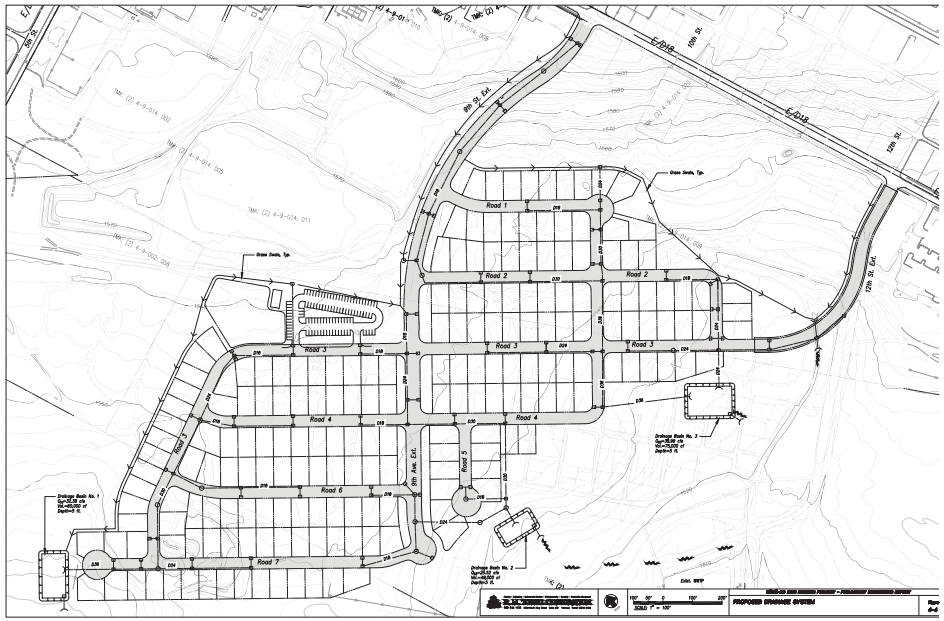


4.5 Estimated Runoff

The proposed improvements will terrace the land to maintain characteristics which are very similar to the existing conditions. The general terrain of the developed condition will generally conform to the existing terrain, which slopes toward the south, and the tributary drainage area will remain the same as the existing. The proposed 200 unit subdivision with retention basins will cause no significant change to the existing storm water runoff. The proposed tributary drainage area is shown on ***Figure 4-5***.

Runoff generated by the project will remain tributary to the low sump area next to the WWRF. To provide storm water quality treatment, runoff will continue to be directed into grassed swales or 2 large detention basins prior to discharge off the property.

4.5.1 Proposed Drainage System

Surface drainage improvements will consist of shallow cutoff swales between the new residential units and Frasier Avenue to capture as much runoff as possible and direct the flow around the project or into new project drainage systems. Roadway drains will be provided along the new roadways towards the proposed retention basins. The proposed drainage system for the project is shown on ***Figure 4-6***.

4.5.2 Erosion Control Measures

During grading and construction measures will be taken to prevent erosion and soil from the leaving the site. Special precaution will be taken to protect the downstream lands from the project sites as well as the existing WWRF to the west. All exposed and graded areas within the project site will be covered with pavements and grass to prevent soil erosion.

4.5.3 Impacts to Regional Drainage Facilities

With regard to the 50-year, 1-hour storm, the calculated increase in peak flow is 32.38 cubic feet per second (cfs) to the north towards the extension of 5th Street and Iwiole Gulch, 25.52 cfs mauka of the WWRF and 39.87 cfs towards Kaumalapau Highway due to the proposed improvements. Three retention basins will mitigate the increase in runoff and flow and will have no impact on existing regional drainage infrastructure. Other than the WWRF, there are no downstream properties that would be adversely impacted by the resulting increases in runoff. A new swale will direct runoff away from the WWRF.

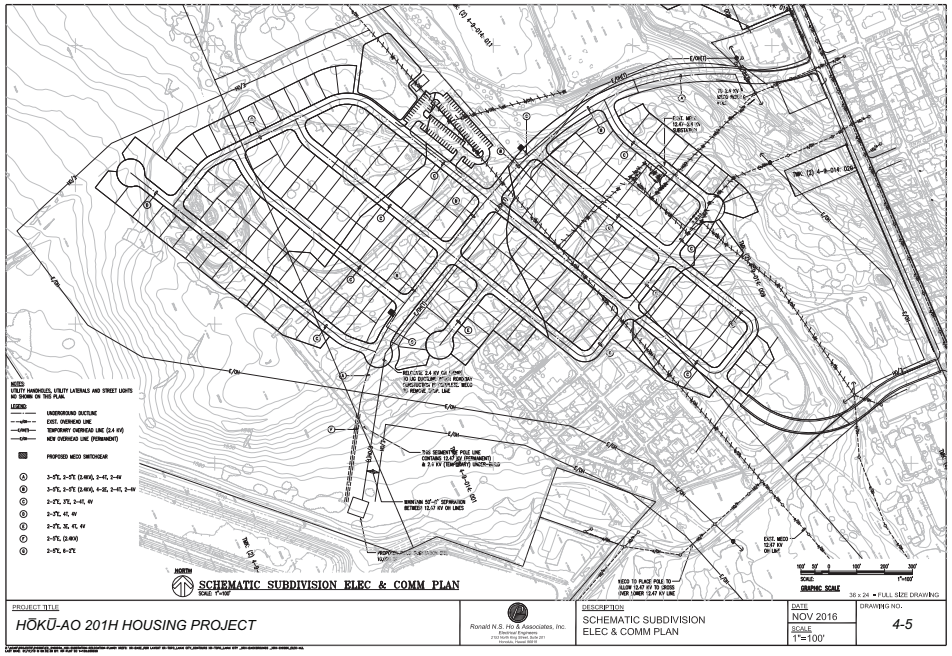
A summary of the calculated existing and proposed 50-year runoff, increase in runoff and retention basin volume required is provided in the **Table 4-2** and **Table 4-3** below.

