOS	C	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	1	0.1	-	-	0.1	-	-	2.6

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	404	41	12	503	40	3
Future Vol, veh/h	404	41	12	503	40	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	439	45	13	547	43	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	484	0	1035	462
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	573	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1079	-	257	600
Stage 1	-	-	-	-	634	-
Stage 2	-	-	-	-	564	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1079	-	254	600
Mov Cap-2 Maneuver	-	-	-	-	254	-
Stage 1	-	-	-	-	634	-
Stage 2	-	-	-	-	557	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	21.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	265	-	-	1079	-
HCM Lane V/C Ratio	0.176	-	-	0.012	-
HCM Control Delay (s)	21.5	-	-	8.4	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	137	262	389	53	16	94
Future Vol, veh/h	137	262	389	53	16	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	149	285	423	58	17	102

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	481	0	-	0	1035	452
Stage 1	-	-	-	-	452	-
Stage 2	-	-	-	-	583	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1082	-	-	-	257	608
Stage 1	-	-	-	-	641	-
Stage 2	-	-	-	-	558	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	1082	-	-	-	222	608
Mov Cap-2 Maneuver	-	-	-	-	222	-
Stage 1	-	-	-	-	553	-
Stage 2	-	-	-	-	558	-

Approach	EB	WB	SB
HCM Control Delay, s	3	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1082	-	-	-	222	608
HCM Lane V/C Ratio	0.138	-	-	-	0.078	0.168
HCM Control Delay (s)	8.9	-	-	-	22.6	12.1
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.3	0.6

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	244	36	23	424	46	8
Future Vol, veh/h	244	36	23	424	46	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	265	39	25	461	50	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	304	0	796	285
Stage 1	-	-	-	-	285	-
Stage 2	-	-	-	-	511	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1257	-	356	754
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1257	-	349	754
Mov Cap-2 Maneuver	-	-	-	-	349	-
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	590	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	16.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	379	-	-	1257	-
HCM Lane V/C Ratio	0.155	-	-	0.02	-
HCM Control Delay (s)	16.2	-	-	7.9	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	57	101	67	40	132	41	60	5	26	22	19	68
Future Vol, veh/h	57	101	67	40	132	41	60	5	26	22	19	68
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	62	110	73	43	143	45	65	5	28	24	21	74

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	188	0	0	183	0	0	570	545	147	539	559	166
Stage 1	-	-	-	-	-	-	271	271	-	252	252	-
Stage 2	-	-	-	-	-	-	299	274	-	287	307	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1386	-	-	1392	-	-	432	446	900	453	438	878
Stage 1	-	-	-	-	-	-	735	685	-	752	698	-
Stage 2	-	-	-	-	-	-	710	683	-	720	661	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1386	-	-	1392	-	-	358	411	900	409	404	878
Mov Cap-2 Maneuver	-	-	-	-	-	-	358	411	-	409	404	-
Stage 1	-	-	-	-	-	-	702	654	-	718	674	-
Stage 2	-	-	-	-	-	-	608	659	-	661	631	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	1.4	15.7	12.3
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	436	1386	-	-	1392	-	-	611
HCM Lane V/C Ratio	0.227	0.045	-	-	0.031	-	-	0.194
HCM Control Delay (s)	15.7	7.7	-	-	7.7	0	-	12.3
HCM Lane LOS	C	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0.1	-	-	0.7

Intersection	
Int Delay, s/veh	2.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	568	55	13	521	65	10
Future Vol, veh/h	568	55	13	521	65	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	617	60	14	566	71	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	677	0	1241	647
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	594	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	915	-	193	471
Stage 1	-	-	-	-	521	-
Stage 2	-	-	-	-	552	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	915	-	190	471
Mov Cap-2 Maneuver	-	-	-	-	190	-
Stage 1	-	-	-	-	521	-
Stage 2	-	-	-	-	544	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	33.5
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	206	-	-	915	-
HCM Lane V/C Ratio	0.396	-	-	0.015	-
HCM Control Delay (s)	33.5	-	-	9	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.8	-	-	0	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	172	464	367	43	15	74
Future Vol, veh/h	172	464	367	43	15	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	187	504	399	47	16	80

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	446	0	-	0	1301	423
Stage 1	-	-	-	-	423	-
Stage 2	-	-	-	-	878	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1114	-	-	-	178	631
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	406	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1114	-	-	-	148	631
Mov Cap-2 Maneuver	-	-	-	-	148	-
Stage 1	-	-	-	-	550	-
Stage 2	-	-	-	-	406	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	15
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1114	-	-	-	148	631
HCM Lane V/C Ratio	0.168	-	-	-	0.11	0.127
HCM Control Delay (s)	8.9	-	-	-	32.3	11.5
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.6	-	-	-	0.4	0.4

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	291	28	15	316	87	8
Future Vol, veh/h	291	28	15	316	87	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	316	30	16	343	95	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	346	0	706	331
Stage 1	-	-	-	-	331	-
Stage 2	-	-	-	-	375	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1213	-	402	711
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	695	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1213	-	397	711
Mov Cap-2 Maneuver	-	-	-	-	397	-
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	686	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	16.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	412	-	-	1213	-
HCM Lane V/C Ratio	0.251	-	-	0.013	-
HCM Control Delay (s)	16.6	-	-	8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0	-

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	72	267	26	19	139	42	61	13	52	28	8	47
Future Vol, veh/h	72	267	26	19	139	42	61	13	52	28	8	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	78	290	28	21	151	46	66	14	57	30	9	51

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	197	0	0	318	0	0	706	699	304	712	690	174
Stage 1	-	-	-	-	-	-	460	460	-	216	216	-
Stage 2	-	-	-	-	-	-	246	239	-	496	474	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1376	-	-	1242	-	-	351	364	736	347	368	869
Stage 1	-	-	-	-	-	-	581	566	-	786	724	-
Stage 2	-	-	-	-	-	-	758	708	-	556	558	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1376	-	-	1242	-	-	305	337	736	293	340	869
Mov Cap-2 Maneuver	-	-	-	-	-	-	305	337	-	293	340	-
Stage 1	-	-	-	-	-	-	548	534	-	741	710	-
Stage 2	-	-	-	-	-	-	691	695	-	471	526	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	0.8	18.3	14.3
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	407	1376	-	-	1242	-	-	479
HCM Lane V/C Ratio	0.337	0.057	-	-	0.017	-	-	0.188
HCM Control Delay (s)	18.3	7.8	-	-	7.9	0	-	14.3
HCM Lane LOS	C	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	1.5	0.2	-	-	0.1	-	-	0.7

Synchro Analysis Worksheets

Future Conditions Tradewinds-Par 3 Site

No Mitigation

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	683	184	15	580	35	5
Future Vol, veh/h	683	184	15	580	35	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	742	200	16	630	38	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	942	0	1504	842
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	662	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	728	-	134	364
Stage 1	-	-	-	-	423	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	728	-	131	364
Mov Cap-2 Maneuver	-	-	-	-	131	-
Stage 1	-	-	-	-	423	-
Stage 2	-	-	-	-	502	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	41.2
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	142	-	-	728	-
HCM Lane V/C Ratio	0.306	-	-	0.022	-
HCM Control Delay (s)	41.2	-	-	10.1	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	1.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	11.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	135	360	193	154	455	50	0	0	0	47	10	140
Future Vol, veh/h	135	360	193	154	455	50	0	0	0	47	10	140
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	147	391	210	167	495	54	0	0	0	51	11	152

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	549	0	0	601	0	0	1728	1673	496	1646	1751	522
Stage 1	-	-	-	-	-	-	790	790	-	856	856	-
Stage 2	-	-	-	-	-	-	938	883	-	790	895	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1021	-	-	976	-	-	70	96	574	79	86	555
Stage 1	-	-	-	-	-	-	383	402	-	352	374	-
Stage 2	-	-	-	-	-	-	317	364	-	383	359	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1021	-	-	976	-	-	34	68	574	61	61	555
Mov Cap-2 Maneuver	-	-	-	-	-	-	34	68	-	61	61	-
Stage 1	-	-	-	-	-	-	328	344	-	301	310	-
Stage 2	-	-	-	-	-	-	184	302	-	328	307	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.8	2.2	0	76.9
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	1021	-	-	976	-	-	61	555
HCM Lane V/C Ratio	-	-	0.144	-	-	0.172	-	-	1.016	0.274
HCM Control Delay (s)	0	0	9.1	-	-	9.5	-	-	231.8	13.9
HCM Lane LOS	A	A	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	-	-	0.5	-	-	0.6	-	-	4.9	1.1

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	315	92	105	624	35	5
Future Vol, veh/h	315	92	105	624	35	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	342	100	114	678	38	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	442	0	1298	392
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	906	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1118	-	178	657
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	394	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1118	-	160	657
Mov Cap-2 Maneuver	-	-	-	-	160	-
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	354	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	31.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	177	-	-	1118	-
HCM Lane V/C Ratio	0.246	-	-	0.102	-
HCM Control Delay (s)	31.8	-	-	8.6	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0.3	-

Intersection	
Int Delay, s/veh	12.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	70	80	60	347	45	60	10	25	90	25	182
Future Vol, veh/h	30	70	80	60	347	45	60	10	25	90	25	182
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	76	87	65	377	49	65	11	27	98	27	198

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	426	0	0	163	0	0	830	742	120	737	761	402
Stage 1	-	-	-	-	-	-	186	186	-	532	532	-
Stage 2	-	-	-	-	-	-	644	556	-	205	229	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1133	-	-	1416	-	-	289	344	931	334	335	648
Stage 1	-	-	-	-	-	-	816	746	-	531	526	-
Stage 2	-	-	-	-	-	-	461	513	-	797	715	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1133	-	-	1416	-	-	175	314	931	295	306	648
Mov Cap-2 Maneuver	-	-	-	-	-	-	175	314	-	295	306	-
Stage 1	-	-	-	-	-	-	792	724	-	516	494	-
Stage 2	-	-	-	-	-	-	284	482	-	740	694	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	1	31.4	31.7
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	237	1133	-	-	1416	-	-	445
HCM Lane V/C Ratio	0.436	0.029	-	-	0.046	-	-	0.725
HCM Control Delay (s)	31.4	8.3	-	-	7.7	0	-	31.7
HCM Lane LOS	D	A	-	-	A	A	-	D
HCM 95th %tile Q(veh)	2.1	0.1	-	-	0.1	-	-	5.8

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	561	45	15	583	40	5
Future Vol, veh/h	561	45	15	583	40	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	610	49	16	634	43	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	659	0	1301	635
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	666	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	929	-	178	478
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	511	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	929	-	175	478
Mov Cap-2 Maneuver	-	-	-	-	175	-
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	502	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	30.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	188	-	-	929	-
HCM Lane V/C Ratio	0.26	-	-	0.018	-
HCM Control Delay (s)	30.8	-	-	8.9	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0.1	-

Intersection	
Int Delay, s/veh	24.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	140	270	156	125	425	55	78	4	64	20	8	95
Future Vol, veh/h	140	270	156	125	425	55	78	4	64	20	8	95
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	152	293	170	136	462	60	85	4	70	22	9	103

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	522	0	0	463	0	0	1502	1476	378	1483	1531	492
Stage 1	-	-	-	-	-	-	682	682	-	764	764	-
Stage 2	-	-	-	-	-	-	820	794	-	719	767	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1044	-	-	1098	-	-	100	126	669	103	117	577
Stage 1	-	-	-	-	-	-	440	450	-	396	413	-
Stage 2	-	-	-	-	-	-	369	400	-	420	411	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1044	-	-	1098	-	-	~ 61	94	669	72	88	577
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 61	94	-	72	88	-
Stage 1	-	-	-	-	-	-	376	384	-	338	362	-
Stage 2	-	-	-	-	-	-	259	350	-	318	351	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.2	1.8	200.2	28.2
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	61	492	1044	-	-	1098	-	-	76	577
HCM Lane V/C Ratio	1.39	0.15	0.146	-	-	0.124	-	-	0.4	0.179
HCM Control Delay (s)	$ 362.9	13.6	9	-	-	8.7	-	-	81	12.6
HCM Lane LOS	F	B	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	7.3	0.5	0.5	-	-	0.4	-	-	1.6	0.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	313	41	40	555	50	15
Future Vol, veh/h	313	41	40	555	50	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	340	45	43	603	54	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	385	0	1052	363
Stage 1	-	-	-	-	363	-
Stage 2	-	-	-	-	689	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1173	-	251	682
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	498	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1173	-	242	682
Mov Cap-2 Maneuver	-	-	-	-	242	-
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	480	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	21.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	284	-	-	1173	-
HCM Lane V/C Ratio	0.249	-	-	0.037	-
HCM Control Delay (s)	21.8	-	-	8.2	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	64	164	70	40	252	45	60	5	30	25	20	78
Future Vol, veh/h	64	164	70	40	252	45	60	5	30	25	20	78
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	70	178	76	43	274	49	65	5	33	27	22	85

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	323	0	0	254	0	0	794	765	216	760	779	299
Stage 1	-	-	-	-	-	-	356	356	-	385	385	-
Stage 2	-	-	-	-	-	-	438	409	-	375	394	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1237	-	-	1311	-	-	306	333	824	323	327	741
Stage 1	-	-	-	-	-	-	661	629	-	638	611	-
Stage 2	-	-	-	-	-	-	597	596	-	646	605	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1237	-	-	1311	-	-	237	301	824	284	296	741
Mov Cap-2 Maneuver	-	-	-	-	-	-	237	301	-	284	296	-
Stage 1	-	-	-	-	-	-	623	593	-	602	587	-
Stage 2	-	-	-	-	-	-	489	572	-	580	571	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0.9	22.3	15.6
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	310	1237	-	-	1311	-	-	472
HCM Lane V/C Ratio	0.333	0.056	-	-	0.033	-	-	0.283
HCM Control Delay (s)	22.3	8.1	-	-	7.8	0	-	15.6
HCM Lane LOS	C	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	1.4	0.2	-	-	0.1	-	-	1.2

Intersection	
Int Delay, s/veh	23.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	581	55	15	649	165	10
Future Vol, veh/h	581	55	15	649	165	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	632	60	16	705	179	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	692	0	1399	662
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	737	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	903	-	~ 155	462
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	473	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	903	-	~ 152	462
Mov Cap-2 Maneuver	-	-	-	-	~ 152	-
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	464	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	193.9
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	158	-	-	903	-
HCM Lane V/C Ratio	1.204	-	-	0.018	-
HCM Control Delay (s)	193.9	-	-	9.1	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	10.7	-	-	0.1	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	40.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	175	405	11	8	465	57	124	7	101	15	1	75
Future Vol, veh/h	175	405	11	8	465	57	124	7	101	15	1	75
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	350	-	-	100	-	-	0	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	190	440	12	9	505	62	135	8	110	16	1	82

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	567	0	0	452	0	0	1422	1411	446	1439	1386	536
Stage 1	-	-	-	-	-	-	826	826	-	554	554	-
Stage 2	-	-	-	-	-	-	596	585	-	885	832	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1005	-	-	1109	-	-	~ 114	138	612	111	143	545
Stage 1	-	-	-	-	-	-	366	387	-	517	514	-
Stage 2	-	-	-	-	-	-	490	498	-	340	384	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1005	-	-	1109	-	-	~ 82	111	612	73	115	545
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 82	111	-	73	115	-
Stage 1	-	-	-	-	-	-	297	314	-	419	510	-
Stage 2	-	-	-	-	-	-	412	494	-	221	311	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.8	0.1	234.1	22.3
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	82	473	1005	-	-	1109	-	-	75	545
HCM Lane V/C Ratio	1.644	0.248	0.189	-	-	0.008	-	-	0.232	0.15
HCM Control Delay (s)	$ 424.9	15.1	9.4	-	-	8.3	-	-	66.9	12.8
HCM Lane LOS	F	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	11.1	1	0.7	-	-	0	-	-	0.8	0.5

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	489	32	30	428	102	73
Future Vol, veh/h	489	32	30	428	102	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	532	35	33	465	111	79

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	567	0	1081	550
Stage 1	-	-	-	-	550	-
Stage 2	-	-	-	-	531	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1005	-	241	535
Stage 1	-	-	-	-	578	-
Stage 2	-	-	-	-	590	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1005	-	233	535
Mov Cap-2 Maneuver	-	-	-	-	233	-
Stage 1	-	-	-	-	578	-
Stage 2	-	-	-	-	571	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	34.5
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	305	-	-	1005	-
HCM Lane V/C Ratio	0.624	-	-	0.032	-
HCM Control Delay (s)	34.5	-	-	8.7	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	3.9	-	-	0.1	-

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	92	405	30	20	148	45	65	15	55	30	10	50
Future Vol, veh/h	92	405	30	20	148	45	65	15	55	30	10	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	440	33	22	161	49	71	16	60	33	11	54

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	210	0	0	473	0	0	919	911	457	925	903	186
Stage 1	-	-	-	-	-	-	657	657	-	230	230	-
Stage 2	-	-	-	-	-	-	262	254	-	695	673	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1361	-	-	1089	-	-	252	274	604	250	277	856
Stage 1	-	-	-	-	-	-	454	462	-	773	714	-
Stage 2	-	-	-	-	-	-	743	697	-	433	454	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1361	-	-	1089	-	-	212	248	604	199	251	856
Mov Cap-2 Maneuver	-	-	-	-	-	-	212	248	-	199	251	-
Stage 1	-	-	-	-	-	-	421	428	-	717	698	-
Stage 2	-	-	-	-	-	-	669	681	-	348	421	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.8	28.7	18.6
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	295	1361	-	-	1089	-	-	361
HCM Lane V/C Ratio	0.497	0.073	-	-	0.02	-	-	0.271
HCM Control Delay (s)	28.7	7.9	-	-	8.4	0	-	18.6
HCM Lane LOS	D	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	2.6	0.2	-	-	0.1	-	-	1.1

Synchro Analysis Worksheets

Future Conditions Tradewinds-Par 3 Site

Mitigation

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	683	184	0	580	35	0
Future Volume (veh/h)	683	184	0	580	35	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	0	1863	1863	0
Adj Flow Rate, veh/h	742	200	0	630	38	0
Adj No. of Lanes	1	0	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	0	2	2	0
Cap, veh/h	1307	352	0	1722	0	0
Arrive On Green	0.92	0.92	0.00	1.00	0.00	0.00
Sat Flow, veh/h	1414	381	0	1863	0	0
Grp Volume(v), veh/h	0	942	0	630	0	0
Grp Sat Flow(s),veh/h/ln	0	1795	0	1863	0	0
Q Serve(g_s), s	0.0	5.5	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	5.5	0.0	0.0	0.0	0.0
Prop In Lane		0.21	0.00		0.00	0.00
Lane Grp Cap(c), veh/h	0	1659	0	1722	0	0
V/C Ratio(X)	0.00	0.57	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	0	1659	0	1722	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.4	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.4	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.0	0.0	0.3	0.0	0.0
LnGrp Delay(d),s/veh	0.0	1.8	0.0	0.6	0.0	0.0
LnGrp LOS		A		A		
Approach Vol, veh/h	942			630	0	
Approach Delay, s/veh	1.8			0.6	0.0	
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		0.0		66.0				66.0
Change Period (Y+Rc), s		5.0		5.0				5.0
Max Green Setting (Gmax), s		19.0		61.0				61.0
Max Q Clear Time (g_c+I1), s		0.0		7.5				2.0
Green Ext Time (p_c), s		0.0		20.8				21.4

Intersection Summary	
HCM 2010 Ctrl Delay	1.3
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	355	193	154	440	50	0	0	0	47	10	140
Future Volume (veh/h)	135	355	193	154	440	50	0	0	0	47	10	140
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	147	386	210	167	478	54	0	0	0	51	11	152
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	568	568	309	510	822	93	2	349	0	0	349	297
Arrive On Green	0.13	0.50	0.50	0.13	0.50	0.50	0.00	0.00	0.00	0.00	0.19	0.19
Sat Flow, veh/h	1774	1136	618	1774	1644	186	1774	1863	0	0	1863	1583
Grp Volume(v), veh/h	147	0	596	167	0	532	0	0	0	0	11	152
Grp Sat Flow(s),veh/h/ln	1774	0	1754	1774	0	1830	1774	1863	0	0	1863	1583
Q Serve(g_s), s	2.7	0.0	20.6	3.1	0.0	16.4	0.0	0.0	0.0	0.0	0.4	6.9
Cycle Q Clear(g_c), s	2.7	0.0	20.6	3.1	0.0	16.4	0.0	0.0	0.0	0.0	0.4	6.9
Prop In Lane	1.00		0.35	1.00		0.10	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h	568	0	877	510	0	915	2	349	0	0	349	297
V/C Ratio(X)	0.26	0.00	0.68	0.33	0.00	0.58	0.00	0.00	0.00	0.00	0.03	0.51
Avail Cap(c_a), veh/h	568	0	877	510	0	915	155	349	0	0	349	297
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	8.2	0.0	15.1	9.5	0.0	14.1	0.0	0.0	0.0	0.0	26.6	29.2
Incr Delay (d2), s/veh	1.1	0.0	4.2	1.7	0.0	2.7	0.0	0.0	0.0	0.0	0.2	6.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	11.0	1.7	0.0	8.8	0.0	0.0	0.0	0.0	0.2	3.5
LnGrp Delay(d),s/veh	9.3	0.0	19.4	11.2	0.0	16.8	0.0	0.0	0.0	0.0	26.7	35.4
LnGrp LOS	A		B	B		B					C	D
Approach Vol, veh/h		743			699			0			163	
Approach Delay, s/veh		17.4			15.5			0.0			34.8	
Approach LOS		B			B						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	0.0	20.0	15.0	45.0	0.0	20.0	15.0	45.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	5.0	15.0	10.0	40.0	7.0	13.0	10.0	40.0
Max Q Clear Time (g_c+I1), s	0.0	0.0	5.1	22.6	0.0	8.9	4.7	18.4
Green Ext Time (p_c), s	0.0	0.0	0.2	7.7	0.0	0.2	0.2	8.6

Intersection Summary	
HCM 2010 Ctrl Delay	18.3
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	310	92	120	609	35	10
Future Vol, veh/h	310	92	120	609	35	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	337	100	130	662	38	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	437	0	1309	387
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	922	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1123	-	176	661
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	387	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1123	-	156	661
Mov Cap-2 Maneuver	-	-	-	-	156	-
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	342	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	30.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	188	-	-	1123	-
HCM Lane V/C Ratio	0.26	-	-	0.116	-
HCM Control Delay (s)	30.8	-	-	8.6	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0.4	-

Intersection	
Int Delay, s/veh	12.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	70	80	60	347	45	60	10	25	90	25	182
Future Vol, veh/h	30	70	80	60	347	45	60	10	25	90	25	182
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	76	87	65	377	49	65	11	27	98	27	198

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	426	0	0	163	0	0	830	742	120	737	761	402
Stage 1	-	-	-	-	-	-	186	186	-	532	532	-
Stage 2	-	-	-	-	-	-	644	556	-	205	229	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1133	-	-	1416	-	-	289	344	931	334	335	648
Stage 1	-	-	-	-	-	-	816	746	-	531	526	-
Stage 2	-	-	-	-	-	-	461	513	-	797	715	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1133	-	-	1416	-	-	175	314	931	295	306	648
Mov Cap-2 Maneuver	-	-	-	-	-	-	175	314	-	295	306	-
Stage 1	-	-	-	-	-	-	792	724	-	516	494	-
Stage 2	-	-	-	-	-	-	284	482	-	740	694	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	1	31.4	31.7
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	237	1133	-	-	1416	-	-	445
HCM Lane V/C Ratio	0.436	0.029	-	-	0.046	-	-	0.725
HCM Control Delay (s)	31.4	8.3	-	-	7.7	0	-	31.7
HCM Lane LOS	D	A	-	-	A	A	-	D
HCM 95th %tile Q(veh)	2.1	0.1	-	-	0.1	-	-	5.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	561	45	0	583	40	0
Future Volume (veh/h)	561	45	0	583	40	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	0	1863	1863	0
Adj Flow Rate, veh/h	610	49	0	634	43	0
Adj No. of Lanes	1	0	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	0	2	2	0
Cap, veh/h	1567	126	0	1715	0	0
Arrive On Green	0.92	0.92	0.00	1.00	0.00	0.00
Sat Flow, veh/h	1702	137	0	1863	0	0
Grp Volume(v), veh/h	0	659	0	634	0	0
Grp Sat Flow(s),veh/h/ln	0	1839	0	1863	0	0
Q Serve(g_s), s	0.0	2.8	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	2.8	0.0	0.0	0.0	0.0
Prop In Lane		0.07	0.00		0.00	0.00
Lane Grp Cap(c), veh/h	0	1693	0	1715	0	0
V/C Ratio(X)	0.00	0.39	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	0	1693	0	1715	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.3	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.6	0.0	0.3	0.0	0.0
LnGrp Delay(d),s/veh	0.0	1.0	0.0	0.6	0.0	0.0
LnGrp LOS		A		A		
Approach Vol, veh/h	659			634	0	
Approach Delay, s/veh	1.0			0.6	0.0	
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		0.0		63.0				63.0
Change Period (Y+Rc), s		5.0		5.0				5.0
Max Green Setting (Gmax), s		22.0		58.0				58.0
Max Q Clear Time (g_c+I1), s		0.0		4.8				2.0
Green Ext Time (p_c), s		0.0		13.7				13.8

