
TRAFFIC IMPACT ANALYSIS REPORT HOOPILI

Ewa, Oahu, Hawaii

DRAFT FINAL

April 28, 2013
Revised May 30, 2014

Prepared for:

D.R. Horton – Schuler Division
650 Iwilei Road, Suite 209
Honolulu, Honolulu, HI 96817



Austin, Tsutsumi & Associates, Inc.

Civil Engineers • Surveyors
501 Sumner Street, Suite 521
Honolulu, Hawaii 96817-5031
Telephone: (808) 533-3646
Facsimile: (808) 526-1267
E-mail: atahnl@atahawaii.com
Honolulu • Wailuku, Hawaii

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TERRANCE S. ARASHIRO, P.E.
STANLEY T. WATANABE
IVAN K. NAKATSUKA, P.E.
ADRIENNE W. L. H. WONG, P.E., LEED AP
KEITH K. NIIYA, P.E.
DEANNA HAYASHI, P.E.
PAUL K. ARITA, P.E.

HOOPILI MASTER PLAN

Ewa, Oahu, Hawaii

1. INTRODUCTION

This report documents the findings of a traffic study conducted by Austin, Tsutsumi, and Associates, Inc. (ATA) to evaluate the traffic impacts of the proposed Hoopili development.

1.1 Location

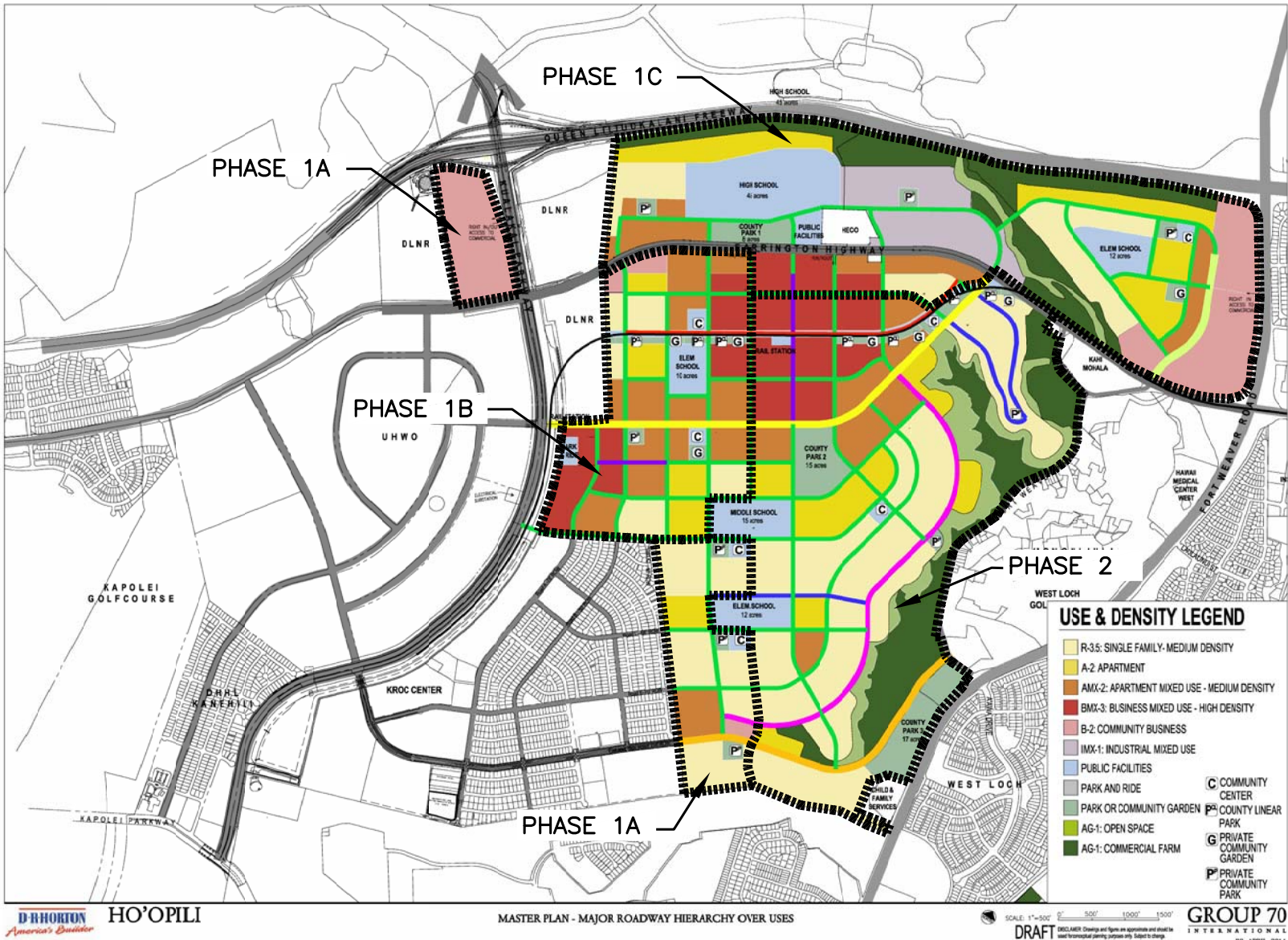
The Hoopili Master Plan is bound by the H-1 Freeway to the north, Fort Weaver Road to the east, Renton Road to the south and Kualakai Parkway to the west. Hereinafter, "Project" shall refer to the Hoopili Master Plan. See Figure 1.1 for the Project location.

1.2 Project Description

The Project will consist of the following:

- Approximately 2,300 single family dwelling units,
- Approximately 9,520 multi-family dwelling units,
- Over 3 million SF of commercial/retail space (including mixed use),
- Over 800 thousand SF of industrial space,
- Over 70 acres of parks (county and private),
- Approximately 200 acres of commercial farm,
- Three elementary schools, one middle school and one high school in the Ewa Plains.

The Hoopili Master Plan aspires to create a community that will allow residents to live, work, learn, play and shop within the Project and reduce the need for the use of motor vehicles on the roadways. The Project is central to the Ewa District (including the neighboring Department of Hawaiian Home Lands), the University of Hawaii at West Oahu and the Hawaii Community Development Authority. See Figure 1.2 for the Project site plan.



AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS,SURVEYORS

HONOLULU,HAWAII

FIGURE

1.2

Figure 1.2: PROJECT SITE PLAN

1.3 Study Methodology

This study will address the following:

- Existing traffic operating conditions at key intersections within the study area.
- Traffic Projections for Base Year 2023 and 2035 (without the project) including traffic generated by other known developments in the vicinity of the Project. These other known developments are projects that are currently under construction or known new/future developments that are anticipated to affect traffic demand and operations within the study area.
- Identify planned improvements and potential traffic mitigative measures for the Base Year 2023 and 2035 Traffic.
- Trip generation and traffic conditions for the proposed Project.
- Analyze the impact of Project-generated traffic on the Base Year traffic operations.
- Recommendations for roadway improvements or other mitigative measures, as appropriate, to reduce or eliminate the adverse impacts resulting from traffic generated by the Project.

2. METHODOLOGY

Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual (HCM), dated 2000, methods for calculating volume to capacity ratios, delays and corresponding Levels of Service were utilized in this study. LOS definitions for signalized and unsignalized intersections are provided in Appendix B.

2.1 Intersection Analysis

Intersection analysis was performed using the traffic analysis software Synchro, which prepares Highway Capacity Manual (HCM) reports. The reports contain quantitative delay results, as based on intersection lane geometry, signal timing (including coordination and actuated minimums and maximums), and hourly traffic volume.

Based on the vehicular delay, reserve capacity and critical gaps at the intersection, a LOS is assigned (see Appendix B) as a qualitative measure of performance. These results, as confirmed or refined by field observations, constitute the technical analysis that will form the basis of the recommendations outlined in this report.

Note that although some movements may be reported at LOS E or worse, it is not always due to roadway capacity issue. Some of the contributing factors to the delays are the intersection signal timing which gives preference to the mainline through to maintain throughput as well as pedestrian crossing time which impact the mainline movements. In some cases an intersection may report LOS E or worse while still operating satisfactorily; clearing the intersection after each cycle length.

2.2 Freeway Segment Analysis

Freeway segment analysis was performed using the Highway Capacity Software (HCS) in a manner consistent with the HCM methodology. The Measure of Effectiveness (MOE) is density (passenger cars per mile per lane); LOS thresholds are based upon density. Refer to Appendix B for LOS density thresholds.

2.3 Freeway Ramp Analysis

Freeway ramp analyses were performed using the Highway Capacity Software (HCS) in a manner consistent with HCM methodology. The Measure of Effectiveness (MOE) is density (passenger cars per mile per lane); LOS thresholds are based upon density. Refer to Appendix B for LOS density thresholds.

3. EXISTING CONDITIONS

3.1 Roadway System

The following are brief descriptions of the existing roadways in the vicinity of the Project:

Fort Weaver Road- State facility

Fort Weaver Road is generally a north-south, two-way, divided principal arterial roadway that provides a link between the Ewa Beach communities to the south and Farrington Highway and the H-1 Freeway to the north. North of its intersection with Farrington Highway this roadway becomes Kunia Road. South of its intersection with Farrington Highway, this roadway is generally a six-lane roadway. Fort Weaver Road narrows to a four-lane roadway at its intersection with Geiger Road/Iroquois Road until its intersection with Kilaha Street, where it narrows into a two-lane roadway until it terminates at its intersection with Popoi Place. The posted speed limit is generally 35 miles per hour (mph).

Kunia Road – State facility

Kunia Road is generally a north-south, four-lane, two-way, undivided principal arterial roadway. This roadway begins at the intersection of Farrington Highway and Fort Weaver Road. North of its intersection with Anonui Street, Kunia Road narrows to a two-lane roadway. Kunia Road widens to a four-lane roadway south of its intersection with Lyman Road until it terminates with Wilikina Drive in Wahiawa where it provides access to Schofield Barracks and Wheeler Airfield. Kunia Road provides residential and commercial access to and from Kunia. The posted speed limit on Kunia Road is 35 mph in the residential and commercial areas, and changes to 45 mph in the rural areas.

Kapolei Parkway – County road

Kapolei Parkway is generally a north-south, two-way, divided principal arterial roadway that provides a link between the Ocean Pointe/Ewa by Gentry communities in Ewa Beach with the City of Kapolei. The entire Kapolei Parkway extends from its intersection with Papipi Road and Hailipo Street in Ewa Beach to its intersection with Wakea Street in Kapolei. Kapolei Parkway is proposed to continue on to connect up with Ko Olina Resort.

Kapolei Parkway is generally a two to six-lane roadway. With its close proximity to Fort Weaver Road, Kapolei Parkway serves as a primary access road to similar land uses such as shopping centers, schools, parks and residential subdivisions. Due to its connectivity, linking Ewa with Kapolei, Farrington Highway and H-1 Freeway and its future extension to Ko Olina, Kapolei Parkway will most likely be the preferred roadway for vehicles travelling to the west. Generally, the posted speed limit along this roadway is 25 mph.

Kualakai Parkway – State facility

Kualakai Parkway is generally a north-south, four to six-lane, two-way principal arterial roadway that provides access from the Kapolei region to areas north of Kapolei. Formerly known as North-South Road, Kualakai Parkway was constructed to provide a link between Kapolei Parkway,

Farrington Highway, and the H-1 Freeway, as well as provide a new gateway for growth. It begins to the north at the H-1 Freeway interchange and continues southward where it terminates at its intersection with Kapolei Parkway. The posted speed limit along Kualakai Parkway is 35 mph.

Farrington Highway – County road west of the Fort Weaver Interchange

Farrington Highway is generally an east-west, two-way principal arterial roadway which provides regional access between the Waianae coast of Oahu and Pearl City. To the east of its intersection with Fort Weaver Road, Farrington Highway is generally a four-lane divided roadway. To the west of its intersection with Fort Weaver Road, Farrington Highway is a two-lane undivided roadway that widens to four lanes at the Kapolei Golf Course with some segments with and without medians. Generally, the posted speed limit along Farrington Highway ranges from 30 to 35 mph. Farrington Highway begins to the east at its intersection with Kamehameha Highway and terminates to the west near Yokohama Bay.

Old Fort Weaver Road – County Road

Old Fort Weaver Road is a north-south, two-lane, two-way, undivided, collector roadway that provides residential access to and from Farrington Highway and Fort Weaver Road. Old Fort Weaver Road begins at its intersection with Fort Weaver Road/Aawa Drive intersection and runs north where it terminates at its intersection with Farrington Highway. Just below Farrington Highway, Old Fort Weaver Road splits into a fork, Old Fort Weaver Road (East) and Old Fort Weaver Road (West), which both intersect with Farrington Highway. The posted speed limit along Old Fort Weaver Road is 25 mph.

Kupuna Loop North and South – County Road

Kupuna Loop at its intersections with Kunia Road is an east-west, four-lane, two-way, undivided collector roadway. It begins to the south at its intersection with Kunia Road, continues eastward then curves to form a loop and terminates approximately 600 feet north of where it started. Kupuna Loop provides access to the commercial area fronting Kunia Road and residential areas further east along it. For the purpose of this study the two connections of Kupuna Loop to Kunia Road will be labeled as Kupuna Loop North and Kupuna Loop South. The posted speed limit along Kupuna Loop is 25 mph.

Honowai Street – County Road

Honowai Street is an east-west, two-lane, two-way, undivided, collector roadway that provides residential access. It begins to the west at its intersection with northbound Kunia Road then curves south and terminates at its intersection with Waipahu Street. The posted speed limit along Honowai Street is 25 mph.

Waipahu Street – County Road

Waipahu Street is an east-west, two-lane, two-way, undivided, collector roadway that provides residential access. Waipahu Street begins to the west at its intersection with northbound Kunia Road and terminates to the east at its intersection with Kamehameha Highway. The posted speed limit along Waipahu Street within the Project vicinity is 25 mph.

Laulaunui Street – County Road

Laulaunui Street is an east-west, four-lane, two-way, divided roadway to the east of its intersection with Fort Weaver Road providing access to the West Loch Estates and terminating at its intersection with Kapapapuhi Street. To the west of Fort Weaver Road, Laulaunui Street is a two-lane undivided roadway providing access to the former Hawaii Medical Center and some residences where it begins. The posted speed limit is 25 mph.

Aawa Drive – County Road

Aawa Drive is generally an east-west, two-lane, two-way, divided collector roadway which forms the east leg of the Fort Weaver Road/Old Fort Weaver Road intersection, curves south and terminates as a dead end. Aawa Drive provides access to the West Loch Fairways residential subdivision. The posted speed limit on Aawa Drive is 25 mph.

Renton Road – County Road

Renton Road is an east-west, two or four-lane, two-way collector roadway with divided and undivided segments that provides residential access between Fort Weaver Road and its termination at Roosevelt Avenue to the west. Renton Road provides residential access as well as to the Asing Park to the east of its intersection with Fort Weaver Road. Generally, the posted speed limit along Renton Road is 25 mph.

Kolowaka Drive

Kolowaka Drive is an east-west, four-lane, two-way divided collector roadway that provides residential access to the Ewa Gentry community. It begins to the west at its intersection with Kuhialoko Street, crosses Kapolei Parkway and terminates to the east at its intersection with Keaunui Drive.

Geiger Road/Iroquois Road – County Road

Geiger Road begins to the west as the continuation of Roosevelt Avenue and terminates as the eastbound leg at its intersection with Fort Weaver Road. It is an east-west, two-way undivided collector roadway providing access to the Ewa Gentry residences. Geiger Road is generally a two-lane roadway and widens to four lanes at its intersection with Fort Weaver Road. The posted speed limit along Geiger Road is 30 mph.

Opposite Geiger Road is Iroquois Road which forms the westbound leg of the intersection with Fort Weaver Road. This roadway is a four-lane, two-way undivided collector roadway providing

access to the Ewa Gentry residences terminating to the east at its intersection with Keaunui Drive. The posted speed limit along Iroquois Road is 30 mph.

Paiwa Street – County Road

Paiwa Street is a north-south, two-way roadway which begins to the south at its intersection with Farrington Highway/Awanui Street and terminates to the north as a dead end north of its intersection with Lumiauau Street. North of Waipahu Street, Paiwa Street turns into a four lane roadway and south of Waipahu Street, this roadway is a two lane roadway. The posted speed limit along Paiwa Street is 25 mph.

Waiawa Interchange – State facility

The Waiawa Interchange is a junction point for the H-1 Freeway, H-2 Freeway, Farrington Highway and Kamehameha Highway. This interchange allows vehicles access between the H-1 Freeway and H-2 Freeway. The H-2 Freeway provides access to Waipio, Mililani and Wahiawa.

H-1 Freeway – State facility

The H-1 Freeway is an east-west freeway beginning in the west in the vicinity of the Kalaeloa interchange and extends through Kapolei, Ewa, Waipahu, and Central Honolulu before terminating in the east and continuing on as Kalanianaʻole Highway. The H-1 Freeway is generally a two way, divided freeway. For the purpose of this study, the portion of the H-1 Freeway being studied is the section between Kualakai Parkway and west of the H-1/H-2 merge. West of the H-1/H-2 merge, the Freeway consists of four travel lanes in each direction and reduces down to three travel lanes in each direction near the Kunia Road interchange as lanes turn into exit lanes. During the AM peak hours of traffic an eastbound “zipper-lane” (single lane only) which uses the inside westbound lane and shoulder is available with two entry points before the H-1/H-2 intersection. The “zipper lane” is available from 5:30-8:00 AM for vehicles traveling with 2 or more passengers. The eastbound shoulder lane during the AM peak hour of traffic is also used as an additional travel lane between the Kunia interchange and the Paiwa interchange during the weekday hours of 5 AM and 8 AM. The posted speed limit along the Freeway is 55 mph along the studied portion of the Freeway.

3.2 Existing Traffic Volumes

The hourly turning movements data utilized in this report were collected on February 15 and 16, 2012, April 3, 2012 and May 10, 2012. Based on the proximity to the Proposed Project site and the Hawaii Department of Transportation (HDOT) letter dated May 16, 2012, the following intersections and ramps were studied:

- [1] Kualakai Parkway/H-1 Westbound On/Off-Ramps (Signalized)
- [2] Kualakai Parkway/H-1 Eastbound On/Off-Ramps (Signalized)
- [4] Kualakai Parkway/Farrington Highway (Signalized)
- [8] Kualakai Parkway/Kapolei Parkway (Signalized)

- [21] Kunia Road/Kupuna Loop North (Signalized)
- [22] Kunia Road/Kupuna Loop South (Signalized)
- [23] Southbound Kunia Road Off-Ramp to H-1 Westbound (Unsignalized)
- [24] Northbound Kunia Road Off-Ramp to H-1 Westbound (Unsignalized)
- [25] H-1 Westbound Off-Ramp to Northbound Kunia Road and H-1 Westbound Loop Off-ramp to Southbound Kunia Road (Unsignalized)
- [26] Kunia Road/H-1 Eastbound On/Off-Ramps (Signalized)
- [41] Kunia Road/Honowai Street (Unsignalized)
- [42] Kunia Road/Waipahu Street (Unsignalized)
- [45] Fort Weaver Road/Laulaunui Street (Signalized)
- [46] Fort Weaver Road/Old Fort Weaver Road/Aawa Drive (Signalized)
- [47] Fort Weaver Road/Hale O Ulu School Crosswalk (Signalized)
- [48] Fort Weaver Road/Renton Road (Signalized)
- [49] Fort Weaver Road/Kolowaka Drive (Signalized)
- [50] Fort Weaver Road/Geiger Road/Iroquois Road (Signalized)
- [69] Farrington Highway/Old Fort Weaver Road (West) (Unsignalized)
- [70] Farrington Highway/Old Fort Weaver Road (East) (Unsignalized)
- [71] Old Fort Weaver Road (West)/Old Fort Weaver Road (East) (Unsignalized)
- [72] Eastbound Farrington Highway Off-Ramp to Southbound Fort Weaver Road and Southbound Kunia Road Off-Ramp to Westbound Farrington Highway (Unsignalized)
- [73] Westbound Farrington Highway Off-Ramp to Southbound Fort Weaver Road (Signalized)
- [74] Southbound Fort Weaver Road Loop Off-Ramp to Eastbound Farrington Highway (Unsignalized)
- [77] Eastbound Farrington Highway Off-ramp to Northbound Kunia Road (Signalized)
- [200] Paiwa Street/H-1 Westbound On/Off-ramps (Signalized)
- [201] Paiwa Street/H-1 Eastbound On/Off-ramps (Signalized)

Ramps:

Kualakai Parkway

- R-1 H-1 Westbound On-Ramp
- R-2 H-1 Westbound Off-Ramp
- R-3 H-1 Eastbound Off-Ramp
- R-4 H-1 Eastbound On-Ramp

Kunia Interchange

- R-10 H-1 Westbound On-Ramp from Southbound Kunia Road
- R-11 H-1 Westbound Loop Off-Ramp to Southbound Kunia Road
- R-12 H-1 Westbound Off-Ramp to Northbound Kunia Road
- R-13 H-1 Eastbound Off-Ramp
- R-15 H-1 Eastbound On-Ramp from Southbound Kunia Road

Paiwa Interchange

- R-16 H-1 Westbound On-Ramp
- R-17 H-1 Westbound Off-Ramp
- R-18 H-1 Eastbound Off-Ramp
- R-19 H-1 Eastbound On-Ramp

Waiawa Interchange

- R-20 H-1 Eastbound Off-Ramp Exit 8A
- R-21 H-1 Eastbound Off-Ramp Exit 8B
- R-22 H-1 Eastbound Loop Off-Ramp Exit 8C
- R-24 H-1 Westbound On-Ramp from Kamehameha Highway

Based on traffic count data, the weekday morning and afternoon peak hours of traffic were determined to occur between 6:45 AM and 7:45 AM and between 3:45 PM to 4:45 PM, respectively. The traffic count data is provided in Appendix A.

3.3 Existing Traffic Conditions Analysis and Observations

3.3.1 Regional Analysis

The Project is generally located in the Kapolei-Ewa region. Over the past 20 years, Kapolei has continued its development as a “second city,” with its resort area, commercial/retail spaces, government agency buildings, Kapolei Judicial Building, Kalaeloa Industrial park and the University of Hawaii West Oahu.

In the vicinity of the Project, the H-1 Freeway, Farrington Highway, and Kapolei Parkway service the regional east-west corridor. While regional traffic is currently weighted more heavily towards the Primary Urban Center during the AM peak hour and away from it during the PM peak hour, the Ewa-Kapolei region is anticipated to steadily increase its share of island-wide employment through the continuing development of the “second city” of Kapolei. Refer to section 4.1.1 and Table 4.1.

H-1 Freeway services West Oahu and experiences a volume of approximately 3,500-7,500 vehicles per hour in either direction during the peak hours of traffic between the Kunia and Paiwa Interchanges.

During the AM peak hour of traffic, traffic queues in the critical eastbound direction often queue back to either the Paiwa Interchange or the Kunia Interchange as a result of downstream conditions near the H-1/H-2 Merge, and at the Pearl City Interchange.

During the PM peak hour of traffic, congestion occurs in the critical westbound direction near the H-1/H-2 Merge and the Waipahu westbound off-ramp; the H-1 Freeway and its ramps generally operate smoothly to the west of the H-1/H-2 Merge.

Kualakai Parkway was recently completed in conjunction with the Kapolei Parkway extension. Kualakai Parkway currently provides alternative access for Kapolei and Ewa residents destined for the H-1 Freeway. Recently, the KROC Center, and UHWO have opened along Kualakai Parkway. Currently, Kualakai Parkway carries approximately 1,200(1,500) vehicles per hour during the AM(PM) peak hours of traffic, and operates at near free-flow conditions in lieu of much of the of planned adjacent development including East Kapolei, full build-out of UHWO, and Kamakana Alii. At the time of data collection, Kualakai Parkway was primarily used as an alternate access to the H-1 Freeway for Ewa and Kapolei Residents.

Kapolei Parkway currently serves as a 6-lane arterial connection between Kapolei and the Ewa Area. Throughout the study area, Kapolei Parkway services approximately 1,000(1,200) vehicles per hour during the AM(PM) peak hours of traffic and generally operates at near free-flow conditions in lieu of Planned neighboring development. Kapolei parkway is generally used for east-west access between Kapolei and Ewa Beach, and also as a means of accessing the H-1 Freeway via Kualakai Parkway.

Farrington Highway provides east-west regional access between Makakilo/Kapolei and the H-1 Freeway and Kamehameha Highway at the H-1/H-2 Merge. Within the study area, Farrington Highway services approximately 700 (650) vehicles per hour during the AM(PM) peak hours of traffic. Although it currently only provides 2 lanes between Kapolei and west of the Farrington Interchange, some residents use it as an alternate route to the H-1 Freeway during their commutes. Farrington Highway is generally not congested during the AM or PM peak hours of traffic within the study area; during the AM peak hour of traffic, eastbound commuter congestion begins near Mokuola Street in Waipahu.

Fort Weaver Road – south of its Farrington Highway Interchange – currently experiences some congestion during the AM(PM) peak hours of traffic as a result of its requisite long cycle lengths; the long cycle lengths are a result of its existing split-phase traffic signal configurations and long pedestrian crossing times.

Kunia Road provides access to Kunia, the H-1 Freeway and Schofield-bound traffic. During the AM peak hour of traffic queues were observed to form in the northbound direction. However, queues were observed to clear after each cycle length. The eastbound H-1 Freeway on-ramp was observed to operate with some delay as a result of the congestion along the eastbound H-1 Freeway. During the PM peak hour of traffic, the heavier volume direction was observed in the southbound direction and flowed relatively smoothly.

3.3.2 Existing Intersection Analysis

The analysis and observations described below are based on prevailing conditions during the time at which the data was collected. Hereinafter, observations that are expressed as ongoing and current shall represent the conditions that prevailed at the time at which the data was collected.

3.3.2.1 Existing Conditions During the AM and PM Peak Hours of Traffic

See Figure 3.1 for the existing lane configurations, volumes and LOS. See Table 3.1, 3.2 and 3.3 for a summary of the analysis.

Kualakai Parkway at its intersection with:

[1] The westbound H-1 Freeway Off-Ramp and On-Ramp:

During both the AM and PM peak hours of traffic the westbound on/off ramps as well as the signalized intersection were observed to operate smoothly.

[2] The eastbound H-1 Freeway Off-Ramp and On-Ramp:

This intersection is located approximately 650 feet directly south of the Kualakai Parkway/westbound H-1 Freeway on/off ramps. During both the AM and PM peak hours of traffic the eastbound on/off ramps as well as the signalized intersection were observed to operate smoothly.

[4] Farrington Highway:

During both peak hours of traffic, the intersection was observed to operate smoothly at LOS D or better.

[8] Kapolei Parkway:

All movements were observed to operate smoothly during both peak hours of traffic at LOS B or better.

Farrington Highway at its intersection with:

[69] Old Fort Weaver Road (West)

The relatively low traffic volume along Farrington Highway in the vicinity of this intersection allows the unsignalized intersection to operate relatively well during both peak hours of traffic.

[70] Old Fort Weaver Road (East)

All the movements at this intersection operate freely except for the westbound left-turn, which was observed to operate satisfactorily during both peak hours of traffic.

[73] Westbound Farrington Highway to Southbound Fort Weaver Road

This intersection provides access from westbound Farrington Highway to southbound Fort Weaver Road. The signal provides gaps in the eastbound direction allowing the intersection to operate smoothly during both peak hours of traffic. The westbound approach operates freely.

[77] Eastbound Farrington Highway to Northbound Kunia Road

This intersection provides eastbound Farrington Highway traffic access to northbound Kunia Road. The signal provides gap in the westbound direction allowing the eastbound left-turn movement to operate smoothly during both peak hours of traffic.

[71] Old Fort Weaver Road (West)/Old Fort Weaver Road (East)

This three-way stop controlled intersection was observed to operate with short delays during both peak hours of traffic. Traffic volume at this intersection was also observed to be minimal.

Kunia Road/Fort Weaver Road at its intersection with:

[21 & 22] Kupuna Loop North and South

Although Kupuna Loop North is a four-legged intersection it was observed to mostly operate as a “tee” intersection due to the low volume to/ from the eastbound approach. Overall, the intersections – Kupuna Loop North and South – were observed to operate smoothly during both peak hours of traffic.

[24] Kunia Road northbound left-turn to westbound H-1 Freeway On-Ramp

Although the analysis shows LOS of B(C) for the stop-controlled northbound left-turn movements during the AM(PM) peak hour of traffic respectively, queuing was observed in the northbound left-turn lane. Vehicles were observed to queue approximately the length of the pocket and sometimes waited for over a minute for a gap in traffic in the southbound direction before proceeding.

Laulaunui Street through Geiger Road

The following intersections were observed to experience some delay during the AM and PM peak hours of traffic as a result requisite long cycle lengths (approximately 4 minutes):

- [45] Laulaunui Street
- [46] Old Fort Weaver Road/Aawa Drive
- [48] Renton Road
- [49] Kolowaka Drive
- [50] Geiger Road/Iroquois Road

The long cycle lengths are attributed to requisite long pedestrian crossing times and split-phase signal operation. As a result, some minor movements operate with long delays and overcapacity conditions.