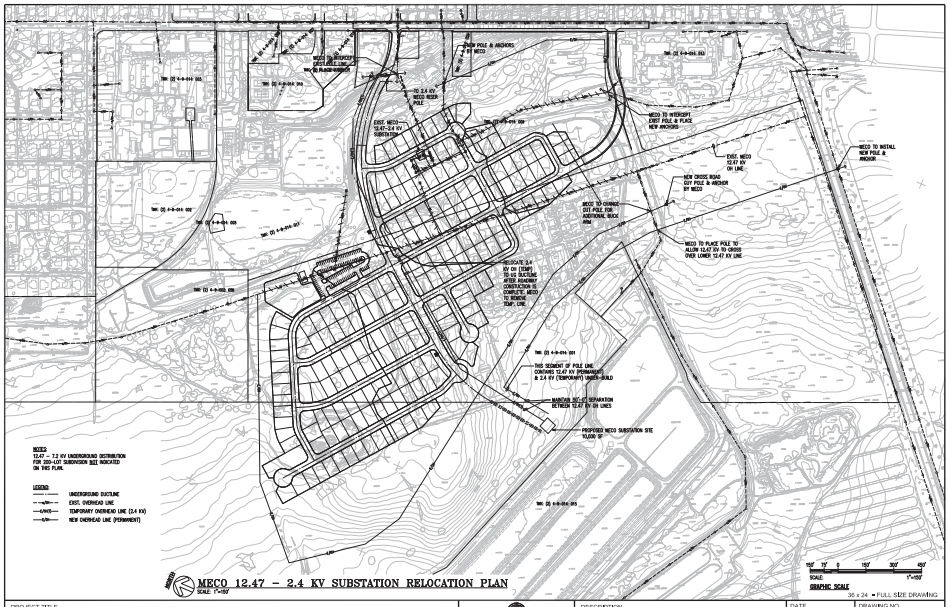
Table 4-2 Runoff Summary

Drainage Area	Existing Runoff (50-year) cfs	Prop. Runoff (50-year) cfs	Difference
To the north	21.43	53.81	32.38
To the WWRF Swale	27.77	53.29	25.52
To Kaumalapau Hwy.	40.76	80.63	39.87

Table 4-3 Retention Basin Volume

Drainage Area	Retention Basin Volume cubic-feet
Basin No. 1 - To the north	58,284
Basin No. 2 - To WWRF Swale	45,936
Basin No. 3 - To Kaumalapau Hwy.	71,766





4.6 Proposed Electrical/Telecom System

4.6.1 Proposed Electrical Demands

The total anticipated electrical demand load for the proposed Lanai 200 Subdivision Development is approximately 1,000 kilo-Volt Amperes (kVA) or 1.0 MVA and is based on a diversified peak demand load of 5 kVA per residential unit. Based on current technologies and cabling policies, HTCO and/or Spectrum would likely provide fiber optic cable service to the building from their overhead facilities in the vicinity of Lana'i City.

4.6.2 Off-site Electrical and Telecommunications

MECO's on-island distribution system consists of both 2.4 kV and 12.47 kV primary overhead and underground lines. The proposed subdivision would be connected to MECO's 12.47 kV distribution system. Although MECO's Lanai generating facilities have sufficient capacity to support the development, the existing 12.47 kV overhead lines may require upgrades. MECO has further indicated that should this project trigger the required upgrades, some or all of the cost for the upgrades may need be allocated to this development. MECO cannot indicate what the budget costs might be without further design on their part.

Both HTCO's and Charter's on-island distribution system consists of cables attached to the joint utility pole lines or, if underground, cables routed through duct systems for owned and maintained by the respective utility company. The cable types consist of copper, twisted pair, coaxial and fiber optic cables. Based on their current practice, both HTCO and Charter will likely extend fiber optic cable infrastructure to provide service to this development. Due to the anticipated revenue anticipated and based on their respective tariff and franchise rules, it is not anticipated that this development would bear any cost for off-site improvements of either HTCO or Charter facilities.

4.6.3 On-site Electrical and Telecommunications

Based on preliminary information received from Pulama Lana'i underground utility infrastructure is proposed for service to the single-family lots and ancillary buildings as shown on **Figure 4-7**. It should be noted MECO would require that pad-mounted transformers be installed and may require the installation of one or more

pad-mounted switchgears to provide sectionalizing of their underground circuits. If necessary HTCO and/or Spectrum may request a hub equipment site which is approximately 8' x 8' in size.

MECO's underground infrastructure would consist of a combination of 2", 3", 4" and 5" PVC conduits, encased in concrete jackets and concrete handholes in sizes varying from 2' x 4' to 6' x 11' which act as cable pulling and splicing points and transformer and lot service vaults. HTCO's and Spectrum's underground infrastructure would consist of a combination of 2" and 4" conduits with handholes varying in size from 2' x 4' to 5' x 10.5' which act as cable pulling and splicing points and lot service vaults.