Intersection Summary	
HCM 2010 Ctrl Delay	0.8
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	265	156	125	410	55	78	4	64	20	8	95
Future Volume (veh/h)	140	265	156	125	410	55	78	4	64	20	8	95
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	152	288	170	136	446	60	85	4	70	22	9	103
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	468	440	260	490	643	87	197	26	453	0	248	211
Arrive On Green	0.13	0.40	0.40	0.13	0.40	0.40	0.11	0.30	0.30	0.00	0.13	0.13
Sat Flow, veh/h	1774	1099	649	1774	1608	216	1774	86	1510	0	1863	1583
Grp Volume(v), veh/h	152	0	458	136	0	506	85	0	74	0	9	103
Grp Sat Flow(s),veh/h/ln	1774	0	1748	1774	0	1825	1774	0	1596	0	1863	1583
Q Serve(g_s), s	3.9	0.0	19.2	3.5	0.0	20.7	4.0	0.0	3.1	0.0	0.4	5.4
Cycle Q Clear(g_c), s	3.9	0.0	19.2	3.5	0.0	20.7	4.0	0.0	3.1	0.0	0.4	5.4
Prop In Lane	1.00		0.37	1.00		0.12	1.00		0.95	0.00		1.00
Lane Grp Cap(c), veh/h	468	0	699	490	0	730	197	0	479	0	248	211
V/C Ratio(X)	0.33	0.00	0.65	0.28	0.00	0.69	0.43	0.00	0.15	0.00	0.04	0.49
Avail Cap(c_a), veh/h	468	0	699	490	0	730	197	0	479	0	248	211
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	13.6	0.0	22.0	13.0	0.0	22.4	37.3	0.0	23.1	0.0	34.0	36.2
Incr Delay (d2), s/veh	1.8	0.0	4.7	1.4	0.0	5.4	6.7	0.0	0.7	0.0	0.3	7.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	10.1	1.9	0.0	11.5	2.3	0.0	1.4	0.0	0.2	2.8
LnGrp Delay(d),s/veh	15.4	0.0	26.7	14.4	0.0	27.8	44.1	0.0	23.8	0.0	34.2	44.0
LnGrp LOS	B		C	B		C	D		C		C	D
Approach Vol, veh/h		610			642			159			112	
Approach Delay, s/veh		23.9			25.0			34.7			43.2	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	0.0	32.0	17.0	41.0	15.0	17.0	17.0	41.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	5.0	17.0	12.0	36.0	10.0	12.0	12.0	36.0
Max Q Clear Time (g_c+I1), s	0.0	5.1	5.5	21.2	6.0	7.4	5.9	22.7
Green Ext Time (p_c), s	0.0	0.6	0.2	5.9	0.1	0.3	0.2	5.6

Intersection Summary	
HCM 2010 Ctrl Delay	26.9
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	308	41	40	540	50	15
Future Vol, veh/h	308	41	40	540	50	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	335	45	43	587	54	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	380	0	1031	358
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	673	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1178	-	258	686
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	507	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1178	-	248	686
Mov Cap-2 Maneuver	-	-	-	-	248	-
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	488	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	21.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	291	-	-	1178	-
HCM Lane V/C Ratio	0.243	-	-	0.037	-
HCM Control Delay (s)	21.3	-	-	8.2	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	64	164	70	40	252	45	60	5	30	25	20	78
Future Vol, veh/h	64	164	70	40	252	45	60	5	30	25	20	78
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	70	178	76	43	274	49	65	5	33	27	22	85

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	323	0	0	254	0	0	794	765	216	760	779	299
Stage 1	-	-	-	-	-	-	356	356	-	385	385	-
Stage 2	-	-	-	-	-	-	438	409	-	375	394	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1237	-	-	1311	-	-	306	333	824	323	327	741
Stage 1	-	-	-	-	-	-	661	629	-	638	611	-
Stage 2	-	-	-	-	-	-	597	596	-	646	605	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1237	-	-	1311	-	-	237	301	824	284	296	741
Mov Cap-2 Maneuver	-	-	-	-	-	-	237	301	-	284	296	-
Stage 1	-	-	-	-	-	-	623	593	-	602	587	-
Stage 2	-	-	-	-	-	-	489	572	-	580	571	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0.9	22.3	15.6
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	310	1237	-	-	1311	-	-	472
HCM Lane V/C Ratio	0.333	0.056	-	-	0.033	-	-	0.283
HCM Control Delay (s)	22.3	8.1	-	-	7.8	0	-	15.6
HCM Lane LOS	C	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	1.4	0.2	-	-	0.1	-	-	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	581	55	0	649	165	0
Future Volume (veh/h)	581	55	0	649	165	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	0	1863	1863	0
Adj Flow Rate, veh/h	632	60	0	705	179	0
Adj No. of Lanes	1	0	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	0	2	2	0
Cap, veh/h	1543	146	0	1715	0	0
Arrive On Green	0.92	0.92	0.00	1.00	0.00	0.00
Sat Flow, veh/h	1676	159	0	1863	0	0
Grp Volume(v), veh/h	0	692	0	705	0	0
Grp Sat Flow(s),veh/h/ln	0	1835	0	1863	0	0
Q Serve(g_s), s	0.0	3.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	3.0	0.0	0.0	0.0	0.0
Prop In Lane		0.09	0.00		0.00	0.00
Lane Grp Cap(c), veh/h	0	1689	0	1715	0	0
V/C Ratio(X)	0.00	0.41	0.00	0.41	0.00	0.00
Avail Cap(c_a), veh/h	0	1689	0	1715	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.3	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.7	0.0	0.3	0.0	0.0
LnGrp Delay(d),s/veh	0.0	1.1	0.0	0.7	0.0	0.0
LnGrp LOS		A		A		
Approach Vol, veh/h	692			705	0	
Approach Delay, s/veh	1.1			0.7	0.0	
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		0.0		63.0				63.0
Change Period (Y+Rc), s		5.0		5.0				5.0
Max Green Setting (Gmax), s		22.0		58.0				58.0
Max Q Clear Time (g_c+I1), s		0.0		5.0				2.0
Green Ext Time (p_c), s		0.0		15.7				15.9

Intersection Summary	
HCM 2010 Ctrl Delay	0.9
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	395	11	8	450	57	124	7	101	15	1	75
Future Volume (veh/h)	175	395	11	8	450	57	124	7	101	15	1	75
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	190	429	12	9	489	62	135	8	110	16	1	82
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	367	822	23	448	738	94	237	35	480	0	248	211
Arrive On Green	0.06	0.46	0.46	0.06	0.46	0.46	0.13	0.32	0.32	0.00	0.13	0.13
Sat Flow, veh/h	1774	1803	50	1774	1621	206	1774	108	1491	0	1863	1583
Grp Volume(v), veh/h	190	0	441	9	0	551	135	0	118	0	1	82
Grp Sat Flow(s),veh/h/ln	1774	0	1854	1774	0	1826	1774	0	1600	0	1863	1583
Q Serve(g_s), s	5.0	0.0	15.3	0.2	0.0	21.2	6.4	0.0	4.9	0.0	0.0	4.3
Cycle Q Clear(g_c), s	5.0	0.0	15.3	0.2	0.0	21.2	6.4	0.0	4.9	0.0	0.0	4.3
Prop In Lane	1.00		0.03	1.00		0.11	1.00		0.93	0.00		1.00
Lane Grp Cap(c), veh/h	367	0	845	448	0	832	237	0	515	0	248	211
V/C Ratio(X)	0.52	0.00	0.52	0.02	0.00	0.66	0.57	0.00	0.23	0.00	0.00	0.39
Avail Cap(c_a), veh/h	367	0	845	448	0	832	237	0	515	0	248	211
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	16.0	0.0	17.5	12.1	0.0	19.1	36.6	0.0	22.3	0.0	33.8	35.6
Incr Delay (d2), s/veh	5.2	0.0	2.3	0.1	0.0	4.1	9.6	0.0	1.0	0.0	0.0	5.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	8.3	0.1	0.0	11.5	3.8	0.0	2.3	0.0	0.0	2.2
LnGrp Delay(d),s/veh	21.1	0.0	19.8	12.2	0.0	23.2	46.2	0.0	23.4	0.0	33.8	41.0
LnGrp LOS	C		B	B		C	D		C		C	D
Approach Vol, veh/h		631			560			253			83	
Approach Delay, s/veh		20.2			23.1			35.6			40.9	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	0.0	34.0	10.0	46.0	17.0	17.0	10.0	46.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	5.0	19.0	5.0	41.0	12.0	12.0	5.0	41.0
Max Q Clear Time (g_c+I1), s	0.0	6.9	2.2	17.3	8.4	6.3	7.0	23.2
Green Ext Time (p_c), s	0.0	0.7	0.0	7.5	0.1	0.4	0.0	6.6

Intersection Summary	
HCM 2010 Ctrl Delay	24.9
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	5.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	479	32	30	413	102	73
Future Vol, veh/h	479	32	30	413	102	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	521	35	33	449	111	79

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	556	0	1054	539
Stage 1	-	-	-	-	539	-
Stage 2	-	-	-	-	515	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1015	-	250	542
Stage 1	-	-	-	-	585	-
Stage 2	-	-	-	-	600	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1015	-	242	542
Mov Cap-2 Maneuver	-	-	-	-	242	-
Stage 1	-	-	-	-	585	-
Stage 2	-	-	-	-	580	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	32.4
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	315	-	-	1015	-
HCM Lane V/C Ratio	0.604	-	-	0.032	-
HCM Control Delay (s)	32.4	-	-	8.7	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	3.7	-	-	0.1	-

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	92	405	30	20	148	45	65	15	55	30	10	50
Future Vol, veh/h	92	405	30	20	148	45	65	15	55	30	10	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	440	33	22	161	49	71	16	60	33	11	54

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	210	0	0	473	0	0	919	911	457	925	903	186
Stage 1	-	-	-	-	-	-	657	657	-	230	230	-
Stage 2	-	-	-	-	-	-	262	254	-	695	673	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1361	-	-	1089	-	-	252	274	604	250	277	856
Stage 1	-	-	-	-	-	-	454	462	-	773	714	-
Stage 2	-	-	-	-	-	-	743	697	-	433	454	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1361	-	-	1089	-	-	212	248	604	199	251	856
Mov Cap-2 Maneuver	-	-	-	-	-	-	212	248	-	199	251	-
Stage 1	-	-	-	-	-	-	421	428	-	717	698	-
Stage 2	-	-	-	-	-	-	669	681	-	348	421	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.8	28.7	18.6
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	295	1361	-	-	1089	-	-	361
HCM Lane V/C Ratio	0.497	0.073	-	-	0.02	-	-	0.271
HCM Control Delay (s)	28.7	7.9	-	-	8.4	0	-	18.6
HCM Lane LOS	D	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	2.6	0.2	-	-	0.1	-	-	1.1

Synchro Analysis Worksheets

Future Conditions Kuntz Gate Site

No Mitigation

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	832	35	15	580	35	5
Future Vol, veh/h	832	35	15	580	35	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	904	38	16	630	38	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	942	0	1585	923
Stage 1	-	-	-	-	923	-
Stage 2	-	-	-	-	662	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	728	-	119	327
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	728	-	116	327
Mov Cap-2 Maneuver	-	-	-	-	116	-
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	502	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	47.9
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	126	-	-	728	-
HCM Lane V/C Ratio	0.345	-	-	0.022	-
HCM Control Delay (s)	47.9	-	-	10.1	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	1.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	135	702	455	50	57	140
Future Vol, veh/h	135	702	455	50	57	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	147	763	495	54	62	152

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	549	0	-	0	1579	522
Stage 1	-	-	-	-	522	-
Stage 2	-	-	-	-	1057	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1021	-	-	-	120	555
Stage 1	-	-	-	-	595	-
Stage 2	-	-	-	-	334	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1021	-	-	-	103	555
Mov Cap-2 Maneuver	-	-	-	-	103	-
Stage 1	-	-	-	-	509	-
Stage 2	-	-	-	-	334	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	33.8
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1021	-	-	-	103	555
HCM Lane V/C Ratio	0.144	-	-	-	0.602	0.274
HCM Control Delay (s)	9.1	-	-	-	82.6	13.9
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	0.5	-	-	-	2.9	1.1

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	684	75	25	470	35	13
Future Vol, veh/h	684	75	25	470	35	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	743	82	27	511	38	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	825	0	1349	784
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	565	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	805	-	166	393
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	569	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	805	-	160	393
Mov Cap-2 Maneuver	-	-	-	-	160	-
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	550	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	30.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	191	-	-	805	-
HCM Lane V/C Ratio	0.273	-	-	0.034	-
HCM Control Delay (s)	30.8	-	-	9.6	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	111.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	353	124	80	60	140	189	60	10	25	90	25	155
Future Vol, veh/h	353	124	80	60	140	189	60	10	25	90	25	155
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	384	135	87	65	152	205	65	11	27	98	27	168

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	357	0	0	222	0	0	1429	1434	179	1351	1375	255
Stage 1	-	-	-	-	-	-	947	947	-	385	385	-
Stage 2	-	-	-	-	-	-	482	487	-	966	990	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1202	-	-	1347	-	-	112	134	864	127	145	784
Stage 1	-	-	-	-	-	-	314	340	-	638	611	-
Stage 2	-	-	-	-	-	-	565	550	-	306	324	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1202	-	-	1347	-	-	~ 50	86	864	~ 80	93	784
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 50	86	-	~ 80	93	-
Stage 1	-	-	-	-	-	-	214	232	-	434	573	-
Stage 2	-	-	-	-	-	-	396	516	-	192	221	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	6	1.2	$ 366.8	$ 397.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	71	1202	-	-	1347	-	-	170
HCM Lane V/C Ratio	1.454	0.319	-	-	0.048	-	-	1.726
HCM Control Delay (s)	$ 366.8	9.4	-	-	7.8	0	-	$ 397.4
HCM Lane LOS	F	A	-	-	A	A	-	F
HCM 95th %tile Q(veh)	8.6	1.4	-	-	0.2	-	-	20.7

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	0	5	0	0	0	122	80	350	10	265	22
Future Vol, veh/h	5	0	5	0	0	0	122	80	350	10	265	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	5	0	0	0	133	87	380	11	288	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	865	1055	300	868	877	277	312	0	0	467	0	0
Stage 1	322	322	-	543	543	-	-	-	-	-	-	-
Stage 2	543	733	-	325	334	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	274	226	740	273	287	762	1248	-	-	1094	-	-
Stage 1	690	651	-	524	520	-	-	-	-	-	-	-
Stage 2	524	426	-	687	643	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	240	189	740	237	240	762	1248	-	-	1094	-	-
Mov Cap-2 Maneuver	240	189	-	237	240	-	-	-	-	-	-	-
Stage 1	584	643	-	444	440	-	-	-	-	-	-	-
Stage 2	444	361	-	674	635	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.3	0	1.8	0.3
HCM LOS	C	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1248	-	-	362	-	1094	-	-
HCM Lane V/C Ratio	0.106	-	-	0.03	-	0.01	-	-
HCM Control Delay (s)	8.2	0	-	15.3	0	8.3	0	-
HCM Lane LOS	A	A	-	C	A	A	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	0	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	54	185	389	63	0	0
Future Vol, veh/h	54	185	389	63	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	201	423	68	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	491	0	-	0	776	457
Stage 1	-	-	-	-	457	-
Stage 2	-	-	-	-	319	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1072	-	-	-	366	604
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	737	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1072	-	-	-	346	604
Mov Cap-2 Maneuver	-	-	-	-	346	-
Stage 1	-	-	-	-	603	-
Stage 2	-	-	-	-	737	-

Approach	EB	WB	SB
HCM Control Delay, s	1.9	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1072	-	-	-	-
HCM Lane V/C Ratio	0.055	-	-	-	-
HCM Control Delay (s)	8.6	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	561	45	15	583	40	5
Future Vol, veh/h	561	45	15	583	40	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	610	49	16	634	43	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	659	0	1301	635
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	666	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	929	-	178	478
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	511	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	929	-	175	478
Mov Cap-2 Maneuver	-	-	-	-	175	-
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	502	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	30.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	188	-	-	929	-
HCM Lane V/C Ratio	0.26	-	-	0.018	-
HCM Control Delay (s)	30.8	-	-	8.9	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	140	426	503	59	28	95
Future Vol, veh/h	140	426	503	59	28	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	152	463	547	64	30	103

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	611	0	-	0	1346	579
Stage 1	-	-	-	-	579	-
Stage 2	-	-	-	-	767	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	968	-	-	-	167	515
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	458	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	968	-	-	-	141	515
Mov Cap-2 Maneuver	-	-	-	-	141	-
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	458	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	19.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	968	-	-	-	141	515
HCM Lane V/C Ratio	0.157	-	-	-	0.216	0.201
HCM Control Delay (s)	9.4	-	-	-	37.4	13.7
HCM Lane LOS	A	-	-	-	E	B
HCM 95th %tile Q(veh)	0.6	-	-	-	0.8	0.7

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	414	40	26	512	50	12
Future Vol, veh/h	414	40	26	512	50	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	450	43	28	557	54	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	493	0	1085	472
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1071	-	240	592
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	541	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1071	-	234	592
Mov Cap-2 Maneuver	-	-	-	-	234	-
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	527	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	23.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	265	-	-	1071	-
HCM Lane V/C Ratio	0.254	-	-	0.026	-
HCM Control Delay (s)	23.2	-	-	8.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0.1	-

Intersection	
Int Delay, s/veh	19.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	226	105	70	40	135	162	60	5	30	84	20	153
Future Vol, veh/h	226	105	70	40	135	162	60	5	30	84	20	153
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	246	114	76	43	147	176	65	5	33	91	22	166

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	323	0	0	190	0	0	1059	1053	152	984	1003	235
Stage 1	-	-	-	-	-	-	644	644	-	321	321	-
Stage 2	-	-	-	-	-	-	415	409	-	663	682	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1237	-	-	1384	-	-	202	226	894	228	242	804
Stage 1	-	-	-	-	-	-	461	468	-	691	652	-
Stage 2	-	-	-	-	-	-	615	596	-	450	450	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1237	-	-	1384	-	-	120	174	894	177	186	804
Mov Cap-2 Maneuver	-	-	-	-	-	-	120	174	-	177	186	-
Stage 1	-	-	-	-	-	-	369	375	-	553	627	-
Stage 2	-	-	-	-	-	-	453	573	-	342	360	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.9	0.9	55	53
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	169	1237	-	-	1384	-	-	333
HCM Lane V/C Ratio	0.611	0.199	-	-	0.031	-	-	0.839
HCM Control Delay (s)	55	8.6	-	-	7.7	0	-	53
HCM Lane LOS	F	A	-	-	A	A	-	F
HCM 95th %tile Q(veh)	3.3	0.7	-	-	0.1	-	-	7.4

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	0	5	142	0	4	5	105	283	8	110	5
Future Vol, veh/h	5	0	5	142	0	4	5	105	283	8	110	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	5	154	0	4	5	114	308	9	120	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	421	573	123	421	421	268	125	0	0	422	0	0
Stage 1	141	141	-	278	278	-	-	-	-	-	-	-
Stage 2	280	432	-	143	143	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	543	430	928	543	524	771	1462	-	-	1137	-	-
Stage 1	862	780	-	728	680	-	-	-	-	-	-	-
Stage 2	727	582	-	860	779	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	534	424	928	534	517	771	1462	-	-	1137	-	-
Mov Cap-2 Maneuver	534	424	-	534	517	-	-	-	-	-	-	-
Stage 1	858	773	-	724	677	-	-	-	-	-	-	-
Stage 2	719	579	-	847	772	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	14.4	0.1	0.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1462	-	-	678	539	1137	-	-
HCM Lane V/C Ratio	0.004	-	-	0.016	0.294	0.008	-	-
HCM Control Delay (s)	7.5	0	-	10.4	14.4	8.2	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	1.2	0	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	219	337	0	0	0
Future Vol, veh/h	0	219	337	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	238	366	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	366	0	-	0	604	366
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	238	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1193	-	-	-	461	679
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	802	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1193	-	-	-	461	679
Mov Cap-2 Maneuver	-	-	-	-	461	-
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	802	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1193	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	0	83	225	0	7	5	130	19	1	85	5
Future Vol, veh/h	17	0	83	225	0	7	5	130	19	1	85	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	0	90	245	0	8	5	141	21	1	92	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	263	269	95	304	261	152	97	0	0	162	0	0
Stage 1	97	97	-	162	162	-	-	-	-	-	-	-
Stage 2	166	172	-	142	99	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	690	637	962	648	644	894	1496	-	-	1417	-	-
Stage 1	910	815	-	840	764	-	-	-	-	-	-	-
Stage 2	836	756	-	861	813	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	682	634	962	585	641	894	1496	-	-	1417	-	-
Mov Cap-2 Maneuver	682	634	-	585	641	-	-	-	-	-	-	-
Stage 1	906	814	-	837	761	-	-	-	-	-	-	-
Stage 2	826	753	-	779	812	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.6	15.5	0.2	0.1
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1496	-	-	899	591	1417	-	-
HCM Lane V/C Ratio	0.004	-	-	0.121	0.427	0.001	-	-
HCM Control Delay (s)	7.4	0	-	9.6	15.5	7.5	0	-
HCM Lane LOS	A	A	-	A	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	2.1	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	581	55	15	749	65	10
Future Vol, veh/h	581	55	15	749	65	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	632	60	16	814	71	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	692	0	1508	662
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	846	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	903	-	133	462
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	421	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	903	-	131	462
Mov Cap-2 Maneuver	-	-	-	-	131	-
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	413	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	57.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	145	-	-	903	-
HCM Lane V/C Ratio	0.562	-	-	0.018	-
HCM Control Delay (s)	57.8	-	-	9.1	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	2.8	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	175	416	689	62	15	75
Future Vol, veh/h	175	416	689	62	15	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	190	452	749	67	16	82

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	816	0	-	0	1615	783
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	832	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	812	-	-	-	114	394
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	427	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	812	-	-	-	87	394
Mov Cap-2 Maneuver	-	-	-	-	87	-
Stage 1	-	-	-	-	345	-
Stage 2	-	-	-	-	427	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	23
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	812	-	-	-	87	394
HCM Lane V/C Ratio	0.234	-	-	-	0.187	0.207
HCM Control Delay (s)	10.8	-	-	-	55.7	16.5
HCM Lane LOS	B	-	-	-	F	C
HCM 95th %tile Q(veh)	0.9	-	-	-	0.6	0.8

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	401	30	20	661	90	10
Future Vol, veh/h	401	30	20	661	90	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	436	33	22	718	98	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	469	0	1215	453
Stage 1	-	-	-	-	453	-
Stage 2	-	-	-	-	762	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1093	-	200	607
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	461	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1093	-	196	607
Mov Cap-2 Maneuver	-	-	-	-	196	-
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	452	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	39.2
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	210	-	-	1093	-
HCM Lane V/C Ratio	0.518	-	-	0.02	-
HCM Control Delay (s)	39.2	-	-	8.4	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	2.7	-	-	0.1	-

Intersection	
Int Delay, s/veh	23.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	86	270	30	20	176	53	65	15	55	123	10	260
Future Vol, veh/h	86	270	30	20	176	53	65	15	55	123	10	260
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	85	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	93	293	33	22	191	58	71	16	60	134	11	283

