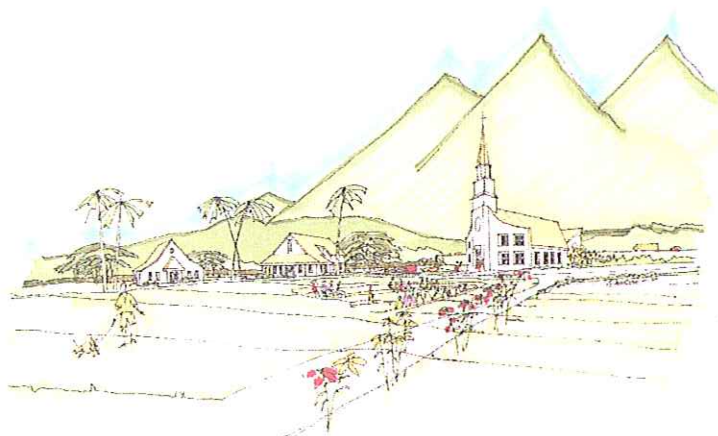
PROJECT ASSESSMENT REPORT

IN SUPPORT OF A

PETITION FOR STATE LAND USE DISTRICT BOUNDARY AMENDMENT

FOR THE

PROPOSED EMMANUEL LUTHERAN CHURCH AND SCHOOL CAMPUS



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August 25, 2006

EXECUTIVE SUMMARY

Project Name:	Proposed Emmanuel Lutheran Church and School Campus
Location:	Maui Island Wailuku TMK: (2) 3-5-002:011
Applicant:	Emmanuel Lutheran Church of Maui 520 West One Kahului, Hawaii 96732 Contact: Richard Sudheimer Phone: 808.877.3037
Consultant:	Chris Hart and Partners, Inc. 1955 Main Street Wailuku, Hawaii 96793 Contact: Matthew M. Slepin Phone: 808.242.1955
Project Summary:	Emmanuel Lutheran Church of Maui ("ELCM" or "applicant") has been a part of the community since its founding in 1967 and proposes to develop a new campus for the Emmanuel Lutheran Church and School. The project site is a 25.263 acre parcel of former agricultural land located in Wailuku, Maui and is designated by Tax Map Key (2) 3-5-002:011. The applicant owns the project site in fee simple. The proposed project will create new campus for the church and school. Approximately 52,000 square feet of structures are proposed for the new campus, including a pre-school building, eighteen (18) classrooms for grades K through 8, a multi-purpose complex, and other buildings accessory to school functions. At full buildout, the new school will be able to accommodate approximately 450 students.

The new campus also includes a 450-seat sanctuary for religious-services and school-related functions. Infrastructure work will also be required for project implementation, including a new access road from Waiale Road.

The project will be implemented in two (2) phases, which will commence following the appropriate approvals and funding. The first phase is preliminarily anticipated to commence in late 2008 and be completed in late 2009.

Due to existing land use designations, project implementation requires a County Change in Zoning from "Agricultural" to "Public/Quasi-Public" uses. The Community Plan designates the subject property for "Public/Quasi-Public" uses which is consistent with the proposed project. The project will also require a District Boundary Amendment from the State Land Use Commission from "Agricultural" to "Urban".

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I. PROJECT OVERVIEW

A. Property Location

The subject property comprises 25.263 acres located in the Central Valley of Maui, approximately midway between Wailuku Town and Waikapu. See Figure 1, Regional Location Map. The parcel is identified by Tax Map Key (2) 3-5-002:011. See Figure 2, Tax Map Key. The property abuts Honoapiilani Highway to the west and the eastern boundary will abut the new Waiale Road extension. The property is also identified as Lot A of the Waikapu East (Large Lot) Subdivision No. 3; it is bordered by the 14.4-acre Lot J to the north and the 25.0-acre Lot B to the south.

B. Existing Land Use

Historically, the subject property was used by Wailuku Agribusiness Co., Inc. and its predecessors for the cultivation of sugarcane and pineapple. More recently, a portion of the project site was used by short term, small scale tenant farmers to grow bananas and other fruits. The property is currently, however, vacant and fallow. See Figures 3a-b, Site Photographs. The applicant acquired the property in 2004 as Wailuku Agribusiness divested its land holdings.

C. Land Ownership and Project Applicant

The subject property is owned in fee simple by the applicant.