4.6.4 Existing Substation Relocation

A proposed site for the relocated substation has been submitted to MECO and a budget cost for the relocation has been provided by MECO to Pulama Lana'i. The overhead poles lines, for the most part, are covered by a "one-time relocation" clause included in the original Lana'I Company grant of easement to MECO. Proposed alignments for the 12.47 kV lines and a temporary alignment for the 2.4 kV line is proposed to facilitate subdivision roadway construction. Eventually, the 2.4 kV lines are intended to be placed underground within the proposed subdivision as shown on Figure 4-8. MECO will require a new grant of easement for the relocated 12.47 kV lines. As a possible alternative, MECO is evaluating whether to up-convert the existing Lana'I City distribution system to 12.47 kV which would eliminate the need for the substation relocation and temporary overhead 2.4 kV relocation.

4.6.5 Street Lighting

Because MECO owns and maintains the street lights on public rights-of-ways within Maui County, it will need to be determined whether MECO would also provide the street lights for this project or whether the project contractor would provide these street lights. If provided under the construction contracts, luminaires selected will be specified with conformance with Act 287 and be designed to minimize glare and provide illumination levels in conformance with the above stated criteria and/or other requirements imposed by the environmental permitting documents.

5. REFERENCES

1. *DWS Amended Draft – Lana`i Island Water Use & Development Plan,* Department of Water Supply, February 25, 2011.

2. *Final Report – Drainage Master Plan, Koele Resort Development*, Koele, Lanai, Hawaii, [prepared for Castle and Cooke Resorts, LLC], July 2007, R.M. Towill Corporation.

3. *For Public Record – Castle and Cooke Resorts LLC's Proposed Water Supply and Demand Plan for the Island of Lana`i,* [prepared for Castle and Cooke Resorts, LLC], December 2004, R.M. Towill Corporation.

4. *Final Report – Lanai City Drainage Master Plan,* [prepared for Castle and Cooke Resorts, LLC], December 2006, R.M. Towill Corporation.

5. *Rules for the Design of Storm Drainage Facilities in the County of Maui*, Department of Public Works and Waste Management, County of Maui.

6. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai,* United States Department of Agriculture, Soil Conservation Service, August 1972.

7. *Water System Standards*, 2002, Department of Water Supply – County of Maui.

ATTACHMENT 1

Traffic Impact Assessment

TRAFFIC IMPACT ANALYSIS REPORT - LANAI CITY EXPANSION

LANAI CITY, LANAI, HAWAII

FINAL DRAFT

November 2, 2018

Prepared for:

R.M. Towill Corporation
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TRAFFIC IMPACT ANALYSIS REPORT –
LANAI CITY EXPANSION

Lanai City, Lanai, Hawaii

FINAL DRAFT

Prepared for

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Prepared by

Austin, Tsutsumi & Associates, Inc.

Civil Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

November 2, 2018

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APPENDICES

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS

CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

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GARRETT K. TOKUOKA, P.E.

FINAL DRAFT

TRAFFIC IMPACT ANALYSIS REPORT

LANAI CITY EXPANSION

Lanai City, Lanai, 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 resulting from the proposed Lanai City Expansion (hereinafter referred to as the "Project") located in Lanai City, Lanai, Hawaii.

1.1 Project Location

The Project is located in Lanai City on the island of Lanai on parcels of land more specifically identified as TMK: (1) 4-9-0140:9000. The project site is bordered by Fraser Avenue to the east, 12th Street to the south, the Department of Public Works office and Existing Wastewater Treatment Plant to the west, and 9th Street to the north. See Figure 1.1 for Project location.

1.2 Project Description

The project proposes to construct a residential development of 200 single family units, one-acre park, 1,500 square foot pavilion, comfort station, and 100 parking stalls for Lanai City. Of the 200 single-family homes, 133 will be comprised of affordable homes and 67 will be comprised of market-rate homes. As a conservative measure, a 1.1-acre park will be assumed to include the amenities identified. Vehicular traffic to the Project will be provided by two (2) existing accesses along Fraser Avenue on 9th Street and 12th Street. The Project is anticipated to be completed by the Year 2024. See Figure 1.2 for Project Site Plan.

1.3 Study Methodology

This study will address the following:

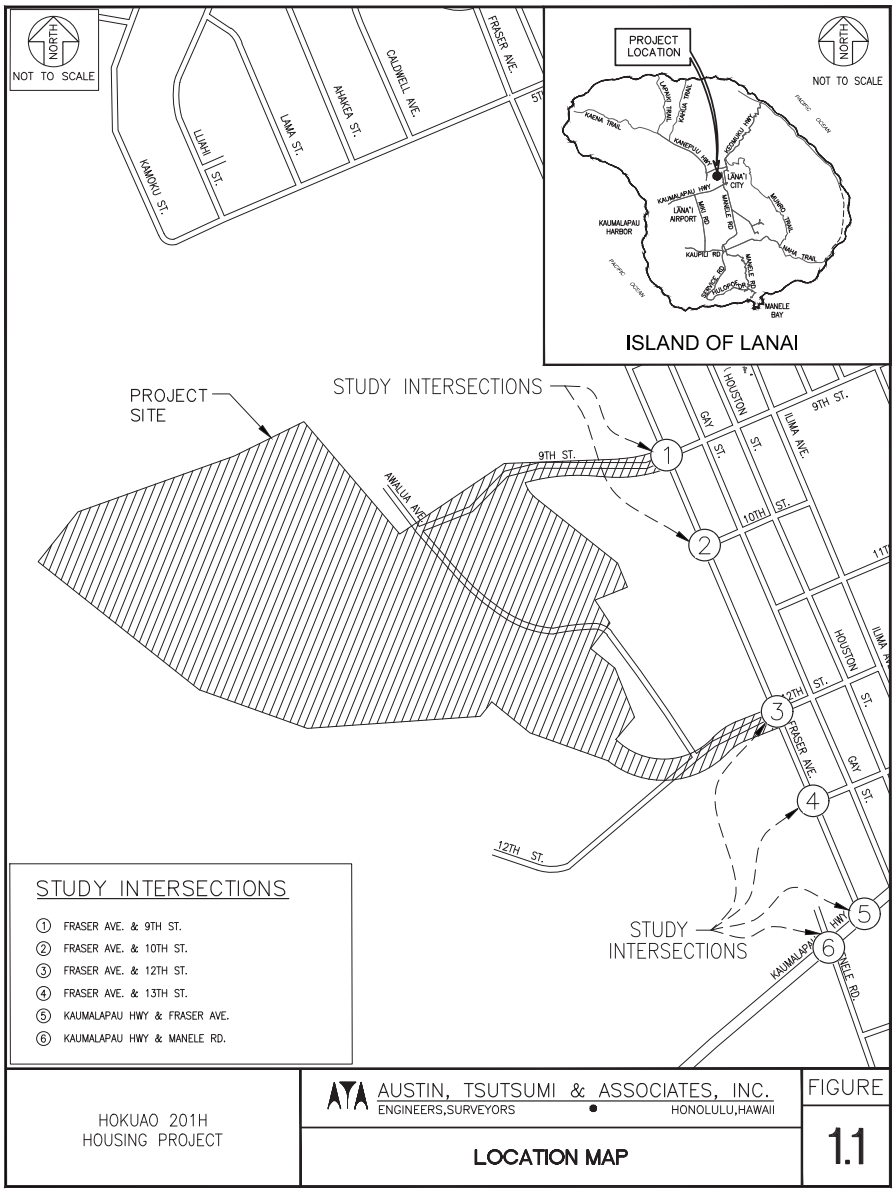
- Assess existing traffic operating conditions during the weekday AM and PM peak hours of traffic within the study area.
- Traffic Projections for Base Year 2024 (without the Project).
- Estimate the vehicular trips that will be generated by the Project.

- Traffic projections for the Project for Future Year 2024 (with project).
- Recommendations for roadway improvements or other mitigative measures, as appropriate, to reduce or eliminate the adverse impacts resulting from traffic generated by the Project.
- Recommendations for intersection improvements or other mitigative measures, as appropriate, to reduce or eliminate the impacts resulting from the Project including conceptual intersection options such as roundabouts.

1.4 Analysis Methodology

Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual (HCM), 6th Edition, includes methods for calculating volume to capacity ratios, delays, and corresponding Levels of Service that were utilized in this study. See Appendix B for Level of Service Criteria.

Analyses for the study intersections were performed using the traffic analysis software Synchro, which is able to prepare reports based on the methodologies described in the HCM. These reports contain control delay results as based on intersection lane geometry, signal timing, and hourly traffic volumes. Based on the vehicular delay at each intersection, a LOS is assigned to each approach and intersection movement as a qualitative measure of performance. These results, as confirmed or refined by field observations, constitute the technical analysis that will form the basis of the recommendations outlined in this report.



LANAI CITY EXPANSION	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU,HAWAII	FIGURE
	SITE PLAN	1.2

2. EXISTING TRAFFIC CONDITIONS

2.1 Roadway System

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

Kaumalapau Highway is an east-west, two-way, two-lane roadway that runs perpendicular to Fraser Avenue. This roadway begins to the west at the Fuel Depot and terminates to the east at its intersection with Lanai Avenue/Queens Street. The speed limit along Kaumalapau Highway is 45 mph near Lanai City and changes to 30 mph to the east, after the Lanai Airport.

Fraser Avenue is a north-south, two-way, two-lane roadway in the vicinity of the study intersections and provides access through Lanai City. This roadway begins to the south at a T-intersection with Kaumalapau Highway and terminates to the north as an outlet. The posted speed limit along this roadway in the vicinity of the Project is 20 miles per hour (mph). This roadway serves as one of the main roadways through the city and provides access to Lanai Elementary and High School, churches, park, and other smaller streets that have access to restaurants and retail.

9th Street is an east-west, two-way, two-lane roadway that runs perpendicular to Fraser Avenue. This roadway begins to the west at a T-intersection with Awalua Avenue and terminates to the east at a T-intersection with Kauna Oa Drive. The posted speed limit was not observed along the roadway.

10th Street is an east-west, two-way, two-lane roadway that runs perpendicular to Fraser Avenue. This roadway begins to the west at a T-intersection with Fraser Avenue and terminates to the east at a T-intersection with Queens Street. The posted speed limit was not observed along the roadway.

12th Street is an east-west, two-way, two-lane roadway that runs perpendicular to Fraser Avenue. This roadway begins to the west at a T-intersection with Fraser Avenue and terminates to the east at a T-intersection with Ilima Ave. The street continues to the east as a T-intersection with Lanai Avenue and terminates to the east as a T-intersection with Queens Street. The posted speed limit was not observed along the roadway.