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	249	0	0	326	0	0	907	789	310	798	776	220
Stage 1	-	-	-	-	-	-	496	496	-	264	264	-
Stage 2	-	-	-	-	-	-	411	293	-	534	512	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1317	-	-	1234	-	-	257	323	730	304	328	820
Stage 1	-	-	-	-	-	-	556	545	-	741	690	-
Stage 2	-	-	-	-	-	-	618	670	-	530	536	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1317	-	-	1234	-	-	152	294	730	249	298	820
Mov Cap-2 Maneuver	-	-	-	-	-	-	152	294	-	249	298	-
Stage 1	-	-	-	-	-	-	517	506	-	688	676	-
Stage 2	-	-	-	-	-	-	390	656	-	438	498	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.8	0.6	39.8	53.9
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	244	1317	-	-	1234	-	-	465
HCM Lane V/C Ratio	0.601	0.071	-	-	0.018	-	-	0.919
HCM Control Delay (s)	39.8	7.9	-	-	8	0	-	53.9
HCM Lane LOS	E	A	-	-	A	A	-	F
HCM 95th %tile Q(veh)	3.5	0.2	-	-	0.1	-	-	10.5

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	448	213	0	42	36
Future Vol, veh/h	0	448	213	0	42	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	487	232	0	46	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	232	0	-	0	719	232
Stage 1	-	-	-	-	232	-
Stage 2	-	-	-	-	487	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1336	-	-	-	395	807
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	618	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1336	-	-	-	395	807
Mov Cap-2 Maneuver	-	-	-	-	395	-
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	618	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1336	-	-	-	517
HCM Lane V/C Ratio	-	-	-	-	0.164
HCM Control Delay (s)	0	-	-	-	13.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Synchro Analysis Worksheets

Future Conditions Kuntz Gate Site

Mitigation

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	832	35	15	580	35	5
Future Vol, veh/h	832	35	15	580	35	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	904	38	16	630	38	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	942	0	1585	923
Stage 1	-	-	-	-	923	-
Stage 2	-	-	-	-	662	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	728	-	119	327
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	728	-	116	327
Mov Cap-2 Maneuver	-	-	-	-	116	-
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	502	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	47.9
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	126	-	-	728	-
HCM Lane V/C Ratio	0.345	-	-	0.022	-
HCM Control Delay (s)	47.9	-	-	10.1	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	1.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	135	702	455	50	57	140
Future Vol, veh/h	135	702	455	50	57	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	147	763	495	54	62	152

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	549	0	-	0	1579	522
Stage 1	-	-	-	-	522	-
Stage 2	-	-	-	-	1057	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1021	-	-	-	120	555
Stage 1	-	-	-	-	595	-
Stage 2	-	-	-	-	334	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1021	-	-	-	103	555
Mov Cap-2 Maneuver	-	-	-	-	103	-
Stage 1	-	-	-	-	509	-
Stage 2	-	-	-	-	334	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	33.8
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1021	-	-	-	103	555
HCM Lane V/C Ratio	0.144	-	-	-	0.602	0.274
HCM Control Delay (s)	9.1	-	-	-	82.6	13.9
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	0.5	-	-	-	2.9	1.1

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	684	75	25	470	35	13
Future Vol, veh/h	684	75	25	470	35	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	743	82	27	511	38	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	825	0	1349	784
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	565	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	805	-	166	393
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	569	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	805	-	160	393
Mov Cap-2 Maneuver	-	-	-	-	160	-
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	550	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	30.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	191	-	-	805	-
HCM Lane V/C Ratio	0.273	-	-	0.034	-
HCM Control Delay (s)	30.8	-	-	9.6	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.1	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	353	124	80	60	140	189	60	10	25	90	25	155
Future Volume (veh/h)	353	124	80	60	140	189	60	10	25	90	25	155
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	384	135	87	65	152	205	65	11	27	98	27	168
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	575	483	311	512	208	281	177	80	196	177	37	232
Arrive On Green	0.22	0.46	0.46	0.06	0.29	0.29	0.10	0.17	0.17	0.10	0.17	0.17
Sat Flow, veh/h	1774	1059	683	1774	720	971	1774	479	1176	1774	224	1393
Grp Volume(v), veh/h	384	0	222	65	0	357	65	0	38	98	0	195
Grp Sat Flow(s),veh/h/ln	1774	0	1742	1774	0	1691	1774	0	1655	1774	0	1617
Q Serve(g_s), s	11.6	0.0	7.2	2.2	0.0	17.1	3.1	0.0	1.8	4.7	0.0	10.3
Cycle Q Clear(g_c), s	11.6	0.0	7.2	2.2	0.0	17.1	3.1	0.0	1.8	4.7	0.0	10.3
Prop In Lane	1.00		0.39	1.00		0.57	1.00		0.71	1.00		0.86
Lane Grp Cap(c), veh/h	575	0	794	512	0	489	177	0	276	177	0	269
V/C Ratio(X)	0.67	0.00	0.28	0.13	0.00	0.73	0.37	0.00	0.14	0.55	0.00	0.72
Avail Cap(c_a), veh/h	575	0	794	512	0	489	177	0	276	177	0	269
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.7	0.0	15.3	20.1	0.0	28.8	37.8	0.0	32.0	38.6	0.0	35.5
Incr Delay (d2), s/veh	6.1	0.0	0.9	0.5	0.0	9.3	5.8	0.0	1.0	11.8	0.0	15.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	0.0	3.6	1.2	0.0	9.2	1.8	0.0	0.9	2.9	0.0	5.8
LnGrp Delay(d),s/veh	21.8	0.0	16.2	20.6	0.0	38.1	43.6	0.0	33.0	50.4	0.0	51.1
LnGrp LOS	C		B	C		D	D		C	D		D
Approach Vol, veh/h		606			422			103			293	
Approach Delay, s/veh		19.7			35.4			39.7			50.9	
Approach LOS		B			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	20.0	10.0	46.0	14.0	20.0	25.0	31.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	9.0	15.0	5.0	41.0	9.0	15.0	20.0	26.0
Max Q Clear Time (g_c+I1), s	6.7	3.8	4.2	9.2	5.1	12.3	13.6	19.1
Green Ext Time (p_c), s	0.0	1.1	0.0	4.4	0.0	0.3	0.7	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	32.2
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	5	0	0	0	122	80	350	10	265	22
Future Vol, veh/h	5	0	5	0	0	0	122	80	350	10	265	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	5	0	0	0	133	87	380	11	288	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	865	1055	300	868	877	277	312	0	0	467	0	0
Stage 1	322	322	-	543	543	-	-	-	-	-	-	-
Stage 2	543	733	-	325	334	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	274	226	740	273	287	762	1248	-	-	1094	-	-
Stage 1	690	651	-	524	520	-	-	-	-	-	-	-
Stage 2	524	426	-	687	643	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	250	200	740	247	254	762	1248	-	-	1094	-	-
Mov Cap-2 Maneuver	250	200	-	247	254	-	-	-	-	-	-	-
Stage 1	616	644	-	468	464	-	-	-	-	-	-	-
Stage 2	468	380	-	675	637	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.9	0	1.8	0.3
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1248	-	-	374	-	1094	-	-
HCM Lane V/C Ratio	0.106	-	-	0.029	-	0.01	-	-
HCM Control Delay (s)	8.2	-	-	14.9	0	8.3	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	0	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	54	185	389	63	0	0
Future Vol, veh/h	54	185	389	63	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	201	423	68	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	491	0	-	0	776	457
Stage 1	-	-	-	-	457	-
Stage 2	-	-	-	-	319	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1072	-	-	-	366	604
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	737	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1072	-	-	-	343	604
Mov Cap-2 Maneuver	-	-	-	-	343	-
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	737	-

Approach	EB	WB	SB
HCM Control Delay, s	1.9	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1072	-	-	-	-
HCM Lane V/C Ratio	0.055	-	-	-	-
HCM Control Delay (s)	8.6	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	561	45	15	583	40	5
Future Vol, veh/h	561	45	15	583	40	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	610	49	16	634	43	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	659	0	1301	635
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	666	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	929	-	178	478
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	511	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	929	-	175	478
Mov Cap-2 Maneuver	-	-	-	-	175	-
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	502	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	30.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	188	-	-	929	-
HCM Lane V/C Ratio	0.26	-	-	0.018	-
HCM Control Delay (s)	30.8	-	-	8.9	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	140	426	503	59	28	95
Future Vol, veh/h	140	426	503	59	28	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	152	463	547	64	30	103

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	611	0	-	0	1346	579
Stage 1	-	-	-	-	579	-
Stage 2	-	-	-	-	767	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	968	-	-	-	167	515
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	458	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	968	-	-	-	141	515
Mov Cap-2 Maneuver	-	-	-	-	141	-
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	458	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	19.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	968	-	-	-	141	515
HCM Lane V/C Ratio	0.157	-	-	-	0.216	0.201
HCM Control Delay (s)	9.4	-	-	-	37.4	13.7
HCM Lane LOS	A	-	-	-	E	B
HCM 95th %tile Q(veh)	0.6	-	-	-	0.8	0.7

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	414	40	26	512	50	12
Future Vol, veh/h	414	40	26	512	50	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	450	43	28	557	54	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	493	0	1085	472
Stage 1	-	-	-	-	472	-
Stage 2	-	-	-	-	613	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1071	-	240	592
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	541	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1071	-	234	592
Mov Cap-2 Maneuver	-	-	-	-	234	-
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	527	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	23.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	265	-	-	1071	-
HCM Lane V/C Ratio	0.254	-	-	0.026	-
HCM Control Delay (s)	23.2	-	-	8.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	226	105	70	40	135	162	60	5	30	84	20	153
Future Volume (veh/h)	226	105	70	40	135	162	60	5	30	84	20	153
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	246	114	76	43	147	176	65	5	33	91	22	166
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	540	418	278	502	198	237	197	43	281	197	38	285
Arrive On Green	0.21	0.40	0.40	0.07	0.26	0.26	0.11	0.20	0.20	0.11	0.20	0.20
Sat Flow, veh/h	1774	1044	696	1774	773	926	1774	213	1403	1774	189	1423
Grp Volume(v), veh/h	246	0	190	43	0	323	65	0	38	91	0	188
Grp Sat Flow(s),veh/h/ln	1774	0	1740	1774	0	1699	1774	0	1615	1774	0	1612
Q Serve(g_s), s	7.4	0.0	6.6	1.5	0.0	15.7	3.0	0.0	1.7	4.3	0.0	9.5
Cycle Q Clear(g_c), s	7.4	0.0	6.6	1.5	0.0	15.7	3.0	0.0	1.7	4.3	0.0	9.5
Prop In Lane	1.00		0.40	1.00		0.54	1.00		0.87	1.00		0.88
Lane Grp Cap(c), veh/h	540	0	696	502	0	434	197	0	323	197	0	322
V/C Ratio(X)	0.46	0.00	0.27	0.09	0.00	0.74	0.33	0.00	0.12	0.46	0.00	0.58
Avail Cap(c_a), veh/h	540	0	696	502	0	434	197	0	323	197	0	322
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.9	0.0	18.2	21.2	0.0	30.8	36.9	0.0	29.5	37.5	0.0	32.6
Incr Delay (d2), s/veh	2.8	0.0	1.0	0.3	0.0	11.0	4.4	0.0	0.7	7.6	0.0	7.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.0	3.4	0.8	0.0	8.7	1.7	0.0	0.8	2.5	0.0	4.9
LnGrp Delay(d),s/veh	18.7	0.0	19.2	21.5	0.0	41.8	41.3	0.0	30.2	45.1	0.0	40.1
LnGrp LOS	B		B	C		D	D		C	D		D
Approach Vol, veh/h		436			366			103			279	
Approach Delay, s/veh		18.9			39.4			37.2			41.7	
Approach LOS		B			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	23.0	11.0	41.0	15.0	23.0	24.0	28.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	10.0	18.0	6.0	36.0	10.0	18.0	19.0	23.0
Max Q Clear Time (g_c+I1), s	6.3	3.7	3.5	8.6	5.0	11.5	9.4	17.7
Green Ext Time (p_c), s	0.1	1.2	0.0	3.7	0.0	0.7	0.5	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	32.2
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	5	142	0	4	5	105	283	8	110	5
Future Vol, veh/h	5	0	5	142	0	4	5	105	283	8	110	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	5	154	0	4	5	114	308	9	120	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	421	573	123	421	421	268	125	0	0	422	0	0
Stage 1	141	141	-	278	278	-	-	-	-	-	-	-
Stage 2	280	432	-	143	143	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	543	430	928	543	524	771	1462	-	-	1137	-	-
Stage 1	862	780	-	728	680	-	-	-	-	-	-	-
Stage 2	727	582	-	860	779	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	535	425	928	535	518	771	1462	-	-	1137	-	-
Mov Cap-2 Maneuver	535	425	-	535	518	-	-	-	-	-	-	-
Stage 1	859	774	-	726	678	-	-	-	-	-	-	-
Stage 2	720	580	-	848	773	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	14.4	0.1	0.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1462	-	-	679	540	1137	-	-
HCM Lane V/C Ratio	0.004	-	-	0.016	0.294	0.008	-	-
HCM Control Delay (s)	7.5	-	-	10.4	14.4	8.2	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	1.2	0	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	219	337	0	0	0
Future Vol, veh/h	0	219	337	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	238	366	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	366	0	-	0	604	366
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	238	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1193	-	-	-	461	679
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	802	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1193	-	-	-	461	679
Mov Cap-2 Maneuver	-	-	-	-	461	-
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	802	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1193	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	581	55	15	749	65	10
Future Vol, veh/h	581	55	15	749	65	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	632	60	16	814	71	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	692	0	1508	662
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	846	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	903	-	133	462
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	421	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	903	-	131	462
Mov Cap-2 Maneuver	-	-	-	-	131	-
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	413	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	57.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	145	-	-	903	-
HCM Lane V/C Ratio	0.562	-	-	0.018	-
HCM Control Delay (s)	57.8	-	-	9.1	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	2.8	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	175	416	689	62	15	75
Future Vol, veh/h	175	416	689	62	15	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	190	452	749	67	16	82

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	816	0	-	0	1615	783
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	832	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	812	-	-	-	114	394
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	427	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	812	-	-	-	87	394
Mov Cap-2 Maneuver	-	-	-	-	87	-
Stage 1	-	-	-	-	345	-
Stage 2	-	-	-	-	427	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	23
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	812	-	-	-	87	394
HCM Lane V/C Ratio	0.234	-	-	-	0.187	0.207
HCM Control Delay (s)	10.8	-	-	-	55.7	16.5
HCM Lane LOS	B	-	-	-	F	C
HCM 95th %tile Q(veh)	0.9	-	-	-	0.6	0.8

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	401	30	20	661	90	10
Future Vol, veh/h	401	30	20	661	90	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	436	33	22	718	98	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	469	0	1215	453
Stage 1	-	-	-	-	453	-
Stage 2	-	-	-	-	762	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1093	-	200	607
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	461	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1093	-	196	607
Mov Cap-2 Maneuver	-	-	-	-	196	-
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	452	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	39.2
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	210	-	-	1093	-
HCM Lane V/C Ratio	0.518	-	-	0.02	-
HCM Control Delay (s)	39.2	-	-	8.4	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	2.7	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	270	30	20	176	53	65	15	55	123	10	260
Future Volume (veh/h)	86	270	30	20	176	53	65	15	55	123	10	260
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	93	293	33	22	191	58	71	16	60	134	11	283
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	415	493	56	334	335	102	177	88	330	296	19	494
Arrive On Green	0.11	0.30	0.30	0.06	0.24	0.24	0.10	0.26	0.26	0.17	0.32	0.32
Sat Flow, veh/h	1774	1645	185	1774	1372	417	1774	344	1291	1774	60	1533
Grp Volume(v), veh/h	93	0	326	22	0	249	71	0	76	134	0	294
Grp Sat Flow(s),veh/h/ln	1774	0	1830	1774	0	1789	1774	0	1635	1774	0	1592
Q Serve(g_s), s	3.1	0.0	13.7	0.8	0.0	11.0	3.4	0.0	3.3	6.1	0.0	13.8
Cycle Q Clear(g_c), s	3.1	0.0	13.7	0.8	0.0	11.0	3.4	0.0	3.3	6.1	0.0	13.8
Prop In Lane	1.00		0.10	1.00		0.23	1.00		0.79	1.00		0.96
Lane Grp Cap(c), veh/h	415	0	549	334	0	437	177	0	418	296	0	513
V/C Ratio(X)	0.22	0.00	0.59	0.07	0.00	0.57	0.40	0.00	0.18	0.45	0.00	0.57
Avail Cap(c_a), veh/h	415	0	549	334	0	437	177	0	418	296	0	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.4	0.0	26.8	22.8	0.0	29.8	38.0	0.0	26.2	33.8	0.0	25.4
Incr Delay (d2), s/veh	1.2	0.0	4.7	0.4	0.0	5.3	6.6	0.0	1.0	4.9	0.0	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	7.6	0.4	0.0	6.0	2.0	0.0	1.6	3.4	0.0	6.7
LnGrp Delay(d),s/veh	20.7	0.0	31.5	23.1	0.0	35.1	44.6	0.0	27.1	38.7	0.0	30.0
LnGrp LOS	C		C	C		D	D		C	D		C
Approach Vol, veh/h		419			271			147			428	
Approach Delay, s/veh		29.1			34.2			35.5			32.7	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	28.0	10.0	32.0	14.0	34.0	15.0	27.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	15.0	23.0	5.0	27.0	9.0	29.0	10.0	22.0
Max Q Clear Time (g_c+I1), s	8.1	5.3	2.8	15.7	5.4	15.8	5.1	13.0
Green Ext Time (p_c), s	0.2	2.3	0.0	2.8	0.0	2.0	0.1	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	32.2
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↱		↰	↱	
Traffic Vol, veh/h	17	0	83	225	0	7	5	130	19	1	85	5
Future Vol, veh/h	17	0	83	225	0	7	5	130	19	1	85	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	0	90	245	0	8	5	141	21	1	92	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	263	269	95	304	261	152	97	0	0	162	0	0
Stage 1	97	97	-	162	162	-	-	-	-	-	-	-
Stage 2	166	172	-	142	99	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	690	637	962	648	644	894	1496	-	-	1417	-	-
Stage 1	910	815	-	840	764	-	-	-	-	-	-	-
Stage 2	836	756	-	861	813	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	682	634	962	585	641	894	1496	-	-	1417	-	-
Mov Cap-2 Maneuver	682	634	-	585	641	-	-	-	-	-	-	-
Stage 1	907	814	-	837	762	-	-	-	-	-	-	-
Stage 2	826	754	-	780	812	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.6	15.5	0.2	0.1
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1496	-	-	899	591	1417	-	-
HCM Lane V/C Ratio	0.004	-	-	0.121	0.427	0.001	-	-
HCM Control Delay (s)	7.4	-	-	9.6	15.5	7.5	-	-
HCM Lane LOS	A	-	-	A	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	2.1	0	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	448	213	0	42	36
Future Vol, veh/h	0	448	213	0	42	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	487	232	0	46	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	232	0	-	0	719	232
Stage 1	-	-	-	-	232	-
Stage 2	-	-	-	-	487	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1336	-	-	-	395	807
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	618	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1336	-	-	-	395	807
Mov Cap-2 Maneuver	-	-	-	-	395	-
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	618	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1336	-	-	-	517
HCM Lane V/C Ratio	-	-	-	-	0.164
HCM Control Delay (s)	0	-	-	-	13.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Synchro Analysis Worksheets

Future Conditions Bloch Arena Site

No Mitigation

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	355	2	15	0	0	0	280	300	219	90	495	425
Future Volume (veh/h)	355	2	15	0	0	0	280	300	219	90	495	425
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	387	0	0	0	0	0	304	326	238	98	538	0
Adj No. of Lanes	2	0	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	530	0	237	2	3	0	595	579	423	126	1007	856
Arrive On Green	0.15	0.00	0.00	0.00	0.00	0.00	0.11	0.58	0.58	0.07	0.54	0.00
Sat Flow, veh/h	3548	0	1583	1774	1863	0	1774	1002	732	1774	1863	1583
Grp Volume(v), veh/h	387	0	0	0	0	0	304	0	564	98	538	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583	1774	1863	0	1774	0	1734	1774	1863	1583
Q Serve(g_s), s	7.7	0.0	0.0	0.0	0.0	0.0	5.4	0.0	15.1	4.0	13.9	0.0
Cycle Q Clear(g_c), s	7.7	0.0	0.0	0.0	0.0	0.0	5.4	0.0	15.1	4.0	13.9	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.42	1.00		1.00
Lane Grp Cap(c), veh/h	530	0	237	2	3	0	595	0	1002	126	1007	856
V/C Ratio(X)	0.73	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.56	0.78	0.53	0.00
Avail Cap(c_a), veh/h	1479	0	660	429	451	0	808	0	1002	191	1007	856
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.2	0.0	0.0	0.0	0.0	0.0	7.5	0.0	9.8	34.0	11.0	0.0
Incr Delay (d2), s/veh	2.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	2.3	10.8	2.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	0.0	0.0	0.0	0.0	2.6	0.0	7.8	2.4	7.6	0.0
LnGrp Delay(d),s/veh	32.2	0.0	0.0	0.0	0.0	0.0	8.2	0.0	12.1	44.8	13.1	0.0
LnGrp LOS	C						A		B	D	B	
Approach Vol, veh/h		387			0			868			636	
Approach Delay, s/veh		32.2			0.0			10.7			17.9	
Approach LOS		C						B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.3	48.0		16.1	13.0	45.2		0.0
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	8.0	43.0		31.0	17.0	34.0		18.0
Max Q Clear Time (g_c+I1), s	6.0	17.1		9.7	7.4	15.9		0.0
Green Ext Time (p_c), s	0.0	9.0		1.4	0.7	7.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	40	35	620	35	80	970
Future Vol, veh/h	40	35	620	35	80	970
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	125	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	38	674	38	87	1054

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1394	356	0	0	712	0
Stage 1	693	-	-	-	-	-
Stage 2	701	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	133	640	-	-	884	-
Stage 1	457	-	-	-	-	-
Stage 2	453	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	120	640	-	-	884	-
Mov Cap-2 Maneuver	120	-	-	-	-	-
Stage 1	457	-	-	-	-	-
Stage 2	409	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	36.6	0	0.7
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	193	884	-
HCM Lane V/C Ratio	-	-	0.422	0.098	-
HCM Control Delay (s)	-	-	36.6	9.5	-
HCM Lane LOS	-	-	E	A	-
HCM 95th %tile Q(veh)	-	-	1.9	0.3	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	330	0	110	326	1	14	95	440	125	6	340	340
Future Volume (veh/h)	330	0	110	326	1	14	95	440	125	6	340	340
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	359	0	0	354	1	15	103	478	136	7	370	0
Adj No. of Lanes	2	0	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	458	0	204	389	22	328	416	617	176	16	744	632
Arrive On Green	0.13	0.00	0.00	0.22	0.22	0.22	0.05	0.44	0.44	0.01	0.40	0.00
Sat Flow, veh/h	3548	0	1583	1774	100	1498	1774	1396	397	1774	1863	1583
Grp Volume(v), veh/h	359	0	0	354	0	16	103	0	614	7	370	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583	1774	0	1598	1774	0	1793	1774	1863	1583
Q Serve(g_s), s	9.8	0.0	0.0	19.4	0.0	0.8	3.3	0.0	28.9	0.4	14.8	0.0
Cycle Q Clear(g_c), s	9.8	0.0	0.0	19.4	0.0	0.8	3.3	0.0	28.9	0.4	14.8	0.0
Prop In Lane	1.00		1.00	1.00		0.94	1.00		0.22	1.00		1.00
Lane Grp Cap(c), veh/h	458	0	204	389	0	350	416	0	792	16	744	632
V/C Ratio(X)	0.78	0.00	0.00	0.91	0.00	0.05	0.25	0.00	0.77	0.45	0.50	0.00
Avail Cap(c_a), veh/h	891	0	398	446	0	401	592	0	792	107	744	632
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.0	0.0	0.0	37.9	0.0	30.7	16.7	0.0	23.6	49.1	22.4	0.0
Incr Delay (d2), s/veh	3.0	0.0	0.0	21.0	0.0	0.1	0.3	0.0	7.3	18.6	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.0	0.0	11.7	0.0	0.4	1.6	0.0	15.9	0.3	8.1	0.0
LnGrp Delay(d),s/veh	45.0	0.0	0.0	58.9	0.0	30.7	17.0	0.0	30.9	67.7	24.8	0.0
LnGrp LOS	D			E		C	B		C	E	C	
Approach Vol, veh/h		359			370			717			377	
Approach Delay, s/veh		45.0			57.6			28.9			25.6	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.9	49.0		17.8	10.1	44.8		26.8
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	6.0	44.0		25.0	15.0	35.0		25.0
Max Q Clear Time (g_c+I1), s	2.4	30.9		11.8	5.3	16.8		21.4
Green Ext Time (p_c), s	0.0	5.6		1.1	0.2	6.7		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	37.2
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	40	40	724	60	30	646
Future Vol, veh/h	40	40	724	60	30	646
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	125	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	43	787	65	33	702