During the AM peak hour of traffic the volume is heavier traveling in the northbound direction. The northbound through movements operate with some delay but overall were observed to flow relatively smoothly. Queues were observed to clear after each cycle length.

During the PM peak hour of traffic the volume is heavier travelling in the southbound direction. Similar conditions to the AM peak exist in the PM peak hour of traffic in the southbound direction.

[47] Hale O Ulu School Crosswalk

This signalized crosswalk is located approximately midway between the Fort Weaver Road intersection with Aawa Drive and Renton Road. This signal is solely to allow pedestrians to cross Fort Weaver Road and was observed to be activated no more than ten times during the peak hours of traffic.

Paiwa Interchange at its intersection with:

[200] Paiwa Street/H-1 Westbound On-Ramp and Off-Ramp

The signalized intersection was observed to operate relatively smoothly during both peak hours of traffic.

[201] Paiwa Street/H-1 Eastbound On-Ramp and Off-Ramp

During the AM peak hour of traffic, the southbound left-turn movement as well as the eastbound H-1 Freeway off-ramp onto northbound Paiwa Street were observed to operate with long delays. Queues from the eastbound off-ramp were observed to extend onto the H-1 Freeway.

During the PM peak hour of traffic, the intersection was observed to operate satisfactorily.

Refer to Table 3.1 for existing intersection analysis results.

3.3.3 Existing Freeway Segment Analysis and Observations

The H-1 Freeway segments studied operate at LOS D or better except for the following segments:

- Between Kunia Interchange and Paiwa Intersection westbound direction during the PM peak hour of traffic, however, based on our observations, this freeway segment was observed to operate smoothly.
- Between Paiwa Interchange and Waiawa Interchange in the eastbound direction during the AM peak hour of traffic as a result of the bottleneck that occurs at the Pearl City Interchange and the weaving that occurs. Although the analysis shows LOS E in the westbound direction during the PM peak hour of traffic, the segment between Paiwa Interchange and Waiawa Interchange was observed to operate smoothly.

3.3.4 Existing Ramp Analysis and Observations

R-1 - 4 Kualakai Interchange

Similar to the signalized intersections, the ramps on and off the H-1 Freeway at the Kualakai Interchange were observed to operate with minimal delays.

Kunia Interchange

R-13 & 15 Kunia Road/Eastbound H-1 Freeway On/Off Ramps

During the AM and PM peak hours of traffic, the on/off-ramps operate at LOS C or D. The eastbound shoulder lane is used as a Freeway lane during the AM peak hour of traffic providing an additional Freeway lane between the Kunia Interchange and the Paiwa Interchange where it drops off.

R 10-12 Kunia Road/Westbound H-1 Freeway On/Off Ramps

During both peak hours of traffic, the westbound on/off ramps operate at LOS D or better.

Paiwa Interchange

R 18 & 19 Eastbound on/off Ramps:

The eastbound on/off ramps were observed to be congested during the AM peak hour of traffic. The additional eastbound Freeway lane provided via the shoulder lane during the AM peak hour of traffic terminates at the Paiwa Street/H-1 eastbound off-ramp intersection. This causes additional vehicles to use the eastbound off-ramp and travel through onto the eastbound on-ramp to get back onto the Freeway. Therefore, due to the heavy H-1 Freeway eastbound volume and eastbound off-ramp volume the eastbound on/off ramps operate with long delays during the AM peak hour of traffic at LOS E. During the PM peak hour of traffic, the eastbound ramps operate at LOS D.

R 16 & 17 Westbound on/off Ramps:

The westbound on/off ramps were observed to operate smoothly during both peak hours of traffic.

R 20, 21, 22 & 24 Waiawa Interchange

During the AM peak hour of traffic queues were observed in the eastbound direction along the Freeway as well as the Kamehameha Highway eastbound off-ramp towards Farrington Highway. The “zipper lane” and Kamehameha Highway on-ramp headed west onto the H-1 westbound Freeway were observed to operate relatively smoothly. In the eastbound direction, queuing along the H-1 Freeway was observed to extend to approximately west of the Kunia interchange.

During the PM peak hour of traffic, although not free flowing, traffic was observed to progress relatively well in the heavier westbound direction. However, the westbound on-ramp from Kamehameha Highway operates at LOS F due to the heavy volume and short merging area.

Refer to Table 3.2 for existing ramp analysis results and Table 3.3 for existing Freeway analysis results.

Table 3.1: Existing Intersection Level of Service Summary

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Kualakai Pkwy/Pueonani St & H-1 WB On-Ramp/H-1 WB Off-Ramp						
WB LT	10	0.22	A	11	0.42	B
WB LT/TH	10	0.22	A	11	0.42	B
WB RT	0	0.02	A	0	0.00	0
NB LT	46	0.84	D	68	0.98	E
NB TH	16	0.07	B	14	0.01	B
SB TH	31	0.34	C	31	0.27	C
SB RT	0	0.00	0	29	0.01	C
Overall	23	0.37	C	30	0.57	C
2: Kualakai Pkwy & H-1 EB Off-Ramp/H-1 EB On-Ramp						
EB LT/TH	55	0.70	D	24	0.59	C
EB RT	0	0.18	A	0	0.11	A
NB TH	8	0.27	A	7	0.22	A
NB RT	0	0.17	A	0	0.23	A
SB LT	35	0.60	C	75	0.78	E
SB TH	3	0.20	A	4	0.33	A
Overall	4	0.57	A	5	0.53	A
4: Kualakai Pkwy & Farrington Hwy						
EB LT	43	0.68	D	32	0.64	C
EB TH	35	0.74	C	18	0.31	B
EB RT	23	0.03	C	16	0.02	B
WB LT	47	0.41	D	39	0.48	D
WB TH	34	0.31	C	33	0.64	C
WB RT	32	0.05	C	26	0.08	C
NB LT	55	0.48	D	50	0.53	D
NB TH	34	0.43	C	32	0.48	C
NB RT	32	0.12	C	29	0.04	C
SB LT	43	0.62	D	42	0.42	D
SB TH	24	0.22	C	31	0.52	C
SB RT	23	0.11	C	29	0.22	C
Overall	33	0.66	C	30	0.61	C
8: Kapolei Pkwy & Kualakai Pkwy						
EB LT	19	0.50	B	19	0.45	B
EB TH	5	0.08	A	6	0.13	A
WB TH	17	0.32	B	18	0.26	B
WB RT	19	0.39	B	17	0.29	B
SB LT	19	0.32	B	17	0.31	B
SB RT	17	0.08	B	16	0.12	B
Overall	16	0.40	B	15	0.34	B
21: Kunia Rd & North Kupuna Lp						
EB LT/TH/RT	54	0.00	D	54	0.01	D
WB LT	52	0.66	D	53	0.79	D
WB LT/TH	53	0.66	D	53	0.80	D
WB RT	42	0.04	D	34	0.03	C
NB LT	127	0.58	F	99	0.42	F
NB TH/RT	8	0.65	A	21	0.76	C
SB LT	60	0.54	E	46	0.51	D
SB TH/RT	9	0.30	A	18	0.60	B
Overall	16	0.64	B	27	0.73	C
22: Kunia Rd & South Kupuna Lp						
WB LT	53	0.84	D	48	0.73	D
WB RT	36	0.02	D	38	0.01	D
NB TH	9	0.55	A	7	0.48	A
NB RT	6	0.25	A	10	0.62	A
SB TH	7	0.39	A	9	0.70	A
Overall	15	0.61	B	13	0.71	B
24: Kunia Rd & H-1 WB On-Ramp NBL						
NB LT	14	0.32	B	102	1.02	F*
Overall	-	-	-	-	-	-
26: Kunia Rd & H-1 EB Off Ramp/H-1EB On Ramp						
EB LT	54	0.75	D	74	0.79	E
EB RT	0	0.16	A	0	0.17	A
NB TH	43	0.76	D	26	0.49	C
SB LT	40	0.80	D	60	0.81	E
SB TH	8	0.50	A	11	0.80	B
Overall	27	0.77	C	23	0.84	C

Note:

* = over-capacity, v/c > 1

Table 3.1 Existing Intersection Level of Service Summary Continued

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
27: H-1 EB On-Ramp from Kunia Rd						
NB TH	7	0.87	A	3	0.61	A
41: Kunia Rd & Honowai St						
WB RT	141	1.06	F*	27	0.42	D
45: Ft Weaver Rd & Laulaunui St						
EB LT	94	0.16	F	107	0.71	F
EB TH/RT	93	0.14	F	95	0.49	F
WB LT	104	0.58	F	95	0.46	F
WB TH	92	0.05	F	0	0.00	0
WB RT	111	0.71	F	87	0.07	F
NB LT	153	0.65	F	120	0.63	F
NB TH	12	0.95	B	19	0.65	B
NB RT	1	0.04	A	24	0.03	C
SB LT	133	0.72	F	148	0.91	F
SB TH	10	0.39	A	23	0.81	C
SB RT	7	0.07	A	9	0.11	A
Overall	19	0.90	B	31	0.82	C
46: Ft Weaver Rd & Old Ft Weaver Rd/Aawa Dr						
EB LT/TH	92	0.07	F	107	0.49	F
EB RT	89	0.04	F	101	0.26	F
WB LT/TH	151	0.93	F	120	0.65	F
WB RT	101	0.56	F	101	0.07	F
NB LT	110	0.61	F	146	0.64	F
NB TH	19	0.91	B	20	0.58	B
NB RT	11	0.05	B	24	0.04	C
SB LT	139	0.77	F	100	0.85	F
SB TH	13	0.44	B	14	0.76	B
SB RT	9	0.00	A	5	0.01	A
Overall	26	0.91	C	26	0.77	C
47: Ft Weaver Rd & CrossWalk at Hale O Ulu School						
NB TH	9	0.88	A	4	0.52	A
SB TH	1	0.41	A	16	0.94	B
Overall	7	0.81	A	12	0.81	B
48: Ft Weaver Rd & Renton Rd						
EB LT	144	0.95	F	143	0.94	F
EB LT/TH	138	0.93	F	142	0.94	F
EB RT	94	0.45	F	95	0.45	F
WB LT/TH	122	0.53	F	252	1.07	F*
WB RT	112	0.01	F	110	0.02	F
NB U/LT	265	1.31	F*	127	0.92	F
NB TH	38	1.02	D*	24	0.50	C
NB RT	14	0.01	B	40	0.05	D
SB U/LT	121	0.60	F	120	0.87	F
SB TH	23	0.48	C	33	0.95	C
SB RT	44	0.16	D	73	0.30	E
Overall	55	1.04	E*	51	0.95	D
49: Ft Weaver Rd & Kolowaka Dr						
EB LT	106	0.86	F	116	0.74	F
EB LT/TH	106	0.86	F	116	0.74	F
EB RT	73	0.03	E	94	0.03	F
WB LT	84	0.05	F	87	0.03	F
WB TH/RT	171	1.06	F*	113	0.78	F
WB RT	119	0.85	F	89	0.14	F
NB LT	146	0.43	F	113	0.48	F
NB TH	57	0.94	E	31	0.47	C
NB RT	35	0.00	D	29	0.00	C
SB LT	151	0.97	F	143	0.86	F
SB TH	28	0.50	C	7	0.70	A
SB RT	60	0.03	E	1	0.35	A
Overall	72	0.94	E	40	0.75	D

Note:

* = over-capacity, v/c > 1

Table 3.1 Existing Intersection Level of Service Summary Continued

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
50: Ft Weaver Rd & Geiger Rd/Iroquois Rd						
EB LT	115	0.73	F	116	0.76	F
EB LT/TH	110	0.73	F	108	0.75	F
EB RT	102	0.52	F	101	0.57	F
WB LT	91	0.35	F	88	0.08	F
WB TH	115	0.83	F	109	0.77	F
WB RT	88	0.19	F	88	0.09	F
NB LT	112	0.63	F	112	0.64	F
NB TH	29	0.53	C	32	0.34	C
NB RT	21	0.02	C	27	0.02	C
SB LT	74	0.63	E	168	0.93	F
SB TH	33	0.33	C	10	0.51	A
SB RT	95	0.08	F	5	0.18	A
Overall	57	0.61	E	55	0.65	E
69: Old Ft Weaver Rd (WEST) & Farrington Hwy						
WB LT/TH	1	0.02	A	0	0.01	A
NB LT/RT	17	0.14	C	15	0.15	C
70: Old Ft Weaver Rd (EAST) & Farrington Hwy						
WB LT	9	0.06	A	9	0.16	A
NB RT	13	0.14	B	11	0.07	B
71: Old Ft Weaver Rd & Old Ft Weaver Rd (WEST)/Old Ft Weaver Rd (EAST)						
EB TH/RT	7	0.05	A	7	0.09	A
WB LT/TH	8	0.07	A	9	0.26	A
NB LT/RT	7	0.09	A	8	0.08	A
72: EB Farrington Hwy to SB Ft Weaver Rd/SB Ft Weaver Rd to WB Farrington Hwy & Farrington Hwy						
SB RT	9	0.06	A	11	0.19	B
73: WB Farrington Hwy to SB Ft Weaver Rd & Farrington Hwy						
EB TH	10	0.49	B	17	0.46	B
WB LT	11	0.53	B	14	0.76	B
WB TH	0	0.08	A	0	0.14	A
Overall	8	0.51	A	10	0.66	B
77: Farrington Hwy & Farrington Hwy to NB Kunia Rd						
EB LT	11	0.50	B	19	0.56	B
EB TH	0	0.25	A	0	0.25	A
WB TH	9	0.46	A	9	0.64	A
WB RT	0	0.11	A	1	0.34	A
Overall	4	0.48	A	6	0.62	A
200: Paiwa St & H-1 WB On-Ramp/H-1 WB Off-Ramp						
WB LT	27	0.51	C	22	0.48	C
WB LT/TH	27	0.51	C	22	0.48	C
WB RT	24	0.14	C	28	0.72	C
NB LT	30	0.66	C	30	0.71	C
NB TH	7	0.28	A	10	0.29	A
SB TH	21	0.35	C	29	0.59	C
SB RT	24	0.58	C	27	0.37	C
Overall	20	0.59	C	24	0.68	C
201: Paiwa St & H-1 EB Off-Ramp/H-1 EB On-Ramp						
EB LT/TH	148	1.19	F*	42	0.80	D
EB RT	39	0.57	D	29	0.36	C
NB TH/RT	41	0.80	D	36	0.75	D
SB LT	56	0.77	E	47	0.75	D
SB TH	11	0.21	B	11	0.30	B
Overall	60	0.93	E	31	0.77	C

Note:

* = over-capacity, v/c > 1

Table 3.2 Existing Ramp Analysis


















Ramp	Existing Conditions			
	AM		PM	
	Density	LOS	Density	LOS
<u>Kualakai Parkway</u>				
 R2 H-1 WB Off-Ramp	21.2	C	26.8	C
 R1 H-1 WB On-Ramp	20.6	C	26.5	C
 R3 H-1 EB Off-Ramp	27.7	C	28.4	D
 R4 H-1 EB On-Ramp	29.3	D	30.8	D
<u>Kunia Road</u>				
 R12 H-1 WB Off-Ramp to NB Kunia Rd	20.7	C	30.9	D
 R11 H-1 WB Loop Off-Ramp to SB Kunia Rd	21.3	C	27.4	C
 R10 H-1 WB On-Ramp	22.3	C	29.8	D
 R13 H-1 EB Off-Ramp	27.5	C	28.7	D
 R15 H-1 EB On-Ramp from SB Kunia Rd	31.3	D	30.8	D
<u>Paiwa Street</u>				
 R17 H-1 WB Off-Ramp	25.3	C	31.4	D
 R16 H-1 WB On-Ramp	30.2	D	31.3	D
 R18 H-1 EB Off-Ramp	35.6	E	29.9	D
 R19 H-1 EB On-Ramp	31.6	D	28.6	D
<u>Waiawa Interchange</u>				
 R24 H-1 WB On-Ramp from Kamehameha Highway	31.4	D	37.9	F
 R20 H-1 EB Off-Ramp Exit 8A	29.3	D	29.0	D
 R21 H-1 EB Off-Ramp Exit 8B	21.7	C	28.5	D
 R22 H-1 EB Loop Off-Ramp Exit 8C	29.8	D	30.2	D

Table 3.3: Existing Freeway Analysis

H-1 Freeway	Existing Conditions			
	AM		PM	
	Density	LOS	Density	LOS
<u>H-1 Freeway between the Kualakai Interchange and the Kunia Interchange</u>				
H-1 EB	31.4	D	33.6	D
H-1 WB	22.2	C	30.4	D
<u>H-1 Freeway between the Kunia Interchange and the Paiwa Interchange</u>				
H-1 EB	29.3	D ¹	33.7	D
H-1 WB	22.6	C	35.1	E
<u>H-1 Freeway between the Paiwa Interchange and the Waiawa Interchange</u>				
H-1 EB	37.4	E ¹	32.4	D
H-1 WB	27.7	D	35.9	E

¹Segment operates at LOS F due to downstream conditions.



4. BASE YEAR SCENARIOS

The Years 2023 and 2035 were studied to reflect the completion years of Phases 1 and 2 of the Project, respectively.

4.1 ORTP 2035 Projections

The Oahu Regional Transportation Plan 2035 (ORTP) was prepared in 2011, and served as the basis for future traffic projections of future conditions throughout this TIAR. The ORTP uses existing data from 2007 as its baseline before assigning land uses and socioeconomic data to Traffic Analysis Zones (TAZ's) to generate and assign traffic across the roadway network. The ORTP provides macroscopic 4-hour AM and PM volume projections along major thoroughfares throughout Oahu. For this report, these projections were converted into peak hour volumes and adjusted to reconcile the trip generation of known projects and their respective turning movements with finer detail. Although island wide projects are accounted for in the ORTP, the economic environment and housing demand would be the main driver for the pace of development to occur. In more cases than not, projects do not get developed to their full potential and are often scaled down. Therefore, traffic projections are considered conservative.

The ORTP currently takes into account the Hoopili Master Plan. Therefore, to obtain Base Year traffic conditions without the Project, the ORTP was revised without the Hoopili Master Plan before determining the growth rates. The growth rates derived from 2007 and 2035 traffic projections were applied linearly to existing 2013 traffic volume to determine year 2023 and 2035 Base Year conditions.

See appendix F for a TAZ map and summary table of the increase in population, employment and housing in the vicinity for the Project.

4.1.1 Housing and Employment Growth in Kapolei and Ewa Beach

Consistent with the Ewa Development Plan and Kapolei Master Plan, the ORTP envisions significant employment and housing growth within the Ewa-Kapolei region; employment is anticipated to increase from five (5) percent to fifteen (15) percent of the island-wide total. In accordance with this, a shift in east-west traffic directionality is anticipated. See Table 4.1.

	2007	2035 (without Hoopili)	2035 [with Hoopili]	Percentage of Island-wide Inventory
Households	22,048	(39,669)	[51,469]	7% (9%) [11%]
Employment (Jobs)	29,167	(94,353)	[101,353]	5% (14%) [15%]

Table 4.1: ORTP 2007 vs. 2035 socioeconomic data.

The list of known future projects nearby anticipated to be completed by year 2023 include:

- University of Hawaii – located west of Kualakai Parkway and south of Farrington Highway. West Oahu (UHWO) – not open at time of the data collection; includes 2,660 non-university dwelling units and 347,400 square feet of village mixed use (VMX development).
- Ka Makana Alii – located to the south of the intersection of Kualakai Parkway/Kapolei parkway. Ka Makana Alii is a planned shopping Center, a DeBartolo Development project, consisting of approximately 1.4 million square feet of retail commercial space..
- East Kapolei II – A Department of Hawaiian Home Lands (DHHL) Residential development will consist of approximately 2,100 dwelling units and located to the south west of the Project.
- Kroc Center – membership based community center – not open at the time of the data collection is located to the north east of the intersection of Kualakai Parkway/East-West Road.
- Makaiwa Hills – Residential/commercial/mixed used development, approximately 4,100 dwelling units, 215,000 square feet of commercial space as well an elementary school. This development is planned to the west of the Project above the H-1 Freeway.
- Kapolei West – is planned as a resort, mixed use residential and commercial development located between the Ko Olina resort and the city of Kapolei.
- Kapolei Harborside – will ultimately include 4.5 million square feet of commercial/industrial space and is generally located north of the Campbell Industrial Park.
- Hoakalei – continued development of the Hoakalei project in the Ewa Beach located at the bottom of Fort Weaver Road. In addition to the residential dwellings, the project is also planned for resort development with a hotel as well as shops and restaurants.
- Hunt's Development – Residential development, approximately 4,000 dwelling units. This development is planned to the west of the Project south of Roosevelt Avenue and east of Kalaeloa Boulevard.

The surrounding projects traffic studies – UHWO, Ka Makana Alii and East Kapolei developments – were used to determine turning movement volumes and were reconciled with the ORTP, which does not provide individual turning movement volumes. Other projects' trip contributions to the background traffic were assumed to be implicit to the ORTP.

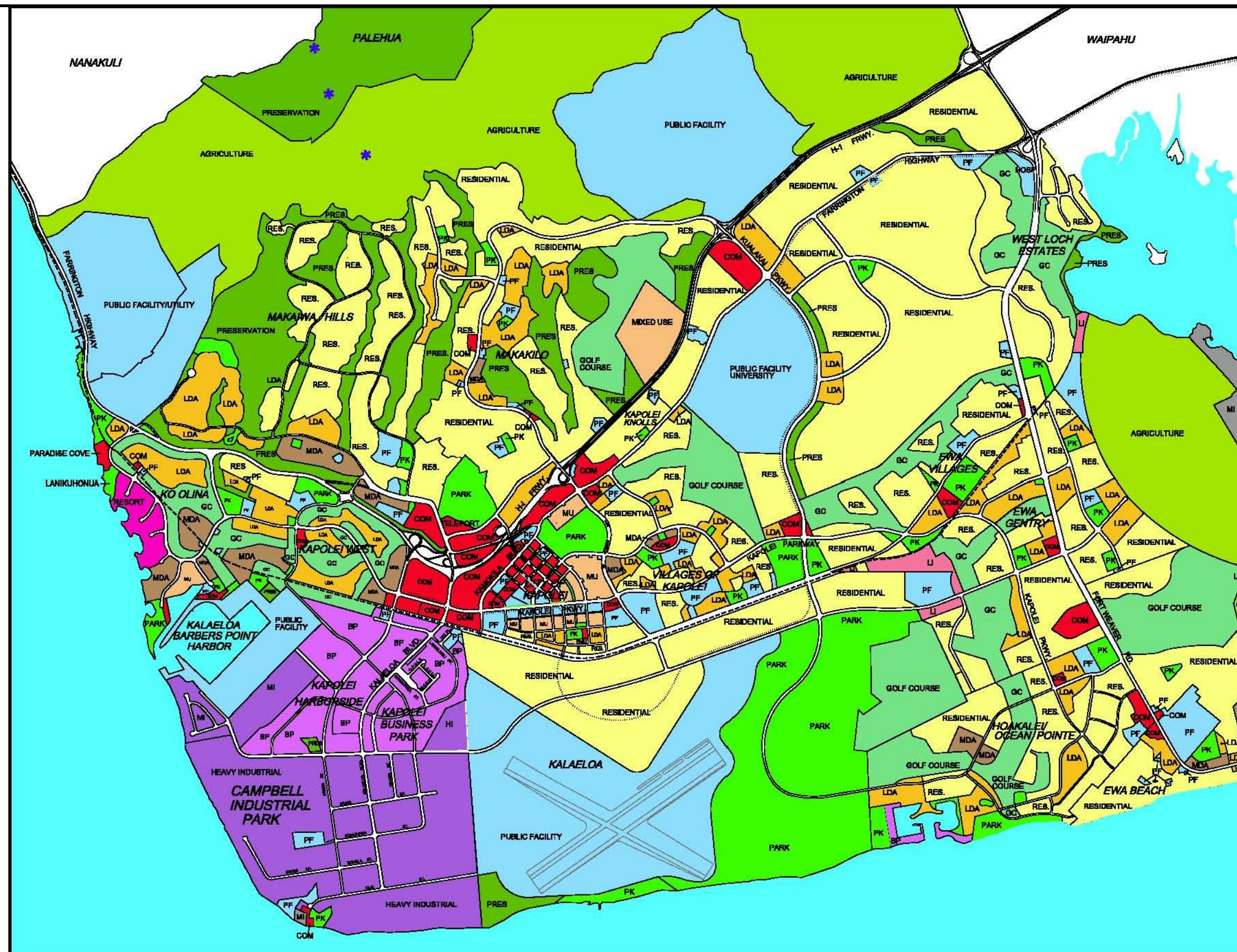
See Figure 4.1 for the Kapolei Long Range Master Plan.

4.1.2 ORTP Recommended Improvements

See Figure 4.2 for a list of regional improvements recommended by the ORTP within the vicinity of the study area.

The ORTP recommends corridor-wide improvements to improve the east-west flow of commuter traffic between West Oahu and the Primary Urban Center (PUC); this is done through the widening of the H-1 Freeway and Farrington Highway by one (1) lane in either direction.

In addition, Makakilo Drive will be extended from its current terminus near Pueonani Street to forge a second access for Makakilo at the Kualakai Interchange. This improvement is anticipated to divert some Makakilo traffic away from the Makakilo Interchange. Figure 4.1:



Kapolei Area LongRange Master Plan *Kapolei, Oahu, Hawaii* The City of Kapolei Kapolei Property Development LLC *an affiliate of the Kaimali Group*

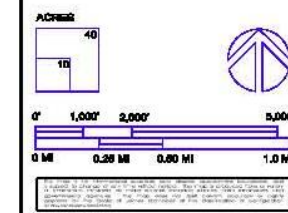


LAND USE CLASSIFICATION

- RES Residential
- LDA Low Density Apartment
- MDA Medium Density Apartment
- COM Commercial/Office
- BP Business Park
- LI Light Industrial
- HI Heavy Industrial/Warfare Industrial
- RE Resort
- PO Park/Open Space
- MU Mixed Use
- PF Public Facility/Utility
- GC Golf Course
- PRES Preservation
- AG Agriculture
- MI Military
- PT Palihua Telecommunications

CIRCULATION

- Railroad
- Transit



HOOPILI TIAR

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS HONOLULU, HAWAII

KAPOLEI AREA LONG RANGE MASTER PLAN

FIGURE

4.1



- ORTP 2011–2020
- ORTP 2021–2035

- 20** WIDEN FARRINGTON HIGHWAY FROM TWO TO FOUR LANES, FROM GOLF COURSE ROAD TO JUST WEST OF FORT WEAVER ROAD.
- 22** WIDEN KUALAKAI PARKWAY FROM THREE TO SIX LANES FROM INTERSTATE ROUTE H-1 TO KAPOLEI PARKWAY. EXTEND KUALAKAI PARKWAY BY SIX LANES FROM KAPOLEI PARKWAY TO FRANKLIN D. ROOSEVELT AVENUE.
- 25** WIDEN THE INTERSTATE ROUTE H-1 BY ONE LANE, IN THE WESTBOUND DIRECTION, THROUGH THE WAIAWA INTERCHANGE. THIS PROJECT WILL BEGIN IN THE VICINITY OF THE WAIAWA INTERCHANGE AND END AT THE PAIWA INTERCHANGE.
- 35** EXTEND MAKAKILO DRIVE (VICINITY PUEONANI STREET) SOUTH TO THE INTERSTATE ROUTE H-1 FREEWAY INTERCHANGE AS A FOUR-LANE ROADWAY, CONNECTING MAKAKILO DRIVE TO KUALAKAI PARKWAY.
- 59** WIDEN FARRINGTON HIGHWAY FROM KUNIA ROAD TO WAIAWA INTERCHANGE BY ONE LANE IN EACH DIRECTION, FROM WEST OF FORT WEAVER ROAD TO WAIAWA INTERCHANGE.
- 61** WIDEN THE INTERSTATE ROUTE H-1 BY ONE LANE IN THE EASTBOUND DIRECTION, FROM THE WAIAWA INTERCHANGE TO THE HALAWA INTERCHANGE.

4.2 Honolulu Rail Transit

The Honolulu High-Capacity Transit Corridor Project (HHCTCP) is a planned Rail Transit (RT) system that is anticipated to reduce vehicular traffic in the surrounding Project area.

According to the Honolulu High-Capacity Transit Corridor Project, Final Environmental Impact Statement (EIS), dated June 2010, the RT will be a fixed guideway rail system that is projected to span 20 miles between East Kapolei and Honolulu when completed in 2019¹. Twenty-one (21) transit stations will be placed throughout the length of the rail line for boarding and de-boarding of transit passengers at major destinations of travel.

Construction for the RT started in early 2011 to connect East Kapolei to Ala Moana Center. Construction also started on the station located within the proposed Project site.

Impacts of the RT will be taken into account in with Project scenarios.

¹ Estimated completion date at the time of this writing.