13th Street is an east-west, two-way, two-lane roadway that runs perpendicular to Fraser Avenue. This roadway begins to the west at a T-intersection with Fraser Avenue and terminates to the east at a T-intersection with Lanai Avenue. The posted speed limit was not observed along the roadway.

Manele Road is a north-south, two-way, two lane roadway. This roadway begins at its intersection with Kaumalapau Highway and terminates to the south at the Manele Small Boat Harbor. The posted speed limit on Manele Road is 35 mph.

2.2 Sustainable Transportation

2.2.1 Complete Streets

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

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

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

2.2.2 Pedestrian Accessibility

Within the Project vicinity, sidewalks are provided along both sides of Fraser Avenue, 5th Street, and sidewalks along one side of Lanai Avenue, 7th Street, and 8th Street. The sidewalks along Fraser and Lanai Avenue provide access to retail, restaurants, church, and schools. See Figure 2.1 for the existing pedestrian facilities.

2.2.3 Bicycle Accessibility

There are no existing bike lanes within the Project vicinity; however, proposed bike lanes within the Hawaii Bike Plan will be shown in Figure 2.2.

2.2.4 Public Transit

There is currently no public transportation on the island of Lanai.

Private transportation shuttles are offered from the airport, to the car rental, and to the hotels, based on reservation.

2.3 Existing Traffic Volumes

Manual turning movement traffic counts and field observations were conducted at the following study intersections on Tuesday, July 9, 2016 and Wednesday, July 10, 2016.

- 9th Street/Fraser Avenue (Unsignalized)
- 10th Street/Fraser Avenue (Unsignalized)
- 12th Street/ Fraser Avenue (Unsignalized)
- 13th Street/ Fraser Avenue (Unsignalized)
- Fraser Avenue/Kaumalapau Highway (Unsignalized)
- Kaumalapau highway/Manele Road (Unsignalized)

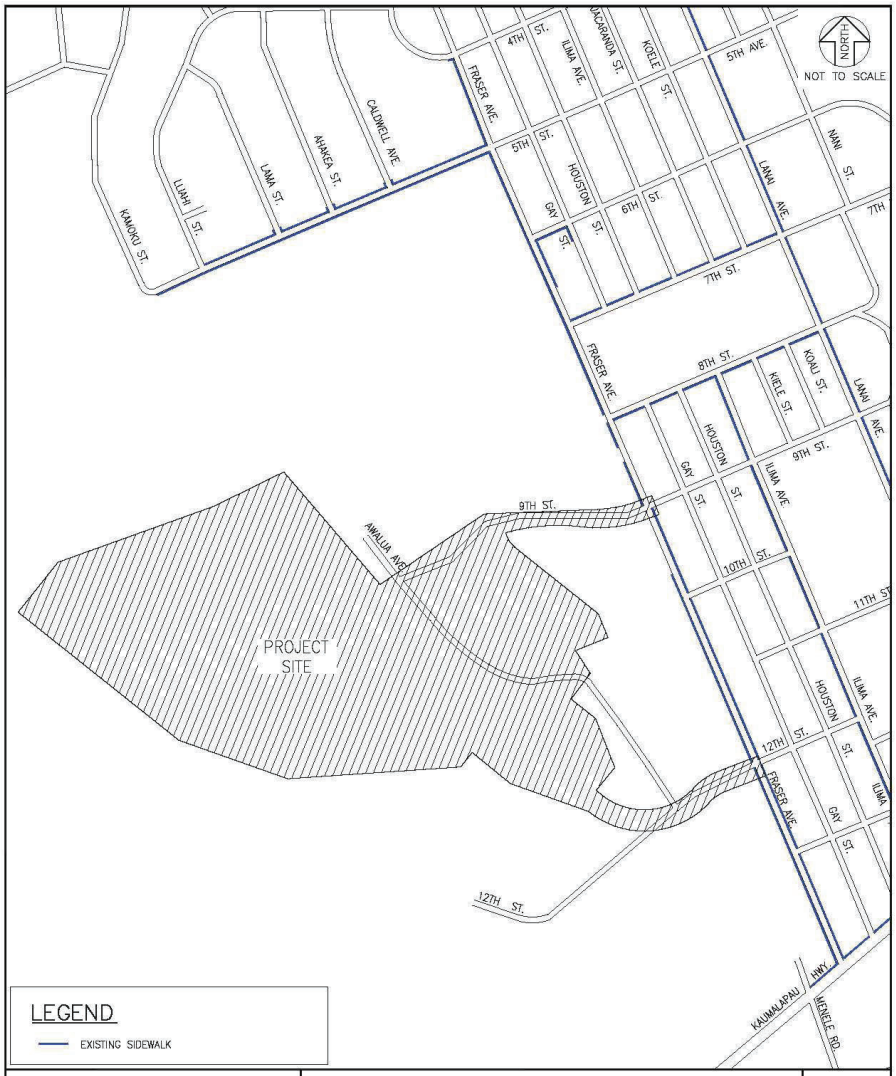
Based on the traffic count data, the weekday AM and PM peak hours of traffic were determined to occur between 7:00 AM and 8:00 AM and between 2:00 PM to 3:00 PM, respectively. During the traffic count, the Four Seasons Resort Lanai, The Lodge at Koele was closed for

renovations; therefore, traffic that would be generated by the resort was not accounted for in the traffic count. The traffic count data is provided in Appendix A.