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1237	426	0	0	852	0
Stage 1	820	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	168	577	-	-	783	-
Stage 1	393	-	-	-	-	-
Stage 2	633	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	161	577	-	-	783	-
Mov Cap-2 Maneuver	161	-	-	-	-	-
Stage 1	393	-	-	-	-	-
Stage 2	606	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.6	0	0.4
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	252	783	-
HCM Lane V/C Ratio	-	-	0.345	0.042	-
HCM Control Delay (s)	-	-	26.6	9.8	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	1.5	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	765	0	210	236	1	103	50	540	11	9	300	145
Future Volume (veh/h)	765	0	210	236	1	103	50	540	11	9	300	145
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	832	0	0	257	1	112	54	587	12	10	326	0
Adj No. of Lanes	2	0	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	949	0	424	297	2	263	343	663	14	21	632	537
Arrive On Green	0.27	0.00	0.00	0.17	0.17	0.17	0.04	0.36	0.36	0.01	0.34	0.00
Sat Flow, veh/h	3548	0	1583	1774	14	1571	1774	1819	37	1774	1863	1583
Grp Volume(v), veh/h	832	0	0	257	0	113	54	0	599	10	326	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583	1774	0	1585	1774	0	1856	1774	1863	1583
Q Serve(g_s), s	23.8	0.0	0.0	15.0	0.0	6.8	2.1	0.0	32.1	0.6	14.9	0.0
Cycle Q Clear(g_c), s	23.8	0.0	0.0	15.0	0.0	6.8	2.1	0.0	32.1	0.6	14.9	0.0
Prop In Lane	1.00		1.00	1.00		0.99	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	949	0	424	297	0	265	343	0	677	21	632	537
V/C Ratio(X)	0.88	0.00	0.00	0.87	0.00	0.43	0.16	0.00	0.88	0.47	0.52	0.00
Avail Cap(c_a), veh/h	1204	0	537	385	0	344	360	0	677	84	632	537
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.2	0.0	0.0	43.0	0.0	39.6	22.4	0.0	31.6	52.1	28.1	0.0
Incr Delay (d2), s/veh	6.2	0.0	0.0	15.1	0.0	1.1	0.2	0.0	15.7	15.1	3.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.5	0.0	0.0	8.6	0.0	3.1	1.0	0.0	19.4	0.4	8.1	0.0
LnGrp Delay(d),s/veh	43.4	0.0	0.0	58.1	0.0	40.7	22.6	0.0	47.3	67.2	31.1	0.0
LnGrp LOS	D			E		D	C		D	E	C	
Approach Vol, veh/h		832			370			653			336	
Approach Delay, s/veh		43.4			52.8			45.2			32.1	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.3	43.7		33.4	9.0	41.0		22.7
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	5.0	36.0		36.0	5.0	36.0		23.0
Max Q Clear Time (g_c+I1), s	2.6	34.1		25.8	4.1	16.9		17.0
Green Ext Time (p_c), s	0.0	1.1		2.6	0.0	6.3		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	43.8
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	9.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	120	1328	80	45	419
Future Vol, veh/h	35	120	1328	80	45	419
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	125	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	130	1443	87	49	455

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1813	765	0	0	1530	0
Stage 1	1487	-	-	-	-	-
Stage 2	326	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	70	346	-	-	431	-
Stage 1	174	-	-	-	-	-
Stage 2	704	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	62	346	-	-	431	-
Mov Cap-2 Maneuver	62	-	-	-	-	-
Stage 1	174	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	121.4	0	1.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	170	431	-
HCM Lane V/C Ratio	-	-	0.991	0.113	-
HCM Control Delay (s)	-	-	121.4	14.4	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	7.9	0.4	-

Synchro Analysis Worksheets

Future Conditions Bloch Arena Site

Mitigation

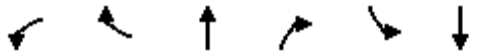
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	355	2	15	0	0	0	280	300	219	90	495	425
Future Volume (veh/h)	355	2	15	0	0	0	280	300	219	90	495	425
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	387	0	0	0	0	0	304	326	238	98	538	0
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	519	0	231	2	2	0	601	1193	852	635	1042	885
Arrive On Green	0.15	0.00	0.00	0.00	0.00	0.00	0.10	0.60	0.60	0.06	0.56	0.00
Sat Flow, veh/h	3548	0	1583	1774	1863	0	1774	1973	1410	1774	1863	1583
Grp Volume(v), veh/h	387	0	0	0	0	0	304	292	272	98	538	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583	1774	1863	0	1774	1770	1614	1774	1863	1583
Q Serve(g_s), s	8.1	0.0	0.0	0.0	0.0	0.0	5.3	6.1	6.2	1.7	13.9	0.0
Cycle Q Clear(g_c), s	8.1	0.0	0.0	0.0	0.0	0.0	5.3	6.1	6.2	1.7	13.9	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.87	1.00		1.00
Lane Grp Cap(c), veh/h	519	0	231	2	2	0	601	1070	975	635	1042	885
V/C Ratio(X)	0.75	0.00	0.00	0.00	0.00	0.00	0.51	0.27	0.28	0.15	0.52	0.00
Avail Cap(c_a), veh/h	1141	0	509	411	431	0	763	1070	975	763	1042	885
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	31.8	0.0	0.0	0.0	0.0	0.0	7.3	7.3	7.3	6.1	10.6	0.0
Incr Delay (d2), s/veh	2.2	0.0	0.0	0.0	0.0	0.0	0.7	0.6	0.7	0.1	1.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	0.0	0.0	0.0	0.0	0.0	2.6	3.1	2.9	0.9	7.6	0.0
LnGrp Delay(d),s/veh	34.0	0.0	0.0	0.0	0.0	0.0	7.9	7.9	8.0	6.2	12.5	0.0
LnGrp LOS	C						A	A	A	A	B	
Approach Vol, veh/h		387			0			868			636	
Approach Delay, s/veh		34.0			0.0			8.0			11.5	
Approach LOS		C						A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.4	52.0		16.4	12.9	48.5		0.0
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	10.0	47.0		25.0	15.0	42.0		18.0
Max Q Clear Time (g_c+I1), s	3.7	8.2		10.1	7.3	15.9		0.0
Green Ext Time (p_c), s	0.1	9.5		1.2	0.6	8.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	40	35	620	35	80	970
Future Volume (veh/h)	40	35	620	35	80	970
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1900	1863	1863
Adj Flow Rate, veh/h	43	38	674	38	87	1054
Adj No. of Lanes	0	0	2	0	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	2	2	2	2
Cap, veh/h	154	136	1817	102	296	2625
Arrive On Green	0.17	0.17	0.53	0.53	0.17	0.74
Sat Flow, veh/h	882	779	3500	192	1774	3632
Grp Volume(v), veh/h	82	0	350	362	87	1054
Grp Sat Flow(s),veh/h/ln	1681	0	1770	1829	1774	1770
Q Serve(g_s), s	5.1	0.0	13.8	13.8	5.2	13.1
Cycle Q Clear(g_c), s	5.1	0.0	13.8	13.8	5.2	13.1
Prop In Lane	0.52	0.46		0.10	1.00	
Lane Grp Cap(c), veh/h	294	0	944	975	296	2625
V/C Ratio(X)	0.28	0.00	0.37	0.37	0.29	0.40
Avail Cap(c_a), veh/h	294	0	944	975	296	2625
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.9	0.0	16.3	16.3	43.8	5.7
Incr Delay (d2), s/veh	2.3	0.0	1.1	1.1	2.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	7.0	7.2	2.7	6.5
LnGrp Delay(d),s/veh	45.3	0.0	17.4	17.4	46.3	6.2
LnGrp LOS	D		B	B	D	A
Approach Vol, veh/h	82		712			1141
Approach Delay, s/veh	45.3		17.4			9.2
Approach LOS	D		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	25.0	69.0				94.0		26.0
Change Period (Y+Rc), s	5.0	5.0				5.0		5.0
Max Green Setting (Gmax), s	20.0	64.0				89.0		21.0
Max Q Clear Time (g_c+I1), s	7.2	15.8				15.1		7.1
Green Ext Time (p_c), s	0.1	20.3				22.9		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.8
HCM 2010 LOS	B

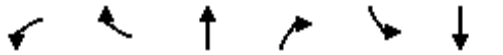
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	330	0	110	326	1	14	95	440	125	6	340	340
Future Volume (veh/h)	330	0	110	326	1	14	95	440	125	6	340	340
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	359	0	0	354	1	15	103	478	136	7	370	0
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	440	0	196	389	22	329	431	1246	352	359	775	659
Arrive On Green	0.12	0.00	0.00	0.22	0.22	0.22	0.05	0.46	0.46	0.01	0.42	0.00
Sat Flow, veh/h	3548	0	1583	1774	100	1498	1774	2726	771	1774	1863	1583
Grp Volume(v), veh/h	359	0	0	354	0	16	103	309	305	7	370	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583	1774	0	1598	1774	1770	1727	1774	1863	1583
Q Serve(g_s), s	10.4	0.0	0.0	20.4	0.0	0.8	3.4	12.1	12.2	0.2	15.2	0.0
Cycle Q Clear(g_c), s	10.4	0.0	0.0	20.4	0.0	0.8	3.4	12.1	12.2	0.2	15.2	0.0
Prop In Lane	1.00		1.00	1.00		0.94	1.00		0.45	1.00		1.00
Lane Grp Cap(c), veh/h	440	0	196	389	0	351	431	809	789	359	775	659
V/C Ratio(X)	0.82	0.00	0.00	0.91	0.00	0.05	0.24	0.38	0.39	0.02	0.48	0.00
Avail Cap(c_a), veh/h	608	0	271	473	0	426	595	809	789	444	775	659
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	44.8	0.0	0.0	40.0	0.0	32.3	16.6	18.7	18.8	17.7	22.3	0.0
Incr Delay (d2), s/veh	6.0	0.0	0.0	19.1	0.0	0.1	0.3	1.4	1.4	0.0	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	0.0	12.1	0.0	0.4	1.7	6.1	6.2	0.1	8.3	0.0
LnGrp Delay(d),s/veh	50.9	0.0	0.0	59.0	0.0	32.4	16.9	20.1	20.2	17.8	24.4	0.0
LnGrp LOS	D			E		C	B	C	C	B	C	
Approach Vol, veh/h		359			370			717			377	
Approach Delay, s/veh		50.9			57.9			19.7			24.3	
Approach LOS		D			E			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.9	53.0		18.0	10.3	48.7		28.0
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	15.0	39.0		28.0
Max Q Clear Time (g_c+I1), s	2.2	14.2		12.4	5.4	17.2		22.4
Green Ext Time (p_c), s	0.0	7.7		0.7	0.2	6.8		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	34.5
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	40	40	724	60	30	646
Future Volume (veh/h)	40	40	724	60	30	646
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1900	1863	1863
Adj Flow Rate, veh/h	43	43	787	65	33	702
Adj No. of Lanes	0	0	2	0	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	2	2	2	2
Cap, veh/h	124	124	2262	187	74	2713
Arrive On Green	0.15	0.15	0.68	0.68	0.04	0.77
Sat Flow, veh/h	828	828	3404	273	1774	3632
Grp Volume(v), veh/h	87	0	421	431	33	702
Grp Sat Flow(s),veh/h/ln	1675	0	1770	1815	1774	1770
Q Serve(g_s), s	5.6	0.0	11.8	11.9	2.2	6.9
Cycle Q Clear(g_c), s	5.6	0.0	11.8	11.9	2.2	6.9
Prop In Lane	0.49	0.49		0.15	1.00	
Lane Grp Cap(c), veh/h	251	0	1209	1240	74	2713
V/C Ratio(X)	0.35	0.00	0.35	0.35	0.45	0.26
Avail Cap(c_a), veh/h	251	0	1209	1240	74	2713
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.7	0.0	7.9	7.9	56.1	4.1
Incr Delay (d2), s/veh	3.7	0.0	0.8	0.8	18.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	6.0	6.1	1.4	3.4
LnGrp Delay(d),s/veh	49.5	0.0	8.7	8.7	74.4	4.3
LnGrp LOS	D		A	A	E	A
Approach Vol, veh/h	87		852			735
Approach Delay, s/veh	49.5		8.7			7.5
Approach LOS	D		A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	10.0	87.0				97.0		23.0
Change Period (Y+Rc), s	5.0	5.0				5.0		5.0
Max Green Setting (Gmax), s	5.0	82.0				92.0		18.0
Max Q Clear Time (g_c+I1), s	4.2	13.9				8.9		7.6
Green Ext Time (p_c), s	0.0	17.4				17.8		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	10.3
HCM 2010 LOS	B

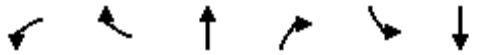
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	765	0	210	236	1	103	50	540	11	9	300	145
Future Volume (veh/h)	765	0	210	236	1	103	50	540	11	9	300	145
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	832	0	0	257	1	112	54	587	12	10	326	0
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	957	0	427	299	2	265	332	1253	26	276	609	518
Arrive On Green	0.27	0.00	0.00	0.17	0.17	0.17	0.04	0.35	0.35	0.01	0.33	0.00
Sat Flow, veh/h	3548	0	1583	1774	14	1571	1774	3547	72	1774	1863	1583
Grp Volume(v), veh/h	832	0	0	257	0	113	54	293	306	10	326	0
Grp Sat Flow(s),veh/h/ln	1774	0	1583	1774	0	1585	1774	1770	1850	1774	1863	1583
Q Serve(g_s), s	22.8	0.0	0.0	14.4	0.0	6.5	2.0	13.1	13.1	0.4	14.6	0.0
Cycle Q Clear(g_c), s	22.8	0.0	0.0	14.4	0.0	6.5	2.0	13.1	13.1	0.4	14.6	0.0
Prop In Lane	1.00		1.00	1.00		0.99	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	957	0	427	299	0	267	332	625	654	276	609	518
V/C Ratio(X)	0.87	0.00	0.00	0.86	0.00	0.42	0.16	0.47	0.47	0.04	0.54	0.00
Avail Cap(c_a), veh/h	1253	0	559	400	0	358	438	625	654	341	609	518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.5	0.0	0.0	41.2	0.0	37.9	22.3	25.5	25.5	22.9	28.0	0.0
Incr Delay (d2), s/veh	5.4	0.0	0.0	13.3	0.0	1.1	0.2	2.5	2.4	0.1	3.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.9	0.0	0.0	8.1	0.0	2.9	1.0	6.8	7.1	0.2	8.0	0.0
LnGrp Delay(d),s/veh	40.9	0.0	0.0	54.5	0.0	39.0	22.5	28.0	27.9	23.0	31.3	0.0
LnGrp LOS	D			D		D	C	C	C	C	C	
Approach Vol, veh/h		832			370			653			336	
Approach Delay, s/veh		40.9			49.8			27.5			31.1	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.2	41.0		32.5	8.9	38.3		22.2
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	5.0	36.0		36.0	10.0	31.0		23.0
Max Q Clear Time (g_c+I1), s	2.4	15.1		24.8	4.0	16.6		16.4
Green Ext Time (p_c), s	0.0	6.1		2.7	0.0	5.2		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	36.9
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	35	120	1328	80	45	419
Future Volume (veh/h)	35	120	1328	80	45	419
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1900	1863	1863
Adj Flow Rate, veh/h	38	130	1443	87	49	455
Adj No. of Lanes	0	0	2	0	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	2	2	2	2
Cap, veh/h	61	208	2205	133	103	2654
Arrive On Green	0.17	0.17	0.65	0.65	0.06	0.75
Sat Flow, veh/h	365	1249	3486	204	1774	3632
Grp Volume(v), veh/h	169	0	750	780	49	455
Grp Sat Flow(s),veh/h/ln	1624	0	1770	1827	1774	1770
Q Serve(g_s), s	11.6	0.0	30.9	31.3	3.2	4.4
Cycle Q Clear(g_c), s	11.6	0.0	30.9	31.3	3.2	4.4
Prop In Lane	0.22	0.77		0.11	1.00	
Lane Grp Cap(c), veh/h	271	0	1150	1187	103	2654
V/C Ratio(X)	0.62	0.00	0.65	0.66	0.47	0.17
Avail Cap(c_a), veh/h	271	0	1150	1187	103	2654
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.5	0.0	12.8	12.8	54.7	4.3
Incr Delay (d2), s/veh	10.4	0.0	2.9	2.8	14.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.0	0.0	15.9	16.5	2.0	2.2
LnGrp Delay(d),s/veh	56.9	0.0	15.6	15.7	69.4	4.4
LnGrp LOS	E		B	B	E	A
Approach Vol, veh/h	169		1530			504
Approach Delay, s/veh	56.9		15.7			10.8
Approach LOS	E		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.0	83.0				95.0		25.0
Change Period (Y+Rc), s	5.0	5.0				5.0		5.0
Max Green Setting (Gmax), s	7.0	78.0				90.0		20.0
Max Q Clear Time (g_c+I1), s	5.2	33.3				6.4		13.6
Green Ext Time (p_c), s	0.0	24.4				31.3		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	17.7
HCM 2010 LOS	B

Appendix D
Intersection Level of Service Definitions

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Highway Capacity Manual 2010

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* (Transportation Research Board, 2010).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into three intersection types: all-way stop, two-way stop, and roundabout control. All-way stop and roundabout control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Appendix E
Extracts from Planning Study and Traffic Study Data Request

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Parking Calculations Worksheet DHA Guidance: PFD v7-3 with 1/3 Scripts, 2/3 Rad and 1/3 Lab		Number of Parking Spaces Required = (.75)(X1) + (.40)(X2) + (X3) + (X4)			
Calc Code Ref.	**Department**	**PFD Numbers**	**Avg. Number per Day based on 250 days**	**Factor in UFC 4-510-01**	**Required Parking Count**
X1	Staff	699		0.75	**524**
X2	Total Patient Encounters	551,901	2,208	0.40	**883**
	Behavioral Health (includes SARP)	28,342	113		
	Lab (Specimen Collection)	20,000	80		
	Dental	65,250	261		
	Internal Med and Specialties	30,929	124		
	Optometry	10,016	40		
	Pediatrics	13,868	55		
	Pharmacy scripts	160,524	642		
	Physical Therapy	47,172	189		
	PCMH	104,980	420		
	Preventative Medicine (BOMC, MRC, & Flight Med)	5,431	22		
	Radiology	34,784	139		
	Child & Adolescent BH (CAFBHS)	4,800	19		
	Women's Health	3,904	16		
	Immunizations	21,901	88		
X3	Inpatient Beds	0		1	**0**
X4	Organizational Gov't Vehicles*	36		1	**36**
TOTAL PARKING COUNT REQUIRED					**1,443**

NOTES:
Pharmacy Services: It is assumed that only 1/3 of total daily Rx workload will require a unique patient visit to the clinic. This assumption may still be overstating parking requirement.
Radiology Services: Some radiology services may be ordered and provided directly following a patient clinical appointment. It is assumed that 2/3 of radiology services will require an advance appointment and a unique patient visit.
Lab Services: Patients encounters are for specimen collection only. Blood and fluid collection are normally both done in same visit, so blood collection encounters are used in calculation. It is assumed that only 1/3 of daily collections are for patients not at clinic for other services.
Gov't Vehicles: Estimate based on current requirements. Includes 6 Oversized / Large Vehicles which consist of 2 Mobile Hearing Conservation Audiometric Truck (MOHCATS), 2 Mobile Dental Units (MDUs), 1 High Deck Patient Loading Platorm (HDLPLP) and, 1 Ambulance Bus (AMBUS).

HAWAII ENHANCED MULTI-SERVICE MARKET

JBPHH TRAFFIC STUDY DATA REQUEST

[redacted]

On-base vs. Off-base Methodology

Source: https://www.zip-codes.com/zip-code/96818/zip-code-96818.asp

- Needed to create a proxy to identify zip code '96818' which covers housing areas on & off base

	Maximum Residents	Come Thru Hickam Gate To Get to Clinic	Distribution	Actual Geography	% of Onbase versus offbase housing
	2,942	Yes	11%	Onbase	50%
	514	No	2%	Onbase	
	152	No	1%	Onbase	
	9,940	No	36%	Onbase	
	1,644	Yes	6%	Off-Base	50%
	356	Yes	1%	Off-Base	
	524	Yes	2%	Off-Base	
	1,276	Yes	5%	Off-Base	
	856	Yes	3%	Off-Base	
	384	Yes	1%	Off-Base	
	1,908	Yes	7%	Off-Base	
	760	Yes	3%	Off-Base	
	92	Yes	0%	Off-Base	
	1,272	Yes	5%	Off-Base	
	3,008	Yes	11%	Off-Base	
	1,608	Yes	6%	Off-Base	
Total	27,236		100%		

Source: Manually obtained base housing data call, Mar 2019 (L.Riley)

- Estimated that 50% of the resident population in 96818 live either on or off base

On-base vs. Off-Base

Hickam and Makalapa Top 20 Zip Codes Appointment Volume By Beneficiary Category						
Zip Code Location	**ADFM**	**ADSM**	**RET**	**RET/OTHER**	**Grand Total**	**Ranked Distribution**
HONOLULU-On-Base (96818)	21,326	25,412	448	1,469	48,654	18%
HONOLULU-OFF-Base (96818)	21,326	25,412	448	1,469	48,654	18%
HONOLULU-OFF-Base (968xx)	774	4,664	263	1,520	7,221	3%
Ewa Beach	4,382	11,144	1,423	4,405	21,354	8%
Aiea	3,053	7,162	514	2,303	13,032	5%
Pearl Harbor	444	11,963	4	100	12,511	5%
Pearl City	3,778	6,199	364	1,980	12,321	5%
Kapolei	1,958	5,693	659	2,676	10,986	4%
#N/A	403	7,854	41	2,226	10,524	4%
Mililani	1,159	5,218	623	3,222	10,222	4%
Waipahu	1,311	4,559	732	3,529	10,131	4%
Kailua	1,268	7,413	278	1,098	10,057	4%
Kapalama	1,753	5,905	169	2,004	9,831	4%
Kaneohe	786	3,968	286	1,897	6,937	3%
Wahiawa	987	2,864	129	823	4,803	2%
Hickam AFB Barracks (On-Base)	224	4,105	37	22	4,388	2%
Waikiki	528	2,783	118	397	3,826	1%
Makiki	316	1,891	120	1,177	3,504	1%
Waianae	393	1,310	198	1,410	3,311	1%
Waialae / Kahala	218	1,159	132	1,236	2,745	1%
M C B H Kaneohe Bay	75	743		2	820	0%
Waimanalo	9	143	29	318	499	0%
All Other Zip Codes	1,457	6,538	174	2,121	10,290	4%
Totals	**67,928**	**154,101**	**7,189**	**37,403**	**266,621**	**100%**
Source: M2, Appointment Detail, FY2019, Tmt DMIS 0280/0287, Excludes TCONs, 7 Jan 2020						

- 80% of appointments generated from Off-base traffic demand
- 20% of appointments are residents living on base