4.3 Base Year 2023 Analysis

It is anticipated that by Base Year 2023, traffic will have increased significantly over existing conditions due to the continuing development of the Ewa-Kapolei region. The following growth is anticipated:

- **H-1 Freeway – 7 percent increase in traffic over existing 2012 conditions** as a result of continuing development. The increase in volume would cause several of the Freeway segments to operate at LOS E and F. Mitigation Measure will be discussed in the with Project scenario.
- **H-1 Freeway Ramps** – The ramps anticipated to increase to LOS E over existing conditions are the Paiwa Interchange westbound on-ramp during the AM peak hour of traffic as well as the Waiawa Interchange westbound on-ramp from Kamehameha Highway during the AM peak hour of traffic. All other ramps would continue to operate at conditions similar to existing.
- **Kualakai Parkway – 90-125 percent increase in traffic over existing conditions** as a result of the development of UHWO, East Kapolei II, and Ka Makana Alii – as well as increased regional traffic destined towards the Kualakai Interchange. It is assumed that Kualakai Parkway will need to be widened to six (6) lanes by Base Year 2023, as recommended by the ORTP project 22.

UHWO, combined with its companion residential and VMX land uses, is anticipated to generate 3,075(4,818) trips during the AM(PM) peak hours of traffic. UHWO will be a major contributor to traffic along Kualakai Parkway.

East Kapolei II is in its planning process, and is anticipated to generate 2,336(2,485) trips during the AM(PM) peak hour of traffic.

Ka Makana Alii is slated to open by year 2023, and is anticipated to generate 1,094(2,704) trips during the AM(PM) peak hours of traffic. Primary project access will be provided at Kinoiki Street. A secondary access would be provided at the intersection of Kualakai Parkway/Kapolei Parkway.

- **Farrington Highway – 39-55 percent increase in traffic over existing conditions** as a result of the aforementioned development along Kualakai Parkway, as well as the continuing development of Kapolei.
- **Fort Weaver Road/Kunia Road – between 3 percent decrease and 12 percent increase in traffic over existing conditions** as a result of a shift in employment away from Honolulu. As Ewa Beach completes the development of Kamakana and Ocean Pointe, residential development will decline; this, combined with the Ewa-Kapolei's increasing share of island-wide job opportunities, will lead to a slight decrease in commuter traffic between Ewa Beach and the Primary Urban Center of Honolulu.

As with existing conditions, Fort Weaver Road through the Ewa Region will continue to experience LOS F at some movements. However, this is generally ascribed to requisite long traffic signal cycle lengths rather than a lack of physical capacity. Further widening of Fort Weaver Road is not prescribed by the ORTP 2035, and is generally considered infeasible due to insufficient ROW.

- **East-West Road** – A portion of the East-West Road is planned to be constructed as part of the East Kapolei II development. Approximately five (5) intersections are planned along East-West Road. A portion of the East-West Road was opened after the data collection to provide access to the Kroc Center. Access is provided via a “tee” intersection.

4.3.1 Base Year 2023 Intersection Analysis

See Figure 4.3 and Figure 4.4 for Peak Hour Volumes, LOS, and recommended lane configurations for Base Year 2023. See Table 4.2 for the LOS summary and Table 4.3 for a summary of the recommended mitigative measures. Comprehensive intersection analysis results are provided in Appendices C.

Table 4.2: BY 2023 LOS Summary

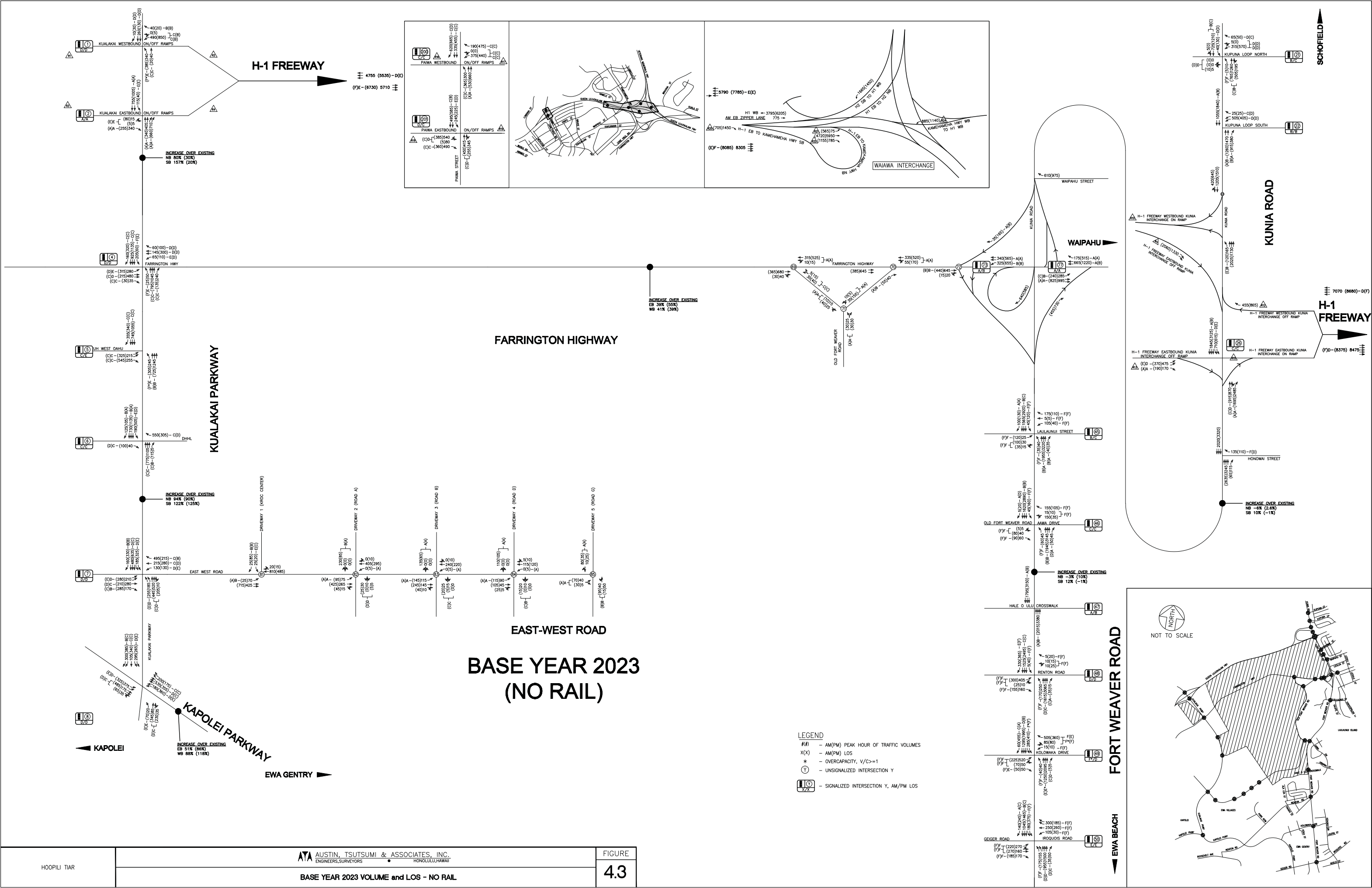
ID Intersection		Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures												
			AM			PM				AM			PM									
			Delay	v/c	LOS	Delay	v/c	LOS		Delay	v/c	LOS	Delay	v/c	LOS							
Kualakai Parkway @																						
1	Westbound H-1 Freeway On/Off-Ramps	⦿	42	0.53	D	52	0.66	D	Yes; see Table 4.3	29	0.30	C	29	0.49	C							
2	Eastbound H-1 Freeway On/Off-Ramps	⦿	5	0.36	A	4	0.43	A	No.													
4	Farrington Highway	⦿	38	0.75	D	36	0.71	D	Yes; see Table 4.3	32	0.64	C	28	0.57	C							
5	UH West Oahu/Future D.R. Horton	⦿	24	0.48	C	57	0.84	E	Yes; see Table 4.3	16	0.44	B	24	0.69	C							
6	DHHL Access	⦿	26	0.74	C	24	0.62	C	No.													
7	East-West Road	⦿	35	0.62	D	37	0.61	D	Yes; see Table 4.3	34	0.60	C	37	0.60	D							
8	Kapolei Parkway	⦿	37	0.47	D	41	0.61	D	Yes; see Table 4.3	36	0.45	D	37	0.56	D							
Kunia Road @																						
21	Kupuna Loop (North)	⦿	18	0.75	B	32	0.85	C	No.													
22	Kupuna Loop (South)	⦿	16	0.69	B	13	0.78	B	No.													
24	H-1 EB Off-ramp/H1- EB On-Ramp	⦿	15	0.32	B	47	0.62	E	Yes; see Table 4.3. Signal	4	0.60	A	4	0.67	A							
26	H-1 EB On-Ramp from Kunia Road	⦿	26	0.75	C	25	0.89	C	Yes; see Table 4.3	25	0.76	C	26	0.88	C							
27	H-1 EB On-Ramp from Kunia Road	⦿	6	0.85	A	2	0.58	A	No.													
41	Honowai Street	⦿	75	0.8	F	31	0.46	D	No.													
Fort Weaver Road @																						
Limited ROW exisit along Fort Weaver Road and therefore mitigations cannot be accomodated.																						
45	Laulaunui Street	⦿	17	0.88	B	28	0.82	C	No.													
46	Old Fort Weaver Road/Aawa Drive	⦿	27	0.91	C	27	0.78	C	No.													
47	Hale O Ulu School	⦿	7	0.8	A	11	0.75	B	No.													
48	Renton Road	⦿	47	0.91	D	49	0.86	D	No.													
49	Kolowaka Drive	⦿	80	1.01	F*	47	0.8	D	Yes, see Table 4.3 for Striping change.	64	0.92	E	49	0.71	D							
50	Geiger Road/Iroquois Point	⦿	58	0.69	E	63	0.74	E	No.													
Farrington Highway @																						
69	Old Fort Weaver Road (West)		20	0.14	C	15	0.14	C	No.													
70	Old Fort Weaver Road (East)		11	0.07	B	10	0.08	A	No.													
71	Old Fort Weaver Road (East)/Old Fort Weaver Road (West)		8	0.06	A	9	0.21	A	No.													
72	Southbound Fort Weaver off-ramp to westbound Farrington Highway	⦿	10	0.05	A	12	0.26	B	No.													
73	Westbound Farrington left-turn onto Southbound Fort Weaver	⦿	15	0.57	B	14	0.76	B	No.													
77	Eastbound Farrington left-turn onto Norhtoubnd Kunia Road	⦿	5	0.55	A	7	0.66	A	No.													
East-West Road @																						
81	Kroc Center		36	0.19	E	21	0.09	C	No.													
82	Road A (Critical Movement)		33	0.28	D	26	0.16	D	New intersections. Intersections should be monitored for signal warrant and should be signalized when warranted.													
83	Road B(Critical Movement)		20	0.15	C	23	0.12	C														
84	Road D (Critical Movement)		14	0.07	B	16	0.05	C														
85	Road G (Critical Movement)		11	0.13	B	11	0.17	B														
Paiwa Street @																						
200	H-1 WB On-Ramp/WB Off-Ramp	⦿	21	0.61	C	29	0.75	C	No.													
201	H-1 EB Off-Ramp/H-1 EB Off-Ramp	⦿	43	0.87	D	28	0.72	C	No.													
ID Intersection		Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures												
			AM			PM				AM			PM									
			Density		LOS	Density		LOS		Density		LOS	Density		LOS							
Ramp Analysis																						
Kualakai Interchange									Yes; Recommendations will be discussed in the with Project scenario.													
R1	H-1 WB On-Ramp		23.9		C	27.8		C														
R2	H-1 WB Off-Ramp		23.6		C	27.6		C														
R3	H-1 EB Off-Ramp		27.6		C	28.6		D														
R4	H-1 EB On-Ramp		32.2		D	32.4		D														
Kunia Interchange																						
R10	H-1 WB On-Ramp		28		C	32.1		D														
R11	H-1 WB Loop Off-Ramp to SB Kunia Rd		26.3		C	29.8		D														
R12	H-1 WB Off-Ramp to NB Kunia Rd		25.2		C	32.7		D														
R13	H-1 EB Off-Ramp		29.4		D	31.8		D														
R15	H-1 EB On-Ramp from SB Kunia Rd		32.8		D	34.9		D														
Paiwa Interchange																						
R16	H-1 WB On-Ramp		35		E	34.3		D														
R17	H-1 WB Off-Ramp		29.8		D	33		D														
R18	H-1 EB Off-Ramp		38.3		E	31.6		D														
R19	H-1 EB On-Ramp		33.4		D	29.5		D														
Waiawa Interchange																						
R20	H-1 EB Off-Ramp Exit 8A		32.5		D	30.7		D														
R21	H-1 EB Off-Ramp Exit 8B		27.8		C	30.6		D														
R22	H-1 EB Loop Off-Ramp Exit 8C		31.8		D	30.5		D														
R24	H-1 WB On-Ramp from Kamehameha Highway		35		E	38.1		F														
Freeway Analysis																						
H-1 Freeway between the Kualakai Interchange and the Kunia Interchange									Yes; Recommendations will be discussed in the with Project scenario.													
	H-1 EB		39.2		E	56.9		F														
	H-1 WB		30.1		D	37.2		E														
H-1 Freeway between the Kunia Interchange and the Paiwa Interchange																						
	H-1 EB		32.8		D	47.6		F														
	H-1 WB		34.8		D	52		F														
H-1 Freeway between the Paiwa Interchange and the Waiawa Interchange																						
	H-1 EB		46.7		F	44.1		E														
	H-1 WB		40.2		E	40.9		E														

Table 4.3: Base Year 2023 Analysis and Recommendations Summary

Base Year 2023 Mitigative Measures		
ID	Intersection	Recommended Improvements
Kualakai Parkway@		
1	Westbound H-1 Freeway On/Off-Ramps	<u>Northbound</u> : Modify the striping to two left-turn lanes and one thorough lane. <u>Southbound</u> : Modify the right-turn to a yield instead of free right-turn and provide an additional through lane. <u>Discussion</u> : those improvements do not require physical improvements.
4	Farrington Highway	<u>Southbound</u> : Modify the striping to provide an additional left-turn lane. <u>Eastbound</u> : Provide an additional left-turn and through lane. <u>Westbound</u> : Provide an additional through lane.
5	UH West Oahu/Future D.R. Horton ¹	<u>Northbound</u> : Provide two new left-turn lanes. <u>Southbound</u> : Provide a new right-turn lane. <u>Eastbound</u> : Provide two new left-turn lanes and one right-turn lane.
6	DHHL Access ¹	<u>Northbound</u> : Provide a new right-turn lane <u>Southbound</u> : Provide a new left-turn and right-turn lane. <u>Eastbound</u> : Provide a new right-turn lane. <u>Westbound</u> : Provide a new right-turn lane.
7	East-West Road ¹	<u>Northbound</u> : Provide a shared new right-turn lane and two new left-turn lanes. <u>Southbound</u> : Modify the striping to provide two new left-turn lanes. and Provide a right turn lane. <u>Eastbound</u> : Provide two new left-turn lanes one new through lane, and one new right-turn lane. <u>Westbound</u> : Modify the striping to provide two new left-turn lanes one new through lane, and one new right-turn lane.
8	Kapolei Parkway ²	<u>Northbound</u> : Provide new left-turn, two through, and right turn lanes. <u>Southbound</u> : Modify the striping to provide two new through lanes. <u>Eastbound</u> : Re-stripe the right most through lane into a right-turn lane. <u>Westbound</u> : Provide two new left-turn lanes.
Kunia Road/Fort Weaver Road		
24	Northbound left-turn to westbound H-1 Freeway On-Ramp	Signalize the intersection when warranted.
26	H-1 EB On-Ramp from Kunia Road	<u>Northbound</u> : Modify the striping to provide two through lanes, and two right-turn lanes.
49	Kolowaka Drive	<u>Westbound</u> : Modify the striping to provide a shared left-turn/through lane and double right-turn lane. <u>Discussion</u> : This improvement does not require physical improvements.
East-West Road		
81-85	New DHHL Intersections	Refer to Figure 4.4 for recommended lane configurations.

Note:

¹ New intersection recommended configuration. Lane configuration also assumed for without mitigations scenario.² Intersection configuration due to new approach. Lane configuration also assumed for without mitigations scenario.



4.4 Base Year 2035 Analysis

Traffic growth will continue its trajectory as outlined in the discussion for Base Year 2023. The following growth is anticipated:

- **H-1 Freeway – 17 percent increase in traffic over Base Year 2023 conditions.** The increase in traffic would cause all the studied Freeway segments to operate at LOS E or F during the AM and PM peak hours of traffic. ORTP project 61 recommends widening the H-1 by one lane in the eastbound direction between the Waiawa Interchange and the Halawa Interchange.
- **H-1 Freeway Ramps –** anticipated to operate with long delays as a result of the increase in traffic. Several of the ramps would operate at LOS E or F mostly in the AM peak hour of traffic at the Paiwa Interchange and Waiawa Interchange.
- **Kualakai Parkway – 32 to 95 percent increase in traffic compared with Base Year 2023 conditions** as a result of the continuing development– as well as increased regional traffic destined towards the Kualakai Interchange.

From Base Year 2023: It is anticipated that Kualakai Parkway will need to be widened to six (6) lanes by Base Year 2023, as recommended by the ORTP project 22.

Farrington Highway – 42-58 percent increase in traffic over Base Year 2023 conditions as a result of the aforementioned development along Kualakai Parkway, as well as the continuing development of Kapolei. It is assumed that Farrington highway will be widened to six (6) lanes from west of Fort Weaver Road to the Waiawa Interchange as part of ORTP project 61.

From Base Year 2023: It is assumed that Farrington Highway will be widened to four (4) lanes between Golf Course Road (Kapolei) and just west of Fort Weaver Road by Base Year 2023 as recommended ORTP project 20.

- **Fort Weaver Road/Kunia Road – between 7 percent decrease and 13 percent increase in traffic compared with Base Year 2023 conditions** as a result of a shift in employment away from Honolulu. As Ewa Beach completes the development of Ocean Pointe, residential development will decline. Hoakalei will develop a resort area with restaurants, shops, and a hotel, and is anticipated to increase employment near Ewa Beach. This, combined with the Ewa-Kapolei's increasing share of island-wide job opportunities, will lead to a slight decrease in commuter traffic between Ewa Beach and the Primary Urban Center of Honolulu.

As with Base Year 2023, Fort Weaver Road through the Ewa Region will continue to experience LOS F at some movements. However, this is generally ascribed to requisite long traffic signal cycle lengths rather than a lack of physical capacity. Further widening of Fort Weaver Road is not prescribed by the ORTP 2035, and is generally considered infeasible due to insufficient ROW.

- **East-West Road –** A portion of the East-West Road is planned to be constructed as part of the East Kapolei II development. Approximately five (5) intersections are planned along East-West Road. A portion of the East-West Road was opened after the data collection to provide access to the Kroc Center. Access is provided via a “tee” intersection.

4.4.1 Base Year 2035 Intersection, Ramp and Freeway Analysis

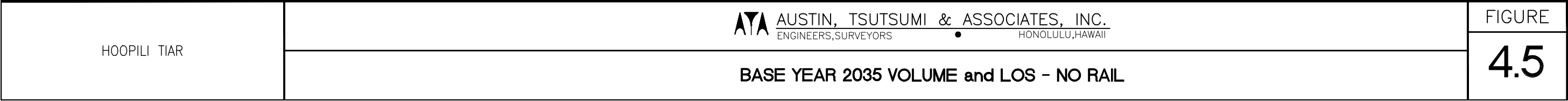
See Figure 4.5 and Figure 4.6 for Peak Hour Volumes, LOS, and recommended lane configurations for Base Year 2035. See Table 4.4 for the LOS summary and Table 4.5 for a summary of the recommended mitigative measures. Comprehensive intersection analysis results are provided in Appendix C.

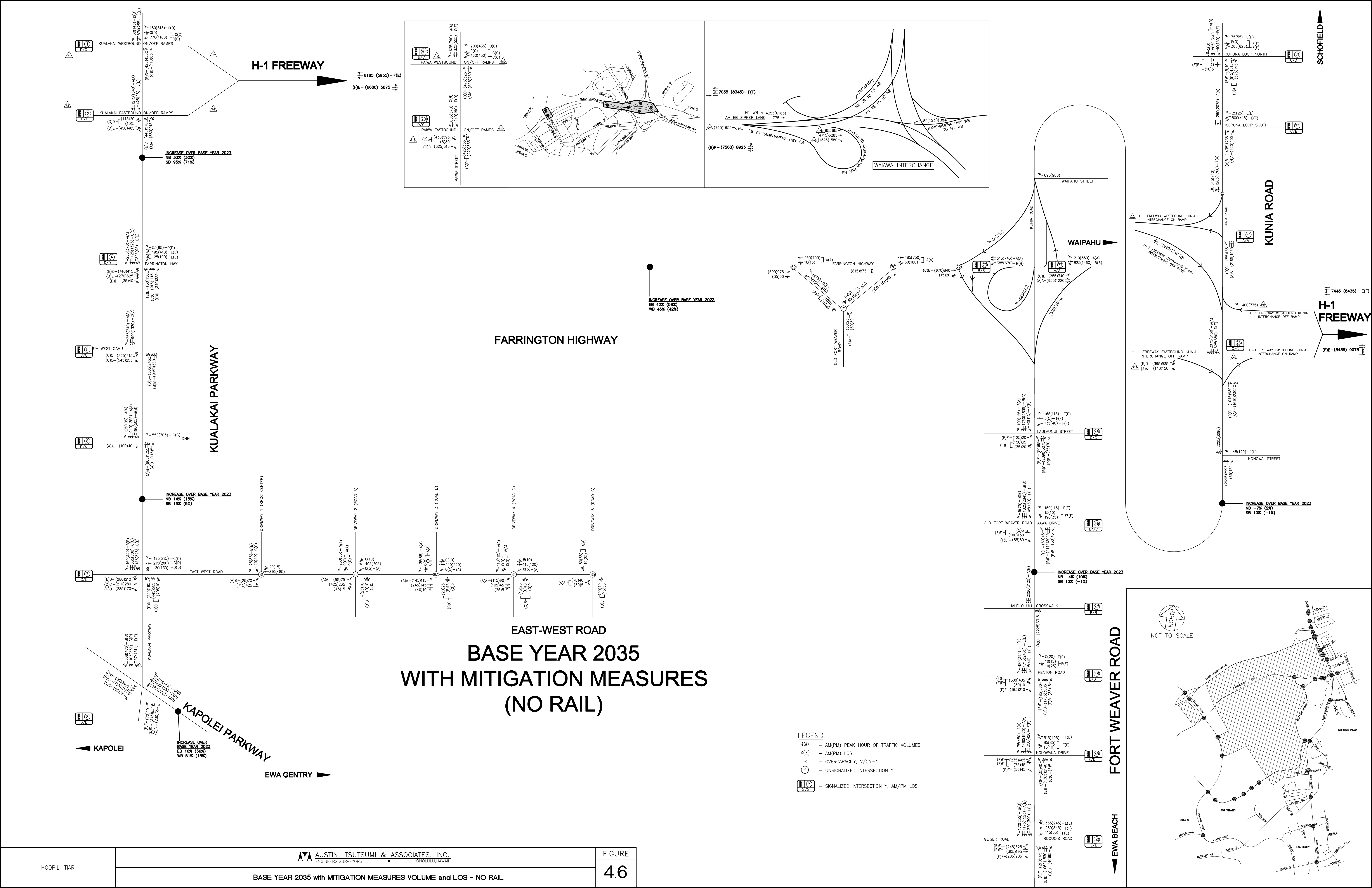
Table 4.4: BY 2035 LOS Summary

ID	Intersection	Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures					
			AM			PM				AM			PM		
			Delay	v/c	LOS	Delay	v/c	LOS		Delay	v/c	LOS	Delay	v/c	LOS
Kualakai Parkway @															
1	Westbound H-1 Freeway On/Off-Ramps	⦿	46	0.74	D	31	0.67	C	No.	44	0.71	D	33	0.64	C
2	Eastbound H-1 Freeway On/Off-Ramps	⦿	10	0.62	B	7	0.60	A	Yes; see Table 4.5	21	0.70	C	16	0.61	B
4	Farrington Highway	⦿	46	0.76	D	42	0.70	D	Yes; see Table 4.5	41	0.65	D	36	0.62	D
5	UH West Oahu/Future D.R. Horton	⦿	16	0.52	B	25	0.76	C	No.						
6	DHHL Access	⦿	23	0.76	C	19	0.68	B	Yes; see Table 4.5	15	0.73	B	8	0.47	A
7	East-West Road	⦿	34	0.62	C	37	0.62	D	No.						
8	Kapolei Parkway	⦿	45	0.61	D	44	0.68	D	Yes; see Table 4.5	43	0.52	D	40	0.65	D
Kunia Road @															
21	Kupuna Loop (North)	⦿	19	0.83	B	42	0.93	D	Yes; see Table 4.5	21	0.76	C	40	0.86	D
22	Kupuna Loop (South)	⦿	16	0.78	B	15	0.86	B	Yes; see Table 4.5	21	0.74	C	16	0.71	B
23	H-1 WB On-ramp SBR	⦿	N/A	N/A	N/A	N/A	N/A	N/A	Yes; see Table 4.5	N/A	N/A	N/A	N/A	N/A	N/A
24	H-1 EB Off-ramp/H1- EB On-Ramp	⦿	4	0.64	A	3	0.72	A	No.						
26	H-1 EB On-Ramp from Kunia Road	⦿	27	0.78	C	30	0.90	C	Yes; see Table 4.5	26	0.78	C	27	0.79	C
27	H-1 EB On-Ramp from Kunia Road	⦿	5	0.79	A	2	0.55	A	No.						
41	Honowai Street	⦿	60	0.75	F	34	0.52	D	No. Limited ROW						
Fort Weaver Road @															
Limited ROW exist along Fort Weaver Road and therefore mitigations cannot be accomodated.															
45	Laulaunui Street	⦿	20	0.86	B	30	0.78	C	No.						
46	Old Fort Weaver Road/Aawa Drive	⦿	55	1.06	E*	33	0.74	C	No.						
47	Hale O Ulu School	⦿	19	0.79	B	15	0.69	A	No.						
48	Renton Road	⦿	57	0.95	E	55	0.86	D	No.						
49	Kolowaka Drive	⦿	62	0.93	E	55	0.71	D	No.						
50	Geiger Road/Iroquois Point	⦿	71	0.76	E	77	0.80	E	No.						
Farrington Highway @															
69	Old Fort Weaver Road (West)		39	0.29	E	26	0.29	D	Yes; see Table 4.5	41	0.28	E	29	0.27	D
70	Old Fort Weaver Road (East)		12	0.08	B	11	0.10	B	No.						
71	Old Fort Weaver Road (East)/Old Fort Weaver Road (West)		8	0.06	A	9	0.21	A	No.						
73	Westbound Farrington left-turn onto Southbound Fort Weaver	⦿	10	0.62	B	15	0.71	B	No.						
77	Eastbound Farrington left-turn onto Norhtoubnd Kunia Road	⦿	6	0.59	A	8	0.70	A	No.						
East-West Road @															
81	Kroc Center		36	0.19	E	21	0.09	C	No. Intersections should be monitored for signal warrant and should be signalized when warranted.	20	0.10	C	21	0.09	C
82	Road A (Critical Movement)		33	0.28	D	26	0.16	D		33	0.28	D	26	0.16	D
83	Road B (Critical Movement)		20	0.15	C	23	0.12	C		20	0.15	C	23	0.12	C
84	Road D (Critical Movement)		14	0.07	B	16	0.05	C		14	0.07	B	16	0.05	C
85	Road G (Critical Movement)		11	0.13	B	12	0.18	B		11	0.13	B	12	0.18	B
Paiwa Street @															
200	H-1 WB On-Ramp/WB Off-Ramp	⦿	15	0.64	B	26	0.83	C	No.						
201	H-1 EB Off-Ramp/H-1 EB Off-Ramp	⦿	43	0.88	D	26	0.72	C	No.						
ID	Intersection	Signalized?	without Mitigative Measures				Mitigation Recommended?	with Mitigative Measures							
			AM		PM			AM		PM					
			Density	LOS	Density	LOS		Density	LOS	Density	LOS				
Ramp Analysis															
Kualakai Interchange															
R1	H-1 WB On-Ramp		28.1	D	29.4	D	Yes; Recommendations will be discussed in the with Project scenario.								
R2	H-1 WB Off-Ramp		27.3	C	29.5	D									
R3	H-1 EB Off-Ramp		27.5	C	29.1	D									
R4	H-1 EB On-Ramp		36.1	E	34.7	D									
Kunia Interchange															
R10	H-1 WB On-Ramp		36.7	F	35.7	E									
R11	H-1 WB Loop Off-Ramp to SB Kunia Rd		33.1	D	32.5	D									
R12	H-1 WB Off-Ramp to NB Kunia Rd		31.8	D	35	D									
R13	H-1 EB Off-Ramp		31.6	D	36.1	F									
R15	H-1 EB On-Ramp from SB Kunia Rd		34.5	D	40.9	F									
Paiwa Interchange															
R16	H-1 WB On-Ramp		43	F	38	F									
R17	H-1 WB Off-Ramp		35.9	F	34.8	D									
R18	H-1 EB Off-Ramp		41.4	E	33.6	D									
R19	H-1 EB On-Ramp		35.5	F	30.5	D									
Waiawa Interchange															
R20	H-1 EB Off-Ramp Exit 8A		36.2	E	32.6	D									
R21	H-1 EB Off-Ramp Exit 8B		41.2	E	33	D									
R22	H-1 EB Loop Off-Ramp Exit 8C		35	D	30.9	D									
R24	H-1 WB On-Ramp from Kamehameha Highway		39.7	F	38.2	F									
Freeway Analysis															
H-1 Freeway between the Kualakai Interchange and the Kunia Interchange															
	H-1 EB		41.4	E	55.8	F	Yes; Recommendations will be discussed in the with Project scenario.								
	H-1 WB		46	F	42.5	E									
H-1 Freeway between the Kunia Interchange and the Paiwa Interchange															
	H-1 EB		36.3	E	48.4	F									
	H-1 WB		37.8	E	48.4	F									
H-1 Freeway between the Paiwa Interchange and the Waiawa Interchange															
	H-1 EB		56.1	F	38.8	E									
	H-1 WB		65.6	F	47.2	F									

Table 4.5: Base Year 2035 Analysis and Recommendations Summary

Base Year 2035 Mitigative Measures		
ID	Intersection	Recommended Improvements
<i>Kualakai Parkway@</i>		
2	Eastbound H-1 Freeway On/Off-Ramps	<u>Eastbound</u> : Provide an additional right-turn lane; modify the right-turn lane to be signal-controlled.
4	Farrington Highway	<u>Northbound</u> : Provide an additional left-turn lane. <u>Eastbound</u> : Provide an additional through lane. <u>Westbound</u> : Provide an additional left-turn lane and an additional through lane.
6	DHHL Access	<u>Southbound</u> : Provide an additional left-turn lane.
8	Kapolei Parkway	<u>Southbound</u> : Provide an additional left-turn lane. <u>Eastbound</u> : Provide an additional left-turn lane.
<i>Kunia Road@</i>		
21	Kupuna Loop (North)	<u>Southbound</u> : Provide an additional through lane.
22	Kupuna Loop (South)	<u>Southbound</u> : Provide an additional through lane.
23	H-1 WB On-ramp SBR	<u>Southbound</u> : Provide an additional through lane.
24	H-1 WB Off-Ramp/H-1 WB On-Ramp NBL	<u>Southbound</u> : Provide an additional through lane.
26	H-1 EB On-Ramp from Kunia Road	<u>Southbound</u> : Provide an additional through lane.
<i>Farrington Highway@</i>		
69	Old Fort Weaver Road (West)	<u>Northbound</u> : Provide separate left-turn and right-turn lanes.