2.4 Existing Observations and Analysis

2.4.1 Intersection Observations and Analysis

All intersections currently operate at LOS B or better during the AM and PM Peak hour of traffic. No significant delays or queuing were observed at any of the intersections during the peak hours of traffic.



HOKUAO 201H
HOUSING PROJECT

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
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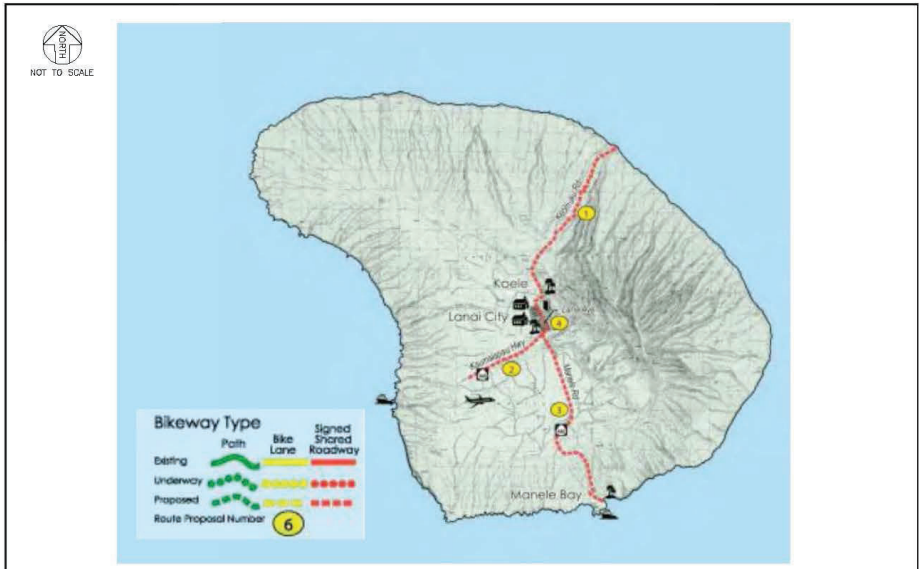
EXISTING PEDESTRIAN ACCESSIBILITY

FIGURE 2.1



NOTE: BIKE PLAN RETRIVED FROM HAWAII.GOV ON SEPTEMBER 13, 2016.

LANAI CITY
EXPANSION

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
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ISLAND OF LANAI BIKE PLAN

FIGURE 2.2

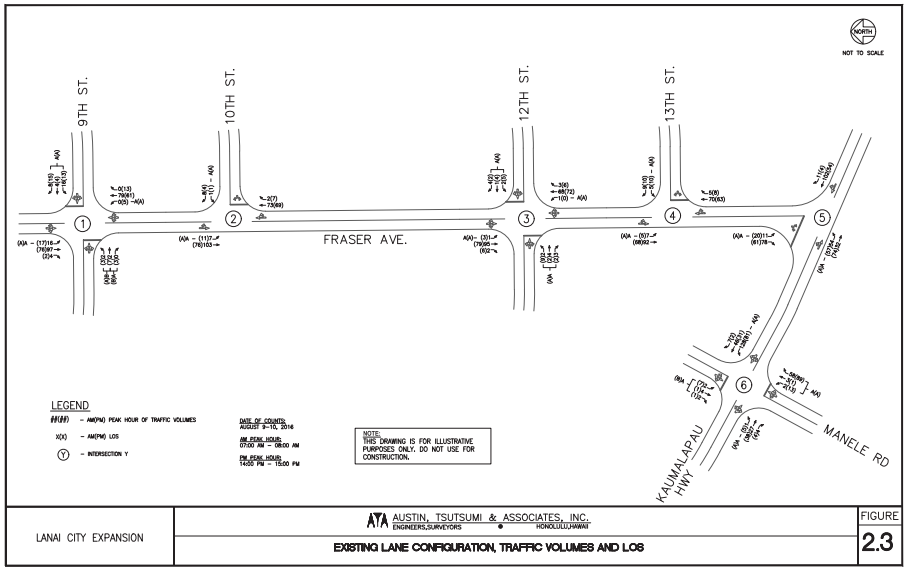


Table 2.1: Existing 2016 Level of Service Summary

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Fraser Ave. & 9th St.						
NB LT	0.0	0.00	A	7.4	0.00	A
EB LT/TH/RT	10.3	0.01	B	10.0	0.02	B
WB LT/TH/RT	9.9	0.04	A	9.6	0.04	A
SB LT	7.4	0.01	A	7.4	0.01	A
2: Fraser Ave. & 10th St.						
WB LT/TH	8.8	0.01	A	8.9	0.01	A
SB LT	7.4	0.01	A	7.4	0.01	A
3: Fraser Ave. & 12th St.						
NB LT	7.4	0.00	A	0.0	0.00	A
EB LT/TH/RT	9.6	0.01	A	9.7	0.02	A
WB LT/TH/RT	9.2	0.01	A	9.7	0.02	A
SB LT	7.4	0.00	A	7.4	0.00	A
4: Fraser Ave. & 13th St.						
WB LT/TH	9.1	0.02	A	9.1	0.02	A
SB LT	7.4	0.01	A	7.4	0.00	A
5: Kaumalapau Hwy & Fraser Ave.						
EB LT	7.6	0.04	A	7.4	0.04	A
SB LT/RT	9.5	0.11	A	9.4	0.10	A
6: Manele St. & Kaumalapau Hwy						
NB LT/TH/RT	8.8	0.06	A	9.3	0.12	A
EB LT	0.0	0.00	A	7.3	0.00	A
WB LT	7.5	0.09	A	7.4	0.06	A
SB LT/TH/RT	0.0	0.00	A	11.2	0.02	B

3. BASE YEAR 2024 TRAFFIC CONDITIONS

The Year 2024 was selected to reflect the Project completion year. The Base Year 2024 scenario represents the traffic conditions within the study area without the Project. Traffic projections were formulated by applying a defacto growth rate to the existing 2016 traffic count volumes as well as trips generated by known future developments in the vicinity of the Project.