D. Proposed Action

ELCM has provided religious services for its congregation and the community for approximately 40 years. In addition, it has offered Christian educational opportunities to the community since 1978. ELCM currently offers pre-school (pre-K), grade school and intermediate school (grades K through 8) programs. Operating on a constrained campus of approximately 1.3 acres, the present school programs serve 38 students in pre-K and 175 students in grades K though 8.

The applicant proposes to develop a new campus for the Emmanuel Lutheran Church and School. See Figure 4, Conceptual Master Plan, and Appendix A. The project will be implemented in three (3) steps, designated as Phase I, Phase IA, and Phase II. Full project build-out is estimated to cost approximately $20 million. Phase I is preliminarily estimated to be commence in late 2008 and to be completed in late 2009.

The current school facility has an enrollment of approximately 213 students in grades pre-K through 8. School functions employ 24 full- and part-time faculty, administration, and maintenance personnel. The current church has two (2) full-time pastors and one (1) administrative assistant. The new facility will employ nine (9) additional school faculty and one (1) additional maintenance person, while the new church sanctuary will have one (1) additional pastor. All church and school functions will be transferred from the existing site in Kahului to the new campus upon completion of Phase I.

Classroom size in the new campus will accommodate approximately 25 students per class in grades K-8, while the pre-school will serve approximately 40 students in total.

The master plan calls for a low-density village concept, with existing view corridors maintained and substantial open space. Buildings are one (1) or two (2) stories and will be sited around a village green, which provides the campus with a sense of place. The majority of parking will be located outside of the pedestrian areas, with visitor and accessible parking located closer.

Description of the specific project elements in each phase follows:

Phase I. The initial project phase will provide 12 regular classrooms, specialty classrooms for art and music, a pre-school building, athletic and recreation areas, and a multi-purpose complex that will allow for athletics and assembly (including church) uses. This phase will create approximately 30,000 gross square feet (sf) of school space and allow the school to accommodate an increase in enrollment of 30 percent, for a total of 265 students. 120 parking stalls will be provided. Infrastructure improvements include water and sewer lines, as well as an access road from Waiale Road.

Phase IA. This phase will provide approximately 8,000 sf of space, including a library and technology center and a science lab.

Phase II. The final phase will provide six (6) additional classrooms and a church sanctuary, which will accommodate 450 people. This will create an additional 14,000 gross sf of school space and is expected to accommodate an increase in student population to 490 students in grades pre-K through 8. 60 additional parking stalls will be provided as well.

It should be noted that the project is still in the conceptual stages of design. Final site plan layout may differ slightly from that described. The applicant is also continuing discussion with the State Department of Transportation, Highways Division, concerning a possible right-in, right-out access connection to Honoapiilani Highway.

E. Alternatives

1. No Action

The "No Action" Alternative would see the church and school continue in their present location and facility. Given the overburdened nature of the school facilities and the desire of the applicant to expand both school enrollment and sanctuary seating capacity, this was deemed an undesirable alternative.

2. Deferred Action

The "Deferred Action" Alternative would see similar consequences in the short-term. In the long-term, with rising construction costs, the proposed project would likely cost more than if undertaken at the present time. This Alternative was also deemed undesirable.

3. Alternative Design

Three (3) Master Plan options were considered by the applicant during the conceptual design phase of the project.

Option A. This Option was a compact, efficient campus with four (4) main buildings: a classroom building, a multi-purpose complex, and pre-school, and a sanctuary. This campus design developed the least area of the various Options.

Option B. This Option was a "village green" concept with the sanctuary acting as the central, focal point and various buildings clustered around it. This Option would develop somewhat more than half of the of the available site and supported the maintenance of mauka and makai viewplanes.

Option C. This Option spread the campus across three-quarters of the site. The sanctuary was separated from the rest of the campus, which was located in the most gently sloping area of the site.

These design Options were considered by the project team, the church congregation, the school employees, and the church board. In the end, Option B was chosen as the Preferred Option for both aesthetic and functional reasons, and because this Option creates a sense of place for the proposed Church and School campus.

F. Project Justification

The current school facility comprises approximately 16,000 sf of building space, which accommodates 213 students in grades pre-K through 8. This facility is over-utilized and is not adequate to meet the needs of the current and projected student population.