Appointment Utilization

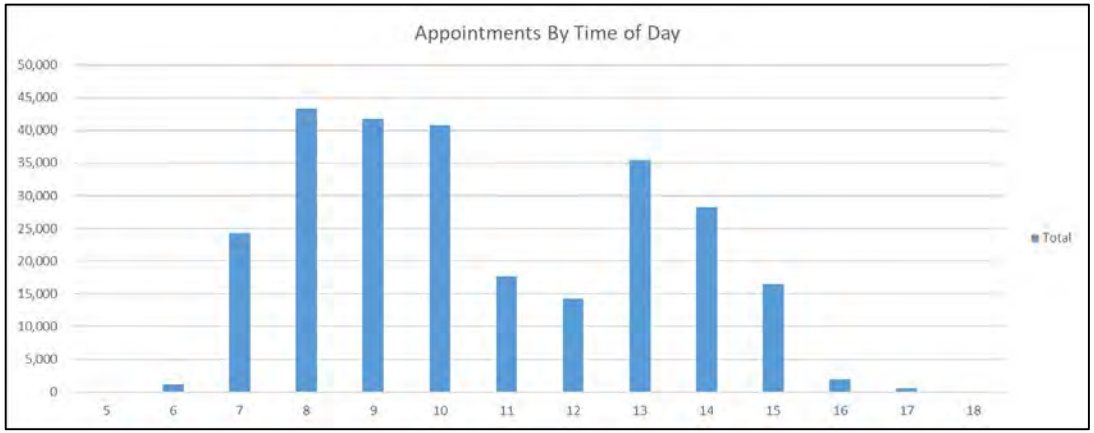
OVERALL Appointment Utilization By Benficiary Category and Time of Day					
Time of Day	ADFM	ADSM	RET	RET/ OTHER	Grand Total
0	0%	0%	0%	0%	0%
1	0%	0%	0%	0%	0%
5	0%	0%	0%	0%	0%
6	0%	1%	0%	0%	0%
7	6%	9%	10%	16%	9%
8	15%	17%	16%	16%	16%
9	16%	15%	16%	18%	16%
10	16%	15%	17%	15%	15%
11	8%	7%	7%	3%	7%
12	2%	6%	5%	12%	5%
13	13%	14%	13%	10%	13%
14	12%	11%	10%	6%	11%
15	11%	5%	7%	3%	6%
16	1%	1%	1%	0%	1%
17	0%	0%	0%	0%	0%
18	0%	0%	0%	0%	0%
19	0%	0%	0%	0%	0%
20	0%	0%	0%	0%	0%
21	0%	0%	0%	0%	0%
22	0%	0%	0%	0%	0%
23	0%	0%	0%	0%	0%
	100%	100%	100%	100%	100%

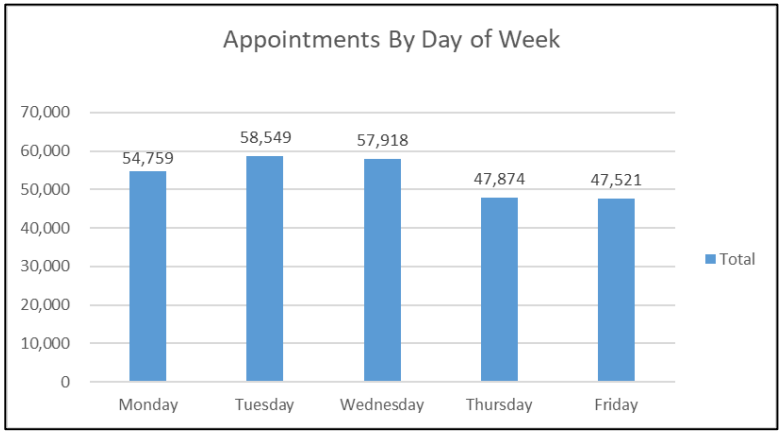
Appointment Distribution by Beneficiary Category				
Active Duty Family Members	Active Duty Service Member	Retired Service Member	Retiree Family Members /Others	Total
25%	58%	3%	14%	100%

TIME OF DAY:

- ADSM Workload surges between 0800-1000
- Retiree Family Members utilize 0700 appointments more than other beneficiaries

Temporal Distribution





Source: M2, Appointment Detail, FY2019, Tmt DMIS 0280/0287, Excludes TCONs, 7 Jan 2020

- Busiest times of the day are 0800,0900,1000, where cumulatively 48% of appointments are scheduled
- Lunch time demand drops, but picks up at 1300 and tapers off by 1500
- Monday thru Wed represents 64% of the workload; Thurs & Fri are 36%

Appendix F
Trip Distribution

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Distribution of Arrivals and Departures of Appointments										
Time of Day	ADFM		ADSM		RET		RET/OTHER		Total	
	In	Out	In	Out	In	Out	In	Out	**In**	**Out**
6:30	33	0	115	0	6	0	49	0	203	0
7:00	0	0	0	0	0	0	0	0	0	0
7:30	83	0	218	0	10	0	49	0	360	0
8:00	0	33	0	115	0	6	0	49	0	203
8:30	88	0	192	0	11	0	56	0	347	0
9:00	0	83	0	218	0	10	0	49	0	360
9:30	88	0	192	0	11	0	50	0	341	0
10:00	0	88	0	192	0	11	0	56	0	347
10:30	44	0	90	0	5	0	9	0	148	0
11:00	0	88	0	192	0	11	0	50	0	341
11:30	11	0	77	0	3	0	37	0	128	0
12:00	0	44	0	90	0	5	0	9	0	148
12:30	72	0	179	0	9	0	31	0	291	0
13:00	0	11	0	77	0	3	0	37	0	128
13:30	66	0	141	0	6	0	19	0	232	0
14:00	0	72	0	179	0	9	0	31	0	291
14:30	61	0	64	0	4	0	9	0	138	0
15:00	0	66	0	141	0	6	0	19	0	232
15:30	6	0	13	0	1	0	0	0	20	0
16:00	0	61	0	64	0	4	0	9	0	138
16:30	0	0	0	0	0	0	0	0	0	0
17:00	0	6	0	13	0	1	0	0	0	20
Total	**552**	**552**	**1281**	**1281**	**66**	**66**	**309**	**309**	**2208**	**2208**

Notes: Assumed patients arrive approximately 30 minutes prior to scheduled appointment
Assumed appointments take approximately an hour to complete

ADFM = Active Duty Family Member, ADSM = Active Duty Service Member, RET = Retired Service Member, RET/OTHER = Retiree Family Members/Others

Distribution of Arrivals and Departures of Staff		
Time of Day	In	Out
0:00	0	0
1:00	0	0
2:00	0	0
3:00	0	0
4:00	0	0
5:00	0	0
6:00	168	0
7:00	251	0
8:00	0	0
9:00	105	0
10:00	0	0
11:00	0	0
12:00	0	0
13:00	0	0
14:00	0	0
15:00	0	168
16:00	0	251
17:00	0	105
18:00	0	0
19:00	0	0
20:00	0	0
21:00	0	0
22:00	0	0
23:00	0	0
Total	524	524

Notes: Assume 80% of staff arrive/depart, then remaining 20% arrive/depart after

AM Peak Hour: 6:00-7:00 AM (~32% of Staff)								
Location	Staff				Appointment			
	In	Out	Total	Percentage	In	Out	Total	Percentage
Offbase	84	0	84	50.0%	162	0	162	80.0%
Navy Barracks	18	0	18	10.9%	9	0	9	4.3%
Other Navy Housing	1	0	1	0.6%	1	0	1	0.2%
AF Barracks	3	0	3	1.9%	2	0	2	0.8%
Hickam West	39	0	39	23.1%	18	0	18	9.2%
Hickam North	23	0	23	13.6%	11	0	11	5.4%
Total	168	0	168	100.0%	203	0	203	100.0%

AM Peak Hour: 7:00-8:00 AM (~48% of Staff)								
Location	Staff				Appointment			
	In	Out	Total	Percentage	In	Out	Total	Percentage
Offbase	126	0	126	50.0%	288	0	288	80.0%
Navy Barracks	27	0	27	10.9%	15	0	15	0.0%
Other Navy Housing	1	0	1	0.6%	1	0	1	0.0%
AF Barracks	5	0	5	1.9%	3	0	3	0.0%
Hickam West	58	0	58	23.1%	33	0	33	0.0%
Hickam North	34	0	34	13.6%	20	0	20	0.0%
Total	251	0	251	100.0%	360	0	360	80.0%

Midday Peak Hour: 11:00 AM -12:00 PM								
Location	Staff				Appointment			
	In	Out	Total	Percentage	In	Out	Total	Percentage
Offbase	0	0	0	50.0%	102	273	375	80.0%
Navy Barracks	0	0	0	10.9%	6	14	20	4.3%
Other Navy Housing	0	0	0	0.6%	0	1	1	0.2%
AF Barracks	0	0	0	1.9%	1	3	4	0.8%
Hickam West	0	0	0	23.1%	12	32	44	9.2%
Hickam North	0	0	0	13.6%	7	18	25	5.4%
Total	0	0	0	100.0%	128	341	469	100.0%

Midday Peak Hour: 12:00 PM -1:00 PM								
Location	Staff				Appointment			
	In	Out	Total	Percentage	In	Out	Total	Percentage
Offbase	0	0	0	50.0%	233	118	351	80.0%
Navy Barracks	0	0	0	10.9%	13	6	19	4.3%
Other Navy Housing	0	0	0	0.6%	1	0	1	0.2%
AF Barracks	0	0	0	1.9%	2	1	3	0.8%
Hickam West	0	0	0	23.1%	26	13	39	9.2%
Hickam North	0	0	0	13.6%	16	8	24	5.4%
Total	0	0	0	100.0%	291	146	437	100.0%

Afternoon Peak Hour: 3:00 PM -4:00 PM (~32% of Staff)								
Location	Staff				Appointment			
	In	Out	Total	Percentage	In	Out	Total	Percentage
Offbase	0	84	84	50.0%	16	186	202	80.0%
Navy Barracks	0	18	18	10.9%	1	10	11	4.3%
Other Navy Housing	0	1	1	0.6%	0	0	0	0.2%
AF Barracks	0	3	3	1.9%	0	2	2	0.8%
Hickam West	0	39	39	23.1%	2	21	23	9.2%
Hickam North	0	23	23	13.6%	1	13	14	5.4%
Total	0	168	168	100.0%	20	232	252	100.0%

Afternoon Peak Hour: 4:00 PM -5:00 PM (~48% of Staff)								
Location	Staff				Appointment			
	In	Out	Total	Percentage	In	Out	Total	Percentage
Offbase	0	126	126	50.0%	0	110	110	80.0%
Navy Barracks	0	27	27	10.9%	0	6	6	4.3%
Other Navy Housing	0	1	1	0.6%	0	0	0	0.2%
AF Barracks	0	5	5	1.9%	0	1	1	0.8%
Hickam West	0	58	58	23.1%	0	13	13	9.2%
Hickam North	0	34	34	13.6%	0	8	8	5.4%
Total	0	251	251	100.0%	0	138	138	100.0%

Appendix G
Traffic Signal Warrant Analysis

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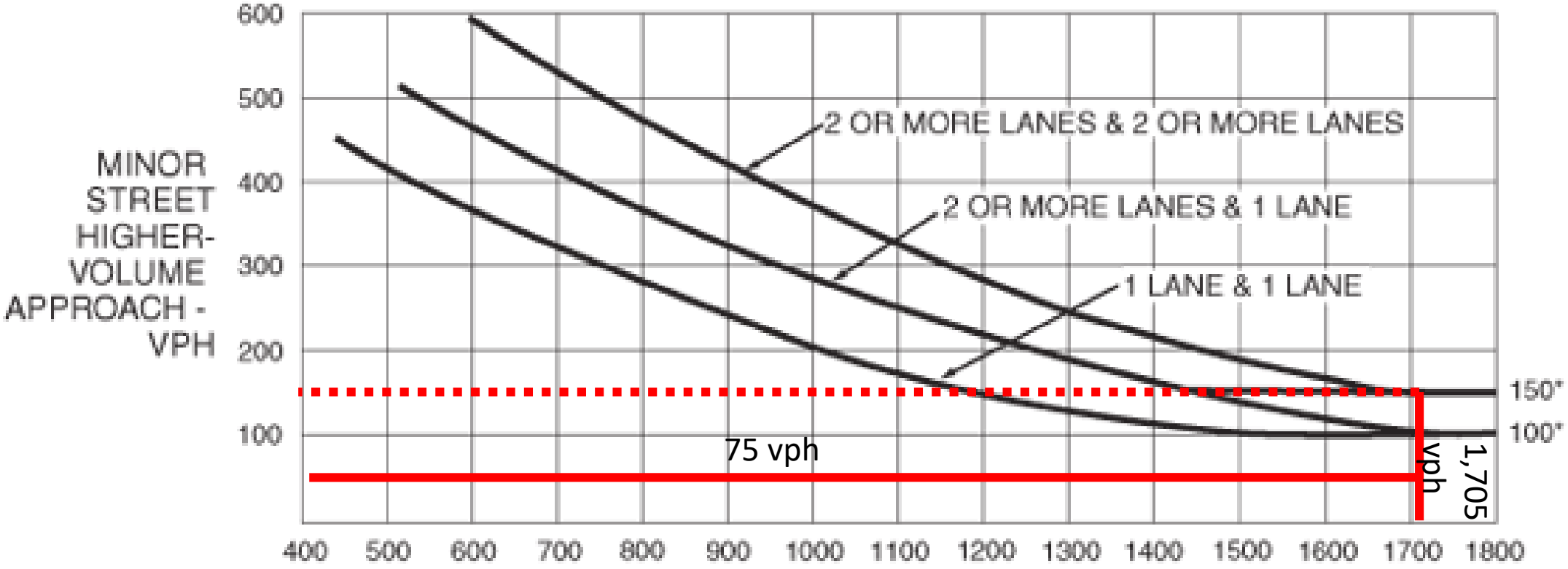
AM Peak Hour with ACC
Bloch Arena Site – North Road and Battleship Drive

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Legend

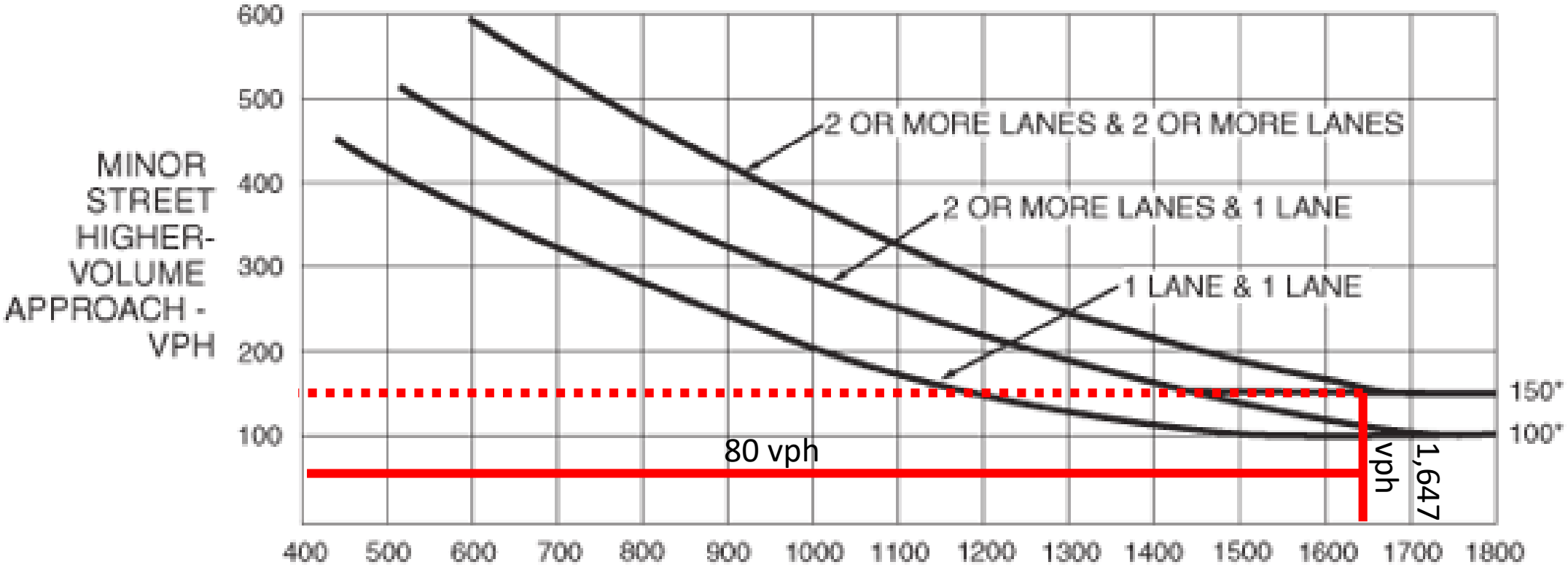
Observed Traffic Volume

Required Threshold

vph vehicles per hour

Midday Peak Hour with ACC
Bloch Arena Site – North Road and Battleship Drive

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

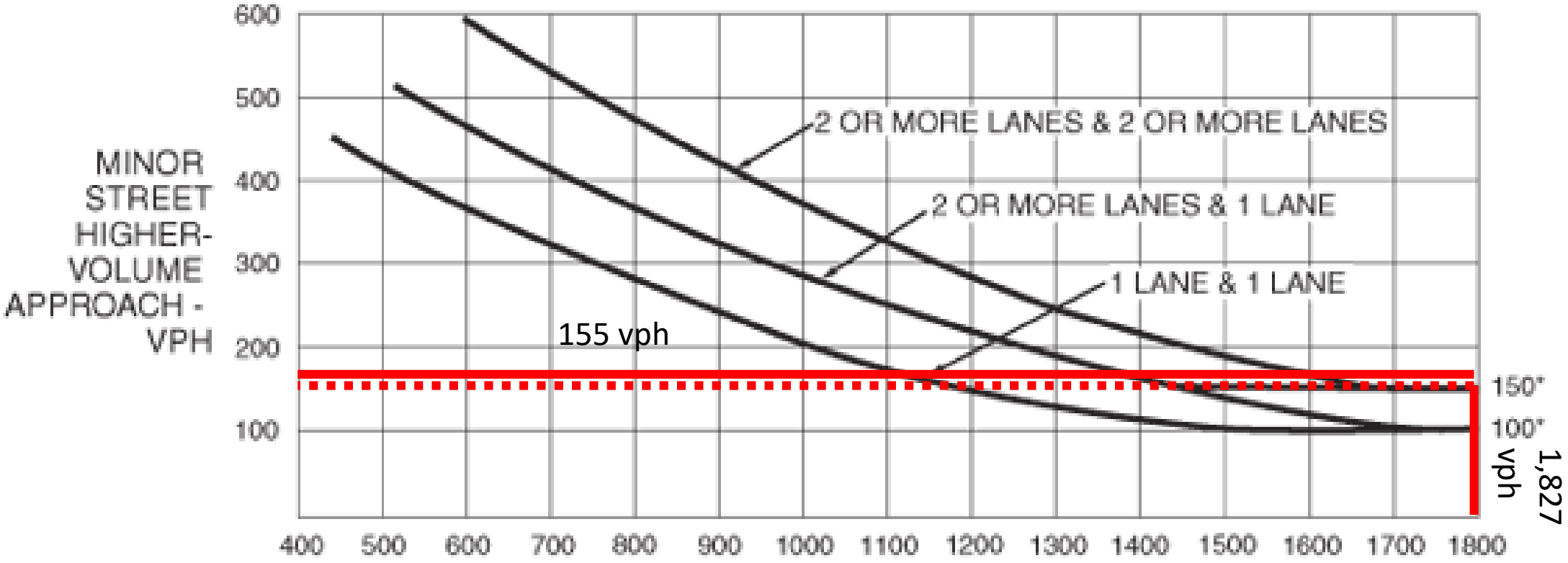
Required Threshold

vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

PM Peak Hour with ACC
Bloch Arena Site – North Road and Battleship Drive

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

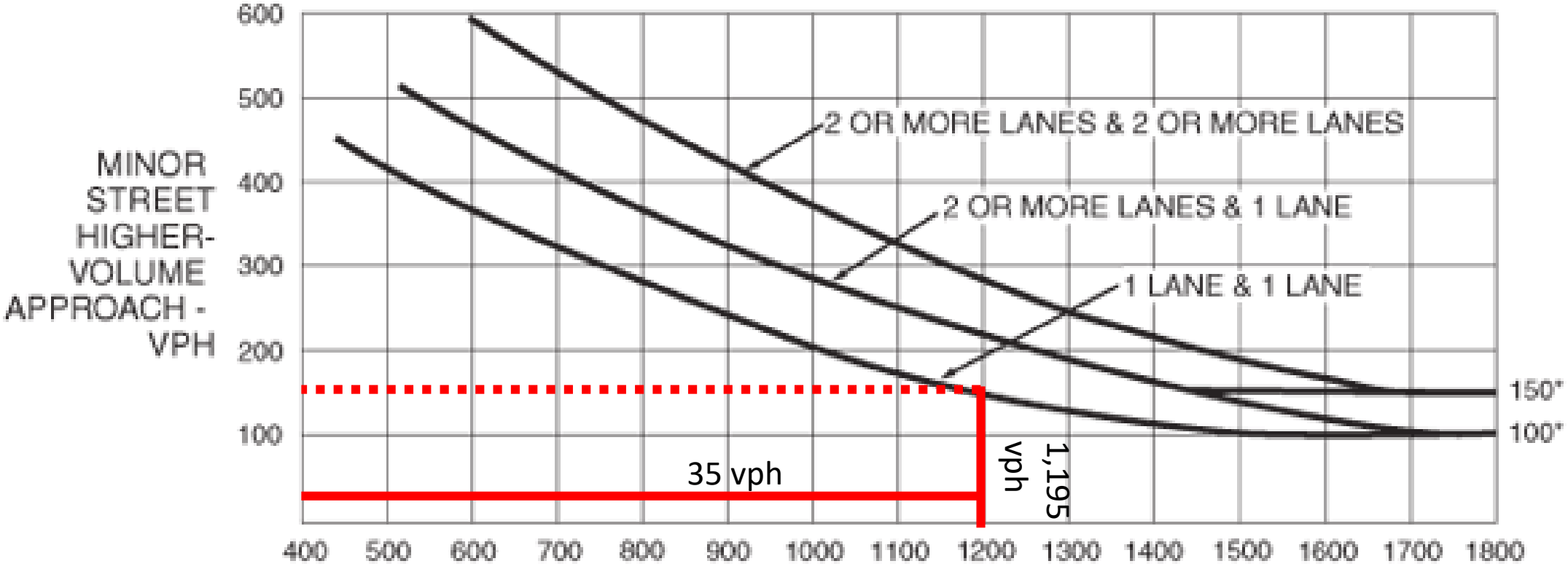
Required Threshold

vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

AM Peak Hour with ACC
Par 3 Tradewinds Site – Kuntz Avenue and McClelland Street

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Legend

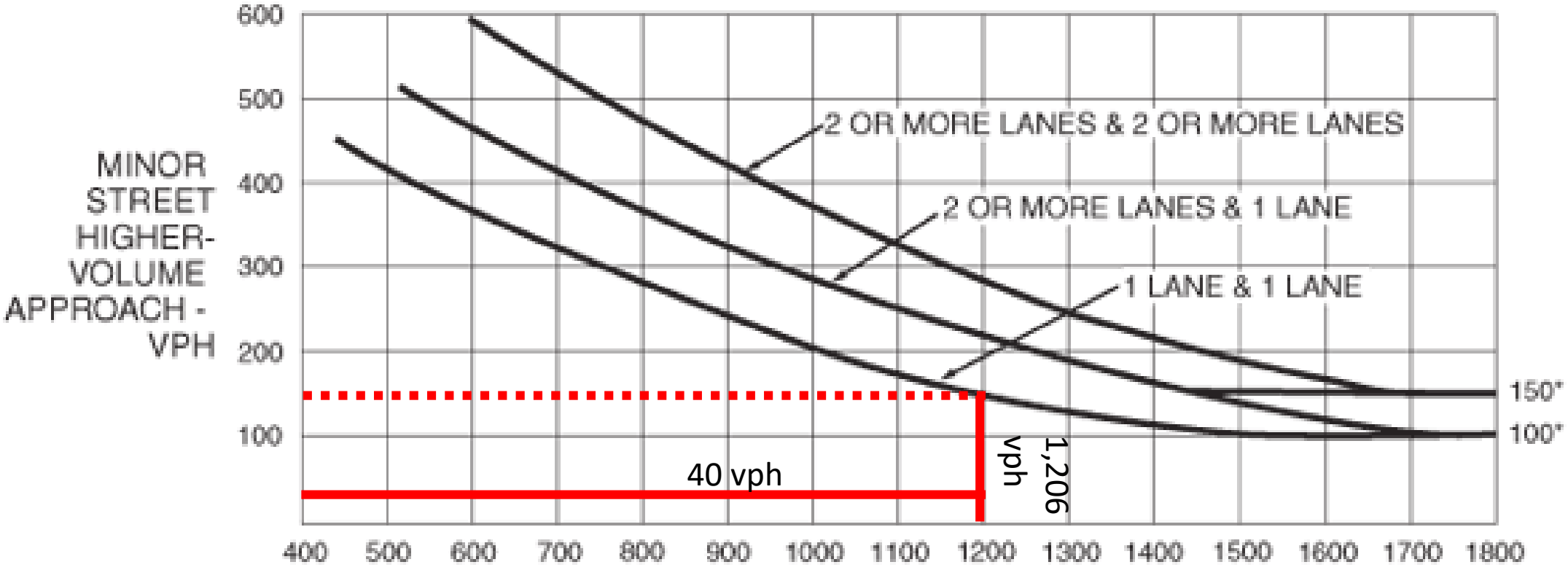
Observed Traffic Volume

Required Threshold

vph vehicles per hour

Midday Peak Hour with ACC
Par 3 Tradewinds Site – Kuntz Avenue and McClelland Street