5. YEAR 2023 AND 2035 WITH PROJECT

The Project is within the urban growth boundary and is consistent with the Ewa Development Plan and Kapolei Master Plan for long-term growth. The Project will provide approximately 11,800 dwelling units (61 percent workforce housing) to meet the demands of Oahu's increasing population, and 7,000 permanent jobs.

Ultimately, the Project is anticipated to generate as many as 8,000(10,154) net external trips during the AM(PM) peak hours of traffic, without considering the benefits of RT. It is estimated that during the critical PM peak hour of traffic:

- **35 percent of Project traffic will be generated by commercial and VMX development.** It is assumed that both Commercial and VMX traffic will primarily serve 1) Kapolei-Ewa-Waipahu residents during the AM(PM) peak hours of traffic, and 2) Existing or Project regional traffic making a stop on their journey to or from work.

For the purpose of this TIAR, 16 to 20-percent pass-by² and 20-percent diverted-linked trip³ rates were applied. This is considered conservative given that 1) The average pass-by and diverted linked trip rate for commercial land uses ranges between 26 percent and 90 percent (combined) for the size of the Project's proposed commercial land uses, and 2) it is likely that the smaller commercial sites would mostly be comprised of pass-by and diverted linked trips due to their small scale geared towards catering to the surrounding neighborhoods and not the greater region. Additionally, during the commuter peak hours of traffic the commercial site are not likely to attract trips that are not already within the area. Refer to Appendix E for a description of Pass-By and Diverted Linked Trips.

- **55 percent of Project traffic will be generated by its residential land uses.**
- **10 percent of Project traffic will be generated by its industrial and other uses.**

5.1 Sustainable Transportation Planning

It is estimated that currently, vehicular travel represents approximately 81 percent of all labor force commutes on Oahu, with walking and public transit accounting for 8 and 6 percent, respectively⁴. To encourage sustainability, Hoopili aspires to *"have its residents break free from automobile dependency through providing a community with mixed-use spaces, pedestrian and bike paths and through the creation of a transit-oriented development (TOD) that will take advantage of the proposed rail stops within the community."*

² Definition: Trips that would already be on the roadway network, but make a stop at a commercial destination along their normal travel route on the way to their final destination.

³ Definition: Trips that would already be on the roadway network, but make a detour to stop at a commercial destination on the way to their final destination.

⁴ Source: Hawaii State Data Book 2011, Table 12.03.

Pursuant to this goal, Hoopili will strategically concentrate its high-density business mixed use development within walking distance (0.5 miles) of the Hoopili and UHWO Rail Stops, while also envisioning the provision of bus stops within a 5-10 minute walk from anywhere within the community for easy access. In addition, neighborhood commercial land uses will be dispersed throughout the project to provide convenient walking and bicycling access to residential areas.

5.1.1 Complete Streets

While transportation planning has traditionally focused on automobile travel, recent “Complete Streets” policies also recognize the numerous benefits of encouraging the use of alternative modes of transportation. “Complete Streets” policies encourage the provision of equitable, accessible, and safe transportation for all modes.

Hawaii State Senate Bill 718 (2009) required that the Hawaii Department of Transportation (HDOT) and the County transportation departments:

“...adopt a complete streets policy that seeks to reasonably accommodate convenient access and mobility for all users of the public highways within their respective jurisdictions...”

City and County of Honolulu Bill 26 (2012) required that the City’s directors employ a multi-modal approach and incorporate complete streets features. As defined by Bill 26, complete streets features could include but are not limited to:

“...sidewalks, crosswalks, accessible curb ramps, curb extensions, raised medians, refuge islands, roundabouts or mini-circles, traffic signals and accessible pedestrian signals such as audible and vibrotactile indications and pedestrian countdown signals, shared-use paths, bicycle lanes, paved shoulders, street trees, planting strips, signs, pavement markings including multi-modal pavement striping, street furniture, bicycle parking facilities, public transportation stops, and facilities including streetscapes, dedicated transit lanes, and transit priority signalization.”

Because Complete Streets ideals have yet to be incorporated into Hawaii State or City and County of Honolulu standard roadway sections, it is recommended that the Developer work closely with the State of Hawaii and City and County of Honolulu to design their roadway networks and cross-sections in a manner that embraces the principles of Complete Streets design.

5.1.2 Rail Transit (RT) Assumptions

Rail Transit trip reductions were obtained from the ORTP for base year scenarios. For with Project scenario, the Rail Transit reductions were derived from the Honolulu High-Capacity Transit Corridor Project Environmental Impact Statement (HHCTCP EIS) and applied to the Project trip distribution. Based on that report it was found that a trip reduction of 3.6 percent could be applied to to/from work trips and 3 percent to/from commercial trips.

This section will analyze conditions with and without rail:

- *Without Rail Transit:* This scenario assumes that the Rail Transit Project is not completed and not operational within the Project vicinity. Therefore, no trip reductions can be attributed to Rail Transit in this scenario.

- *With Rail Transit:* This scenario assumes that the Rail Transit would be fully completed and operational by year 2023. Current plans are for the RT alignment to traverse the Project and run south, roughly parallel to Farrington Highway within the Project boundaries.

Based on a comparison of the ORTP model (with Hoopili) with and without RT⁵, traffic along the major roadways within the study area are estimated to either:

- Increase by as much as 4 percent as a result of park-n-ride traffic, or
- Decrease by as much as 10 percent along the H-1 Freeway or Kualakai Parkway.

Refer to Figure 5.1 for a rendering of the Hoopili rail stop.



Figure 5.1: Hoopili Rail Stop Rendering (Source: www.honolulutransit.org)

5.2 Trip Generation

The Institute of Transportation Engineers (ITE) publishes a book based on empirical data compiled from a body of more than 4,250 trip generation studies submitted by public agencies, developers, consulting firms, and associations. This publication, titled Trip Generation, 9th Edition, provides trip rates and/or formulae based on graphs that correlate vehicular trips with independent variables. The independent variables can range from Dwelling Units (DU) for single-family attached homes to Gross Floor Area (GFA) for commercial or office development. These trip rates/formulae and their associated directional distributions were used to estimate the increase in the number of vehicular trips generated by the Proposed Project. The rates selected were based on the land use description.

⁵ Trip reductions along the H-1 Freeway were determined based upon screenline data from the HHTCP EIS.

Expected average enrollment for the proposed elementary, middle and high schools were obtained from the Department of Education (DOE).

Note that trips were not generated for the 200 acres of agricultural lands. Currently the majority of the site is agricultural land. The area that is planned for the 200 acres of agricultural land is currently being used as such by small users. Therefore, existing counts already account for those trips. Furthermore, access to those 200 acres will remain the same with the completion of Project. Therefore, trips were not generated for these 200 acres of commercial farm.

See Tables 5.1-5 for Trip Generation formulae and projections.

5.3 Trip Distribution/Assignment

Trips generated by the Project were assigned onto the network based on distribution obtained from the ORTP 2035 Model. The overall distribution was approximated as follows:

- 50% towards the east to the Mililani area, the Honolulu Business Core and Waikiki area
- 15% towards the Barber's Point Industrial area
- 20% towards the Kapolei city
- 10% north towards Schofield
- 5% towards other areas north of the Project

5.3.1 Internal Capture Rate

This report assumes an internal capture rate of 16%(12%) for the AM(PM) peak hours of traffic.

As defined by the ITE Trip Generation Handbook, June 2004:

"[...] a multi-use development is typically a single real-estate project that consists of two or more ITE land use classifications between which trips can be made without using the off-site road system. Because of the nature of these land uses, the trip-making characteristics are interrelated, and some trips are made among the on-site uses. This capture of trips internal to the site had the net effect of reducing vehicle trip generation between the overall development site and external street system (compared to the total number of trips generated by comparable, stand-alone sites)."

During the weekday AM peak, commercial land uses are generally not open and generate small amount of trips. Therefore, although internal trips may occur there would likely not be significant and not accounted for during the weekday AM peak hour of traffic as a conservative measure. However, internal trip capture was accounted for the schools during the AM as well as the PM peak hours of traffic due to the fact that a significant portion of the students would be located within the Project area.

The methodology provided within the ITE Trip Generation Handbook was used to determine the internal capture rates for each phase.

Table 5.1: Trip Generation Rates

Land Use (ITE Code)	Independent Variable	AM Peak Hour of Traffic		PM Peak Hour of Traffic	
		Trip Rate	% Entering	Trip Rate	% Entering
Low-Rise Residential Condominium/Townhouse (231)	Dwelling Units	[a]	25%	0.78	58%
Specialty Retail Center (826)	GLA	-	-	[b]	44%
Shopping Center (820)	GLA	[c]	62%	[d]	48%
General Office Building (710)	GFA	[e]	88%	[f]	17%
Recreational Community Center (495)	GFA	2.05	61%	2.74	36%
State Park (413)	ACRES	-	-	-	-
County Park (412)	ACRES	0.02	61%	0.09	61%
Regional Park (417)	ACRES	-	-	0.2	45%
City Park (411)	ACRES	-	-	-	-
Industrial Park (130)	GLA	[g]	82%	[h]	21%
Low-Rise Residential Condominium/Townhouse (231)	Dwelling Units	[i]	25%	0.78	58%
Single-Family Detached Housing (210)	Dwelling Units	[j]	25%	[k]	63%
Apartment (220)	Dwelling Units	[l]	20%	[m]	65%
Elementary School (520)	Students	0.45	55%	0.15	49%
Middle School (522)	Students	0.54	55%	0.16	49%
High School (530)	Students	0.43	68%	0.13	47%

$$[a] T = 0.88*(X) - 49.7$$

$$[b] T = 2.4*(X) + 21.48$$

$$[c] LN(T) = 0.61*LN(X) + 2.24$$

$$[d] LN(T) = 0.67*LN(X) + 3.31$$

$$[e] LN(T) = 0.8*LN(X) + 1.57$$

$$[f] T = 1.12*(X) + 78.45$$

$$[g] LN(T) = 0.79*LN(X) + 0.91$$

$$[h] T = 0.78*LN(X) + 30.48$$

$$[i] T = 0.88*(X) - 49.7$$

$$[j] T = 0.7*(X) + 9.74$$

$$[k] LN(T) = 0.9*LN(X) + 0.51$$

$$[l] T = 0.49*(X) + 3.73$$

$$[m] T = 0.55*(X) + 17.65$$

T = trips generated by units

X = number of units

GLA = gross leasable area

GFA = gross floor area

Table 5.2 Project Trip Generation without Rail Transit - Phase 1

LAND USE	ITE CODE #	Units	Quantity	AM Peak Hour Enter/Exit %	AM PEAK HOUR TRIPS			PM Peak Hour Enter/Exit %	PM PEAK HOUR TRIPS		
					ENTER	EXIT	TOTAL		ENTER	EXIT	TOTAL
Single Family Detached Housing	210	DU	594	25/75	107	319	426	63/37	330	192	522
Apartment	220	DU	546	20/80	56	215	271	65/35	208	110	318
AMX Low Residential Condo	230	DU	1,145	17/83	62	301	363	67/33	297	146	444
AMX Commercial	820/814	SF GLA	332,413	61/39	199	125	324	44/56	360	459	819
BMX Low Residential Condo	230	DU	1,091	17/83	59	290	349	67/33	286	141	427
BMX Commercial	820/814	SF GLA	163,825	61/39	129	82	211	44/56	182	232	415
Community Center	495	ACRES	2	61/39	104	67	171	37/63	84	144	228
County Park	412	ACRES	2	61/39	0	0	0	61/39	0	0	0
Private Community Park	412	ACRES	6	61/39	2	0	2	61/39	7	3	10
Shopping Center	820	SF GLA	544,867	61/39	268	170	438	49/51	915	951	1,866
Commercial Farm ¹	N/A	Acres	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>Subtotal</i>					986	1,569	2,556		2,671	2,378	5,049
Pass-by Trips											
Shopping Center/Commercial					0	0	0		239	269	508
Diverted Linked Trips											
Shopping Center/Commercial					0	0	0		160	180	340
Internal Trip Capture											
Shopping Center - internal capture ²					0	0	0		13	20	33
<i>Trip Reduction Total</i>					0	0	0		412	469	881
Grand Total with Trip Reductions					986	1,569	2,556		2,259	1,909	4,167

¹ Existing Land Use, therefore no new trips anticipated.² Internal Trip capture applied only to the commercial site along East-West Road

Table 5.3 Project Trip Generation with Rail Transit - Phase 1

LAND USE	ITE CODE #	Units	Quantity	AM Peak Hour Enter/Exit %	AM PEAK HOUR TRIPS			PM Peak Hour Enter/Exit %	PM PEAK HOUR TRIPS		
					ENTER	EXIT	TOTAL		ENTER	EXIT	TOTAL
Single Family Detached Housing	210	DU	594	25/75	107	319	426	63/37	330	192	522
Apartment	220	DU	546	20/80	56	215	271	65/35	208	110	318
AMX Low Residential Condo	230	DU	1,145	17/83	62	301	363	67/33	297	146	444
AMX Commercial	820/814	SF GLA	332,413	61/39	199	125	324	44/56	360	459	819
BMX Low Residential Condo	230	DU	1,091	17/83	59	290	349	67/33	286	141	427
BMX Commercial	820/814	SF GLA	163,825	61/39	129	82	211	44/56	182	232	415
Community Center	495	ACRES	2	61/39	104	67	171	37/63	84	144	228
County Park	412	ACRES	2	61/39	0	0	0	61/39	0	0	0
Private Community Park	412	ACRES	6	61/39	2	0	2	61/39	7	3	10
Shopping Center	820	SF GLA	544,867	61/39	268	170	438	49/51	915	951	1,866
Commercial Farm ¹	N/A	Acres	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>Subtotal</i>					986	1,569	2,556		2,671	2,378	5,049
Pass-by Trips											
Shopping Center/Commercial					0	0	0		239	269	508
Diverted Linked Trips											
Shopping Center/Commercial					0	0	0		160	180	340
Internal Trip Capture											
Shopping Center - internal capture ²					0	0	0		13	20	33
Transit											
Residential, 3.6%					10	41	51		40	21	62
Commercial, 3%					18	11	29		44	49	93
<i>Trip Reduction Total</i>					28	52	80		496	540	1,036
Grand Total with Trip Reductions					958	1,518	2,476		2,175	1,838	4,013

¹ Existing Land Use, therefore no new trips anticipated.² Internal Trip capture applied only to the commercial site along East-West Road

Table 5.4 Project Trip Generation without Rail Transit - Phase 1 and 2

LAND USE	ITE CODE #	Units	Quantity	AM Peak Hour Enter/Exit %	AM PEAK HOUR TRIPS			PM Peak Hour Enter/Exit %	PM PEAK HOUR TRIPS		
					ENTER	EXIT	TOTAL		ENTER	EXIT	TOTAL
Single Family Detached Housing	210	DU	2,287	25/75	405	1,206	1,611	63/37	1,110	647	1,757
Apartment	220	DU	2,347	20/80	234	920	1,154	65/35	853	456	1,309
AMX Low Residential Condo	230	DU	3,074	17/83	136	664	800	67/33	668	329	997
AMX Commercial	820/814	SF GLA	892,758	61/39	364	229	593	44/56	952	1,212	2,164
BMX Low Residential Condo	230	DU	4,105	17/83	171	837	1,008	67/33	847	417	1,264
BMX Commercial	820/814	SF GLA	616,593	61/39	290	183	473	44/56	661	841	1,501
High School	530	Students	1,000	68/32	292	138	430	47/53	61	69	130
Middle School	522	Students	600	55/45	178	146	324	49/51	47	49	96
Elementary School	520	Student	1,650	55/45	408	334	743	49/51	121	126	248
Community Center	495	ACRES	4	61/39	689	440	1,129	37/63	558	950	1,509
County Park	412	ACRES	54	61/39	0	0	0	61/39	1	0	1
Private Community Park	412	ACRES	20.23	61/39	5	1	6	61/39	18	7	25
Industrial Mixed Use (IMU)	130	ACRES	795,695	82/18	399	88	486	21/79	137	514	651
Shopping Center	820	SF GLA	1,513,841	61/39	500	318	818	49/51	1,816	1,884	3,700
Commercial Farm	N/A	Acres	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>Subtotal</i>					<i>4,072</i>	<i>5,502</i>	<i>9,573</i>		<i>7,850</i>	<i>7,502</i>	<i>15,352</i>
Pass-by Trips											
Shopping Center/Commercial					0	0	0		523	657	1,180
Diverted Linked Trips											
Shopping Center/Commercial					0	0	0		729	882	1,611
Internal Trip Capture											
Shopping Center - internal capture					0	0	0		174	274	448
High School - internal					58	28	86		12	14	26
Middle School Internal Capture					90	73	162		24	25	48
Elementary School					287	234	521		86	89	174
<i>Trip Reduction Total</i>					<i>435</i>	<i>334</i>	<i>769</i>		<i>1,547</i>	<i>1,940</i>	<i>3,486</i>
Grand Total with Trip Reductions					3,637	5,168	8,805		6,303	5,562	11,866

Table 5.5 Project Trip Generation with Rail Transit - Phase 1 and 2

LAND USE	ITE CODE #	Units	Quantity	AM Peak Hour Enter/Exit %	AM PEAK HOUR TRIPS			PM Peak Hour Enter/Exit %	PM PEAK HOUR TRIPS		
					ENTER	EXIT	TOTAL		ENTER	EXIT	TOTAL
Single Family Detached Housing	210	DU	2,287	25/75	405	1,206	1,611	63/37	1,110	647	1,757
Apartment	220	DU	2,347	20/80	234	920	1,154	65/35	853	456	1,309
AMX Low Residential Condo	230	DU	3,074	17/83	136	664	800	67/33	668	329	997
AMX Commercial	820/814	SF GLA	892,758	61/39	364	229	593	44/56	952	1,212	2,164
BMX Low Residential Condo	230	DU	4,105	17/83	171	837	1,008	67/33	847	417	1,264
BMX Commercial	820/814	SF GLA	616,593	61/39	290	183	473	44/56	661	841	1,501
High School	530	Students	1,000	68/32	292	138	430	47/53	61	69	130
Middle School	522	Students	600	55/45	178	146	324	49/51	47	49	96
Elementary School	520	Student	1,650	55/45	408	334	743	49/51	121	126	248
Community Center	495	ACRES	4	61/39	689	440	1,129	37/63	558	950	1,509
County Park	412	ACRES	54	61/39	0	0	0	61/39	1	0	1
Private Community Park	412	ACRES	20.23	61/39	5	1	6	61/39	18	7	25
Industrial Mixed Use (IMU)	130	ACRES	795,695	82/18	399	88	486	21/79	137	514	651
Shopping Center	820	SF GLA	1,513,841	61/39	500	318	818	49/51	1,816	1,884	3,700
Commercial Farm	N/A	Acres	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>Subtotal</i>					<i>4,072</i>	<i>5,502</i>	<i>9,573</i>		<i>7,850</i>	<i>7,502</i>	<i>15,352</i>
Pass-by Trips											
Shopping Center/Commercial					0	0	0		523	657	1,180
Diverted Linked Trips											
Shopping Center/Commercial					0	0	0		729	882	1,611
Internal Trip Capture											
Shopping Center - internal capture					0	0	0		174	274	448
High School - internal					58	28	86		12	14	26
Middle School Internal Capture					90	73	162		24	25	48
Elementary School					287	234	521		86	89	174
Transit											
Residential, 3.6%					34	131	165		125	67	192
Commercial, 3%					47	25	71		107	134	240
<i>Trip Reduction Total</i>					<i>516</i>	<i>489</i>	<i>1,004</i>		<i>1,779</i>	<i>2,141</i>	<i>3,918</i>
Grand Total with Trip Reductions					3,556	5,013	8,569		6,070	5,362	11,434

5.4 Year 2023 with Project without Rail

There are multiple development projects within the ORTP that are assumed to be under construction or nearing completion by year 2023. Those include the University of Hawaii West Oahu (2,660 residential units and 347,400 square feet of commercial space), Makaiwa Hills (4,100 residential units), Kapolei West (2,350 residential units), Kalaeloa (4,000 residential units) and Kapolei Harborside (4.5 million square feet of industrial and commercial space). Based on current information, it is unclear whether one or all of the listed projects will be under construction, but none will be completed by 2023. Based on the uncertainty surrounding other regional projects, D.R. Horton agrees to provide an updated TIAR to the State DOT for their acceptance prior to 3,377 dwelling units and 1,041,105 square feet of commercial space is constructed. This updated TIAR will provide updated information thereby, allowing DOT to make more accurate determinations of the size and degree of improvements in and around the Hoopili project area. Year 2023 with Project without Rail provides an analysis based on this threshold.

By Year 2023, the project will generate approximately 2,556(4,167) trips during the AM (PM) peak hours of traffic. The following increases and changes are anticipated over Base Year 2023 as a result of phase 1 of the project:

- **H-1 Freeway – 5-11 percent increase in traffic over Base Year 2023** as a result of the Project. It is recommended that the H-1 Freeway be restriped to provide one (1) additional lane each in the eastbound and westbound directions between the Paiwa Interchange and the Kualakai Interchange to accommodate the traffic generated by the increase in Base Year as well as the Project.

These improvements are based on Alternative 1 of the Final Traffic Impact Analysis Report Hoopili (FTIAR Hoopili), prepared in 2011 by ATA, Wilbur Smith Associates (WSA).

In the eastbound direction, the new lane would begin as an add lane to the Kualakai interchange eastbound on-ramp, and terminate as a lane drop at east of the Waiawa Interchange.

In the westbound direction, the new lane would begin in the vicinity of the Waiawa Interchange, and terminate as a shared through/right-turn westbound off ramp at Kualakai interchange.

The results contained within this TIAR lead to the same conclusions and recommendations as that of the WSA FTIAR Hoopili Report, but with the following differences:

- Extend the widening of the H-1 Freeway in either direction further east of the Waiawa Interchange as per projects 25 and 61 in the ORTP.

See Figure 5.5 for a proposed schematic of recommended improvements to the H-1 Freeway, segment LOS, and volume.

See Table 5.4 for ramp analysis.

- **H-1 Freeway Ramps** – anticipated to operate similarly to Base Year 2023 with the proposed H-1 Freeway improvements or better. In fact conditions are anticipated to be similar to existing conditions.
- **Kualakai Parkway** – **13-83 percent increase in traffic compared with Base Year 2023.** The project will also increase cross and turning traffic at Kualakai Parkway's intersections with the H-1 Freeway On- and Off-ramps, Farrington Highway, East-West Road, and the UHWO and DHHL Accesses. Accordingly, Project-related improvements are recommended at all intersections along Kualakai Parkway.
- **Farrington Highway** – **39-121 percent increase in traffic over Base Year 2023.** Much of the east-west traffic along Farrington Highway is anticipated to continue serving regional purposes, as Farrington Highway through Kapolei, the Project, and Waipahu can serve as an alternate route to the H-1 Freeway.

Project-related improvements are recommended to accommodate additional turning movements and cross-traffic at the new Project intersections.

- **Fort Weaver Road/Kunia Road (North of Old Fort Weaver Road)** – **0-2 percent increase in traffic compared with Base Year 2023.**
Traffic operations would continue to be similar to Base Year 2023 – Albeit with some longer delays..
- **Fort Weaver Road (South of Old Fort Weaver Road)** – **0 percent increase in traffic compared with Base Year 2023.** As with Base Year 2023, Fort Weaver Road through the Ewa Region will continue to experience LOS F at some movements. However, this is generally ascribed to requisite long traffic signal cycle lengths rather than a lack of physical capacity. Further widening of Fort Weaver Road is not prescribed by the ORTP 2035, and is generally considered infeasible due to insufficient ROW.
- **East-West Road** – **19-38 percent increase in traffic over Base Year 2023.**

5.4.1 Year 2023 with Project Intersection, Ramp and Freeway Analysis

The revised Phase 1 development threshold, all intersections along Kualakai Parkway would operate at LOS D or better with each movements also operating at LOS D or better. Intersections along Farrington Highway and East-West Road should be monitored for traffic signal warrants. Along Fort Weaver Road, the intersections would continue to operate at conditions similar to Base Year 2023 without the Project. Furthermore, the Project is not anticipated to add traffic along that roadway with the revised phasing.

See Figure 5.2, 5.3, 5.4 for Peak Hour Volumes, LOS, and recommended lane configurations for Year 2023. See Table 5.6 for the LOS summary and Table 5.7 for a summary of the recommended and mitigative measures. Comprehensive intersection analysis results are provided in Appendix C.