The proposed project will allow the school to meet an expanding student enrollment and improve the adequacy of classrooms, as well as expand the size of the congregation. Classroom sizes will be increased and will incorporate urgently needed storage space.

G. Entitlements and Approvals

The proposed project will require a County Change in Zoning from "Agricultural" to "Public/Quasi-Public" uses. The Community Plan designates the site for "Public/Quasi-Public" uses and is consistent with the proposed project. The project will further require State Land Use District Boundary Amendment from "Agricultural" to "Urban" from the Land Use Commission.

The landmark church and steeple of the sanctuary may exceed the current Public/Quasi-public Zoning height restriction of 35 feet. The County is currently in the process of amending the ordinance to accommodate good architecture. However, the proposed project may require a variance depending upon the timing of project implementation and the Zoning revisions.

Project implementation will also require building and grading permits from the County of Maui. Noise permits and National Pollution Discharge Elimination System permits for construction –related activities may also be required from the State of Hawaii.

H. Pre-Consultation

Maui County Department of Planning, September 23, 2005

Topics: Height restrictions
Faculty/Employee Housing
Vehicular Access and Traffic
Parking Requirements
General Plan Update

Land Use Commission staff, May 2, 2006

Topics: Appropriateness of the proposed action in relation to regional land uses.

II. Affected Environment, Potential Impacts and Mitigation Measures

A. Physical Environment

1. Land Use

Existing Conditions. The lands of the project site were formerly used for agricultural cultivation. In recent years, Wailuku Agribusiness has abandoned the cultivation of many of these fields. The corridor running from Wailuku Town in the north, through Waikapu, and down to Ma`alaea in the south, has increasingly been given over to rural residential uses. Properties immediately abutting the project site are vacant or retain vestiges of low-intensity cultivation, such as Lot J and Lot B of the Waikapu East (Large Lot) Subdivision. Lot J is currently being used for field offices for Stanford Carr Development and Goodfellow Brothers. The parcel immediately to the south has been acquired by the Valley Isle Fellowship, but remains idle at present. Honoapiilani Highway forms the mauka (western) boundary of the subject property.

Properties in the general vicinity include the Waikapu Affordable Housing subdivision, an approximately 440 unit, affordable, single-family residential subdivision, to the south; other residential subdivisions are also located to the south, including the Waiolani and Waiolani Elua subdivisions. A mixed residential and commercial property is in the planning stages to the north with the Kehalani project, an approximately 2000 unit single- and multi-family residential subdivision, beyond that. Directly mauka (west) of the subject property, an approximately 400 unit, single-family residential subdivision is also in the planning stages. The Maui Lani Project District lies to the east, with the "Maui Lani 8B" component in the planning stage.

Potential Impacts and Mitigation Measures. The proposed school and church campus is anticipated to have a positive impact on existing land uses in the vicinity. The project site itself is currently fallow while the project region is in substantially rural and residential uses. The church and school campus is seen as a positive community building component.

2. **Topography and Soils**

Existing Conditions. A Preliminary Drainage Report was prepared for the project by Otomo Engineering, Inc. See Appendix B. This report analyzed the soils at the project site. The subject property lies within the Pulehu-Ewa-Jaucas soil association. The soils within the project site are classified as Iao clay (IaA and IaB). See Appendix B, Exhibit 3. Iao clay is characterized as having slow runoff and not more than slight erosion hazard for 0 to 3 percent slopes; moderately slow permeability, medium runoff and slight to moderate erosion hazard for 3 to 7 percent slopes; and medium runoff and moderate erosion hazard for 7 to 15 percent slopes (*Soil Survey*, 1972).

The site slopes in a west to east direction from elevation 384 feet above mean sea level (amsl) at the southwest corner of the property (adjacent to Honoapiilani Highway) to 323 feet amsl at the northeast corner of the property (adjacent to the Waiale Road extension. The average slope is 6.2 percent.

The historic Kama Ditch crosses the southwest portion of the subject property. A drainage channel crosses the property along its north and east boundaries, isolating approximately three (3) acres abutting Waiale Road from the rest of the site.

Potential Impacts and Mitigation Measures. Mass grading will be required to lessen the slope for project implementation. Grading permitting will be obtained from the County of Maui. The project will comply with Chapter 20.08, Soil Erosion and Sediment Control, of the Maui County Code. A grading plan will be devised with appropriate erosion control measures, such as sprinkling of soil, silt fences, and grassing of areas immediately following construction activities.