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Legend

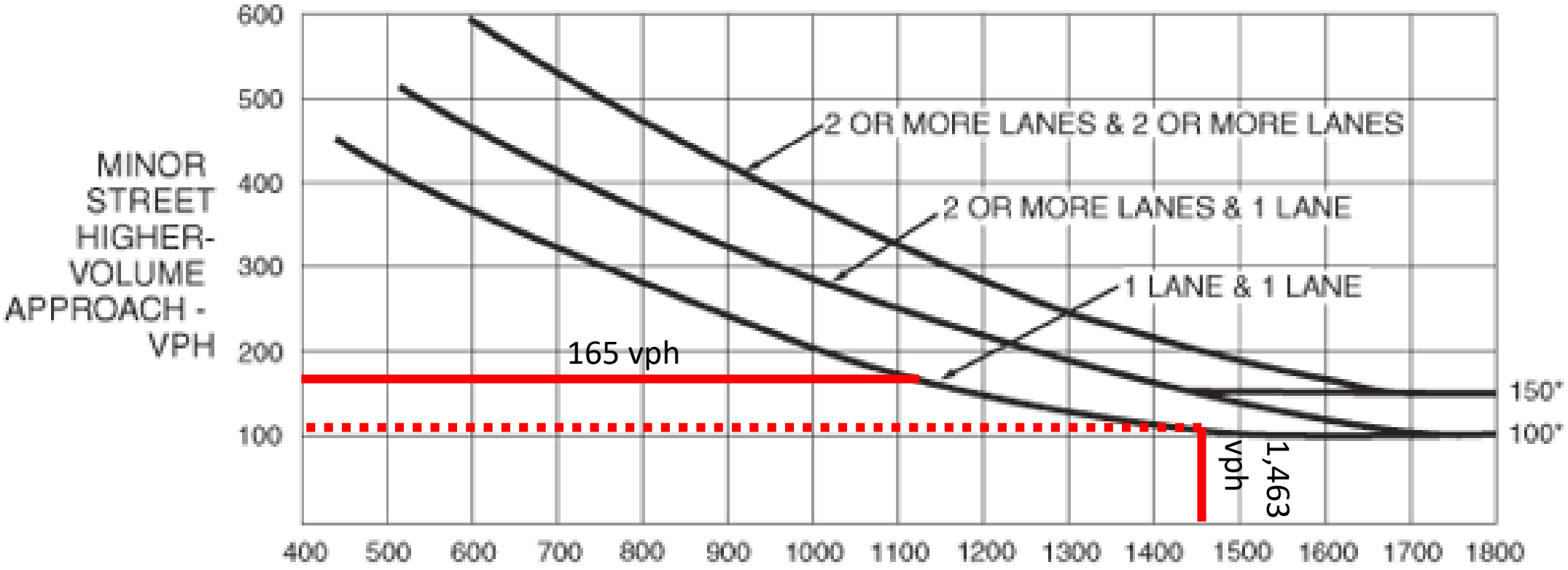
Observed Traffic Volume

Required Threshold

vph vehicles per hour

PM Peak Hour with ACC
Par 3 Tradewinds Site – Kuntz Avenue and McClelland Street

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

Required Threshold

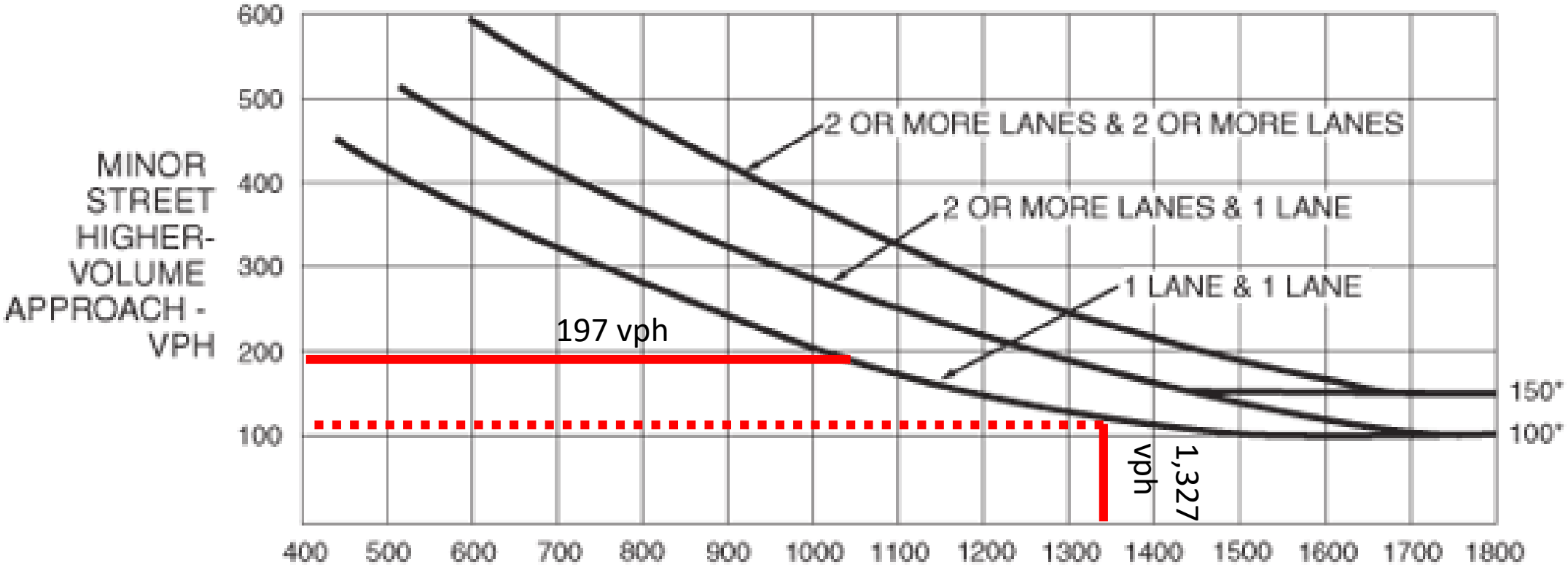
vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

AM Peak Hour with ACC

Par 3 Tradewinds Site – Kuntz Avenue and Kokomalei Street/Proposed Driveway

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

Required Threshold

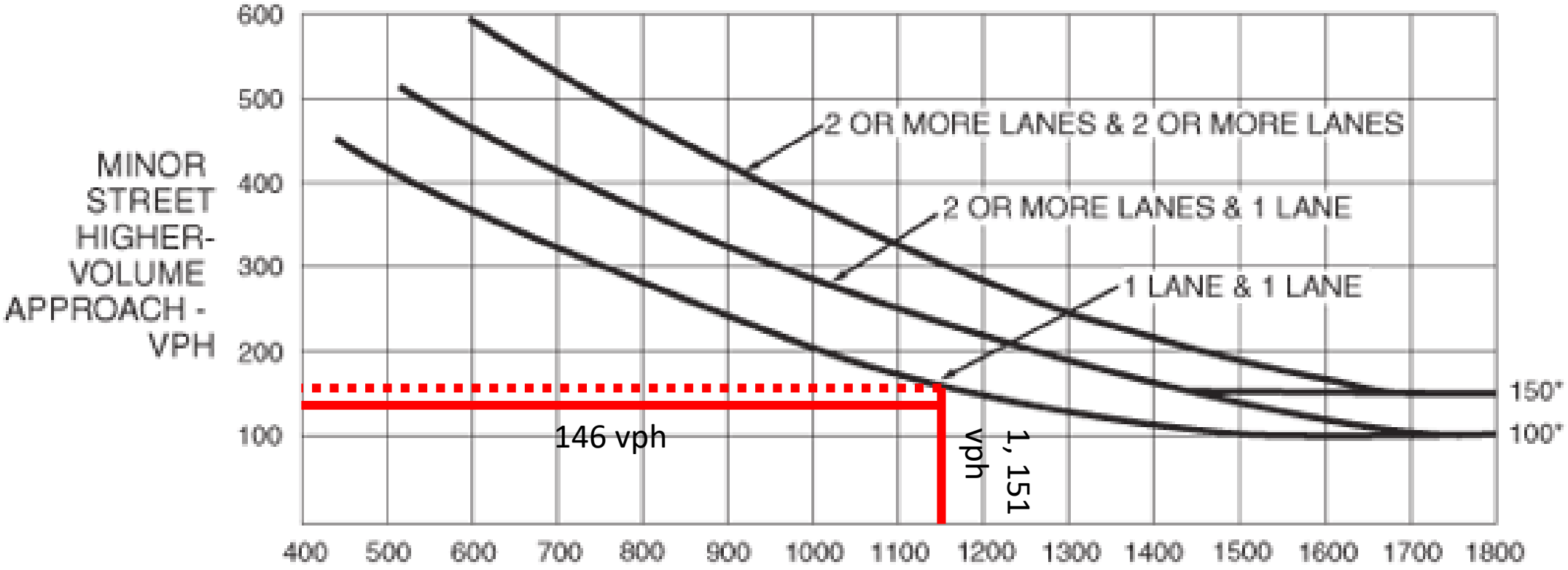
vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Midday Peak Hour with ACC

Par 3 Tradewinds Site – Kuntz Avenue and Kokomalei Street/Proposed Driveway

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

Required Threshold

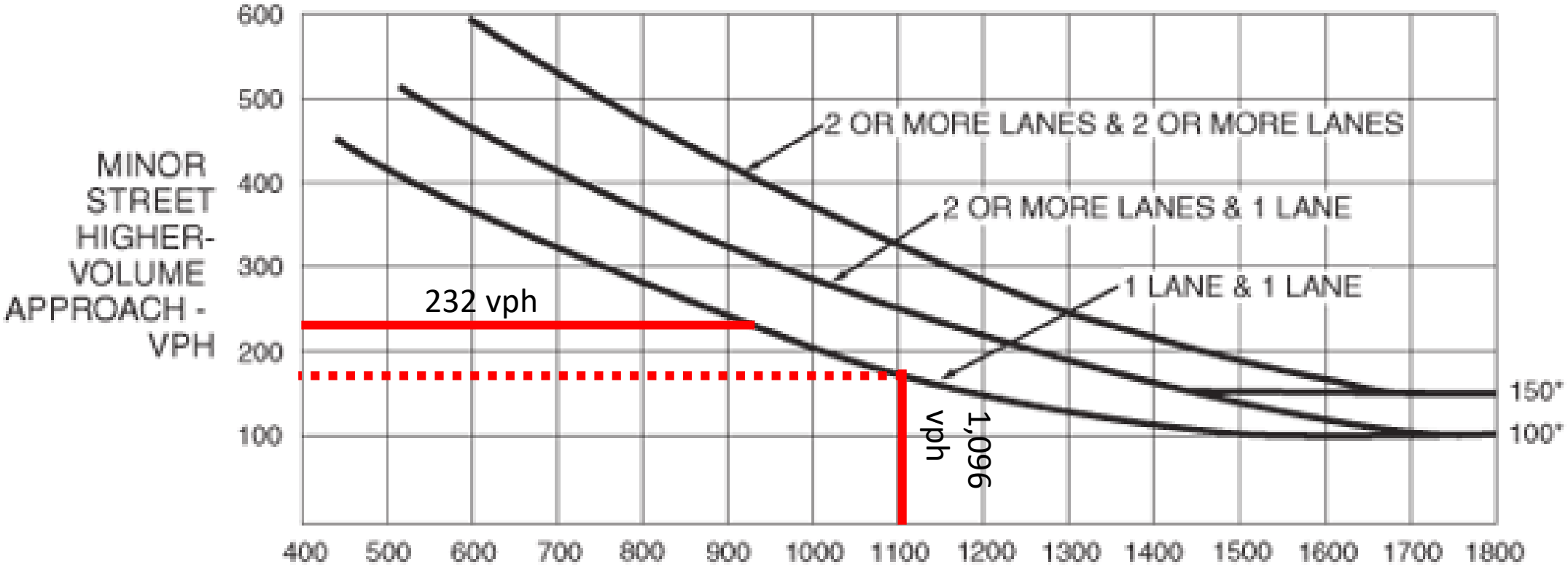
vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