3.1 Defacto Growth Rate

The population on the island of Lanai is currently about 3,100 residents. According to the Lanai Community Plan Update published by the County of Maui Planning Department in December 2013, the anticipated growth of Lanai's economy may require its population to nearly double in size to about 6,000 residents. This planning document was published as a guide for decision making and implementation through 2025. In order for Lanai's population to reach 6,000 by year 2025, the island would experience an average growth rate of approximately 5.7 percent per year. Therefore, this growth rate was applied on all movements to represent the anticipated growth.

3.2 Traffic Forecasts for Known Developments

By the year 2024, other known developments are anticipated to generate vehicle trips and impact the study intersections. As mentioned in section 2.3, the Four Seasons Resort Lanai, The Lodge at Koele was closed for renovation at the time of the traffic count. As the resort is assumed to resume normal operations by Year 2024, it is included in the Base Year 2024 projections.

- The Four Seasons Resort Lanai, The Lodge at Koele is located along Keomuku Highway northeast of the Project. The development plans to renovate 88 hotel units, which is expected to be completed and occupied in 2017. The vehicle trips shown in Table 4.1 were generated using the Institute of Traffic Engineers (ITE) Trip Generation Manual, 10th Edition, and was included in the Base Year 2024 traffic projections.

Table 3.1: Four Seasons Resort Lanai Trip Generation Rates

Land Use (ITE Code)	Independent Variable	Weekday AM Peak Hour		Weekday PM Peak Hour	
		Trip Rate	% Enter	Trip Rate	% Enter
Resort Hotel (330)	Rooms	[a]	72%	0.41	43%

Notes: [a] T = 0.38 (X) - 28.58

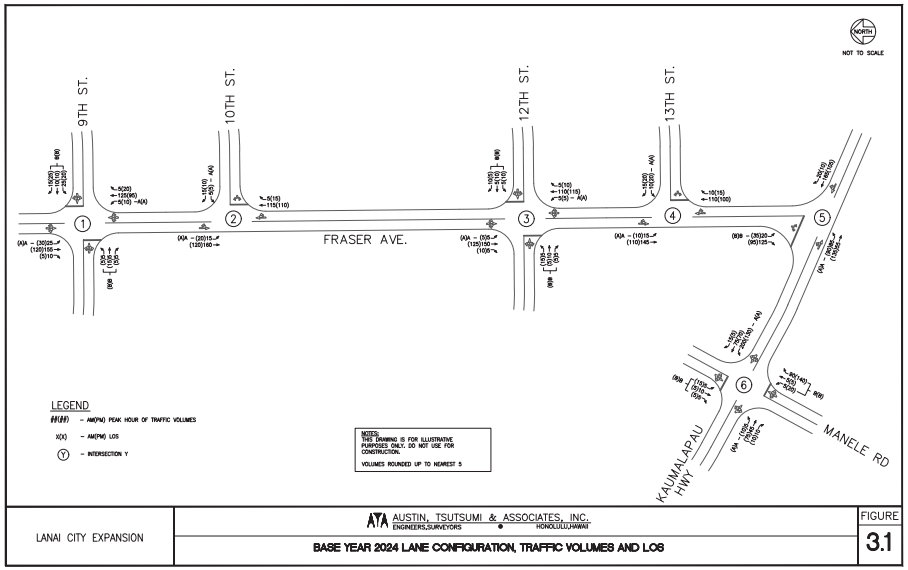
Table 3.2: Total Trips Generated by Known Developments in Project Vicinity

Development	Independent Variable	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Four Seasons Resort Lanai, The Lodge at Koele	88 Rooms	3	2	5	16	20	36

3.3 Base Year 2024 Analysis

All study intersections are forecast to operate similar to existing conditions. All intersection movements will continue to operate at LOS B or better during the AM and PM peak hours of traffic.

Figure 3.1 illustrates the Base Year 2024 forecast traffic volumes and LOS for the study intersection movements. Table 3.1 summarizes the Base Year 2024 LOS at the study intersections compared to existing conditions. LOS worksheets are provided in Appendix C.