3. Hazardous Substances

Existing Conditions. As the property was formerly subject to agricultural cultivation, various chemicals and fertilizers were used on the site soils. A Phase I, Environmental Site Assessment was performed for the subject property by Vuich Environmental Consultants, Inc. See Appendix C. A list of chemicals used by the former owners is included in that report.

The property is located within ¼ mile of the former Waikapu Landfill. Landfills have the potential to leak hazardous substances into the soil.

Potential Impacts and Mitigation Measures. The Phase I, Environmental Site Assessment concludes that there is no evidence of hazardous substance concerns for the project site. Because the property is upgrade from the former Waikapu Landfill, there is little likelihood of potential for contamination from that facility. Similarly, the report concludes that it is unlikely that residual agricultural chemicals remain on-site and pose a threat to health. The report does suggest soil testing prior to development.

4. Flood and Tsunami Zones

Existing Conditions. The Preliminary Drainage Report analyzed the project site's flood zone hazard. According to that report, the project site is located in Flood Zone C, an area of minimal flood hazard. See Appendix B, Exhibit 4. The project is not located within a tsunami zone.

Potential Impacts and Mitigation Measures. Absence of flood risk obviates the need for mitigation measures.

5. **Flora and Fauna**

Existing Conditions. The project site is an extensively disturbed area of long-term agricultural cultivation. Onsite flora are typical of such areas and include weeds and scrub grasses, as well as bananas trees. Onsite fauna include rats, mice, mongoose, francolins, and mynah.

Potential Impacts and Mitigation Measures. There are no known habitats of rare, endangered, or threatened species of flora or fauna located on the subject property. Project implementation is not expected to result in any adverse impacts to flora or fauna.

6. **Air and Noise Quality**

Existing Conditions. Air quality in the Central Valley is considered relatively good. There are no point sources of air-borne emissions within proximity to the subject property. Non-point source emissions, such as automotive traffic from the adjacent highway and sugarcane burning from the nearby fields, are not significant enough to generate high concentrations of pollutants. The region's exposure to winds, which disperse pollutants, also helps maintain air quality.

Noise quality is affected primarily by traffic from the adjacent Honoapiilani Highway, with other area roadways also contributing ambient noise. The project site is situated in an area of mixed rural, single-family residential and agricultural uses, with some industrial sues as well. Noise quality is relatively good.

Potential Impacts and Mitigation Measures. Construction-related activities will result in short-term impacts to air and noise quality. Best Management Practices (BMPs) will help to mitigate such impacts. Adequate dust control measures, in compliance with Section 11-60-1-33, "Fugitive Dust", of the Hawaii Administrative Rules will be implemented during all phases of construction. Construction-activities will be limited to normal daylight hours in order to limit noise impacts and adhere to the Department of Health's noise regulations for construction equipment.

Project implementation is not anticipated to result in substantive impacts to air or noise quality in the long-term.

7. Historical and Archaeological Resources

Existing Conditions. An archaeological field inspection was performed for the subject property and a report prepared; see Appendix D. The inspection included a pedestrian survey and backhoe trenching for subsurface deposits. One (1) surface site, the Kama Ditch, was identified. No subsurface deposits were discovered. The report notes that the project site has been extensively disturbed through years of intensive agricultural activities.

Potential Impacts and Mitigation Measures. No further archaeological investigation is recommended for the project site. Given the subject property's history, there is little likelihood of uncovering any archaeological deposits. However, the report recommends archaeological monitoring during construction-related activities.

There are no known cultural activities or historical associations connected with the site.

8. Visual Resources

Existing Conditions. The property is located within the Central Maui valley. Waikapu Valley and the West Maui Mountains are immediately visible to the west of the property, while agricultural fields and Haleakala are visible to the east.

Potential Impacts and Mitigation Measures. The project will have minimal impact on views of East Maui from the Honoapiilani Highway. These impacts are relatively minor, given the low-density design of the campus. The site plan has been designed to maintain both mauka and makai view corridors and to provide substantial open space buffer areas between the low-density campus and Honoapiilani Highway. Aesthetically, the campus will be in harmony with traditional architectural styles and provide a sense of place.