Table 5.6: Year 2023 With Project LOS Summary

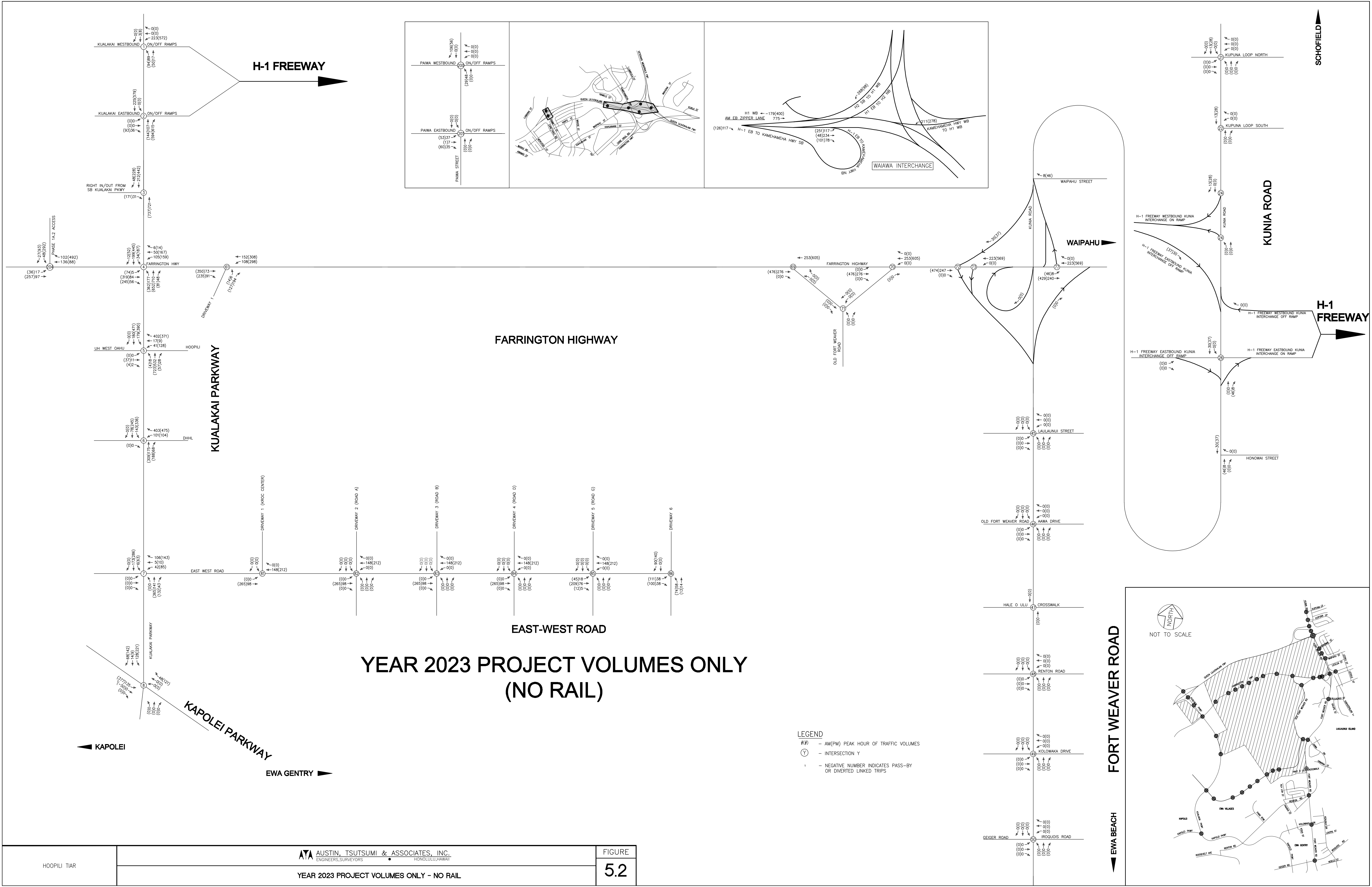
ID	Intersection	Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures						
			AM			PM				AM			PM			
			Delay	v/c	LOS	Delay	v/c	LOS		Delay	v/c	LOS	Delay	v/c	LOS	
Kualakai Parkway @																
1	Westbound H-1 Freeway On/Off-Ramps	BB	32	0.49	C	37	0.72	D	No.							
2	Eastbound H-1 Freeway On/Off-Ramps	BB	4	0.69	A	5	0.64	A	No.							
3	Hoopili RIRO		13	0.07	B	22	0.47	C	Yes; see Table 5.7	12	0.07	B	20	0.44	C	
4	Farrington Highway	BB	50	0.90	D	102	1.04	F*	Yes; see Table 5.7	35	0.76	C	42	0.81	D	
5	UH West Oahu/Future D.R. Horton	BB	35	0.81	D	41	0.79	E	Yes; see Table 5.7	35	0.81	D	45.8	0.80	D	
6	DHHL Access	BB	33	0.94	C	27	0.85	C	Yes; see Table 5.7	37	0.96	D	26	0.78	C	
7	East-West Road	BB	36	0.72	D	36	0.76	D	No.							
8	Kapolei Parkway	BB	32	0.57	C	37	0.74	D	No.							
Kunia Road @																
21	Kupuna Loop (North)	BB	16	0.71	B	28	0.80	C	No.							
22	Kupuna Loop (South)	BB	16	0.69	B	14	0.79	B	No.							
24	H-1 EB Off-ramp/H1- EB On-Ramp	BB	4	0.60	A	4	0.67	A	No.							
26	H-1 EB On-Ramp from Kunia Road	BB	25	0.76	C	27	0.89	C	No.							
27	H-1 EB On-Ramp from Kunia Road	BB	7	0.85	A	3	0.60	A	No.							
41	Honowai Street	BB	76	0.81	F	32	0.48	D	No. Limited ROW							
Fort Weaver Road @																
Limited ROW exisit along Fort Weaver Road and therefore mitigations cannot be accomodated.																
45	Laulaunui Street	BB	31	0.85	C	29	0.77	C	No.							
46	Old Fort Weaver Road/Aawa Drive	BB	37	0.91	D	31	0.74	C	No.							
47	Hale O Ulu School	BB	18	0.80	B	15	0.70	B	No.							
48	Renton Road	BB	53	0.91	D	54	0.86	D	No.							
49	Kolowaka Drive	BB	64	0.92	E	49	0.71	D	No.							
50	Geiger Road/Iroquois Point	BB	64	0.69	E	69	0.71	E	No.							
Farrington Highway @																
61	Driveway 1	BB	20	0.44	C	38	0.59	E	No.							
69	Old Fort Weaver Road (West)	BB	39	0.26	E	58	0.48	F	No.							
70	Old Fort Weaver Road (East)	BB	13	0.08	B	13	0.11	B	No.							
71	Old Fort Weaver Road (East)/Old Fort Weaver Road (West)	BB	7	0.14	A	9	0.24	A	No.							
73	Westbound Farrington left-turn onto Southbound Fort Weaver	BB	15	0.78	A	26	0.91	C	No.							
77	Eastbound Farrington left-turn onto Norhtoubnd Kunia Road	BB	5	0.58	A	11	0.82	B	No.							
204	Phase 1.A.2 Access	BB	23	0.35	C	22	0.50	C	No.							
East-West Road @																
81	Kroc Center		53	0.27	F	37	0.16	E	Intersections should be monitored for signal warrant and should be signalized when warranted.							
82	Road A (Critical Movement)		54	0.41	F	58	0.33	F								
83	Road B(Critical Movement)		29	0.22	D	47	0.24	E								
84	Road D (Critical Movement)		18	0.10	C	30	0.10	D								
85	Road G (Critical Movement)		14	0.20	B	26	0.42	D								
86	Road 6 (Critical Movement)		9	0.09	A	9	0.14	A								
Paiwa Street @																
200	H-1 WB On-Ramp/WB Off-Ramp	BB	14	0.71	B	20	0.76	B	No.							
201	H-1 EB Off-Ramp/H-1 EB Off-Ramp	BB	46	0.90	D	30	0.77	C	No.							
ID	Intersection	Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures						
			AM			PM				AM			PM			
			Density	LOS		Density	LOS			Density	LOS		Density	LOS		
Ramp Analysis																
An additional H-1 freeway lane would be provided in the eastbound and westbound direction between the Kualakai Interchange and the Waiawa Interchange. Therefore traffic flow along the freeway would improve and consequently improve ramp operations. Unless otherwise noted the ramp analyzed configurations remain the same.																
Kualakai Interchange																
R1	H-1 WB On-Ramp		24.6		C	28.6		D	Yes; see Figure 5.5	24.6	C	28.6		D		
R2	H-1 WB Off-Ramp		24.1		C	29		D	Yes; see Figure 5.5	23.3	C	27.3		C		
R3	H-1 EB Off-Ramp		27.6		C	28.8		D	No.	27.6	C	21.8		C		
R4	H-1 EB On-Ramp		37.2		E	37.2		E	Yes; see Figure 5.5	29.7	D	29.4		D		
Kunia Interchange																
R10	H-1 WB On-Ramp		29.2		D	35.2		E	Yes; see Figure 5.5	22.1	C	26.7		C		
R11	H-1 WB Loop Off-Ramp to SB Kunia Rd		27.4		C	32.3		D	Yes; see Figure 5.5	22	C	28		C		
R12	H-1 WB Off-Ramp to NB Kunia Rd		26.2		C	35.2		E	Yes; see Figure 5.5	22.6	C	29.1		D		
R13	H-1 EB Off-Ramp		32.2		D	34.3		D	Yes; see Figure 5.5	25.8	C	27.6		C		
R15	H-1 EB On-Ramp from SB Kunia Rd		36		E	38.4		F	Yes; see Figure 5.5	27	C	28.2		D		
Paiwa Interchange																
R16	H-1 WB On-Ramp		36.8		E	36.8		F	Yes; see Figure 5.5	28.5	D	29.6		D		
R17	H-1 WB Off-Ramp		30.2		D	35.1		E	Yes; see Figure 5.5	23.6	C	29		D		
R18	H-1 EB Off-Ramp		41.1		E	34.5		D	Yes; see Figure 5.5	34.5	D	28.5		D		
R19	H-1 EB On-Ramp		35.4		F	31.4		D	Yes; see Figure 5.5	27.6	C	24.2		C		
Waiawa Interchange																
R20	H-1 EB Off-Ramp Exit 8A		35		D	33.1		D	Yes; see Figure 5.5	29.6	D	27.3		C		
R21	H-1 EB Off-Ramp Exit 8B		30.6		D	32.6		D	Yes; see Figure 5.5	17.1	B	17.8		B		
R22	H-1 EB Loop Off-Ramp Exit 8C		32.9		D	31		D	Yes; see Figure 5.5	27.3	C	26.8		C		
R24	H-1 WB On-Ramp from Kamehameha Highway		33.4		D	41		F	Yes; see Figure 5.5	24.4	C	32.3		D		
Freeway Analysis																
An additional H-1 freeway lane would be provided in the eastbound and westbound direction between the Kualakai Interchange and the Waiawa Interchange. Therefore traffic flow along the freeway would improve.																
H-1 Freeway between the Kualakai Interchange and the Kunia Interchange																
	H-1 EB		42.8		E	50.5		F	Yes; see Figure 5.5	28.1	D	30.6		D		
	H-1 WB		30.5		D	41		E	Yes; see Figure 5.5	22.6	C	27.5		D		
H-1 Freeway between the Kunia Interchange and the Paiwa Interchange																
	H-1 EB		35.8		E	46.4		F	Yes; see Figure 5.5	28.3	D	31.8		D		
	H-1 WB		28.9		D	45.6		F	Yes; see Figure 5.5	23	C	31.5		D		
H-1 Freeway between the Paiwa Interchange and the Waiawa Interchange																
	H-1 EB		51.5		F	39.5		E	Yes; see Figure 5.5	33.7	D	28.8		D		
	H-1 WB		37.4		E	44.9		E	Yes; see Figure 5.5	26.1	D	31.2		D		

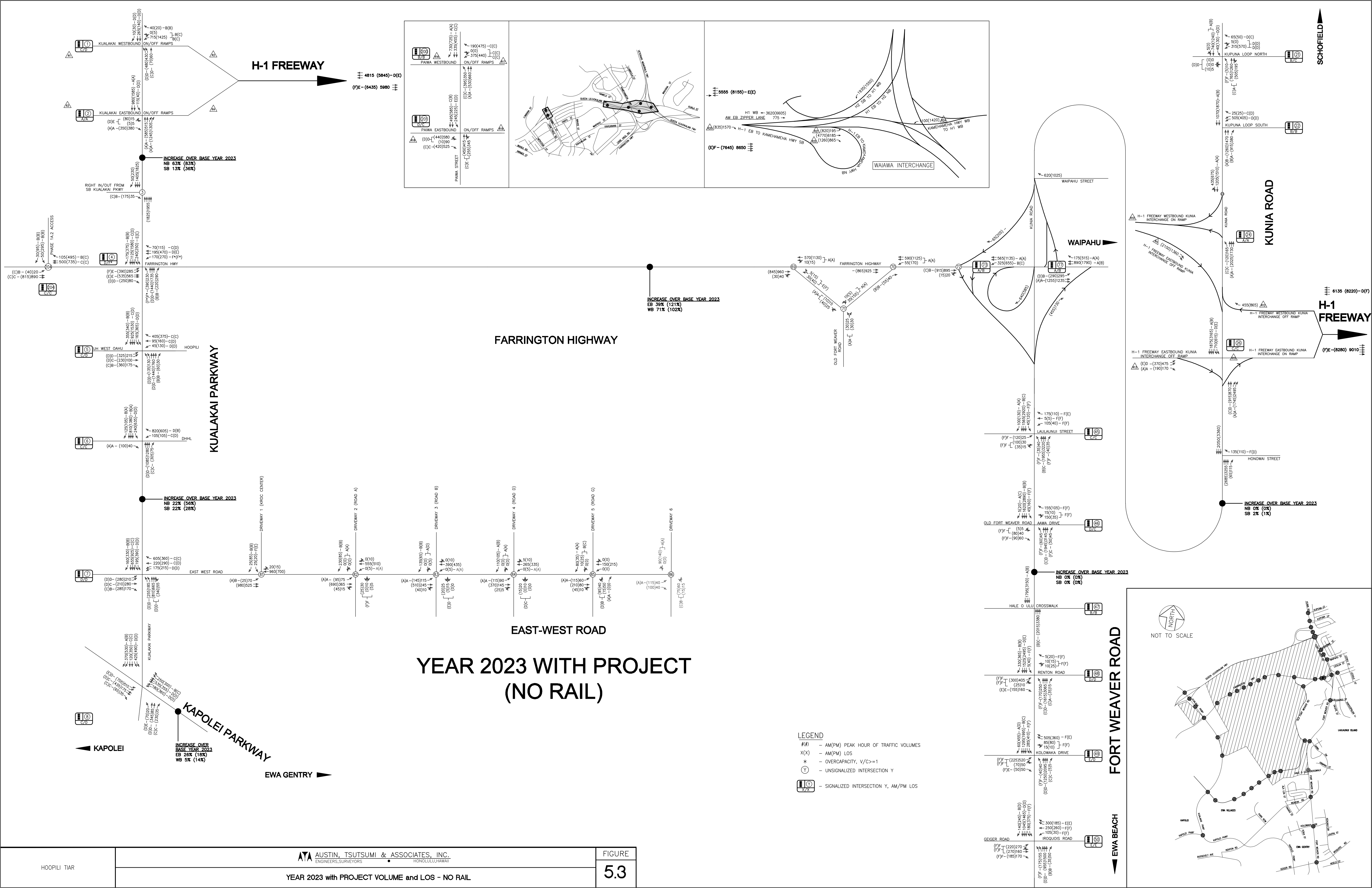
Table 5.7: Year 2023 with Project Mitigative Measures (without Rail) Analysis and Recommendations Summary

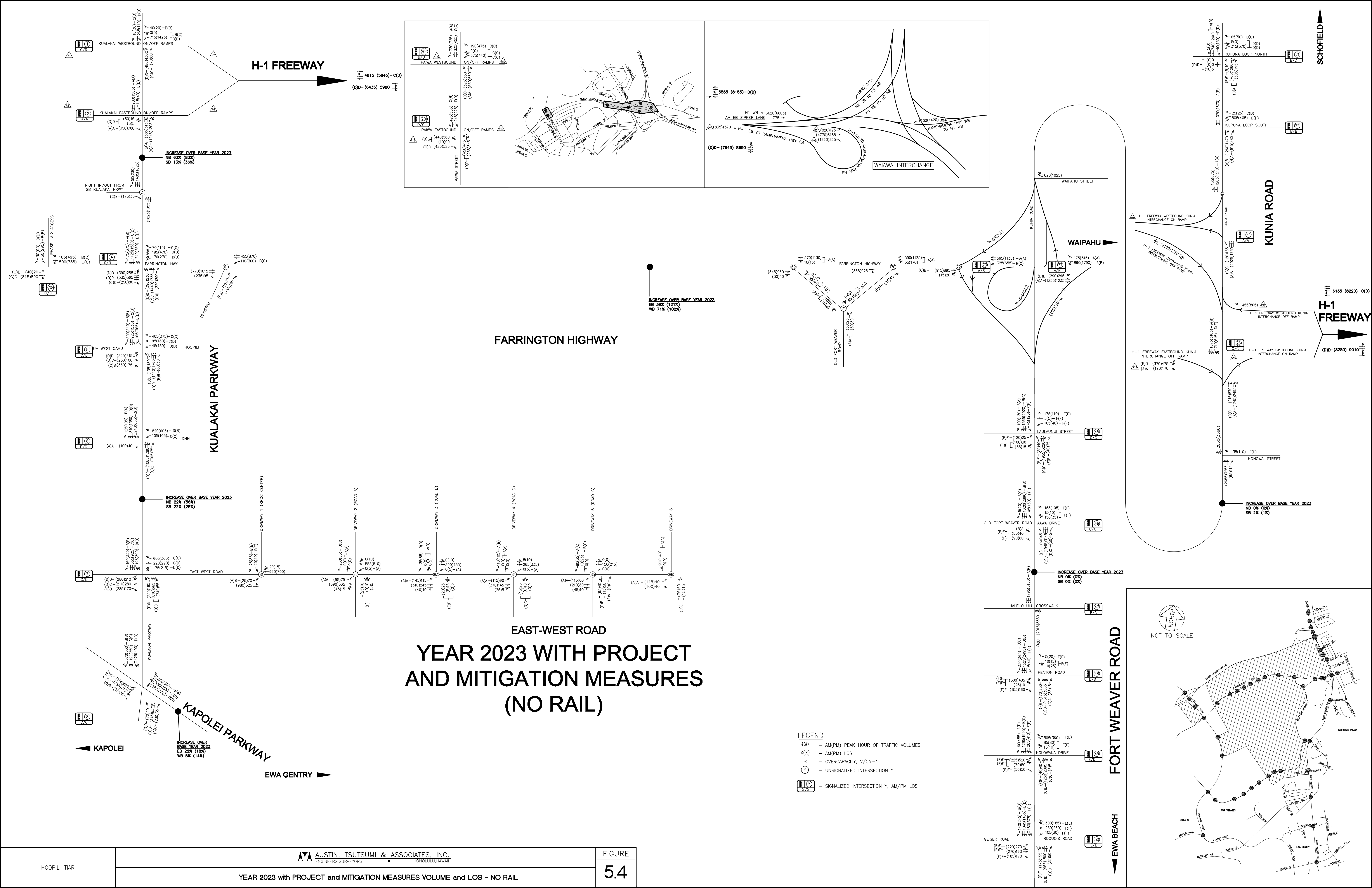
Year 2023 with Project		
ID	Intersection	Recommended Improvements
H-1 Freeway		
Provide an additional eastbound and westbound lane between the Kualakai Interchange and the H-1/H-2 Merge.		
Kualakai Parkway@		
3	Right in/out Access along southbound Kualakai Parkway ¹	<u>Southbound</u> : Provide new right-turn lane. <u>Eastbound</u> : Provide new right-turn lane.
4	Farrington Highway	<u>Northbound</u> : Provide an additional left-turn lane. <u>Eastbound</u> : Provide an additional through lane. <u>Westbound</u> : Provide an additional left-turn and through lane.
5	Future D.R. Horton Access/UH West Oahu Driveway 1 ²	<u>Northbound</u> : Provide a new right turn lane. <u>Southbound</u> : Provide two new left turn lanes. <u>Eastbound</u> : Provide one new through lane <u>Westbound</u> : Provide a new left-turn lane, right-turn lane, and through lane.
6	DHHL Access	<u>Westbound</u> : Provide a new left-turn lane.
Farrington Highway@		
61	New Farrington Highway Intersection	Refer to Figure 5.4 for recommended lane configurations.
East-West Road@		
85	Road G (Driveway 5) ²	<u>Northbound</u> : Provide a new right-turn lane. <u>Southbound</u> : Modify striping to provide a shared through/left-turn lane. <u>Eastbound</u> : Widen to provide a new left-turn lane, and a new through lane. Modify striping to provide a shared through/right-turn lane. <u>Westbound</u> : Provide a new left-turn lane and a new through lane. Modify striping to provide a shared through/right-turn lane.
86	New East-West Road Intersections	Refer to Figure 5.4 for recommended lane configurations.

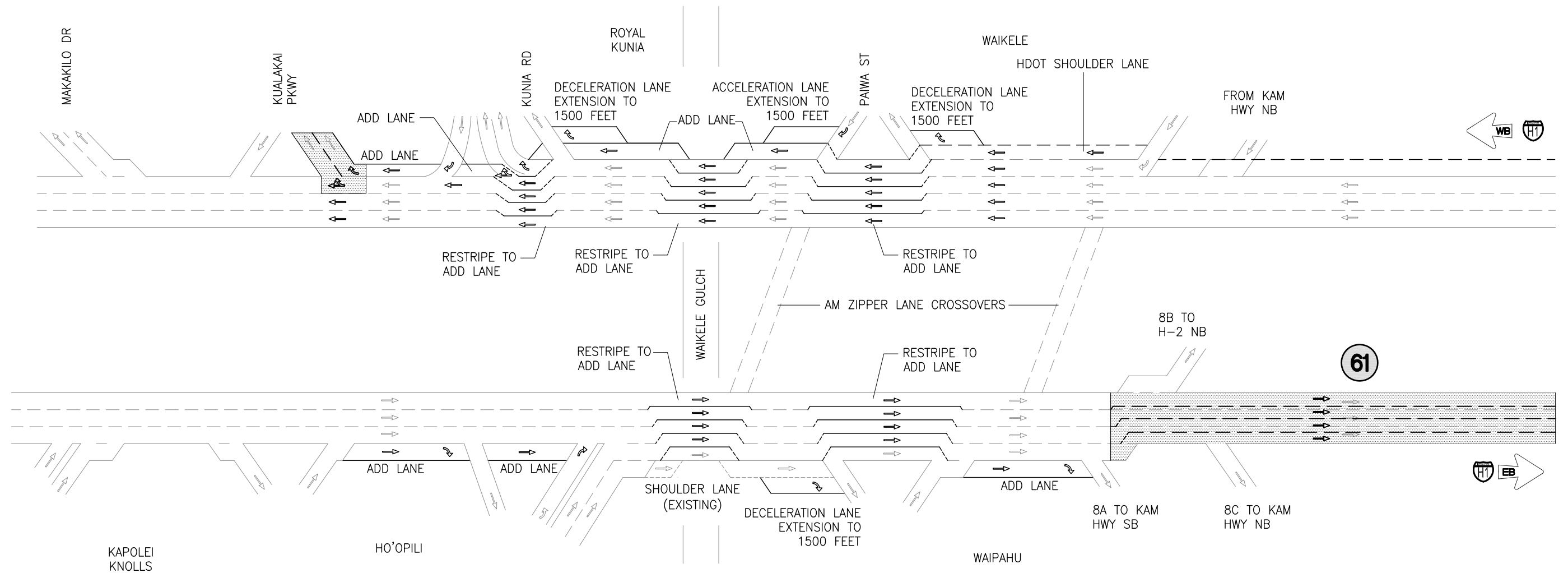
Note:

¹ New intersection recommended configuration. Lane configuration also assumed for without mitigations scenario.









LEGEND

- PROPOSED IMPROVEMENTS BY WILBUR SMITH ASSOCIATES**
- ASSUMPTION FOR LANE CONFIGURATION BASED UPON ORTP XX. REFER TO FIGURE 4.2
- ATA PROPOSED IMPROVEMENTS

NOTES

**ORIGINAL FIGURE AND PROPOSED IMPROVEMENTS DONE BY WILBUR SMITH ASSOCIATES TAKEN FROM:
FINAL TRAFFIC IMPACT ANALYSIS REPORT (TIAR)
BY WILBUR SMITH ASSOCIATES, APRIL 2011

HOOPILI TIAR

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS HONOLULU, HAWAII

RECOMMENDED FREEWAY IMPROVEMENTS

FIGURE

5.5

5.5 Year 2035 with Project Intersection Analysis

By Year 2035, the project will generate approximately 8,800(11,800) net external trips during the AM (PM) peak hours of traffic. The following increases and changes are anticipated over Base Year 2035 as a result of phases 1 and 2 of the project:

- **H-1 Freeway – 18-45 percent increase in traffic over Year 2023** as a result of the Project. As with Year 2023 with Project, it is recommended that the H-1 Freeway be restriped to provide one (1) additional lane each in the eastbound and westbound directions between the Paiwa Interchange and the Kualakai Interchange to accommodate the traffic generated by the increase in Base Year as well as the Project.

The results contained within this TIAR lead to the same conclusions and recommendations as that of the WSA FTIAR Hoopili Report, but with the following differences:

- Extend the H-1 Freeway widening in either direction east of the Waiawa interchange as per project 25 in the ORTP
- Reconfigure the westbound Off-Ramp at the Kualakai interchange to add a shared through/right-turn lane to the proposed lane drop off-ramp.

See Figure 5.5 for a proposed schematic of recommended improvements to the H-1 Freeway, segment LOS, and volume. See Table 5.6 for ramp analysis.

- **Kualakai Parkway – 21-77 percent increase in traffic compared with Year 2023.** The project will also increase cross and turning traffic at Kualakai Parkway's intersections with Farrington Highway, East-West Road, and the UHWO and DHHL Accesses. Accordingly, Project-related improvements are recommended at some of the intersections along Kualakai Parkway.
- **Farrington Highway – 32-83 percent increase in traffic over Year 2023.** Farrington Highway will serve regional and Project-related traffic. Accordingly, Project-related improvements and recommended lane configurations are provided at all intersections along Farrington Highway within the Study Area.
- **Fort Weaver Road/Kunia Road (North of Old Fort Weaver Road) 15-39 percent increase in traffic compared with Year 2023.**

The additional increase in traffic would cause the delays to increase. However, overall operations are anticipated to be similar to existing with the additional southbound lane between Kupuna Loop North and the Waipahu off-ramp.

- **Fort Weaver Road (South of Old Fort Weaver Road) – -1-26 percent increase in traffic compared with Year 2023.** As with Base Year 2035, Fort Weaver Road through the Ewa Region will continue to experience LOS F at some movements. However, this is generally ascribed to requisite long traffic signal cycle lengths rather than a lack of physical capacity. Further widening of Fort Weaver Road is not prescribed by the ORTP 2035, and is generally considered infeasible due to insufficient ROW.
- **East-West Road – 20-27 percent increase in traffic over Year 2023.**

5.5.1 Year 2035 with Project Intersection, Ramp and Freeway Analysis

See Figure 5.6, 5.7, 5.8 for Peak Hour Volumes, LOS, and recommended lane configurations for Year 2035. See Table 5.8 for the LOS summary and Table 5.9 for a summary of the recommended mitigative measures. Comprehensive intersection analysis results are provided in Appendix C.