LANAI CITY EXPANSION	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU,HAWAII	FIGURE 3.1
	BASE YEAR 2024 LANE CONFIGURATION, TRAFFIC VOLUMES AND LOS	

Table 3.3: Existing and Base Year 2024 Level of Service Summary

	Existing Conditions						Base Year 2024					
	AM			PM			AM			PM		
Intersection	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Fraser Ave. & 9th St.												
NB LT	0.0	0.00	A	7.4	0.00	A	7.6	0.00	A	7.5	0.01	A
EB LT/TH/RT	10.3	0.01	B	10.0	0.02	B	11.0	0.03	B	11.2	0.05	B
WB LT/TH/RT	9.9	0.04	A	9.6	0.04	A	11.3	0.09	B	10.7	0.09	B
SB LT	7.4	0.01	A	7.4	0.01	A	7.5	0.02	A	7.5	0.02	A
2: Fraser Ave. & 10th St.												
WB LT/TH	8.8	0.01	A	8.9	0.01	A	9.4	0.03	A	9.5	0.02	A
SB LT	7.4	0.01	A	7.4	0.01	A	7.5	0.01	A	7.5	0.02	A
3: Fraser Ave. & 12th St.												
NB LT	7.4	0.00	A	0.0	0.00	A	7.6	0.00	A	7.5	0.00	A
EB LT/TH/RT	9.6	0.01	A	9.7	0.02	A	10.7	0.03	B	10.6	0.04	B
WB LT/TH/RT	9.2	0.01	A	9.7	0.02	A	10.0	0.03	B	10.6	0.04	B
SB LT	7.4	0.00	A	7.4	0.00	A	7.5	0.00	A	7.5	0.00	A
4: Fraser Ave. & 13th St.												
WB LT/TH	9.1	0.02	A	9.1	0.02	A	9.6	0.03	A	9.7	0.05	A
SB LT	7.4	0.01	A	7.4	0.00	A	7.5	0.01	A	7.5	0.01	A
5: Kaumalapau Hwy & Fraser Ave.												
EB LT	7.6	0.04	A	7.4	0.04	A	7.8	0.07	A	7.6	0.07	A
SB LT/RT	9.5	0.11	A	9.4	0.10	A	10.7	0.20	B	10.8	0.19	B
6: Manele St. & Kaumalapau Hwy												
NB LT/TH/RT	8.8	0.06	A	9.3	0.12	A	9.8	0.13	A	10.6	0.22	B
EB LT	0.0	0.00	A	7.3	0.00	A	7.4	0.00	A	7.4	0.01	A
WB LT	7.5	0.09	A	7.4	0.06	A	7.7	0.14	A	7.6	0.09	A
SB LT/TH/RT	0.0	0.00	A	11.2	0.02	B	14.5	0.05	B	14.3	0.07	B

4. FUTURE YEAR 2024 TRAFFIC CONDITIONS

The Future Year 2024 scenario represents the traffic conditions within the Project study area with the full build-out of the Project.

4.1 Background

The project proposes to construct a residential development of 200 single family units, one-acre park, 1,500 square foot pavilion, comfort station, and 100 parking stalls for Lanai City. Of the 200 single-family homes, 133 will be comprised of affordable homes and 67 will be comprised of market-rate homes. As a conservative measure, a 1.1-acre park will be assumed to include the amenities identified. Vehicular traffic to the Project will be provided by two (2) existing accesses along Fraser Avenue at 9th Street and at 12th Street. The Project is anticipated to be completed by Year 2024.

4.2 Travel Demand Estimations

4.2.1 Trip Generation

The Institute of Transportation Engineers (ITE) publishes a book based on empirical data compiled from a body of more than 4,250 trip generation studies submitted by public agencies, developers, consulting firms, and associations. This publication, titled Trip Generation Manual, 10th Edition, provides trip rates and/or formulae based on graphs that correlate vehicular trips with independent variables.

The Project is forecast to generate approximately 147(221) trips during the AM(PM) peak hours of traffic.

See Tables 4.1 and 4.2 for Trip Generation formulae and projections for the Project.

Table 4.1: Project Trip Generation Rates

Land Use (ITE Code)	Independent Variable	Weekday AM Peak Hour		Weekday PM Peak Hour	
		Trip Rate	% Enter	Trip Rate	% Enter
Single-Family Detached Housing (210)	200 DU	[a]	25%	[b]	63%
County Park (411)	1.1 Acre[1]	0.02	59%	[c]	55%

Note:
[a] T = 0.71(X) + 4.80
[b] Ln(T) = 0.96*Ln(X) + 0.20
[c] T = 0.06(X) + 22.60
[1] Acrage includes 1,500 sf pavilion to be conservative.

Table 4.2: Project-Generated Trips

Land Use (ITE Code)	Independent Variable	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Enter (vph)	Exit (vph)	Total (vph)	Enter (vph)	Exit (vph)	Total (vph)
Single-Family Detached Housing (210)	200 DU	37	110	147	125	73	198
County Park (411)	1.1 Acre[1]	0	0	0	12	11	23
Total		**37**	**110**	**147**	**137**	**84**	**221**

[1] Acreage includes 1,500 sf pavilion to be conservative.

4.2.2 Trip Distribution & Assignment

Trips generated by the Project were assigned throughout the study area based upon existing travel patterns. The traffic generated by the Project was added to the forecast Base Year 2024 traffic volumes within the vicinity of the Project to constitute the traffic volumes for the Future Year 2024 traffic conditions. Figure 4.1 illustrates the Project-generated trip distribution.

4.3 Future Year 2024 Analysis

Upon completion of the Project, all study intersections are forecast to operate similar to Base Year 2024 traffic conditions, with all manual turning movements operating at LOS C or better during the AM and PM peak hours of traffic.

See Figure 4.2 for the Future Year 2024 with Project traffic volumes and LOS. Table 4.3 summarizes the Existing, Base Year 2024, and Future Year 2024 with Project LOS at the study intersections. LOS worksheets are provided in Appendix C.