PM Peak Hour with ACC

Par 3 Tradewinds Site – Kuntz Avenue and Kokomalei Street/Proposed Driveway

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Legend

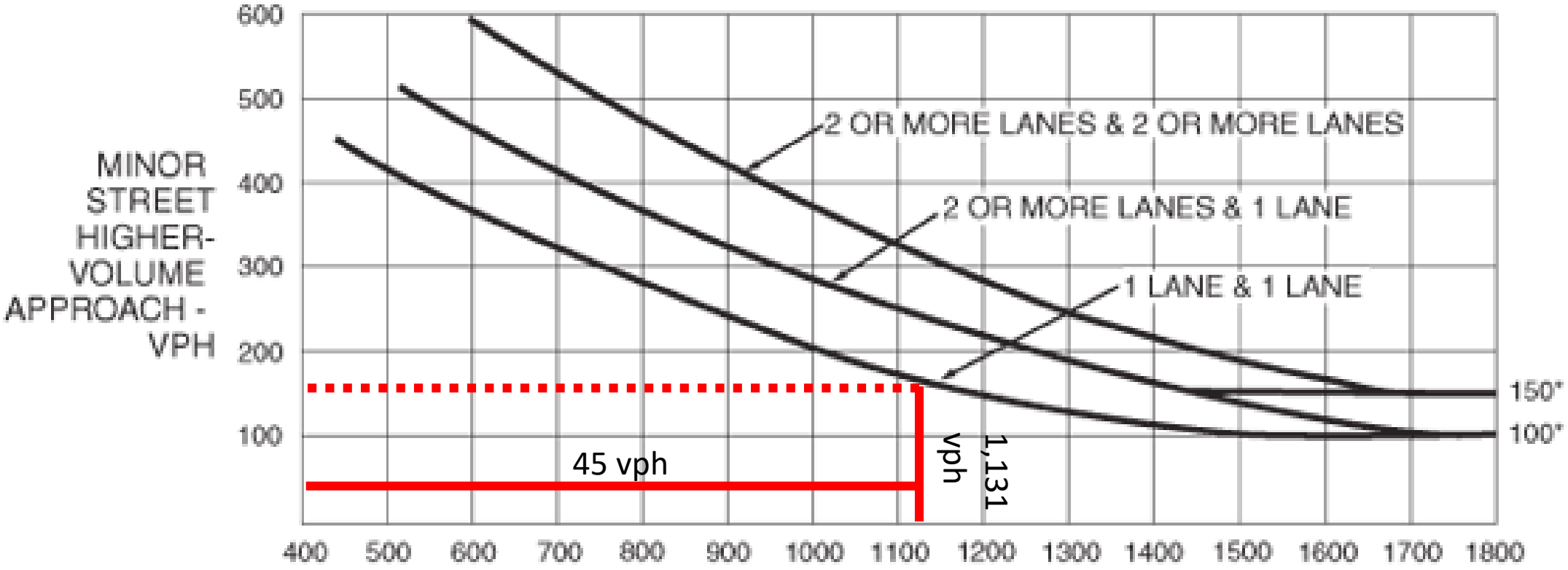
Observed Traffic Volume

Required Threshold

vph vehicles per hour

AM Peak Hour with ACC
Par 3 Tradewinds Site – Kuntz Avenue and McChord

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Legend

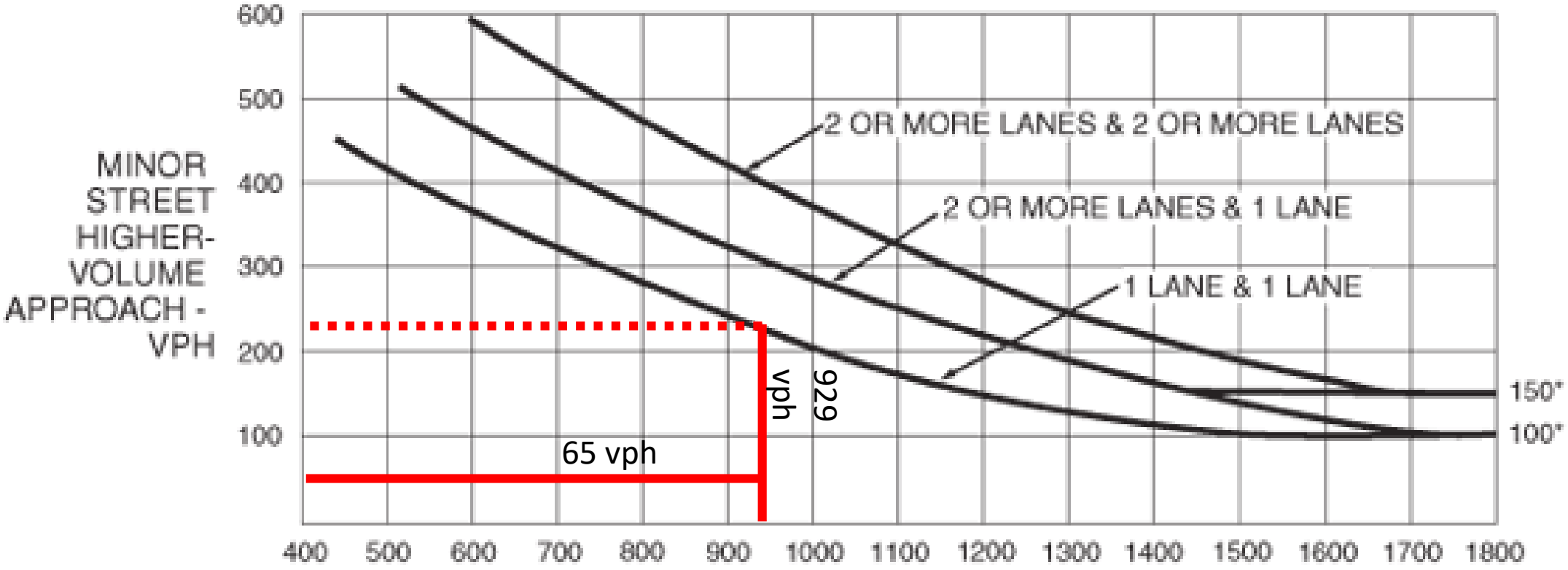
Observed Traffic Volume

Required Threshold

vph vehicles per hour

Midday Peak Hour with ACC
Par 3 Tradewinds Site – Kuntz Avenue and McChord

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

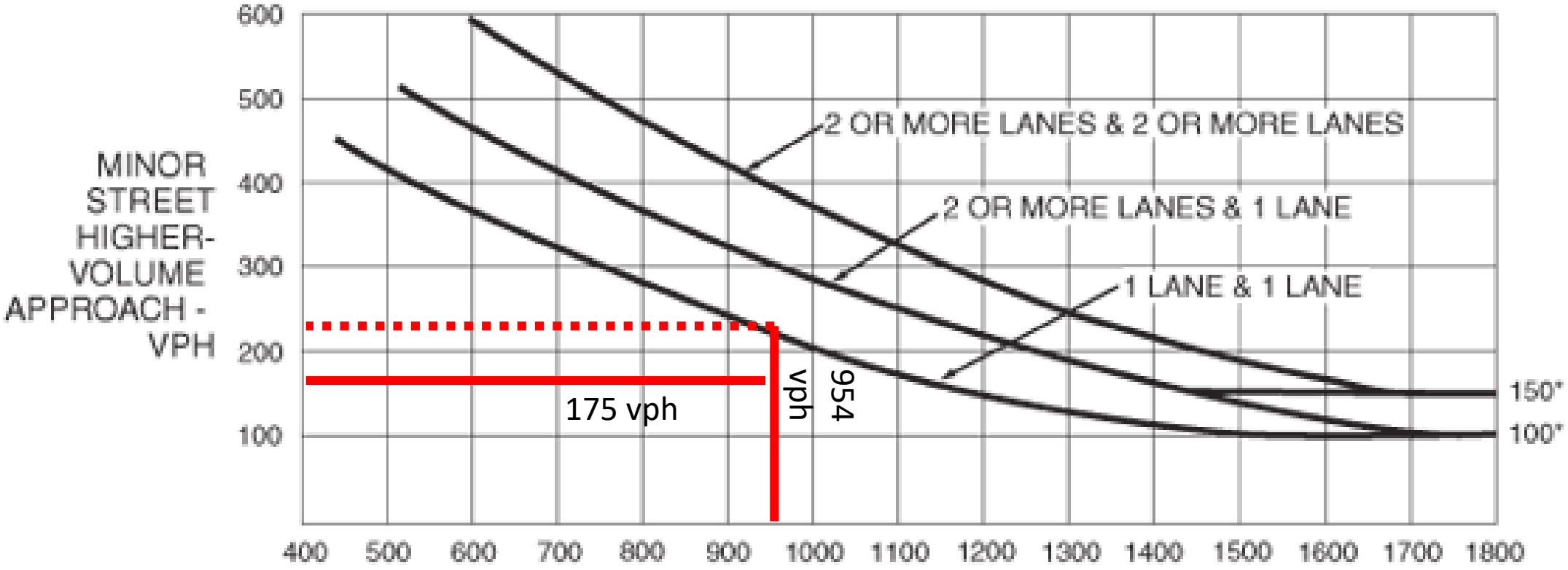
Required Threshold

vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

PM Peak Hour with ACC
Par 3 Tradewinds Site – Kuntz Avenue and McChord

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Legend

Observed Traffic Volume

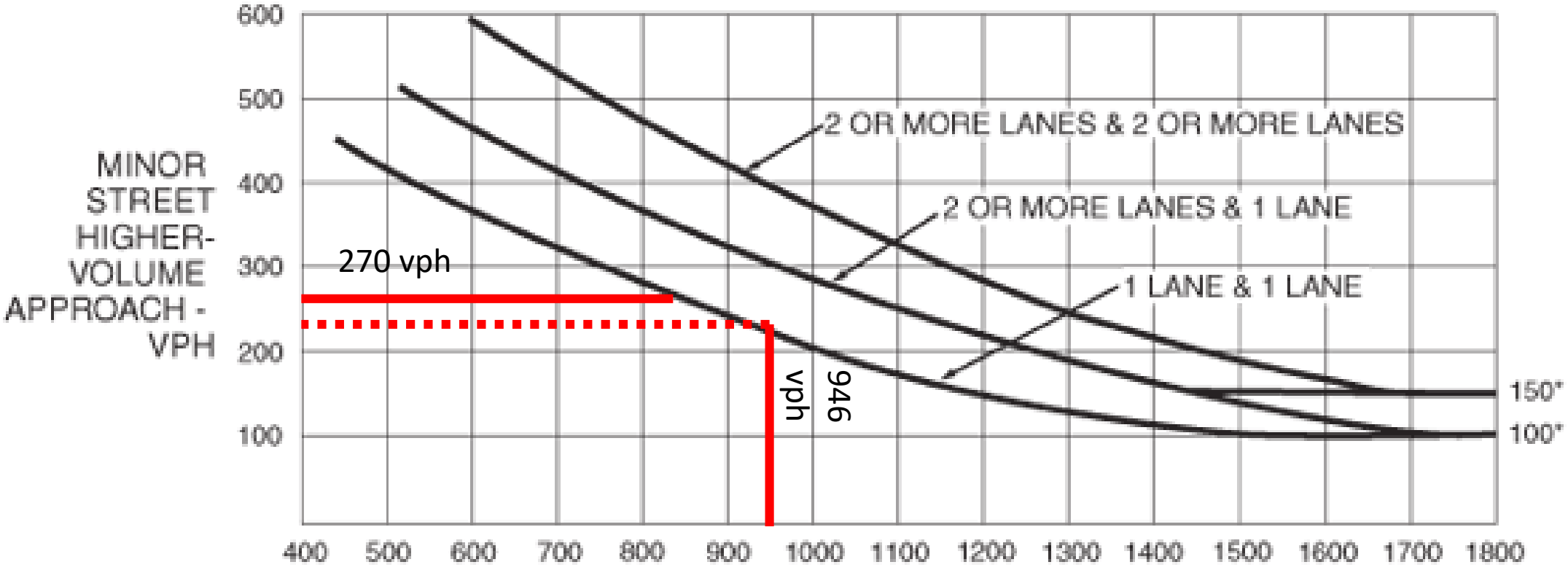
Required Threshold

vph vehicles per hour

AM Peak Hour with ACC

Kuntz Gate Site – Kuntz Avenue and Halehaka Street/Kamakahi Street

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

Required Threshold

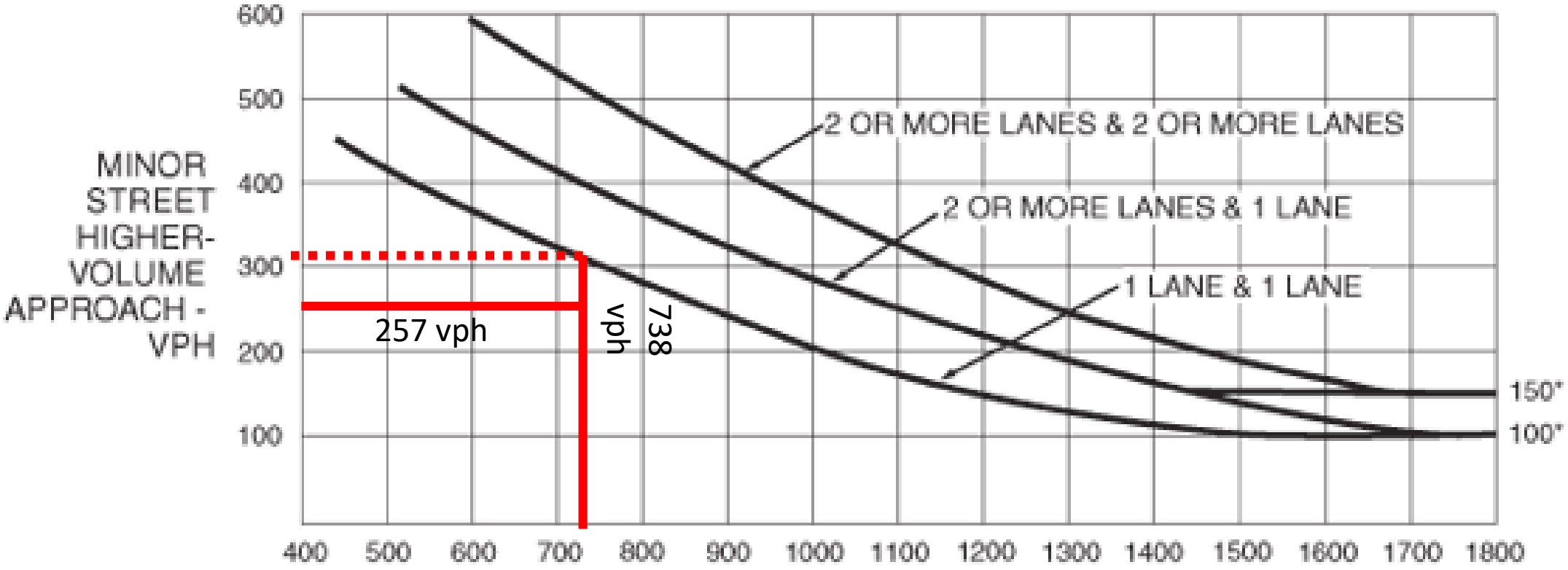
vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Midday Peak Hour with ACC

Kuntz Gate Site – Kuntz Avenue and Halehaka Street/Kamakahi Street

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

Required Threshold

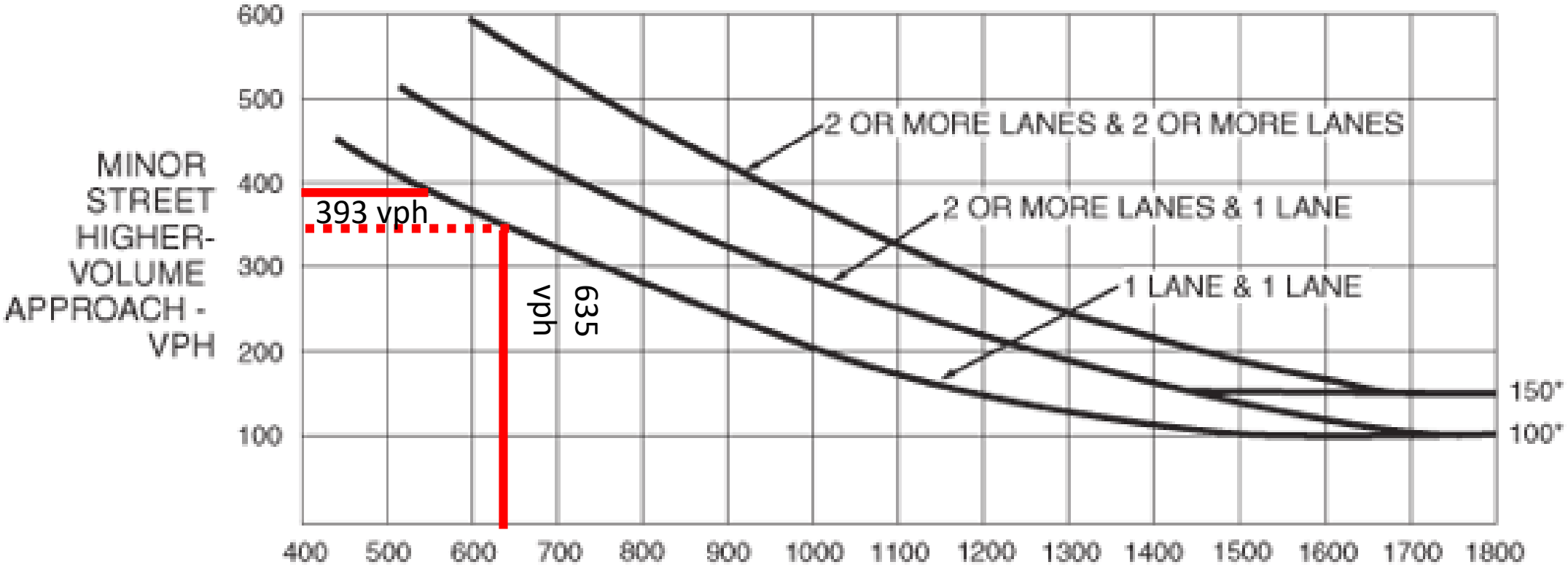
vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

PM Peak Hour with ACC

Kuntz Gate Site – Kuntz Avenue and Halehaka Street/Kamakahi Street

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Legend

Observed Traffic Volume

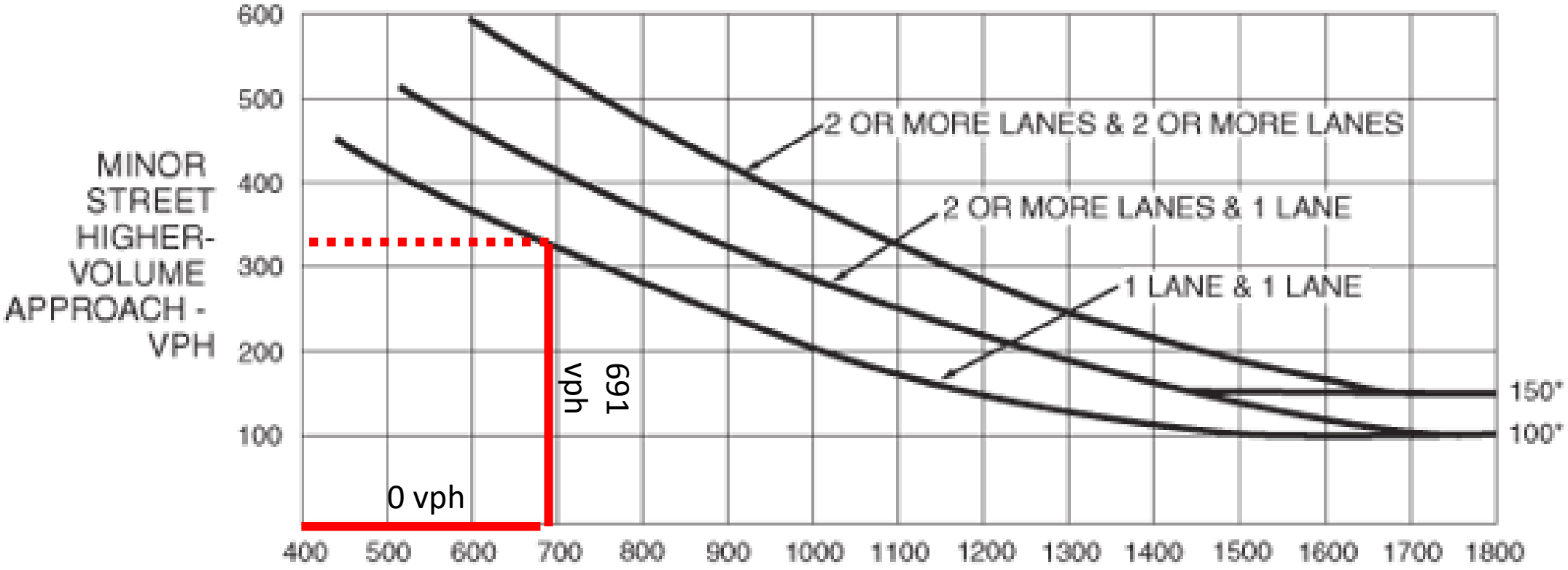
Required Threshold

vph vehicles per hour

AM Peak Hour with ACC

Kuntz Gate Site – Kuntz Avenue and Proposed Access

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

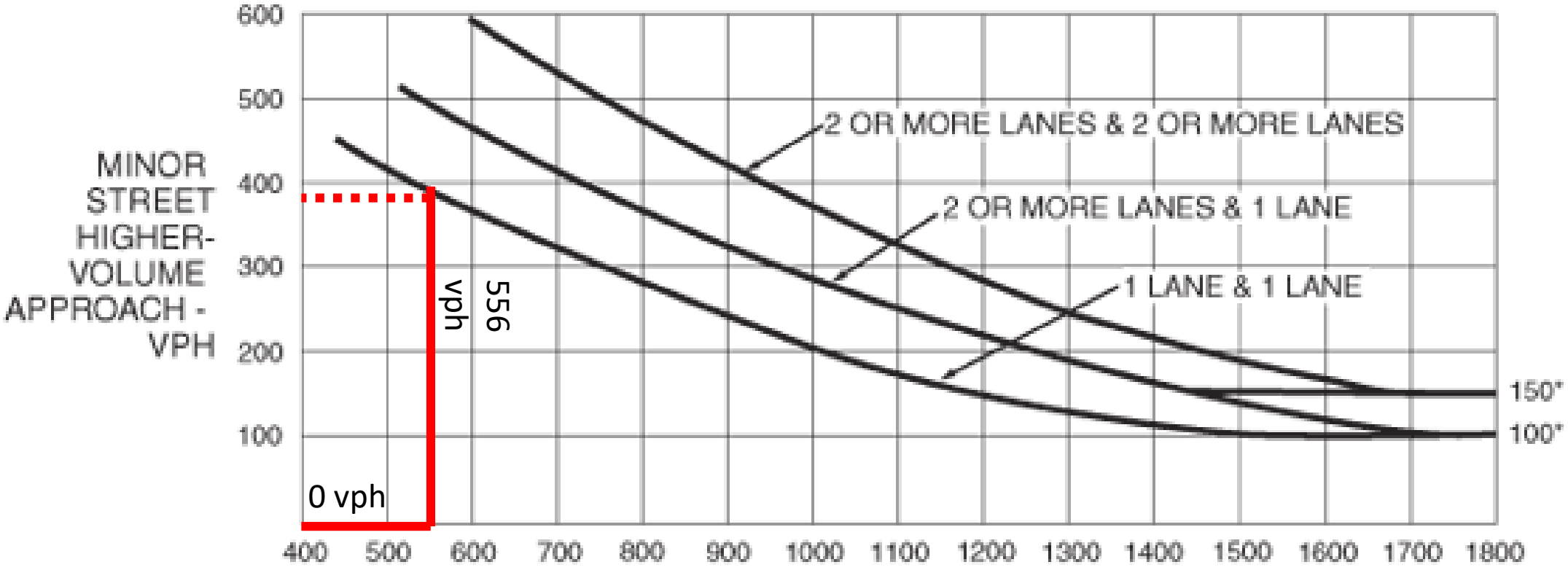
Required Threshold

vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Midday Peak Hour with ACC
Kuntz Gate Site – Kuntz Avenue and Proposed Access

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

Required Threshold

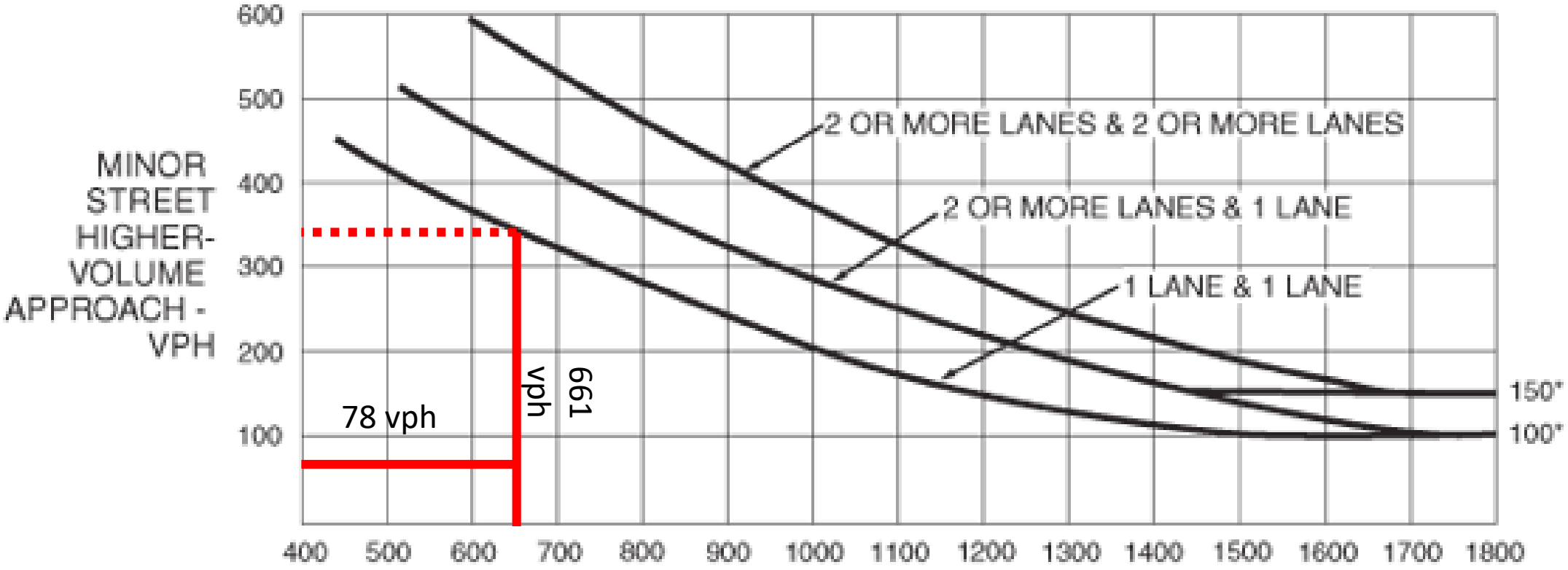
vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

PM Peak Hour with ACC

Kuntz Gate Site – Kuntz Avenue and Proposed Access

Figure 4C-3. Warrant 3, Peak Hour



Legend

Observed Traffic Volume

Required Threshold

vph vehicles per hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Appendix H
Itemization of Conceptual ROM Costs of Recommended Mitigation Improvements

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JBPHH ACC -
Itemization of Conceptual ROM Costs of Recommended Mitigation Improvements

JBPHH ACC Site Alternatives	Conceptual ROM Costs
Tradewinds-Par 3 Site	
Restripe Kuntz Avenue to eliminate WB Kuntz LT lane at McClelland and lengthen EB Kuntz LT Lane at Kokomalei/ACC Driveway	50,000
Install new traffic signal at Kuntz Avenue/McClelland intersection	400,000
Add new crosswalks across east leg of Kuntz Avenue/McClelland intersection	50,000
Construct new ACC Access Driveway at Kuntz Avenue/ Kokomalei Street intersection	100000
Install new traffic signal at Kuntz Avenue/Kokomalei intersection	400,000
Convert existing median striping into WB Kuntz LT Lane at Kokomalei/ACC Driveway	50,000
Add new crosswalks across east and west legs of Kuntz Avenue/Kokomalei/ACC Driveway intersection	50,000
Miscellaneous Traffic Signs	50,000
Approximate Conceptual ROM Total	**$1,150,000**
Kuntz Gate Site	
Widen Kuntz Avenue by one lane width for approximately 1,050 feet to provide WB LT lane at Halehaka/Kamakahi intersection and EB LT lane at proposed East Staff Parking Lot Driveway	1,050,000
Install new traffic signal at Kuntz Avenue/Halehaka/Kamakahi intersection	400,000
Widen Halehaka Street by one lane width for approximately 260 feet to provide separate SB TH/LT and RT lanes between Kuntz Avenue and 20th Street.	260,000
Construct new ACC East Parking Lot Driveway on Kuntz Avenue	100,000
Miscellaneous Traffic Signs	50,000
Approximate Conceptual ROM Total	**$1,860,000**
Bloch Arena Site	
Widen North Road by one lane width for approximately 1,500 feet to maintain 2 NB lanes from Nimitz Gate to Pearl Harbor Drive and to provide SB LT lane at North Rd/Pearl Harbor Drive/ACC Driveway intersection and at North Rd/Battleship Drive intersection.	1,500,000
Add new ACC Driveway leg to North Road/Pearl Harbor Drive intersection	100,000
Modify existing traffic signal at North Road/Pearl Harbor Drive /ACC Driveway intersection	400,000
Install new traffic signal at North Road/Battleship Drive intersection.	400,000
Relocate existing crosswalk at North Road/Battelship Drive intersection from south leg to north leg.	50,000
Construct secondary ACC access to Battleshp Drive	100,000
Miscellaneous Traffic Signs	50,000
Approximate Conceptual ROM Total	**$2,600,000**

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Appendix C
Public and Agency Participation

NOTE TO REVIEWERS: Public notices will be added to this Appendix in the Final EA.

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Appendix D
Coastal Zone Management Act Correspondence

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From: Nakagawa, John D <john.d.nakagawa@hawaii.gov>
Sent: Tuesday, March 24, 2020 10:05 AM
To: Bigay, John C CIV USN NAVFAC PACIFIC (USA)
Cc: Nihipali, Justine W
Subject: Re: CZMA DEMINIMIS NOTIFICATION

Received.

John Nakagawa
Hawaii Coastal Zone Management Program

From: Bigay, John C CIV USN NAVFAC PACIFIC (USA)
Sent: Tuesday, March 24, 2020 9:58 AM
To: Nakagawa, John D
Subject: CZMA DEMINIMIS NOTIFICATION

Aloha, Mr. Nakagawa,

The Navy is preparing an Environmental Assessment for an Ambulatory Care Center (ACC) Replacement at Joint Base Pearl Harbor-Hickam (JBPHH), O'ahu, Hawai'i. The proposed action would construct and operate a new ACC at JBPHH. The new ACC would be a consolidated joint service facility replacing several existing facilities separately operated by the Navy, Air Force, and Army. In summary, construction would include an approximately 250,000-square foot (ft^2) health/dental clinic facility (over multiple stories), an approximately 7,500-ft^2 central utility plant to service the health/dental clinic; approximately 1,500 parking stalls (i.e., 600 in surface parking and 900 in structured parking garage); and associated site preparation work and utility connections including electricity, water, storm sewer, and sanitary sewer. The final site selection has not been made, but all of the potential sites are located within the fencelines of JBPHH.

The proposal falls within Item 1 on the Navy/Marine Corps De Minimis Activities Under CZMA:
Item 1: New Construction of facilities and structures wholly within Navy/Marine Corps controlled areas (including land and water) that is similar to present use and when completed, the use or operation of which complies with existing regulatory requirements.

The Navy would observe all mitigation/conditions for Item 1 (i.e., 1, 3, 6, 9, 10, 11, 13, 14, 16). Per General Condition 16 of the De Minimis Activities Under CZMA, we are notifying you of the de minimis list use. Please let me know if you have any questions.

Very Respectfully,

John Bigay
NEPA Planner
NAVFAC Pacific

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR
ABBEY SETH MAYER
DIRECTOR
OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-12644

July 9, 2009

Lieutenant Commander E. J. D'Andrea
Assistant Regional Engineer
Department of the Navy
Commander
Navy Region Hawaii
850 Ticonderoga Street, Suite 110
Pearl Harbor, Hawaii 96860-5101

Attention: Mr. Brian Yamada

Dear Lt. Commander D'Andrea:

Subject: Hawaii Coastal Zone Management (CZM) Program Federal Consistency Concurrence with Modifications to the Department of the Navy De Minimis Activities in Hawaii under the Coastal Zone Management Act (CZMA)

The Hawaii CZM Program has completed the federal consistency review of the proposed modifications to the list of Department of the Navy de minimis activities under the CZMA, including changes to various activity categories, adding new activity categories, and expanding the coverage to Marine Corps Base Hawaii Kaneohe Bay and Camp Smith. The CZM Program conducted a thorough review of the request and a public notice of the CZM review was published in the State of Hawaii Office of Environmental Quality Control's publication, *The Environmental Notice*, on June 23, 2009. The public was provided an opportunity to participate in the review through July 7, 2009. There were no public comments received.

We concur that the activities identified on the modified list entitled, "Navy/Marine Corps De Minimis Activities Under CZMA" are expected to have insignificant direct or indirect (cumulative and secondary) coastal effects, and should not be subject to further review by the Hawaii CZM Program on the basis and condition that the listed activities are subject to and bound by full compliance with the corresponding "Project Mitigation / General Conditions."

The Hawaii CZM Program reserves the right to review, amend, suspend, and/or revoke the "Navy/Marine Corps De Minimis Activities Under CZMA" list whenever it finds that a listed activity or activities will have reasonably foreseeable coastal effects. CZM consistency

concurrence does not convey approval with any other regulations administered by any State or County agency.

Modifying and expanding the list of Navy de minimis activities under the CZMA was a cooperative effort between our Office and Mr. Brian Yamada from the Department of the Navy, who interned with the Hawaii CZM Program in September 2008. We appreciate the efforts of Mr. Yamada in working with our CZM staff. The de minimis activities list will result in more efficient compliance with CZMA federal consistency requirements for both the Navy and the Hawaii CZM Program.

If you have any questions, please call John Nakagawa of our CZM Program at 587-2878.