Table 5.8: Year 2035 With Project LOS Summary

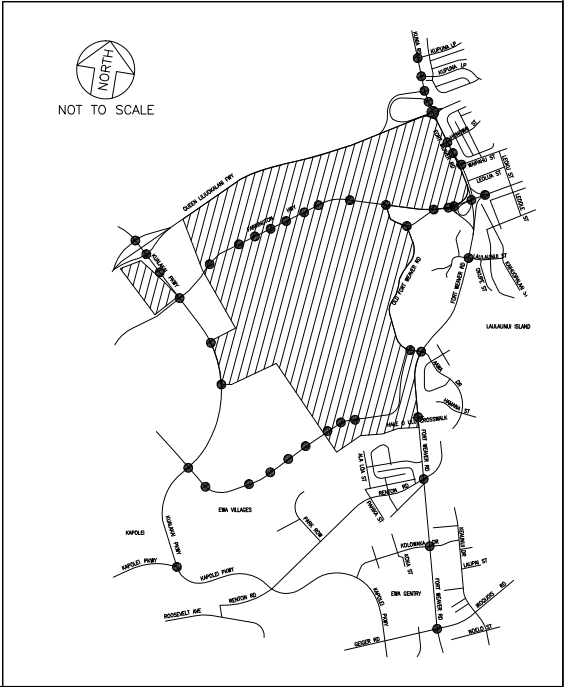
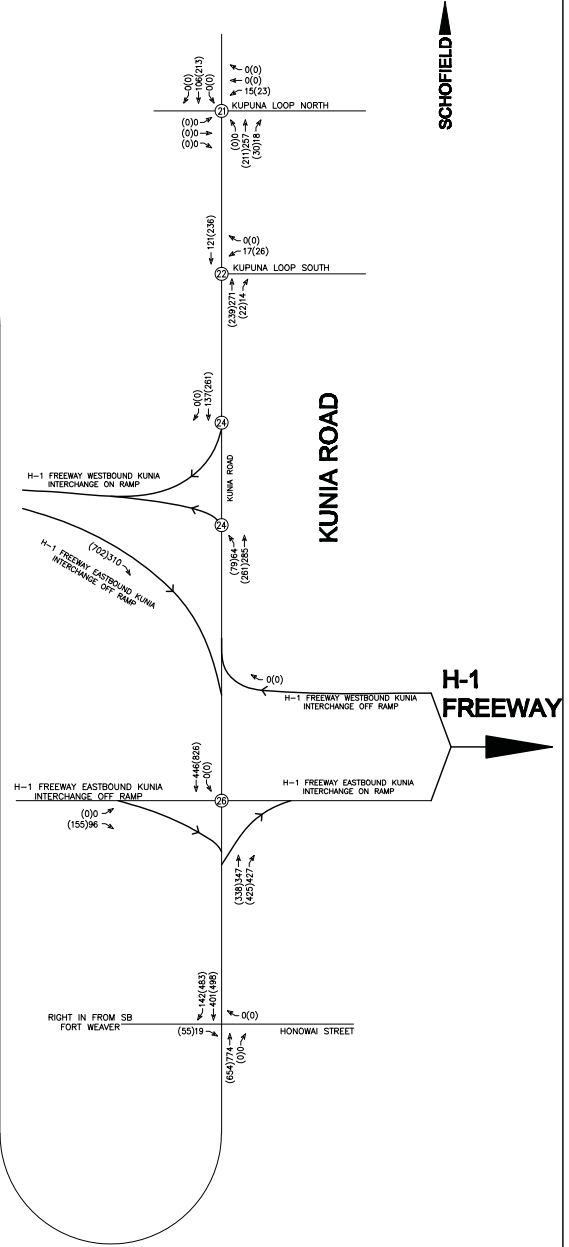
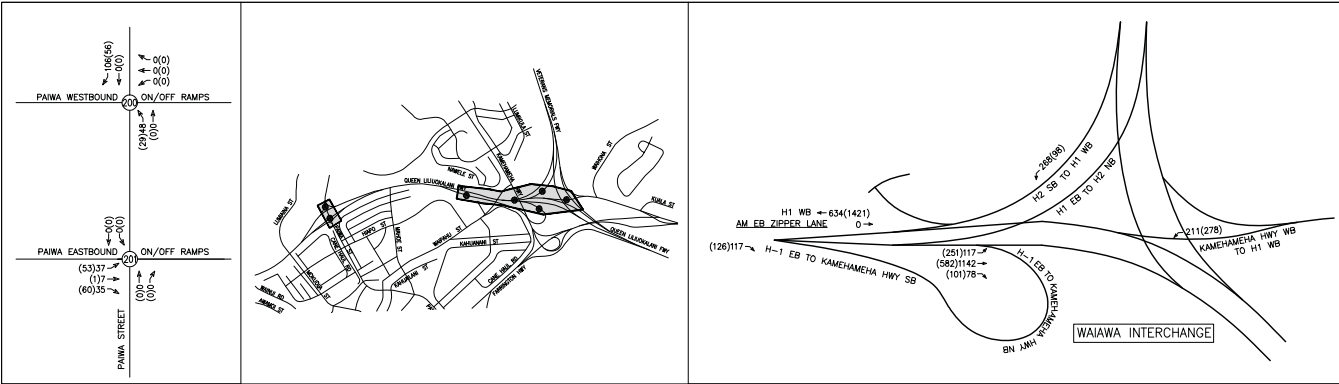
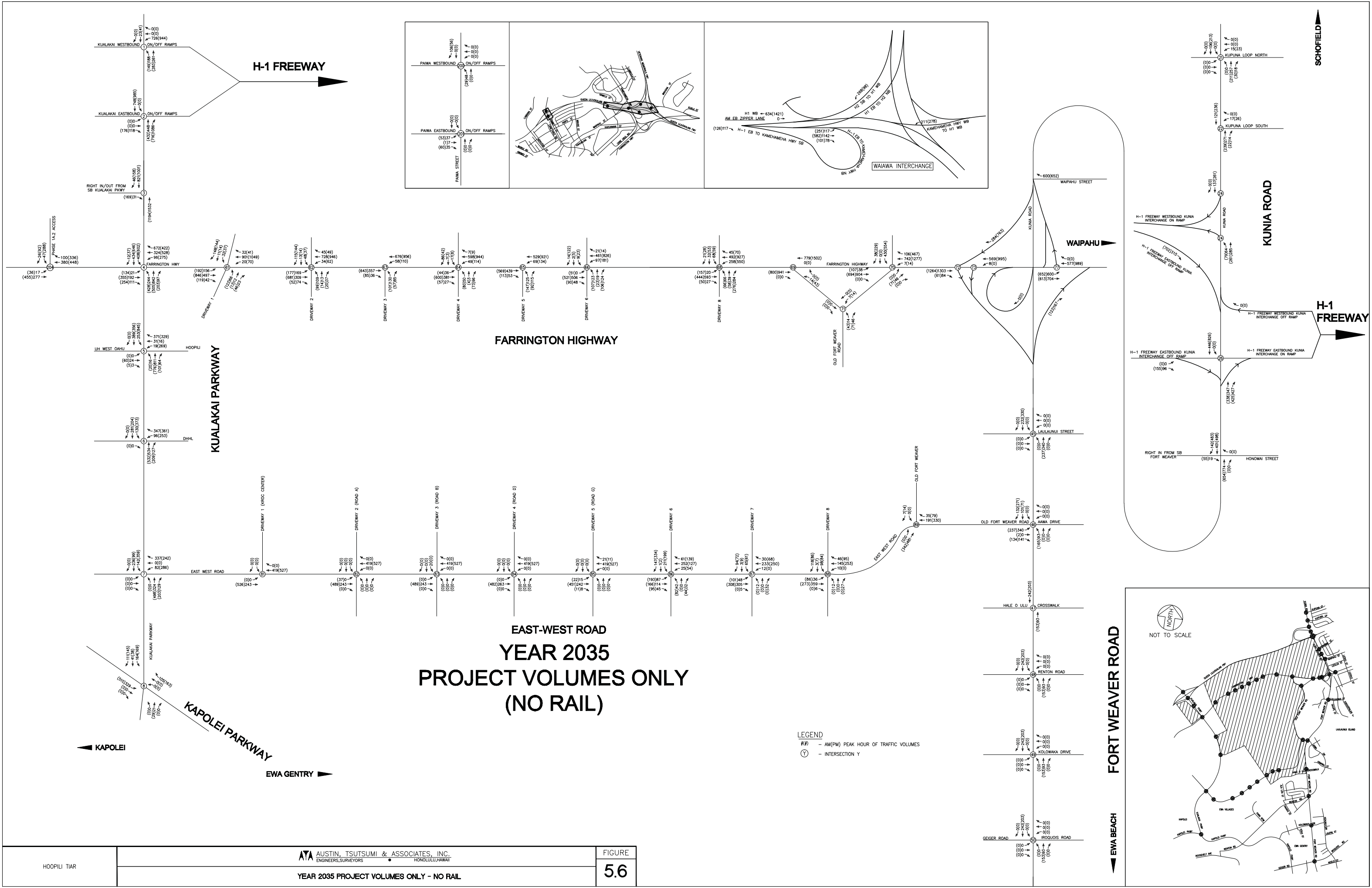
ID Intersection		Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures						
			AM			PM				AM			PM			
			Delay	v/c	LOS	Delay	v/c	LOS		Delay	v/c	LOS	Delay	v/c	LOS	
Kualakai Parkway @																
1	Westbound H-1 Freeway On/Off-Ramps	⦿	94	1.04	F*	109	1.06	F*	Yes; see Table 5.9	46	0.86	D	39	0.84	D	
2	Eastbound H-1 Freeway On/Off-Ramps	⦿	10	0.88	A	13	0.98	B	Yes; see Table 5.9	23	0.88	C	16	0.80	B	
3	Hoopili RIRO		15	0.10	B	13	0.31	B	No.							
4	Farrington Highway	⦿	102	1.14	F*	105	1.06	F*	Yes; see Table 5.9	63	0.85	E	80	0.92	E	
5	UH West Oahu/Future D.R. Horton	⦿	44	0.90	D	69	0.87	E	Yes; see Table 5.9	41	0.78	D	55	0.79	E	
6	DHHL Access	⦿	47	1.00	F*	30	0.80	C	Yes; see Table 5.9	27	0.82	C	28	0.91	C	
7	East-West Road	⦿	60	0.98	E	63	0.94	E	Yes; see Table 5.9	40	0.69	D	59	0.89	E	
8	Kapolei Parkway	⦿	61	0.77	E	56	0.83	E	Yes; see Table 5.9	48	0.64	D	45	0.74	D	
Kunia Road @																
21	Kupuna Loop (North)	⦿	23	0.87	C	54	0.97	D	Yes; see Table 5.9	22	0.87	C	51	0.97	D	
22	Kupuna Loop (South)	⦿	24	0.84	C	24	0.92	C	Yes; see Table 5.9	23	0.84	C	18	0.75	B	
24	H-1 EB Off-ramp/H1- EB On-Ramp	⦿	6	0.70	A	7	0.84	A	No.							
26	H-1 EB On-Ramp from Kunia Road	⦿	33	0.88	C	67	1.11	F*	Yes; see Table 5.9	32	0.88	C	30	0.91	C	
27	H-1 EB On-Ramp from Kunia Road	⦿	11	0.93	B	3	0.69	A	No.							
41	Honowai Street	⦿	182	1.14	F*	75	0.77	F	No. Limited ROW							
Fort Weaver Road @																
Limited ROW exisit along Fort Weaver Road and therefore mitigations cannot be accomodated.																
45	Laulaunui Street	⦿	34	0.94	C	41	0.86	D	No.							
46	Old Fort Weaver Road/Aawa Drive	⦿	214	2.79	F*	82	1.13	F*	Yes; see Table 5.9	75	1.07	F*	51	0.92	D	
47	Hale O Ulu School	⦿	13	0.81	B	16	0.74	B	No.							
48	Renton Road	⦿	60	1.00	F*	44	0.92	D	No.							
49	Kolowaka Drive	⦿	66	0.96	E	42	0.79	D	No.							
50	Geiger Road/Iroquois Point	⦿	80	0.78	F	86	0.85	F	No.							
Farrington Highway @																
61	Driveway 1	⦿	21	0.77	C	35	0.95	C	Yes; see Table 5.9	19	0.58	B	28	0.74	C	
62	Driveway 2	⦿	19	0.78	B	32	0.89	C	Yes; see Table 5.9	22	0.60	C	22	0.69	C	
63	Driveway 3	⦿	13	0.77	B	14	0.74	B	Yes; see Table 5.9	19	0.56	B	17	0.54	B	
64	Driveway 4	⦿	17	0.69	B	18	0.76	B	Yes; see Table 5.9	20	0.50	B	19	0.57	B	
65	Driveway 5	⦿	15	0.76	B	15	0.74	B	Yes; see Table 5.9	18	0.56	B	15	0.55	B	
66	Driveway 6	⦿	20	0.85	B	26	0.82	C	Yes; see Table 5.9	14	0.65	B	30	0.63	C	
68	Driveway 8	⦿	28	0.79	C	33	0.88	C	Yes; see Table 5.9	27	0.59	C	33	0.68	C	
69	Old Fort Weaver Road (East)	⦿	29	0.70	C	29	0.86	C	Yes; see Table 5.9	17	0.47	B	21	0.61	C	
70	Old Fort Weaver Road (East)	⦿	46	0.94	D	108	1.20	F*	Yes; see Table 5.9	28	0.73	C	43	0.96	D	
71	Old Fort Weaver Road (East)/Old Fort Weaver Road (West)	⦿	7	0.14	A	9	0.25	A	Yes; see Table 5.9	7	0.14	A	9	0.23	A	
73	Westbound Farrington left-turn onto Southbound Fort Weaver	⦿	40	0.99	D	59	1.12	F*	Yes; see Table 5.9	10	0.66	A	13	0.72	B	
77	Eastbound Farrington left-turn onto Norhtoubnd Kunia Road	⦿	71	1.13	F*	140	1.46	F*	Yes; see Table 5.9	10	0.70	B	21	0.91	C	
204	Phase 1.A.2 Access	⦿	22	0.50	C	22	0.65	C	Yes; see Table 5.9	21	0.37	C	13	0.54	B	
East-West Road @																
81	Kroc Center		120	0.49	F	73	0.29	F	Intersections should be monitored for signal warrant and should be signalized when warranted.							
82	Road A (Critical Movement)		162	0.78	F	244	0.82	F								
83	Road B(Critical Movement)		59	0.40	F	127	0.51	F								
84	Road D (Critical Movement)		30	0.19	D	61	0.20	F								
85	Road G (Critical Movement)		26	0.36	D	99	0.84	F								
86	Road 6 (Critical Movement)		44	0.75	E	301	1.48	F*								
87	Road 7 (Critical Movement)		18	0.23	C	29	0.38	D								
88	Road 8 (Critical Movement)		17	0.27	C	31	0.47	D								
89	Old Fort Weaver Road		29	0.65	D	35	0.67	E								
Paiwa Street @																
200	H-1 WB On-Ramp/WB Off-Ramp	⦿	15	0.72	B	24	0.80	C	No.							
201	H-1 EB Off-Ramp/H-1 EB Off-Ramp	⦿	46	0.91	D	31	0.74	C	No.							
ID Intersection		Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures						
			AM			PM				AM			PM			
			Density		LOS	Density		LOS		Density		LOS	Density		LOS	
Ramp Analysis																
An additional H-1 freeway lane would be provided in the eastbound and westbound direction between the Kualakai Interchange and the Waiawa Interchange. Therefore traffic flow along the freeway would improve and consequently improve ramp operations. Unless otherwise noted the ramp analyzed configurations remain the same.																
Kualakai Interchange																
R1	H-1 WB On-Ramp		30		D	31.5		D	Yes; see Figure 5.5	30		D	31.5		D	
R2	H-1 WB Off-Ramp		29.5		D	33.3		F	Yes; see Figure 5.5	27.3		C	29.4		D	
R3	H-1 EB Off-Ramp		28.3		D	30.4		D	No.	22.1		C	24.6		C	
R4	H-1 EB On-Ramp		45.2		F	41.5		F	Yes; see Figure 5.5	37.6		E	33.3		D	
Kunia Interchange																
R10	H-1 WB On-Ramp		42.4		F	43.3		F	Yes; see Figure 5.5	30.6		D	31.6		D	
R11	H-1 WB Loop Off-Ramp to SB Kunia Rd		36.8		F	37.8		F	Yes; see Figure 5.5	31.5		D	34.9		D	
R12	H-1 WB Off-Ramp to NB Kunia Rd		36.2		E	42		F	Yes; see Figure 5.5	29.4		D	34.4		D	
R13	H-1 EB Off-Ramp		37.5		F	43.5		F	Yes; see Figure 5.5	30.6		D	32.8		D	
R15	H-1 EB On-Ramp from SB Kunia Rd		41.8		F	47.7		F	Yes; see Figure 5.5	29.6		D	32.3		D	
Paiwa Interchange																
R16	H-1 WB On-Ramp		52.2		F	44.3		F	Yes; see Figure 5.5	36.2		F	36.5		E	
R17	H-1 WB Off-Ramp		44.6		F	41.5		F	Yes; see Figure 5.5	33.1		D	34.1		D	
R18	H-1 EB Off-Ramp		48		F	39		F	Yes; see Figure 5.5	40.1		E	32.1		D	
R19	H-1 EB On-Ramp		40.7		F	34.5		F	Yes; see Figure 5.5	32.9		D	26.7		C	
Waiawa Interchange																
R20	H-1 EB Off-Ramp Exit 8A		42.6		E	37.5		E	Yes; see Figure 5.5	35.9		E	31		D	
R21	H-1 EB Off-Ramp Exit 8B		51.4		F	39.4		E	Yes; see Figure 5.5	23		C	22.9		C	
R22	H-1 EB Loop Off-Ramp Exit 8C		41		F	33.9		D	Yes; see Figure 5.5	36.9		E	30.2		D	
R24	H-1 WB On-Ramp from Kamehameha Highway		45.2		F	47.8		F	Yes; see Figure 5.5	32.4		D	36.4		E	
Freeway Analysis																
An additional H-1 freeway lane would be provided in the eastbound and westbound direction between the Kualakai Interchange and the Waiawa Interchange. Therefore traffic flow along the freeway would improve.																
H-1 Freeway between the Kualakai Interchange and the Kunia Interchange																
	H-1 EB		67.1		F	91.4		F	Yes; see Figure 5.5	34.9		D	39.2		E	
	H-1 WB		64.3		F	68.3		F	Yes; see Figure 5.5	34.3		D	35.1		E	
H-1 Freeway between the Kunia Interchange and the Paiwa Interchange																
	H-1 EB		49.2		F	72		F	Yes; see Figure 5.5	34.8		D	40		E	
	H-1 WB		49.3		F	82.7		F	Yes; see Figure 5.5	32.9		D	42.6		E	
H-1 Freeway between the Paiwa Interchange and the Waiawa Interchange																
	H-1 EB		104		F	52		F	Yes; see Figure 5.5	46.7		F	33.9		D	
	H-1 WB		117.8		F	82.3		F	Yes; see Figure 5.5	42.5		E	42.5		E	

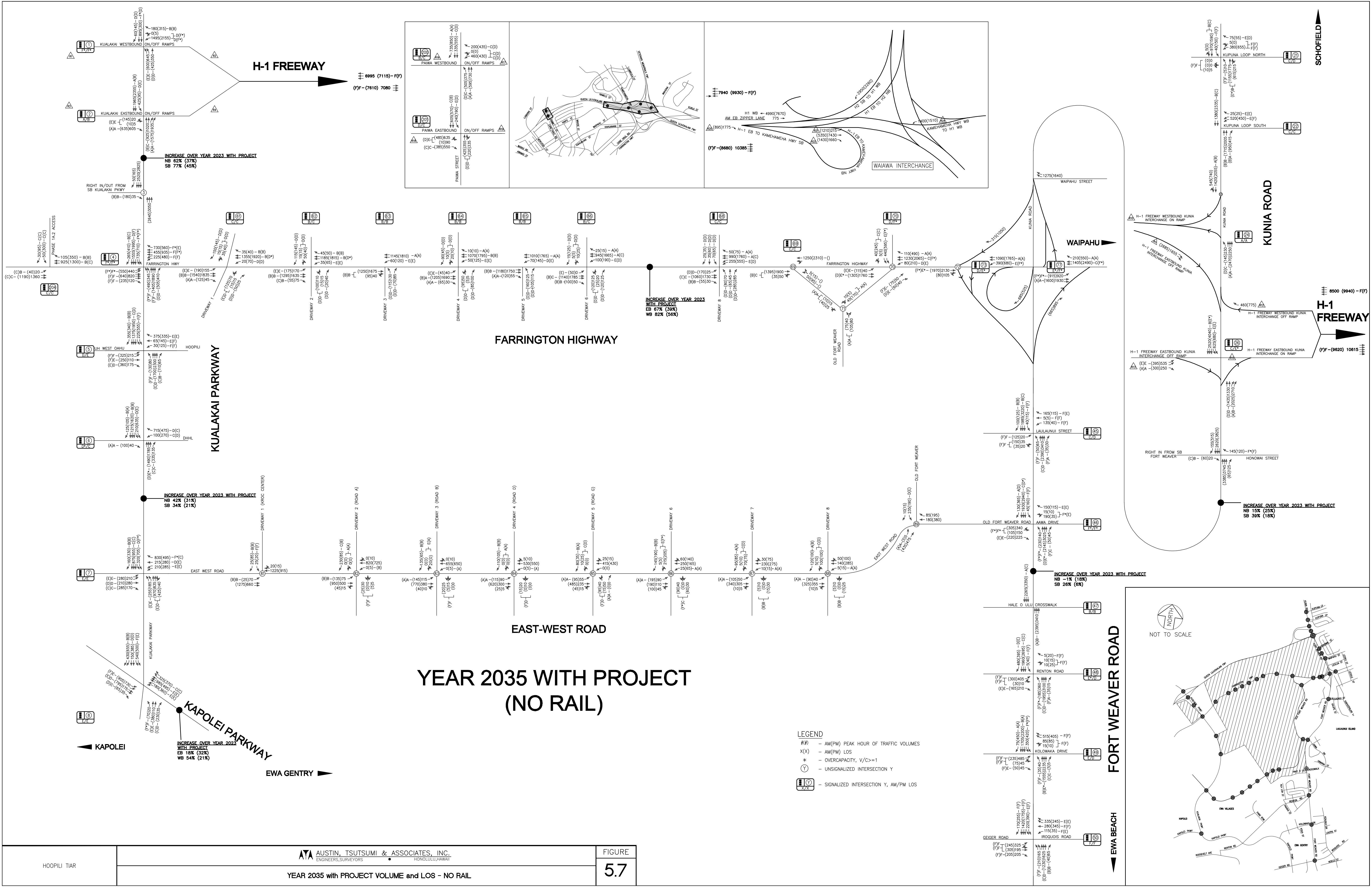
Table 5.9: Year 2035 with Project Mitigative Measures (without Rail) Analysis and Recommendations Summary

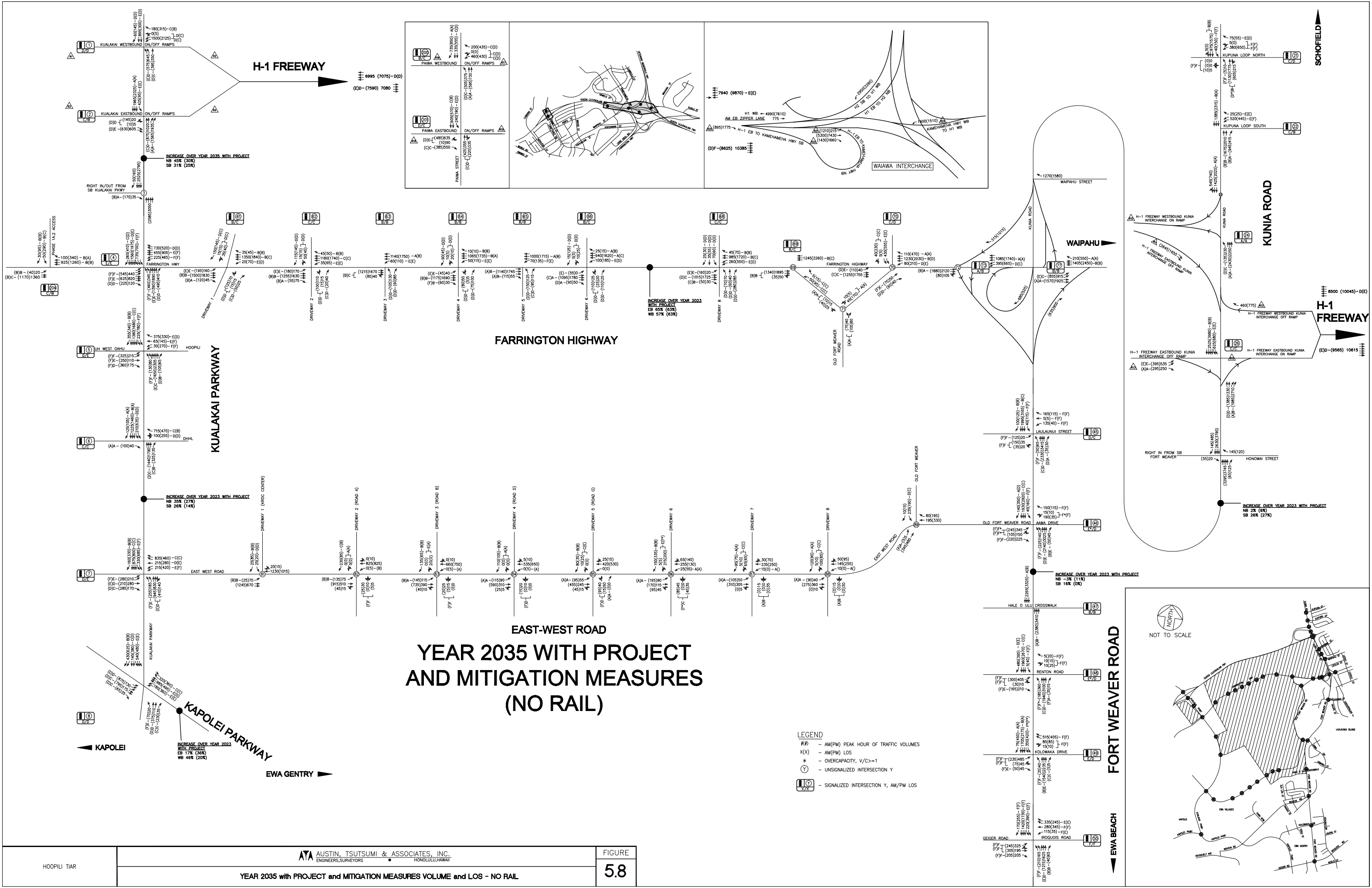
Year 2035 with Project		
ID	Intersection	Recommended Improvements
<i>Kualakai Parkway@</i>		
1	Westbound H-1 Freeway On/Off-Ramps	<u>Westbound</u> : Provide a new left-turn lane.
2	Eastbound H-1 Freeway On/Off-Ramps	<u>Southbound</u> : Provide a new through lane. <u>Eastbound</u> : Provide an additional right-turn lane; modify the right-turn lane to be signal-controlled.
4	Farrington Highway	<u>Northbound</u> : Provide an additional through lane. <u>Southbound</u> : Provide an additional left-turn and through lane. <u>Eastbound</u> : Provide an additional left-turn lane.
5	UH West Oahu/Future D.R. Horton	<u>Northbound</u> : Provide an additional through lane. <u>Southbound</u> : Provide an additional through lane. <u>Westbound</u> : Provide an additional left-turn lane.
6	DHHL Access	<u>Westbound</u> : Modify striping to provide a shared left/right lane.
7	East-West Road	<u>Westbound</u> : Provide an additional right-turn lane.
8	Kapolei Parkway	<u>Southbound</u> : Provide an additional left-turn lane. <u>Eastbound</u> : Provide an additional left-turn lane.
<i>Kunia Road@</i>		
21	Kupuna Loop (North)	<u>Southbound</u> : Provide an additional through lane.
22	Kupuna Loop (South)	<u>Southbound</u> : Provide an additional through lane.
23	H-1 WB On-ramp SBR	<u>Southbound</u> : Provide an additional through lane.
24	H-1 WB Off-Ramp/H-1 WB On-Ramp NBL	<u>Southbound</u> : Provide an additional through lane.
26	H-1 EB On-Ramp from Kunia Road	<u>Southbound</u> : Provide an additional through lane.
41	Honowai Street¹	<u>Northbound</u> : Provide an additional through lane. <u>Southbound</u> : Provide new right-turn lane. <u>Eastbound</u> : Provide new right-turn lane.
N/A	Waipahu Street On Ramp	<u>Northbound</u> : Widen Kunia Road from the Waipahu Ramp to Honowai Street to allow two lanes from Waipahu Street ramp to merge with Kunia Road. Widen Kunia Road by an additional lane from Honowai Street to the H-1 Freeway Eastbound on-ramp.
<i>Fort Weaver Road@</i>		
46	Olt Fort Weaver Road/Aawa Drive	<u>Northbound</u> : Provide an additional left-turn lane. <u>Eastbound</u> : Provide a new left-turn lane.
<i>Farrington Highway@</i>		
61-73	Farrington Highway Intersections	Widen Farrington Highway to three (3) lanes in each direction between Kualakai Parkway and Kunia Road/Fort Weaver Road.
<i>East-West Road@</i>		
86-89	New East-West Road Intersections	Refer to Figure 5.4 for recommended lane configurations.

Note:

¹ Intersection configuration due to new approach. Lane configuration also assumed for without







6. FUTURE YEAR WITH PROJECT AND RAIL TRANSIT

As discussed in section 5.1.2, it is estimated that the RT will decrease traffic by between 1 and 9 percent along major thoroughfares within the study area.

When Rail is considered, the recommendations would not differ from Year 2023 and Year 2035 with Project as is shown in Table 5.8 and 5.9 below.

The Project trip generation would decrease slightly as a result of the RT trip reduction. Overall, the Project would generate approximately 8,670(11,434) trips during the AM(PM) peak hours of traffic, respectively. The trip reductions used are low as a conservative measure. However, the benefits of RT are that it would complement the Projects' vision by providing alternate transportation in the more dense areas – therefore reducing the need for vehicular means of transportation.

6.1 Year 2023 with Project and Rail Transit

With Rail Transit traffic reductions, some movements would improve in delay. However, the main improvements would be from mitigation measures. See Figures 5.9, 5.10 and 5.11 for Peak Hour Volumes, LOS and recommended lane configurations for Year 2023 with Rail. See Table 5.10 for the LOS summary.

6.2 Year 2035 with Project and Rail Transit

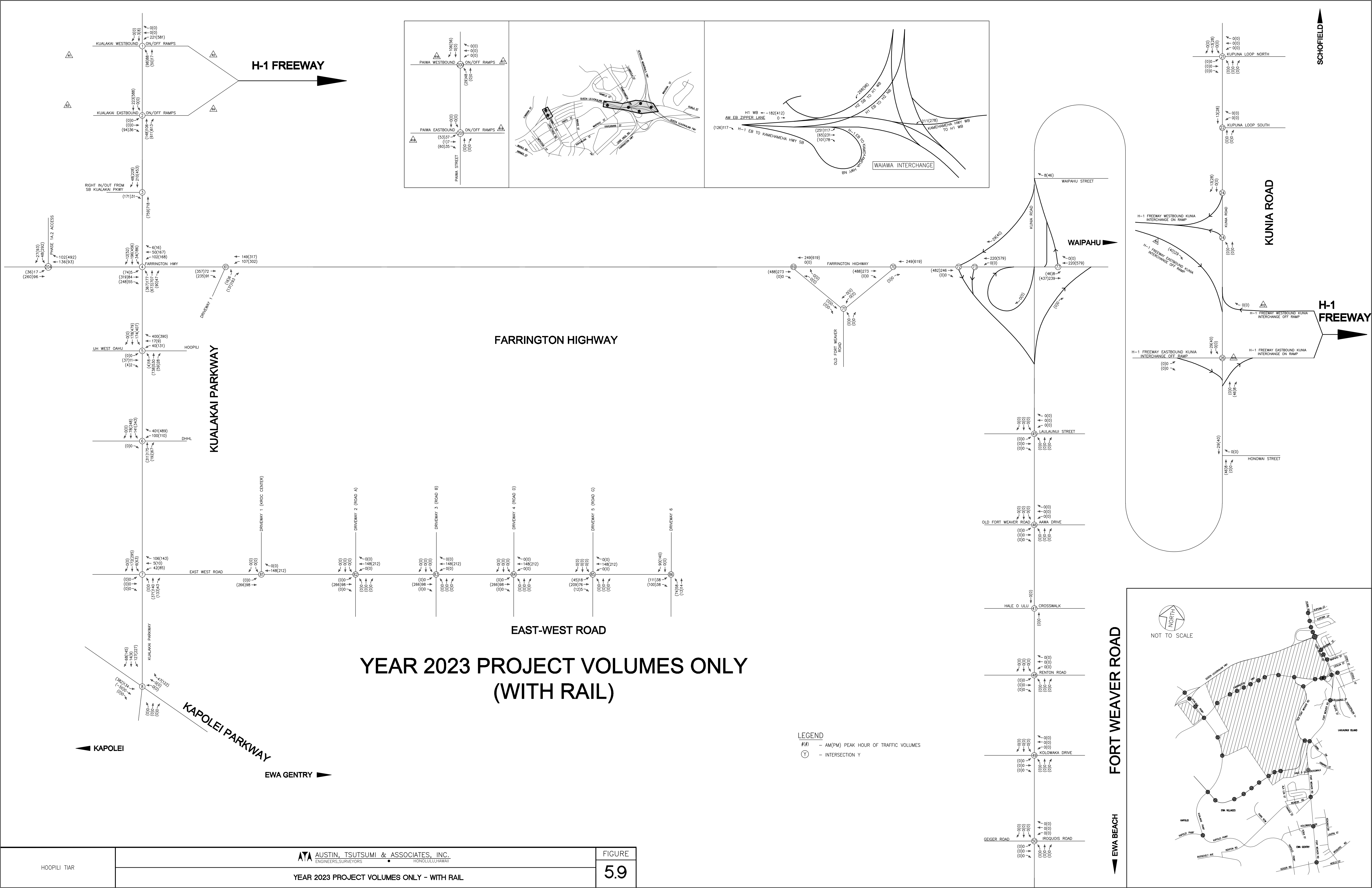
Similar to Year 2023 with RT reduction, some reduction in delay would be anticipated. However, the major improvements would be a result of the mitigations measures. See Figures 5.12, 5.13 and 5.14 for Peak Hour Volumes, LOS and recommended lane configurations for Year 2035 with Rail. See Table 5.11 for the LOS summary.

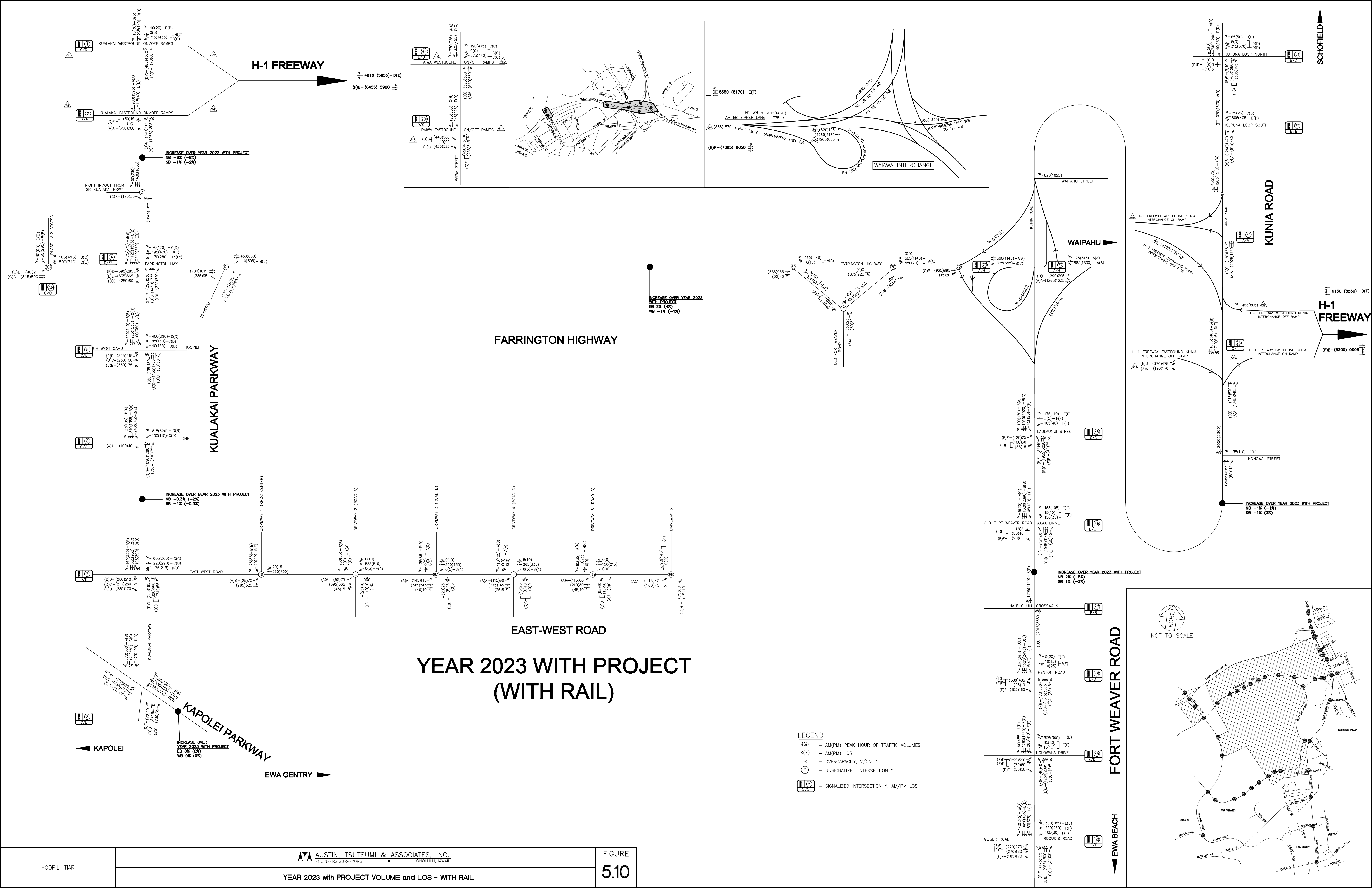
Table 5.10: Year 2023 With Project and Rail LOS Summary

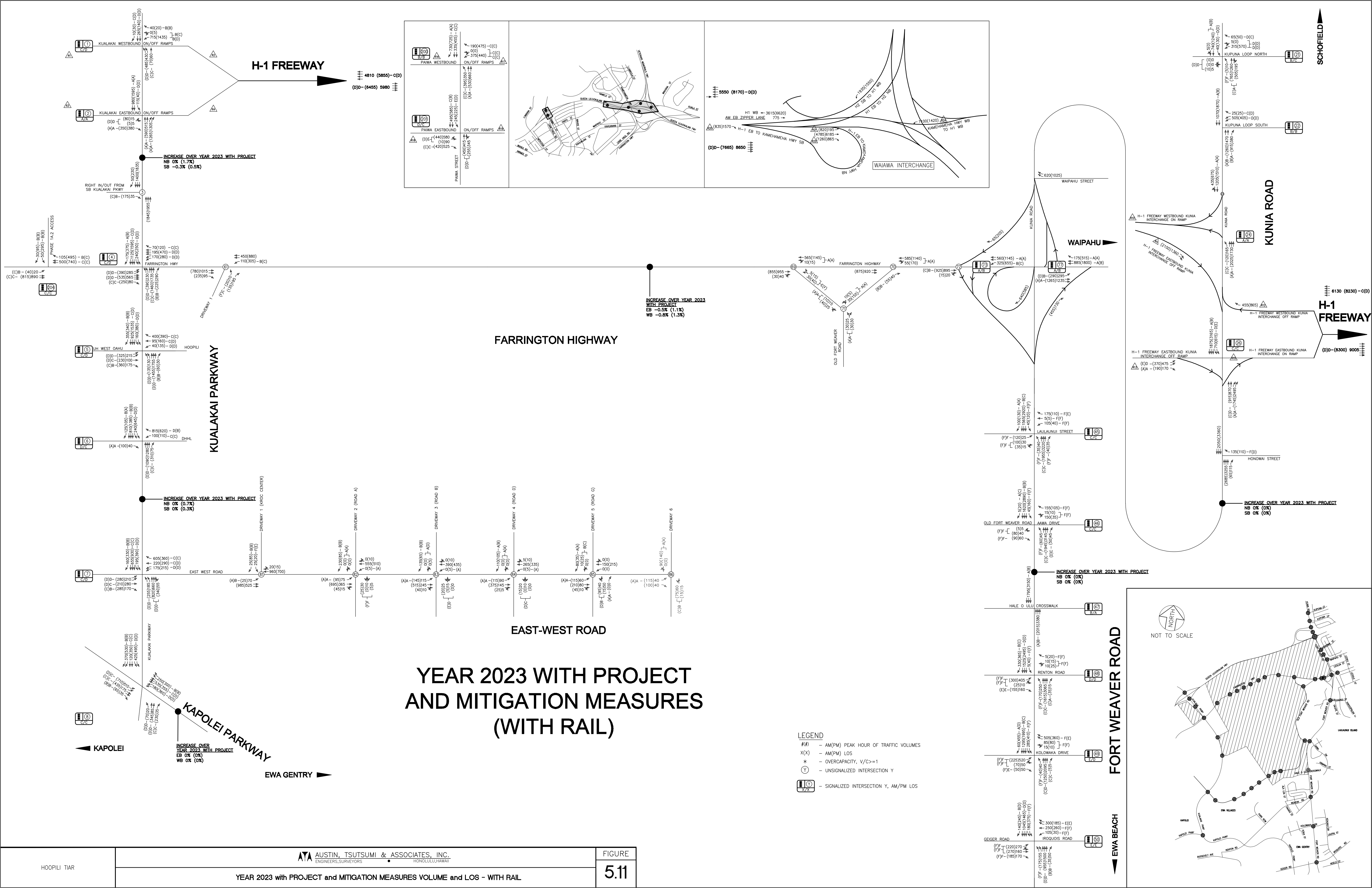
ID Intersection		Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures						
			AM			PM				AM			PM			
			Delay	v/c	LOS	Delay	v/c	LOS		Delay	v/c	LOS	Delay	v/c	LOS	
Kualakai Parkway @																
1	Westbound H-1 Freeway On/Off-Ramps	⌘	32	0.49	C	38	0.79	D	No.							
2	Eastbound H-1 Freeway On/Off-Ramps	⌘	4	0.59	A	5	0.65	A	No.							
3	Hoopili RIRO		13	0.07	B	21	0.47	C	Yes; see Table 5.7	12	0.07	B	20	0.44	C	
4	Farrington Highway	⌘	50	0.90	D	105	1.05	F*	Yes; see Table 5.7	35	0.76	C	42	0.82	D	
5	UH West Oahu/Future D.R. Horton	⌘	35	0.80	C	43	0.80	D	Yes; see Table 5.7	34	0.80	C	39	0.80	D	
6	DHHL Access	⌘	32	0.93	C	27	0.86	C	Yes; see Table 5.7	36	0.95	D	26	0.79	C	
7	East-West Road	⌘	36	0.72	D	36	0.76	D	No.							
8	Kapolei Parkway	⌘	32	0.57	C	41	0.77	D	No.							
Kunia Road @																
21	Kupuna Loop (North)	⌘	16	0.71	B	28	0.80	C	No.							
22	Kupuna Loop (South)	⌘	16	0.69	B	14	0.79	B	No.							
24	H-1 EB Off-ramp/H1- EB On-Ramp	⌘	4	0.60	A	4	0.67	A	No.							
26	H-1 EB On-Ramp from Kunia Road	⌘	25	0.76	C	27	0.89	C	No.							
27	H-1 EB On-Ramp from Kunia Road	⌘	7	0.85	A	3	0.60	A	No.							
41	Honowai Street	⌘	76	0.81	F	32	0.48	D	No. Limited ROW							
Fort Weaver Road @																
Limited ROW exist along Fort Weaver Road and therefore mitigations cannot be accomodated.																
45	Laulaunui Street	⌘	31	0.85	C	26	0.77	C	No.							
46	Old Fort Weaver Road/Aawa Drive	⌘	37	0.91	D	31	0.74	C	No.							
47	Hale O Ulu School	⌘	18	0.80	B	15	0.70	B	No.							
48	Renton Road	⌘	53	0.91	D	54	0.86	D	No.							
49	Kolowaka Drive	⌘	64	0.92	E	49	0.71	D	No.							
50	Geiger Road/Iroquois Point	⌘	64	0.69	E	69	0.71	E	No.							
Farrington Highway @																
61	Driveway 1	⌘	20	0.44	c	56	0.85	F	No.							
69	Old Fort Weaver Road (West)	⌘	38	0.26	E	60	0.49	F	No.							
70	Old Fort Weaver Road (East)	⌘	13	0.08	B	13	0.11	B	No.							
71	Old Fort Weaver Road (East)/Old Fort Weaver Road (West)	⌘	7	0.06	A	8	0.08	A	No.							
73	Westbound Farrington left-turn onto Southbound Fort Weaver	⌘	9	0.80	A	17	0.78	B	No.							
77	Eastbound Farrington left-turn onto Northbound Kunia Road	⌘	5	0.58	A	11	0.82	B	No.							
204	Phase 1.A.2 Access	⌘	23	0.35	C	22	0.50	C	No.							
East-West Road @																
81	Kroc Center		53	0.27	F	37	0.16	E	Intersections should be monitored for signal warrant and should be signalized when warranted.							
82	Road A (Critical Movement)		54	0.41	F	58	0.33	F								
83	Road B(Critical Movement)		29	0.22	D	0.47	0.24	E								
84	Road D (Critical Movement)		18	0.10	C	30	0.10	D								
85	Road G (Critical Movement)		14	0.20	B	26	0.42	D								
86	Road 6 (Critical Movement)		11	0.12	B	16	0.24	C								
Paiwa Street @																
200	H-1 WB On-Ramp/WB Off-Ramp	⌘	14	0.71	B	20	0.76	B	No.							
201	H-1 EB Off-Ramp/H-1 EB Off-Ramp	⌘	46	0.90	D	30	0.77	C	No.							
ID Intersection		Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures						
			AM			PM				AM			PM			
			Density		LOS	Density		LOS		Density		LOS	Density		LOS	
Freeway Analysis																
An additional H-1 freeway lane would be provided in the eastbound and westbound direction between the Kualakai Interchange and the Waiawa Interchange. Therefore traffic flow along the freeway would improve.																
H-1 Freeway between the Kualakai Interchange and the Kunia Interchange																
	H-1 EB		42.8		E	50.8		F	Yes; see Figure 5.5	28.1	D		30.7	D		
	H-1 WB		30.5		D	41.1		E	Yes; see Figure 5.5	22.6	C		27.5	D		
H-1 Freeway between the Kunia Interchange and the Paiwa Interchange																
	H-1 EB		35.8		E	46.7		F	Yes; see Figure 5.5	28.3	D		31.9	D		
	H-1 WB		28.9		D	45.8		F	Yes; see Figure 5.5	23	C		31.5	D		
H-1 Freeway between the Paiwa Interchange and the Waiawa Interchange																
	H-1 EB		51.5		F	39.7		E	Yes; see Figure 5.5	33.7	D		28.9	D		
	H-1 WB		37.4		E	45.1		F	Yes; see Figure 5.5	26	D		31.2	D		

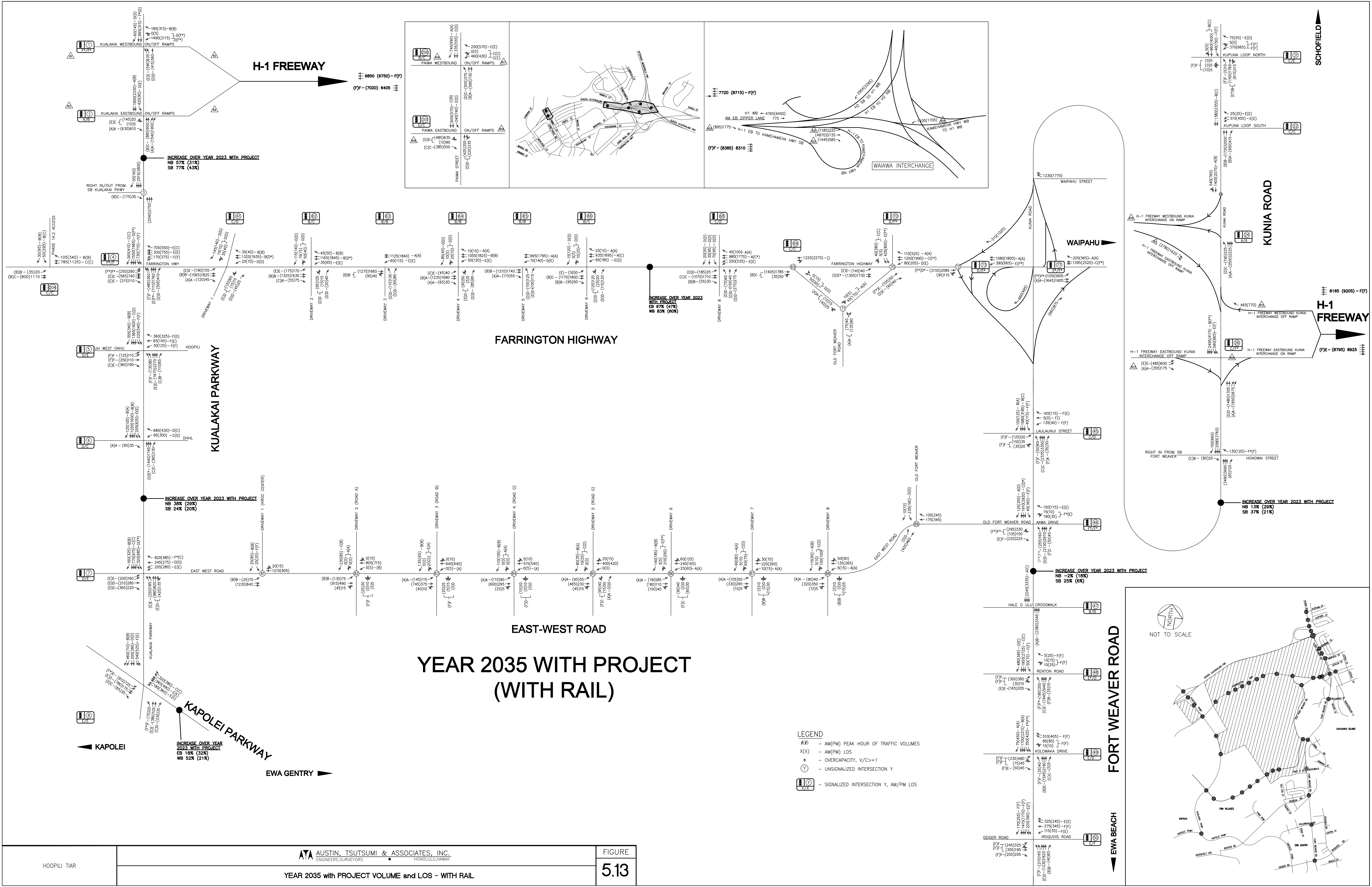
Table 5.11: Year 2035 With Project and Rail LOS Summary

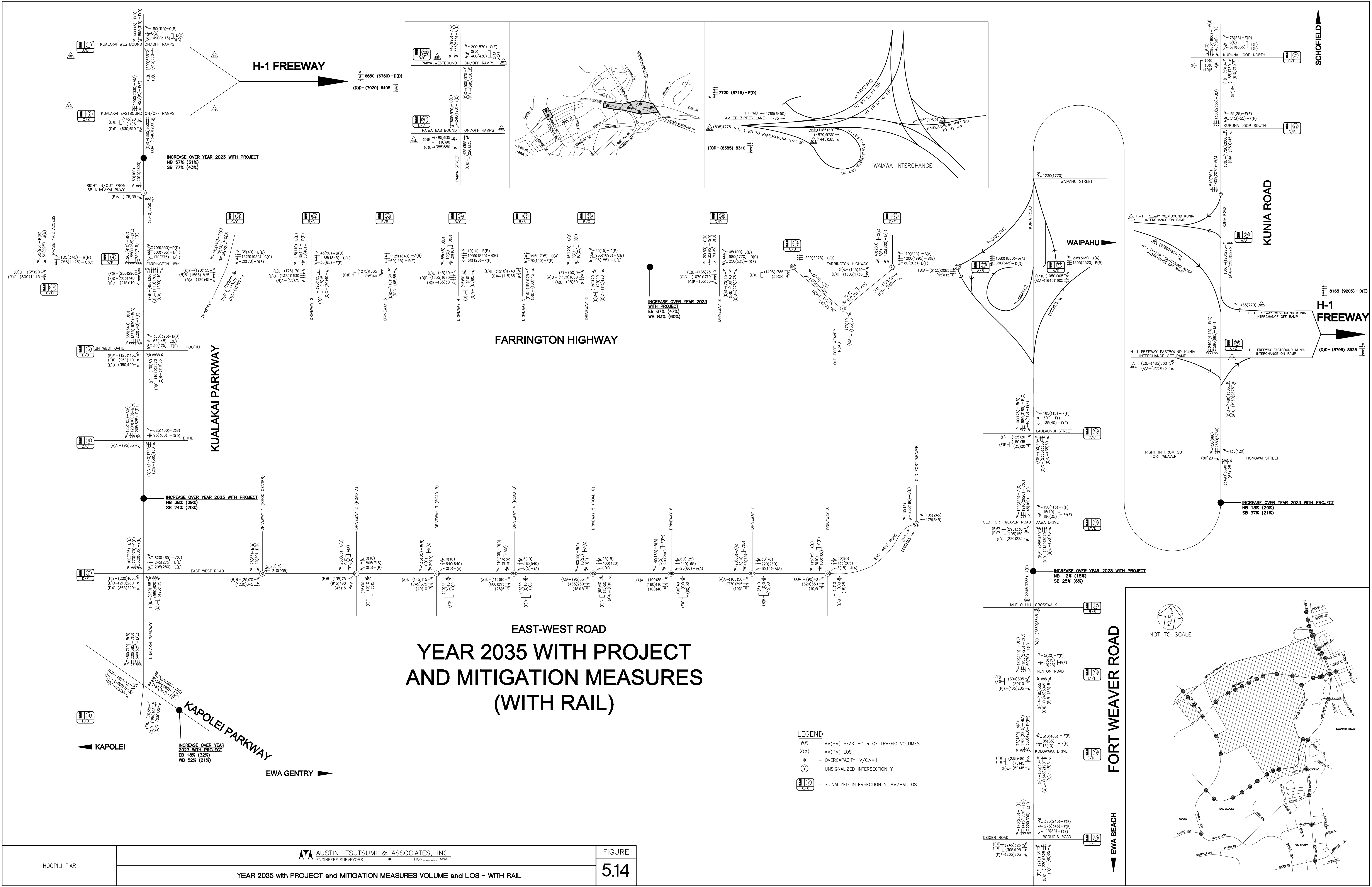
ID Intersection			Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures					
				AM			PM				AM			PM		
				Delay	v/c	LOS	Delay	v/c	LOS		Delay	v/c	LOS	Delay	v/c	LOS
Kualakai Parkway @																
1	Westbound H-1 Freeway On/Off-Ramps		⌘	94	1.04	F*	109	1.06	F*	Yes; see Table 5.9	46	0.86	D	38	0.83	D
2	Eastbound H-1 Freeway On/Off-Ramps		⌘	9	0.86	A	12	0.95	B	Yes; see Table 5.9	23	0.86	C	16	0.80	B
3	Hoopili RIRO			15	0.10	C	13	0.29	B	No.						
4	Farrington Highway		⌘	81	1.07	F*	81	0.99	F	Yes; see Table 5.9	46	0.81	D	67	0.81	E
5	UH West Oahu/Future D.R. Horton		⌘	49	0.84	D	61	0.85	E	Yes; see Table 5.9	36	0.73	D	51	0.75	D
6	DHHL Access		⌘	41	0.97	D	28	0.81	C	Yes; see Table 5.9	26	0.79	C	26	0.88	C
7	East-West Road		⌘	55	0.95	D	60	0.92	E	Yes; see Table 5.9	39	0.67	D	56	0.88	E
8	Kapolei Parkway		⌘	60	0.77	E	57	0.84	E	Yes; see Table 5.9	47	0.64	D	45	0.74	D
Kunia Road @																
21	Kupuna Loop (North)		⌘	22	0.86	C	56	0.98	E	Yes; see Table 5.9	21	0.86	C	53	0.98	D
22	Kupuna Loop (South)		⌘	24	0.83	C	25	0.93	C	Yes; see Table 5.9	23	0.83	C	18	0.75	B
24	H-1 EB Off-ramp/H1- EB On-Ramp		⌘	5	0.69	A	9	0.88	A	No.						
26	H-1 EB On-Ramp from Kunia Road		⌘	35	0.88	C	83	1.16	F*	Yes; see Table 5.9	33	0.88	C	36	0.96	D
27	H-1 EB On-Ramp from Kunia Road		⌘	10	0.89	A	3	0.65	A	No.						
41	Honowai Street		⌘	145	1.03	F*	86	0.82	F	No. Limited ROW						
Fort Weaver Road @																
Limited ROW exisit along Fort Weaver Road and therefore mitigations cannot be accomodated.																
45	Laulaunui Street		⌘	32	0.92	C	40	0.85	D	No.						
46	Old Fort Weaver Road/Aawa Drive		⌘	219	2.68	F*	82	1.14	F*	Yes; see Table 5.9	71	1.06	F*	51	0.92	D
47	Hale O Ulu School		⌘	12	0.79	B	16	0.74	B	No.						
48	Renton Road		⌘	64	1.02	F*	46	0.92	D	No.						
49	Kolowaka Drive		⌘	64	0.94	E	42	0.79	D	No.						
50	Geiger Road/Iroquois Point		⌘	80	0.77	E	87	0.84	F	No.						
Farrington Highway @																
61	Driveway 1		⌘	21	0.76	C	36	0.95	D	Yes; see Table 5.9	23	0.56	C	27	0.74	C
62	Driveway 2		⌘	19	0.77	B	33	0.90	C	Yes; see Table 5.9	18	0.58	B	28	0.68	C
63	Driveway 3		⌘	13	0.76	B	14	0.74	B	Yes; see Table 5.9	13	0.57	B	18	0.54	B
64	Driveway 4		⌘	17	0.69	B	18	0.81	B	Yes; see Table 5.9	18	0.50	B	23	0.61	C
65	Driveway 5		⌘	15	0.75	B	15	0.75	B	Yes; see Table 5.9	15	0.57	B	17	0.56	B
66	Driveway 6		⌘	20	0.85	B	27	0.83	C	Yes; see Table 5.9	16	0.65	B	21	0.63	C
68	Driveway 8		⌘	27	0.78	C	36	0.90	C	Yes; see Table 5.9	26	0.65	C	36	0.69	D
69	Old Fort Weaver Road (West)		⌘	29	0.66	C	27	0.85	C	Yes; see Table 5.9	24	0.47	C	16	0.60	B
70	Old Fort Weaver Road (East)		⌘	43	0.92	D	125	1.28	F*	Yes; see Table 5.9	26	0.72	C	70	0.93	E
71	Old Fort Weaver Road (East)/Old Fort Weaver Road (West)		⌘	7	0.14	A	9	0.27	A	Yes; see Table 5.9	7	0.14	A	9	0.27	A
73	Westbound Farrington left-turn onto Southbound Fort Weaver		⌘	35	0.98	D	79	1.17	F*	Yes; see Table 5.9	9	0.65	A	13	0.75	B
77	Eastbound Farrington left-turn onto Norhtoubnd Kunia Road		⌘	69	1.11	F*	174	1.56	F*	Yes; see Table 5.9	10	0.69	A	36	0.96	D
204	Phase 1.A.2 Access		⌘	23	0.43	C	21	0.60	C		22	0.31	C	20	0.46	B
East-West Road @																
81	Kroc Center			113	0.47	F	68	0.28	F	Intersections should be monitored for signal warrant and should be signalized when warranted.						
82	Road A (Critical Movement)			150	0.75	F	214	0.76	F							
83	Road B(Critical Movement)			56	0.39	F	116	0.48	F							
84	Road D (Critical Movement)			29	0.18	D	58	0.19	F							
85	Road G (Critical Movement)			25	0.35	C	87	0.80	F							
86	Road 6 (Critical Movement)			38	0.71	E	244	1.35	F*							
87	Road 7 (Critical Movement)			17	0.21	C	27	0.36	D							
88	Road 8 (Critical Movement)			16	0.27	C	29	0.46	D							
89	Old Fort Weaver Road			27	0.63	D	30	0.61	D							
Paiwa Street @																
200	H-1 WB On-Ramp/WB Off-Ramp		⌘	15	0.72	B	31	0.90	C	No.						
201	H-1 EB Off-Ramp/H-1 EB Off-Ramp		⌘	46	0.91	D	31	0.74	C	No.						
ID Intersection			Signalized?	without Mitigative Measures						Mitigation Recommended?	with Mitigative Measures					
				AM			PM				AM			PM		
				Density		LOS	Density		LOS		Density		LOS	Density		LOS
Freeway Analysis																
An additional H-1 freeway lane would be provided in the eastbound and westbound direction between the Kualakai Interchange and the Waiawa Interchange. Therefore traffic flow along the freeway would improve.																
H-1 Freeway between the Kualakai Interchange and the Kunia Interchange																
	H-1 EB			49.9		F	65.1		F	Yes; see Figure 5.5	30.5		D	34.4		D
	H-1 WB			60.1		F	57.5		F	Yes; see Figure 5.5	33.2		D	32.6		D
H-1 Freeway between the Kunia Interchange and the Paiwa Interchange																
	H-1 EB			35.3		E	53.8		F	Yes; see Figure 5.5	28		D	34.6		D
	H-1 WB			45		F	61.6		F	Yes; see Figure 5.5	31.2		D	37.1		E
H-1 Freeway between the Paiwa Interchange and the Waiawa Interchange																
	H-1 EB			46.8		F	47.8		F	Yes; see Figure 5.5	31.9		D	32.3		D
	H-1 WB			98.8		F	52.5		F	Yes; see Figure 5.5	40.2		E	34.1		D











7. CONCLUSIONS

Hoopili is a master planned community that will provide approximately 11,800 dwelling units (approximately 61 percent workforce housing) to meet the demands of Oahu's increasing population. The master plan also includes commercial, business mixed use, light industrial, school, park, and agricultural land uses. It is anticipated that Hoopili will generate as many as 27,000 construction jobs and 7,000 permanent jobs at the time of full buildout.