Sincerely,

Abbey Seth Mayer
Director

c: U.S. Army Corps of Engineers, Regulatory Branch (w/ copy of de minimis list)
Ms. Rebecca Hommon, Region Counsel, Navy Region Hawaii

JDN/do
Disk #12

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
850 TICONDEROGA ST STE 110
PEARL HARBOR, HAWAII 96860-5101

5090
Ser N4/ 04163
01 JUN 2009

CERTIFIED MAIL NO. 7007 2560 0002 0326 9580

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RECEIVED
JUN - 5 2009
OFFICE OF PLANNING

Mr. Abbey Mayer
Office of Planning
Department of Business, Economic
Development and Tourism
P. O. Box 2359
Honolulu HI 96804

Dear Mr. Mayer:

SUBJECT: REQUEST FOR CONCURRENCE WITH MODIFICATIONS TO THE DEPARTMENT OF THE NAVY DE MINIMIS ACTIVITIES UNDER THE COASTAL ZONE MANAGEMENT ACT (CZMA)

This letter is to request your concurrence with the attached list of Navy/Marine Corps de minimis activities under the CZMA. The attached de minimis list will amend the current de minimis list which was established on April 2, 2007. The new de minimis list will include the Marine Corps, and will cover areas in the Pearl Harbor Naval complex, Naval Magazine Lualualei, Naval Communications and Telecommunications Area Master Station Pacific, Pacific Missile Range Facility on Kauai, Kaneohe Marine Corps Base Hawaii, Camp Smith and all associated installations/facilities/equipment located outside of those Navy/Marine Corps properties.

The Navy and Marine Corps have determined that the listed Proposed Actions have insignificant direct or indirect (cumulative and secondary) coastal effects and should therefore be categorized as de minimis in accordance with the Department of Commerce, National Oceanic and Atmospheric Administration, CZMA Federal Consistency Regulations 15 CFR part 930.33 (3). With the corresponding mitigation and conditions applied, these actions would be exempt from a negative determination or a consistency determination from the State of Hawaii.

Should you have any questions, please contact Mr. Brian Yamada at 472-1449, by facsimile transmission at 474-5419, or by email at brian.yamada@navy.mil.

Sincerely,

Eileen J. D'Andrea

E. J. D'ANDREA
Lieutenant Commander, CEC, U. S. Navy
Assistant Regional Engineer
By direction of the
Commander

Enclosure: 1.Navy De minimis Activities Under CZMA

Navy/Marine Corps De Minimis Activities Under CZMA

***covering areas in Pearl Harbor Naval Complex, Naval Magazine Lualualei, Naval Communications and Telecommunications Area Master Station (NCTAMS) Pacific, Pacific Missile Range Facility (PMRF), Kaneohe Marine Corps Base Hawaii, Camp Smith, and all associated installations/facilities/equipment located outside of these Navy/Marine Corps properties**

No.	Proposed Action	Description	Mitigation / Conditions
1	New Construction	Construction of new facilities and structures wholly within Navy/Marine Corps controlled areas (including land and water) that is similar to present use and, when completed, the use or operation of which complies with existing regulatory requirements.	1, 3, 6, 8, 9, 10, 11, 13, 14, 16
2	Utility Line Activities	Acquisition, installation, operation, construction, maintenance, or repair of utility or communication systems that use rights of way, easements, distribution systems, or facilities on Navy/Marine Corps controlled property. This also includes the associated excavation, backfill, or bedding for the utility lines, provided there is no change in preconstruction contours.	1, 10, 11, 12, 14, 16
3	Repair and Maintenance	Routine repair and maintenance of buildings, ancillary facilities, piers, wharves, dry docks, vessels, or equipment associated with existing operations and activities.	12, 14, 16
4	Aids to Navigation	Includes buoys, beacons, signs, etc. placed within Navy/Marine Corps controlled coasts and navigable waters as guides to mark safe water.	2, 5, 14, 16
5	Structures in Fleeting and Anchorage Areas	The installation of structures, buoys, floats and other devices placed within anchorage or fleeting areas to facilitate moorage of vessels within Navy/Marine Corps controlled property.	2, 5, 14, 16
6	Oil Spill and Hazardous Waste Cleanup	Activities required for the containment, stabilization, removal and cleanup of oil and hazardous or toxic waste materials on Navy/Marine Corps controlled property.	1, 8, 14, 16
7	Maintenance Dredging	Excavation and removal of accumulated sediment for maintenance to previously authorized depths.	2, 3, 4, 5, 7, 8, 9, 13, 14, 16
8	New Dredging	Excavation and removal of material from the ocean floor not to exceed 100 cubic yards below the plane of the ordinary high water mark or the mean high water mark from navigable waters of the US and; excavation and removal of material from the ocean floor within Navy/Marine Corps controlled property. This does not include dredging or degradation through coral reefs.	2, 3, 4, 5, 7, 8, 9, 13, 14, 16
9	Scientific Measuring Devices	The installation of devices which record scientific data (staff gages, tide gages, water recording devices, water quality testing and improvement devices and similar structures) on Navy/Marine Corps controlled property. Devices must not transmit acoustics (certain frequencies) that will adversely affect marine life.	1, 2, 14, 16
10	Studies and Data Collection and Survey Activities	Studies, data and information-gathering, and surveys that involve no permanent physical change to the environment. Includes topographic surveys, wetlands mapping, surveys for evaluating environmental damage, engineering efforts to support environmental analyses, core sampling, soil survey sampling, and historic resources surveys.	2, 3, 6, 8, 9, 11, 12, 13, 14, 16
11	Demolition	Demolition and disposal involving buildings or structures when done in accordance with applicable regulations and within Navy/Marine Corps controlled properties.	1, 11, 12, 14, 16
12	Military Testing and Training	Routine testing and evaluation of military equipment on or over military, or an established range, restricted area or operating area or training conducted on or over military land or water areas in which the impact is not significant.	9, 13, 14, 15, 16
13	Real Estate/Property Transfer	Real estate acquisitions or outleases of land involving new ingrants/outgrants and/or 50 acres or more where existing land use will change.	14, 16

ENCLOSURE(/)

14	Mission Changes	Mission changes, base closures/relocations/consolidations, and deployments that would cause long term population increases or decreases in affected areas.	14, 16
15	Limitation of Access to Property	Permanent closure or limitation of access to any areas that were open previously to public use, such as roads or recreational purposes (provided the access is not required by established agreements with State of Hawaii, private industry, etc.)	14, 16
16	Environmental Management Activities	Environmental management activities within Navy/Marine Corps controlled areas including, but not limited to, activities such as vegetation and mangrove removal, ditch clearing, sediment removal, invasive species removal, construction related to protecting endangered species and wildlife, and actions prescribed by the Integrated Natural Resources Management Plan (INRMP)	2, 13, 14, 16
17	Towers	Installation, operation, and maintenance of towers (such as communication towers, cellular phone antennas, wind-energy towers) within Navy/Marine Corps controlled areas.	1, 2, 6, 8,9 , 12, 13, 14, 16
18	Alternative Energy Research	Installation, operation, replacement, and removal of alternative energy research structures/equipment taking place within Navy/Marine Corps controlled areas.	1, 2, 3, 5, 6, 12, 13, 14, 16
19	Army Corps Nation Wide Permits	Work subject to an Army Corps of Engineers Nationwide permit (which are applicable to Hawaii)	16

Project Mitigation / General Conditions

1) Navy/Marine Corps controlled property refers to land areas, rights of way, easements, roads, safety zones, danger zones, ocean and naval defensive sea areas under active Navy/Marine Corps control.
2) If any listed species enters the area during conduct of construction activities, all activities should cease until the animal(s) voluntarily depart the area.
3) Turbidity and siltation from project related work shall be minimized and contained to within the vicinity of the site through appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions.
4) Dredging/filling in the marine/aquatic environment shall be scheduled to avoid coral spawning and recruitment periods.
5) All project-related materials and equipment (dredges, barges, backhoes, etc.) to be placed in the water shall be cleaned of pollutants prior to use.
6) No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands, etc.).
7) All debris removed from the marine/aquatic environment shall be disposed of at an upland site or EPA approved ocean disposal site, and Best Management Practices shall be followed.
8) No contamination (trash or debris disposal, alien species introductions, etc.) of adjacent marine/aquatic environments (reef flats, channels, open ocean, stream channels, wetlands, etc.) shall result from project-related activities.
9) Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate clean-up of accidental petroleum releases.
10) Any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.
11) Any soil exposed near water as part of the project shall be protected from erosion (with plastic sheeting, filter fabric, etc.) after exposure and stabilized as soon as practicable (with vegetation matting, hyrdroseeding, etc.).
12) Section 106, of the National Historic Preservation Act (NHPA), consultation requirements must be met. Also, follow guidelines in the area-specific Integrated Cultural Resources Management Plan (ICRMP) if applicable.
13) Navy/Marine Corps shall evaluate the possible impact of the action on species and habitats protected under the Endangered Species Act (ESA). If the Navy/Marine Corps determines that no such species or habitats will be affected by the action, neither U.S. Fish and Wildlife (FWS) Service nor National Oceanic and Atmospheric Administration (NOAA) concurrence is required. Should it be determined by the Navy/Marine Corps, FWS, or NOAA that the action may affect any such species or habitat, informal or formal consultation will be initiated by the Navy/Marine Corps as required by section 7 (Interagency Cooperation) of the ESA.
14) The National Environmental Policy Act (NEPA) review process will be completed.
15) The training, testing and evaluation will be conducted in accordance with applicable standard operating procedures protective of the environment.
16) Navy or Marine Corps staff shall notify State CZM of de minimis list usage for projects which require an Environmental Assessment (EA). Notification can be sent via email: to JNakagaw@dbedt.hawaii.gov

Appendix E
Entry Control Facility Memorandum

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MILITARY SURFACE DEPLOYMENT AND DISTRIBUTION COMMAND
TRANSPORTATION ENGINEERING AGENCY
1 SOLDIER WAY
SCOTT AIR FORCE BASE, ILLINOIS 62225-5006

23 April 2020

Jeffery H. Butts, J.D., AICP
Community Planner, EV21 NEPA Infrastructure
Naval Facilities Engineering Command, Atlantic
6506 Hampton Blvd
Norfolk, VA 23508-1278
(757) 322-4015
Jeffrey.Butts@navy.mil

SUBJECT: Entry Control Facility (ECF) ID Check Lane Sizing as part of the Ambulatory Care Center Development, Joint Base Pearl Harbor-Hickman (JBPHH), HI

ISSUE: The Naval Facilities Engineering Command (NAVFAC), Atlantic District, is in the initial stages of planning for the new Ambulatory Care Center (ACC) development. A traffic impact study is in the final stages of being completed to determine the AM and PM peak hour traffic volumes generated by the ACC and how this traffic impacts various intersections within the study area. As part of the ACC development-generated traffic, some of the trips will originate/terminate off base and will utilize an ECF to enter/exit the installation. This ECF Lane Sizing analysis utilizes the proposed AM peak hour traffic volumes included in the *Transportation Impact Assessment Report (TIAR) for Ambulatory Care Center Replacement at Joint Base Pearl Harbor-Hickam, Oahu, Hawaii,* dated February 2020 to determine the additional number of ID check lanes at the impacted ECFs for the three alternative site locations for the ACC, as discussed in the TIAR.

BLUF: For each of the three alternative locations for the ACC project, SDDCTEA has determined the minimum number of ID check lanes and the minimum storage required at each of the ECFs.

Future ACP ***minimum*** requirements

- *O'Malley Gate:*
  - Number of existing inbound POV ID check lanes – Existing/Required: 4 lanes/4 lanes
  - Number of inbound POV ID check lanes for ACC – 5 lanes
  - Minimum POV storage length – 1,075 feet
- *Kuntz Gate:*
  - Number of existing inbound POV ID check lanes – Existing/Required: 2 lanes/2 lanes
  - Number of inbound POV ID check lanes for ACC – 2 lanes
  - Minimum POV storage length – 650 feet
- *Makalapa Gate:*
  - Number of existing inbound POV ID check lanes – Existing/Required: 3 lanes/4 lanes
  - Number of inbound POV ID check lanes for ACC – 4 lanes
  - Minimum POV storage length – 1,000 feet

- *Nimitz Gate:*
  - Number of existing inbound POV ID check lanes – Existing/Required: 4 lanes/5 lanes
  - Number of inbound POV ID check lanes for ACC – 5 lanes
  - Minimum POV storage length – 1,525 feet

BACKGROUND:

As part of the planning process, the project team has developed a TIAR to determine the number of peak hour vehicular trips generated by the ACC, the number of trips originating/terminating on and off the installation, trip assignment to the ECFs and intersections within the study area, and the impact of the development-generated traffic on the intersections within the study area for each alternative. During the design charrette for the project, it was noted that the impact of the development-generated traffic on the various ECFs to the installation was not included in the TIAR.

In order to keep the project on-schedule, the SDDCTEA Traffic Engineering (TE) Branch offered to perform the ECF lane sizing assessments for the four (4) gates impacted by the three (3) alternative sites for the ACC on JBPHH. The SDDCTEA TE Branch worked with Mr. Jeffery Butts, Community Planner, NAVFAC, to obtain the existing traffic volumes and estimated typical traffic queues at the four ECFs – Nimitz Gate, Makalapa Gate, Kuntz Gate, and O'Malley Gate. Peak hour development-generated traffic from the ACC as well as its trip assignment along the study corridors, intersections and ECFs was obtained from the project's TIAR.

The purpose of this ECF Lane Assessment is to calculate the number of additional ID check lanes at each of the 4 ECFs impacted by the 3 ACC alternatives.

TRAFFIC VOLUMES

Existing Demand Volumes

Reports from the electronic card readers at the four ECFs potentially impacted by the ACC alternatives were provided by NAVFAC. The reports included the hourly totals of vehicles processed through the ECF. The traffic counts were provided for the Nimitz Gate, Makalapa Gate, Kuntz Gate, and O'Malley Gate. The traffic count data was provided for each 1-hour period of when the gate was open but it was not collected in 15-minute increments. Queue data of vehicles waiting to be processed was not available in the traffic data provided. However, visual observations of the typical location of the backup of traffic waiting at the gates was provided by guards from the installation. Vehicular volumes for the queue of traffic were estimated based upon these typical queue lengths and added to the existing AM peak hour traffic volumes for each gate. These four ECFs process only POVs and do not allow commercial vehicles.

The hourly existing traffic data provided was for a 5-day period earlier this year. The three-day traffic counts of Tuesday, Wednesday and Thursday were utilized to calculate the average weekday AM peak hour traffic volume for each of the gates. The estimated typical traffic backup (queue) lengths, provided by the installation, were converted to an estimated POV volume. The estimated queue volume was added to the existing AM peak hour traffic volume. This value results in the existing AM peak hour demand volume at each of the gates. Table 1 summarizes the existing weekday AM peak hour traffic demand volume at each ECF.

Table 1 Existing AM Peak Hour ECF Volumes			
Gate	**Ex AM Vol (vph)**	**Est. Ex AM Queue* (vph)**	**Total AM Vol (vph)**
O'Malley	1,508	37	1,545
Kuntz	400	10	410
Makalapa	1,288	30	1,318
Nimitz	1,642	119	1,761

*Including typical estimated existing AM queues based on visual observations.

Background Growth

Based upon the information in the TIAR, no growth in background traffic through the year 2027 was assumed for the background traffic around the three proposed alternative sites.

Future Demand Volume

In order to determine the future demand traffic volume, the existing demand volume is added to the development-generated traffic as detailed in the TIAR. Table 2 includes a summary of the future demand AM peak hour demand traffic volumes that are projected to utilize each of the gates for the various ACC alternatives.

Table 2 Future AM Peak Hour Demand Volume				
Gate	**Ex Vol***	**Background**	**ACC**	**Future**
O'Malley	1,545	0	207	**1,752**
Kuntz	410	0	207	**617**
Makalapa	1,318	0	123	**1,441**
Nimitz	1,761	0	123	**1,884**

*Including typical estimated existing AM queues based on visual observations

ACP POV Lane Requirements

The installation provided the number of existing ID check lanes that are currently being utilized to process traffic at each of the gates. Due to the existing traffic backups that at the gates, this analysis calculated the required number of ID check lanes that should be provided at each gate to adequately process the existing peak hour demand traffic. The minimum number of existing ID check lanes required will be compared to the number of lanes required to adequately process the

future peak hour traffic demand at the gates. By comparing these two values of ID check lanes, the true impact of the ACC-generated traffic can be determined.

In order to calculate the minimum number of ID check lanes to adequately process the existing and future peak hour traffic volumes, the SDDCTEA SMART Decision Evaluator was utilized to calculate the minimum number of ID check lanes required at each gate. Tables 3-6 include the existing number of ID check lanes and the minimum number of ID check lanes at each gate for both the existing and future peak hour demand volumes as well the total queue length and average vehicular delay.

Table 3
O'Malley ECF

SMART Evaluator Results (Existing AM Vol 1,545 vph*)				
	Manual Processing		**Handheld Processing**	
	Single	**Tandem**	**Single**	**Tandem**
Required Lanes	4	3	5	4
Total Queue (# Veh)	54	48	45	33
Delay/Veh (Sec)	97	95	35	24
Total Manpower	4	6	5	8
Existing # of ID Check Lanes:				**4**
Recommended # of ID Check Lanes:				**4**
SMART Evaluator Results (Future AM Vol 1,752 vph*)				
	Manual Processing		**Handheld Processing**	
	Single	**Tandem**	**Single**	**Tandem**
Required Lanes	5	4	6	4
Total Queue (# Veh)	43	28	42	57
Delay/Veh (Sec)	27	19	25	86
Total Manpower	5	8	6	8
Recommended # of ID Check Lanes:				**5**

*Including typical estimated existing AM queues based on visual observations

As shown in Table 3, currently there are four (4) ID check lanes at the O'Malley gate. The existing peak hour traffic demand of 1,545 vehicles per hour (vph) requires a minimum of 4 ID check lanes (based upon a single guard in each lane preforming manual processing of each entering vehicle). The future traffic demand of 1,715 vph results in a minimum of 5 ID check lanes to adequately process the peak hour demand. With 5 ID check lanes, with 1 guard in each lane doing manual ID checks, this results in a total queue of 43 vehicles and an average delay of 27 seconds per vehicle.

The results of the existing and future ECF lane sizing for the Kuntz Gate is shown in Table 4. The existing peak hour demand volume is 410 vph and the future peak hour traffic demand volume is 617 vph.

Table 4
Kuntz ECF

SMART Evaluator Results (Existing AM Vol 410 vph*)				
	Manual Processing		**Handheld Processing**	
	Single	**Tandem**	**Single**	**Tandem**
Required Lanes	2	1	2	1
Total Queue (# Veh)	3	5	5	11
Delay/Veh (Sec)	19	29	22	74
Total Manpower	2	2	2	2
Existing # of ID Check Lanes:				**2**
Recommended # of ID Check Lanes:				**2**
SMART Evaluator Results (Future AM Vol 617 vph*)				
	Manual Processing		**Handheld Processing**	
	Single	**Tandem**	**Single**	**Tandem**
Required Lanes	2	2	2	2
Total Queue (# Veh)	11	5	18	7
Delay/Veh (Sec)	26	16	54	20
Total Manpower	2	4	2	4
Recommended # of ID Check Lanes:				**2**

*Including typical estimated existing AM queues based on visual observations

***Note: The minimum approach zone length provided for queuing vehicles is 200 feet.*

As shown in Table 4, currently there are two (2) existing ID check lanes at the Kuntz Gate. The results of the existing peak hour traffic demand volume is two (2) ID check lanes to adequately process the volume. With the additional traffic from the ACC, no additional ID check lanes are required at the Kuntz Gate. The total queue increases from 3 vehicles to 12 vehicles. The total average delay increases from 19 seconds per vehicle to 26 seconds per vehicle.

At the Makalapa Gate, the existing peak hour demand volume is 1,318 vph and the future peak hour demand volume is 1,441 vph. The results of the existing and future ECF lane sizing calculations for the existing and future peak hour traffic volumes utilizing the Makalapa Gate are shown in Table 5.

Table 5 Makalapa ECF				
SMART Evaluator Results (Existing AM Vol 1,318 vph*)				
	Manual Processing		**Handheld Processing**	
	Single	**Tandem**	**Single**	**Tandem**
Required Lanes	4	3	4	3
Total Queue (# Veh)	27	22	47	44
Delay/Veh (Sec)	24	22	81	104
Total Manpower	4	6	4	6
Existing # of ID Check Lanes:				**3**
Recommended # of ID Check Lanes:				**4**
SMART Evaluator Results (Future AM Vol 1,441 vph*)				
	Manual Processing		**Handheld Processing**	
	Single	**Tandem**	**Single**	**Tandem**
Required Lanes	4	3	5	4
Total Queue (# Veh)	40	34	34	24
Delay/Veh (Sec)	38	36	25	20
Total Manpower	4	6	5	8
Recommended # of ID Check Lanes:				**4**

*Including typical estimated existing AM queues based on visual observations

As shown in Table 5, the Makalapa Gate currently has three (3) ID check lanes to process traffic. Based on the analysis of the existing peak hour traffic demand volume, four (4) ID check lanes are needed to adequately process the AM peak hour traffic volumes. The Makalapa Gate does not require any additional ID check lanes to process the traffic generated by the ACC (if the required number of ID check lanes to process the existing traffic demand were provided). Based upon the analysis, with four (4) ID check lanes utilizing Manual Processing with a single guard in each lane, the total vehicular queue expected is 40 vehicles with an average delay of 38 seconds per vehicle.

At the Nimitz Gate, the existing peak hour demand volume is 1,761 vph and the future peak hour demand volume is 1,884 vph. The results of the existing and future ECF lane sizing calculations for the existing and future peak hour traffic volumes utilizing the Nimitz Gate are shown in Table 6.

Table 6 Nimitz ECF				
SMART Evaluator Results (Existing AM Vol 1,761 vph*)				
	Manual Processing		**Handheld Processing**	
	Single	**Tandem**	**Single**	**Tandem**
Required Lanes	5	4	6	4
Total Queue (# Veh)	45	30	44	60
Delay/Veh (Sec)	29	20	25	102
Total Manpower	5	8	6	8
Existing # of ID Check Lanes:				**4**
Recommended # of ID Check Lanes:				**5**
SMART Evaluator Results (Future AM Vol 1,884 vph*)				
	Manual Processing		**Handheld Processing**	
	Single	**Tandem**	**Single**	**Tandem**
Required Lanes	5	4	6	5
Total Queue (# Veh)	61	41	57	37
Delay/Veh (Sec)	62	26	37	21
Total Manpower	5	8	6	10
Recommended # of ID Check Lanes:				**5**

*Including typical estimated existing AM queues based on visual observations

Currently, at the Nimitz Gate, there are four (4) ID check lanes to process traffic. As shown in Table 6, the existing peak hour demand volume requires five (5) ID check lanes for Manual Processing with a single guard per lane. With the additional traffic generated by the ACC that will utilize the Nimitz Gate, five (5) IDC check lanes are required for adequately process the peak hour traffic. The analysis shows that there will be a queue of 61 vehicles and an average delay of 62 seconds per vehicle.

LOS

Per 2012 Army Standard, a LOS D was the design goal. The number of ID check lanes shown in Tables 3-6 for the existing and future peak hour traffic volumes are the minimum number that will operate at a LOS D or better.

Queue

The design of the ACP should consider an appropriate approach zone length that prevents the ECF traffic from queuing so that it does not impact movements into entrances, intersections or interchanges. For an ECF with only POV traffic, use the average length of 25 feet for 1 vehicle to convert the queue in vehicles to a length in feet. The minimum queue length should be based upon the value shown in the table for that gate.

ACP POV Lane Recommendation

Based upon the comparison of the existing and future peak hour design demand traffic volumes of the four JBPHH gates impacted by the proposed ACC development, Table 7 includes a summary of the minimum required ID check lanes at each gate.

Table 7
ID Check Lanes Summary

Gate	ECF Lanes		
	Current # of Lanes	# Lanes for Existing	# Lanes for Future
O'Malley	4	4	5
Kuntz	2	2	2
Makalapa	3	4	4
Nimitz	4	5	5

Table 7 summarizes the minimum required number of ID check lanes at each ECF impacted by the ACC project. Based upon the comparison of the number of ID check lanes currently present at each gate to the number of ID check lanes recommended for the existing traffic volumes, the Makalapa Gate and Nimitz Gate both need one (1) additional lane to satisfactorily meet the peak hour traffic demands.

The results of the ID check lane analysis show that only the O'Malley Gate requires one (1) additional ID check lane to adequately process the additional peak hour due to the ACC. The other gates would be able to process the additional ACC traffic if the required number of ID check lanes for the existing peak hour traffic demand volume were in place.

If you have any questions, feel free to contact me.

Sincerely,

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