Ultimately, the Project is anticipated to generate as many as 8,000(10,154) net external trips during the AM(PM) peak hours of traffic, without considering the benefits of the City and County of Honolulu's Rail Transit system – anticipated to be completed in 2019.

Two rail stops for the proposed Rail Transit system will be provided within the site plan; however the roadway and intersection recommendations contained herein would be the same with or without Rail.

As part of its sustainable planning objectives, Hoopili will strategically concentrate its high-density business mixed use development within walking distance (0.5 miles) of the Hoopili and UHWO Rail Stops, while also envisioning the provision of bus stops within a 5-10 minute walk from anywhere within the community for easy access. In addition, neighborhood commercial land uses will be dispersed throughout the Project to provide convenient walking and bicycling access to residential areas.

In light of recent Complete Streets legislation, it is recommended that the Developer work with the City and County of Honolulu and the Hawaii Department of Transportation to design their roadway networks and cross-sections in a manner that embraces the principles of complete streets design. This could include the provision of bicycle lanes, mixed use paths, and other amenities that encourage and equalize the experience for non-motorized modes of transportation.

It should be noted that the recommendations made for Years 2023 and 2035 have been made based upon long-term planning estimates, and in lieu of data regarding the actual impact of the proposed Rail Transit system and speed of nearby development – which is driven by ever-changing market demand. Therefore, it is recommended that periodic updates to this TIAR be performed periodically.

7.1 Existing Conditions

The Project is generally located in the Kapolei-Ewa region. Over the past 20 years, Kapolei has continued its development as a “second city,” with its resort area, commercial/retail spaces, government agency buildings, Kapolei Judicial Building, Kalaeloa Industrial park and the University of Hawaii West Oahu.

In the vicinity of the Project, the H-1 Freeway, Farrington Highway, and Kapolei Parkway service the regional east-west corridor. While regional traffic is currently weighted more heavily towards the Primary Urban Center during the AM peak hour and away from it during the PM peak hour,

the Ewa-Kapolei region is anticipated to steadily increase its share of island-wide employment through the continuing development of the “second city” of Kapolei. Refer to section 4.1.1 and Table 4.1.

H-1 Freeway services West Oahu and experiences a volume of approximately 3,500-7,500 vehicles per hour in either direction during the peak hours of traffic between the Kunia and Paiwa Interchanges.

During the AM peak hour of traffic, traffic queues in the critical eastbound direction often queue back to either the Paiwa Interchange or the Kunia Interchange as a result of downstream conditions near the H-1/H-2 Merge, and at the Pearl City Interchange.

During the PM peak hour of traffic, congestion occurs in the critical westbound direction near the H-1/H-2 Merge and the Waipahu westbound off-ramp; the H-1 Freeway and its ramps generally operate smoothly to the west of the H-1/H-2 Merge.

Kualakai Parkway was recently completed in conjunction with the Kapolei Parkway extension. Kualakai Parkway currently provides alternative access for Kapolei and Ewa residents destined for the H-1 Freeway. Recently, the KROC Center, and UHWO have opened along Kualakai Parkway. Currently, Kualakai Parkway carries approximately 1,200(1,500) vehicles per hour during the AM(PM) peak hours of traffic, and operates at near free-flow conditions in lieu of much of the of planned adjacent development including East Kapolei, full build-out of UHWO, and Kamakana Alii. At the time of data collection, Kualakai Parkway was primarily used as an alternate access to the H-1 Freeway for Ewa and Kapolei Residents.

Kapolei Parkway currently serves as a 6-lane arterial connection between Kapolei and the Ewa Area. Throughout the study area, Kapolei Parkway services approximately 1,000(1,200) vehicles per hour during the AM(PM) peak hours of traffic and generally operates at near free-flow conditions in lieu of Planned neighboring development. Kapolei parkway is generally used for east-west access between Kapolei and Ewa Beach, and also as a means of accessing the H-1 Freeway via Kualakai Parkway.

Farrington Highway provides east-west regional access between Makakilo/Kapolei and the H-1 Freeway and Kamehameha Highway at the H-1/H-2 Merge. Within the study area, Farrington Highway services approximately 700 (650) vehicles per hour during the AM(PM) peak hours of traffic. Although it currently only provides 2 lanes between Kapolei and west of the Farrington Interchange, some residents use it as an alternate route to the H-1 Freeway during their commutes. Farrington Highway is generally not congested during the AM or PM peak hours of traffic within the study area; during the AM peak hour of traffic, eastbound commuter congestion begins near Mokuola Street in Waipahu.

Fort Weaver Road – south of its Farrington Highway Interchange – currently experiences some congestion during the AM(PM) peak hours of traffic as a result of its requisite long cycle lengths; the long cycle lengths are a result of its existing split-phase traffic signal configurations and long pedestrian crossing times.

Kunia Road provides access to Kunia, the H-1 Freeway and Schofield-bound traffic. During the AM peak hour of traffic queues were observed to form in the northbound direction. However,

queues were observed to clear after each cycle length. The eastbound H-1 Freeway on-ramp was observed to operate with some delay as a result of the congestion along the eastbound H-1 Freeway. During the PM peak hour of traffic, the heavier volume direction was observed in the southbound direction and flowed relatively smoothly.

7.2 Base Year Projections

The projections within this report are based upon the Oahu Regional Transportation (ORTP) 2035, prepared by the Oahu Metropolitan Planning Organization in 2011; its macroscopic results were refined to reconcile turning movements and cross-traffic based upon Trip Generation and projections from the TIARs of known developments.

7.2.1 Base Year 2023 without Rail

By Base Year 2023, traffic will have grown significantly along Kualakai Parkway, Farrington Highway, and Kapolei Parkway as nearby projects in Kapolei, Barbers Point, and Kalaeloa are constructed. Combined, these projects are anticipated to add households, industrial land uses, and new commercial space. As a result, it is estimated that traffic will increase along the major roadways as follows:

- H-1 Freeway – 9(6) percent increase in east-west traffic during AM(PM) peak hour of traffic.
- Kualakai Parkway – 90-125 percent increase in traffic as a result of the continuing development. It is assumed that Kualakai Parkway will need to be widened to six (6) lanes by Base Year 2023, as recommended by the ORTP project 22.
- Farrington Highway – 39-55 percent increase in traffic as a result of development along Kualakai Parkway, as well as other Kapolei Developments, including Kalaeloa Harborside and West Kapolei.
- Fort Weaver Road/Kunia Road – between 3 percent decrease and 12 percent increase as a result of a shift in employment away from Honolulu, and “winding down” of residential development within the Ewa area.
- East-West Road – A portion is assumed to be constructed as a part of the East Kapolei II development.

7.2.2 Base Year 2035 without Rail

By Base Year 2035, traffic will have grown significantly along Kualakai Parkway, Farrington Highway, and Kapolei Parkway as nearby projects in Kapolei, Barbers Point, and Kalaeloa are constructed. Combined, these projects are anticipated to increase traffic along these roadways in the following ways over Base Year 2023:

- H-1 Freeway – 17 percent increase in east-west traffic during the AM(PM) peak hours of traffic over Base Year 2023.
- Kualakai Parkway – 32-95 percent increase in traffic directionally as a result of the continuing development of UHWO, East Kapolei II, and Kamakana Alii. As a result, it is anticipated that Kualakai Parkway will need to be widened to six (6) lanes By Base Year 2023, and recommended by the ORTP project 22.

- Farrington Highway – 42-58 percent increase in traffic directionally as a result of development along Kualakai Prkway, as well as other Kapolei Developments, including Makiwa Hills, Kalaeloa Harborside, and West Kapolei.
- Fort Weaver Road/Kunia Road – between 7 percent decrease and 13 percent increase directionally as a result of a shift in employment away from Honolulu, and “winding down” of residential development within the Ewa area.
- East-West Road – A portion is assumed to be constructed as a part of the East Kapolei II development.

7.3 Year 2023 with Project without Rail

By Year 2023, the project will generate approximately 2,259(4,167) trips during the AM (PM) peak hours of traffic. The following increases and changes are anticipated over Base Year 2023 as a result of phase 1 of the Project:

- H-1 Freeway – 12 percent increase in traffic over Base Year 2023 as a result of the Project.
- Kualakai Parkway – 13-85 percent increase in traffic. The project will also increase cross and turning traffic at Kualakai Parkway’s intersections with Farrington Highway, East-West Road, and the UHWO and DHHL Accesses. Accordingly, Project-related improvements are recommended at some of the intersections along Kualakai Parkway.
- Farrington Highway – 39-121 percent increase in traffic. Farrington Highway will serve regional and Project-related traffic. Accordingly, Project-related improvements and recommended lane configurations are provided at all intersections along Farrington Highway within the Study Area.
- Fort Weaver Road/Kunia Road (North of Old Fort Weaver Road) – 0-0.1 percent increase in traffic compared with Year 2023.
- The additional increase in traffic would cause the delays to increase. However, overall operations are anticipated to be similar to existing with the additional southbound lane between Kupuna Loop North and the Waipahu off-ramp.
- Fort Weaver Road (South of Old Fort Weaver Road) – 0 percent increase in traffic. Further widening of Fort Weaver Road is not prescribed by the ORTP 2035, and is generally considered infeasible due to insufficient ROW.
- East-West Road – 36 percent increase in traffic over Base Year 2023.

7.4 Year 2035 with Project without Rail

By Year 2035, the project will generate approximately 8,800(11,866) trips during the AM (PM) peak hours of traffic. The following increases and changes are anticipated over Year 2023 with Project as a result of phases 1 and 2 of the project:

- H-1 Freeway – 17 percent increase in traffic over Base Year 2035 as a result of the Project. As with Year 2023 with Project, it is recommended that the H-1 Freeway be restriped to provide one (1) additional lane each in the eastbound and westbound directions between the Paiwa Interchange and the Kualakai Interchange to accommodate the traffic generated by the increase in Base Year as well as the Project.
- Kualakai Parkway – 21-77 percent increase in traffic compared with Year 2023. The project will also increase cross and turning traffic at Kualakai Parkway's intersections with Farrington Highway, East-West Road, and the UHWO and DHHL Accesses. Accordingly, Project-related improvements are recommended at some of the intersections along Kualakai Parkway.
- Farrington Highway – 32-83 percent increase in traffic over Year 2023. Farrington Highway will serve regional and Project-related traffic. Accordingly, Project-related improvements and recommended lane configurations are provided at all intersections along Farrington Highway within the Study Area.
- Fort Weaver Road/Kunia Road (North of Old Fort Weaver Road) – 15-39 percent increase in traffic compared with Year 2023.

The additional increase in traffic would cause the delays to increase. However, overall operations are anticipated to be similar to existing with the additional southbound lane between Kupuna Loop North and the Waipahu off-ramp.

- Fort Weaver Road (South of Old Fort Weaver Road) – -1-26 percent increase in traffic compared with Year 2023. Further widening of Fort Weaver Road is not prescribed by the ORTP 2035, and is generally considered infeasible due to insufficient ROW.

The Project is anticipated to only slightly increase traffic because traffic going to or coming from the West Loch, Ewa Villages, Ocean Pointe, or Ewa Beach – even if destined towards the Project – will not necessarily be “new” traffic.

- East-West Road – 20-27 percent increase in traffic over Year 2023.

7.5 Year 2023 and 2035 with Project and Rail

It is estimated that RT will decrease traffic by between 1 and 9 percent along major thoroughfares within the study area based upon ORTP model comparisons. However, it is possible that through proximate high-density Transit-Oriented development, the trip reductions could be higher.

The roadway and intersection recommendations would not differ from those described with rail in the previous sections.

8. RECOMMENDATIONS

The following general roadway improvements are recommended:

- Base Year 2023 without Rail Transit
 - Widen Kualakai Parkway to six lanes as recommended in ORTP project 22 of the ORTP.
 - Construct the western portion of East-West Road to service the East Kapolei II development.
 - Widen Farrington Highway to four (4) lanes between the Golf Course and west of Fort Weaver Road as recommended in the ORTP project 20.
 - Freeway improvements similar to those discussed in Year 2023 with Project would likely be required by Base Year 2023.
- Base Year 2035 without Rail Transit – in addition to the Base Year 2023 recommendations
 - Widen Kunia Road in the southbound direction between Kupuna Loop North and near Honowī Street to four lanes
- Year 2023 with Project without Rail Transit – in addition to the Base Year 2023 recommendations
 - Widen the H-1 Freeway by one (1) lane in either direction between the Kualakai Interchange and the Paiwa Interchange.
- Year 2035 with Project without Rail Transit – in addition to the Base Years 2023, 2035 and Year 2023 with Project recommendations
 - Widen Farrington Highway to six (6) lanes between west of Kualakai Parkway and Old Fort Weaver Road (west).
 - Provide an additional westbound off-ramp lane at the Kualakai Interchange.
 - Widen Kualakai Parkway to eight (8) lanes between the Kualakai H-1 Freeway eastbound off/on-ramp to the DHHL access.
- Year 2023 and 2035 with Project and Rail Transit
 - With and without the Rail Transit, the recommendation would be the same as Year 2023 and 2035 with Project without Rail Transit respectively.

Also see Tables 4.3 4.5, 5.5 and 5.7 for a narrative of intersections improvements and Figure 5.5 for the recommended Freeway improvements.

For individual intersection improvements schematic refer to Table 8.1, which details the improvements for each alternative incrementally.

Due to the Project and other project's timeline, it is recommended that updates to this TIAR be performed to confirm or amend the recommended improvements listed in this report as the implementation of the RT or market fluctuations could affect the traffic volume projections. Furthermore, timing and construction of the surrounding projects can significantly affect the required improvements at the various intersections.

As outlined above, D.R. Horton will provide SDOT and updated TIAR for their acceptance prior to the construction of 3,377 dwelling units and 1,041, 105 SF of commercial space.

Table 8.1: Intersection Mitigation Summary

ID	Intersection		Existing		Base Year 2023 w/ Mitigation		Base Year 2035 w/ Mitigation		Year 2023 w/Project w/ Mitigation		Year 2035 w/Project w/ Mitigation	
Kualakai Parkway@												
1	Kualakai Parkway	Westbound H-1 Freeway On/Off-Ramps	#1 Kualakai Pkwy. H-1 Freeway On/Off-ramps D/E	N↑	#1 Kualakai Pkwy. H-1 Freeway On/Off-ramps C/C	N↑	See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation	#1 Kualakai Pkwy. H-1 Freeway On/Off-ramps D/D	N↑		
2		Eastbound H-1 Freeway On/Off-Ramps	#2 Kualakai Pkwy. H-1 Freeway On/Off-ramps B/B	N↑	See Existing	#2 Kualakai Pkwy. H-1 Freeway On/Off-ramps C/B	See Existing	#2 Kualakai Pkwy. H-1 Freeway On/Off-ramps C/B	N↑			
3		Right in/out from Southbound Kualakai Parkway							#3 Kualakai Pkwy. Right in/out access B/C	N↑	#3 Kualakai Pkwy. Right in/out access B/B	N↑
4		Farrington Highway (Assumes ORTP 20 -- widening to four lanes)	#4 Kualakai Pkwy. Farrington Hwy. C/C	N↑	#4 Kualakai Pkwy. Farrington Hwy. C/C	N↑	#4 Kualakai Pkwy. Farrington Hwy. D/D	N↑	#4 Kualakai Pkwy. Farrington Hwy. C/D	N↑	#4 Kualakai Pkwy. Farrington Hwy. E/E	N↑
5		UH West Oahu/Future D.R. Horton	#5 Kualakai Pkwy. UH West Oahu/Future D.R. Horton B/C	N↑	#5 Kualakai Pkwy. UH West Oahu/Future D.R. Horton B/C	N↑	See Base Year 2023 w/Mitigation	#5 Kualakai Pkwy. UH West Oahu/Future D.R. Horton C/D	N↑	#5 Kualakai Pkwy. UH West Oahu/Future D.R. Horton D/E	N↑	
6		DHHL Access	#6 Kualakai Pkwy. DHHL C/B	N↑	#6 Kualakai Pkwy. DHHL C/B	N↑	#6 Kualakai Pkwy. DHHL B/A	N↑	#6 Kualakai Pkwy. DHHL D/C	N↑	#6 Kualakai Pkwy. DHHL C/C	N↑
7		East-West Road	#7 Kualakai Pkwy. East-West Road C/D	N↑	#7 Kualakai Pkwy. East-West Road C/D	N↑	See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation	#7 Kualakai Pkwy. East-West Road D/E	N↑		
8		Kapolei Parkway	#8 Kualakai Pkwy. Kapolei Pkwy. B/B	N↑	#8 Kualakai Pkwy. Kapolei Parkway D/D	N↑	#8 Kualakai Pkwy. Kapolei Parkway D/D	N↑	See Base Year 2023 w/Mitigation	#8 Kualakai Pkwy. Kapolei Parkway D/D	N↑	
Kunia Road @												
21	Kunia Road	Kupuna Loop (North)	#21 Kunia Rd Kupuna Lp. (North) B/C	N↑	See Existing	#21 Kunia Rd Kupuna Lp. (North) C/D	N↑	See Existing	#21 Kunia Rd Kupuna Lp. (North) C/D	N↑		
22		Kupuna Loop (South)	#22 Kunia Rd. Kupuna Lp. (South) B/B	N↑	See Existing	#22 Kunia Rd. Kupuna Lp. (South) C/B	N↑	See Existing	#22 Kunia Rd. Kupuna Lp. (South) C/B	N↑		
23		H-1 WB On-ramp SBR	#23 Kunia Rd. Ramps AAA	N↑	See Existing	#23 Kunia Rd. Ramps AAA	N↑	See Existing	#23 Kunia Rd. Ramps AAA	N↑		
24		H-1 WB Off-Ramp/ H-1 WB On-Ramp NBL	#24 Kunia Rd. Ramps AAAA	N↑	#24 Kunia Rd. Ramps AAAA	N↑	#24 Kunia Rd. Ramps A/A	N↑	See Base Year 2023 w/Mitigation	#24 Kunia Rd. Ramps A/A	N↑	
26		H-1 EB On-Ramp from Kunia Road	#26 Kunia Rd. Ramps C/C	N↑	#26 Kunia Rd. Ramps C/C	N↑	#26 Kunia Rd. Ramps C/C	N↑	See Base Year 2023 w/Mitigation	#26 Kunia Rd. Ramps C/C	N↑	
41		Honowai Street	#41 Kunia Rd. Honowai St. AAA	N↑	See Existing	See Existing	See Existing	See Existing	#41 Kunia Rd. Honowai St. AAA	N↑		

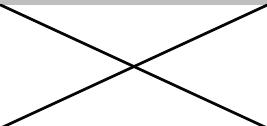
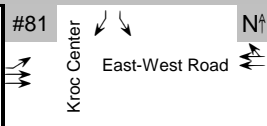
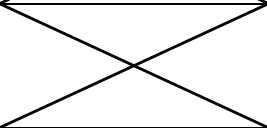

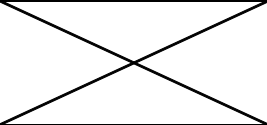

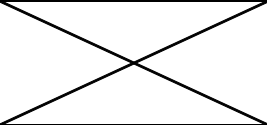

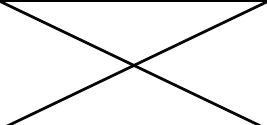

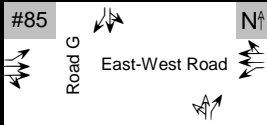
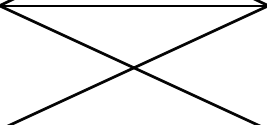
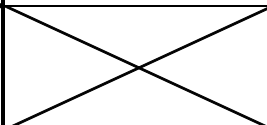
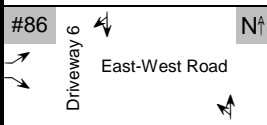
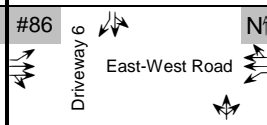
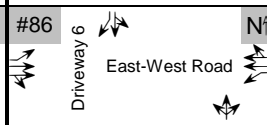
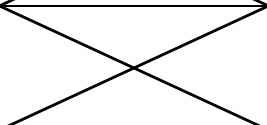
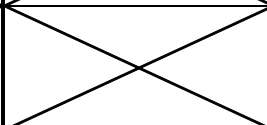
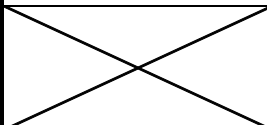
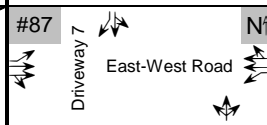
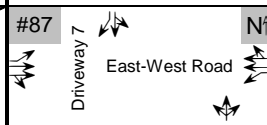
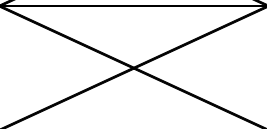
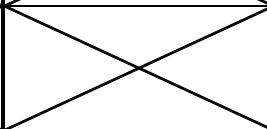
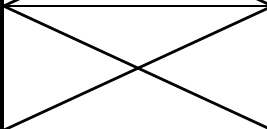
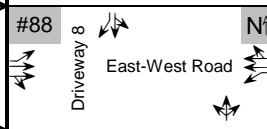
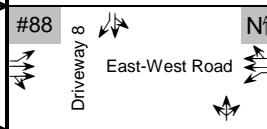
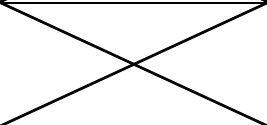
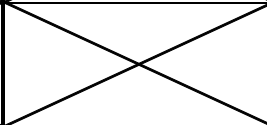
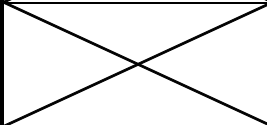


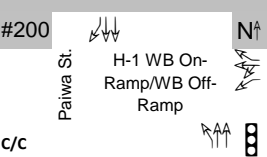
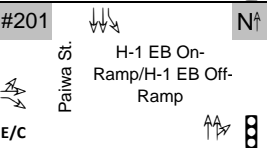
Note:
Comparisons are made between:
1. Base Year 2023 against Existing
2. Base Year 2035 against Base Year 2023
3. Year 2023 with Project against Base Year 2023
4. Year 2035 with Project against Year 2023 with Project

Table 8.1: Intersection Mitigation Summary

ID	Intersection	Existing	Base Year 2023 w/ Mitigation	Base Year 2035 w/ Mitigation	Year 2023 w/Project w/ Mitigation	Year 2035 w/Project w/ Mitigation
Fort Weaver Road @						
45 46 47 48 49 50	Farrington Highway (See Farrington Highway Section)					
	Laulaunui Street	#45 FWR B/C Laulaunui St. 	See Existing	See Existing	See Existing	See Existing
	Old Fort Weaver Road/Aawa Drive	#46 FWR C/C Old Fort Weaver Rd./Aawa Dr. 	See Existing	See Existing	See Existing	#46 FWR F*/D Old Fort Weaver Rd./Aawa Dr.
	Hale O Ulu School	#47 FWR A/B Crosswalk 	See Existing	See Existing	See Existing	See Existing
	Renton Road	#48 FWR D*/D Renton Rd. 	See Existing	See Existing	See Existing	See Existing
	Kolowaka Drive	#49 FWR E/D Kolowaka Dr. 	#49 FWR E/D Kolowaka Dr. 	See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation
	Geiger Road/Iroquois Point	#50 FWR E/E Geiger Rd./Iroquois Rd. 	See Existing	See Existing	See Existing	See Existing
Farrington Highway @						
61	Driveway 1				#61 Farrington Hwy. Driveway 1 	#61 Farrington Hwy. Driveway 1
62	Driveway 2					#62 Farrington Hwy. Driveway 2
63	Driveway 3					#63 Farrington Hwy. Driveway 3
64	Driveway 4					#64 Farrington Hwy. Driveway 4
65	Driveway 5					#65 Farrington Hwy. Driveway 5
66	Driveway 6					#66 Farrington Hwy. Driveway 6
68	Driveway 8					#68 Farrington Hwy. Driveway 8
69	Old Fort Weaver Road (West)	#69 Farrington Hwy. Old Fort Weaver 	#69 Farrington Hwy. Old Fort Weaver 	#69 Farrington Hwy. Old Fort Weaver 	See Base Year 2023 w/Mitigation	#69 Farrington Hwy. Old Fort Weaver
70	Old Fort Weaver Road (East)	#70 Farrington Hwy. Old Fort Weaver 	#70 Farrington Hwy. Old Fort Weaver 	See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation	#70 Farrington Hwy. Old Fort Weaver
71	Old Fort Weaver Road (East)/Old Fort Weaver Road (West)	#71 Old Fort Weaver Rd. Old Fort Weaver Rd. 	See Existing	See Existing	See Existing	See Existing
72	Old Fort Weaver Road/On-Off Ramp to Southbound Kunia Road	#72 Ramps Farrington Hwy. 	See Existing	See Existing	See Existing	#72 Ramps Farrington Hwy.
73	Old Fort Weaver Road/Ramp to Southbound Kunia Road	#73 Ramps Farrington Hwy. 	See Existing	See Existing	See Existing	#73 Ramps Farrington Hwy.
77	Farrington Highway/Ramp to Northbound Kunia Road	#77 Ramps Farrington Hwy. 	See Existing	See Existing	See Existing	#77 Ramps Farrington Hwy.

Note:
Comparisons are made between:
1. Base Year 2023 against Existing
2. Base Year 2035 against Base Year 2023
3. Year 2023 with Project against Base Year 2023
4. Year 2035 with Project against Year 2023 with Project

Table 8.1: Intersection Mitigation Summary

ID	Intersection		Existing	Base Year 2023 w/ Mitigation	Base Year 2035 w/ Mitigation	Year 2023 w/Project w/ Mitigation	Year 2035 w/Project w/ Mitigation
East-West Road @							
81	East-West Road	Kroc Center (Driveway 1)			See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation
82		Road A (Driveway 2)			See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation
83		Road B (Driveway 3)			See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation
84		Road D (Driveway 4)			See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation	See Base Year 2023 w/Mitigation
85		Road G (Driveway 5)			See Base Year 2023 w/Mitigation		See Year 2023 w/Project w/Mitigation
86		Driveway 6					
87		Driveway 7					
88		Driveway 8					
89		Old Fort Weaver Road					
Paiwa Street @							
200	Paiwa Street	H-1 WB On-Ramp/WB Off-Ramp		See Existing	See Existing	See Existing	See Existing
201		H-1 EB On-Ramp/H-1 EB Off-Ramp		See Existing	See Existing	See Existing	See Existing

Note:
Comparisons are made between:
1. Base Year 2023 against Existing
2. Base Year 2035 against Base Year 2023
3. Year 2023 with Project against Base Year 2023
4. Year 2035 with Project against Year 2023 with Project

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