9. Agricultural Resources

Existing Conditions. In 1977, the State Department of Agriculture developed a classification system to identify Agricultural Lands of Importance to the State of Hawaii (ALISH). The classification system is based primarily, though not exclusively, upon the soil characteristics of the lands. The three (3) classes of ALISH lands are: "Prime", "Unique", and "Other", with all remaining lands termed "Unclassified". When utilized with modern farming methods, "Prime" agricultural lands have a soil quality, growing season, and moisture supply necessary to produce sustained crop yields economically. "Unique" agricultural lands possess a combination of soil quality, growing season, and moisture supply to produce sustained high yields of a specific crop. "Other" agricultural lands include those that have not been rated as "Prime" or "Unique".

The ALISH map for the project region indicates that the subject property is comprised of lands that have been defined as "Prime" agricultural lands. See Figure 5, ALISH Map.

The University of Hawaii, Land Study Bureau (LSB), developed the Overall Productivity Rating, which classifies soils according to five

(5) levels, ranging from "A", representing the class of highest productivity soils, to "E", representing the lowest. The majority of the project site is comprised of lands designated as "A" by the LSB. See Figure 6, LSB Map.

Potential Impacts and Mitigation Measures. The subject property's 25.263 acres represent approximately one hundredth of one percent of the estimated 244,726 acres in Maui County currently designated as "Agricultural" by the State Land Use Commission. Further, the subject property is located in an area that is seeing a general transition from industrialized agricultural cultivation to rural residential uses. The proposed district boundary amendment will not result in any substantial impacts to agriculture.

B. Socio-Economic Environment

1. Population

Existing Conditions. Maui County experienced strong population growth during the past two (2) decades. The Year 2000 resident population expanded from 1980's 70,991 to 128,241. This represents an 80.6 percent increase (Maui County Data Book, 2005). Population growth is expected to continue with the year 2020 resident population projected at 229,700. Visitor counts have increased even more dramatically, with the average daily visitor count increasing from 15,363 in 1980 to 43,854 in 2000. This represents a 285 percent increase in visitor per day. Thus the County's de facto population, which includes residents and visitors, grew from 85,803 in 1980 to 168,544 in 2000, representing an 88 percent increase.

Potential Impacts and Mitigation Measures. The proposed project will not contribute significantly to population growth. It will, rather, add to school capacity at a time when dramatic increases in the population have placed increasing pressure on existing public and private school facilities. The new school will create opportunities for families seeking a Christian-based education. Similarly, the new church sanctuary will allow ELCM to increase its congregation to meet the religious needs of the rising population.

2. Economy

Existing Conditions. Tourism and agriculture are the predominate components of Maui County's economy. Maui County hosted 2,207,826 visitors in the year 2004 and hotels experienced a 78.69 percent occupancy rate. In Central Maui, economic activity centers on sales and service industries, including air and water transportation, as well as the various branches of state and county government.

Large-scale mono-crop agriculture, including sugar, pineapple, and cattle ranching, is the County's dominant agricultural land use and generates the majority of agricultural revenues. As of 2002, approximately 256,690 acres of the County were in farm use of some kind. This is a decrease from the 355,786 acres in farmland in 1992. Central Maui mirrors the county as a whole in this trend.

As of March 2006, unemployment in Maui County was 2.4 percent; this is substantially better than the nationwide average of 4.8 percent. It is noted that the State Department of Labor and Industrial relations estimates an average annual growth rate of 2.4 percent in educational and health services fields (Hawaii Workforce Informer). There were an estimated 730 elementary school teachers as of May 2004 (the last date of available information).

Potential Impacts and Mitigation Measures. The project is expected to generate short-term economic benefits in the from of construction-related employment. Long-term benefits will accrue from the increase in teaching and other positions available at the new campus.

C. Public Services

1. Recreational Facilities

Existing Conditions. The Wailuku-Kahului area is serviced by several recreational facilities, such as the War Memorial Stadium Complex, featuring a 20,000-seat stadium, a gymnasium, and a swimming pool; the 110-acre Ke'opuolani Regional Park; the recently renovated and enlarged small boat launch ramp at Kahului Harbor; the Maui Botanical Garden; and several smaller parks and beaches. The Waikapu Community Center is also located near the project site.

Potential Impacts and Mitigation Measures. The project is not anticipated to increase demand on area recreational facilities. The school campus will contain a 5,700 sf gymnasium as well as basketball courts and other athletic and play fields to serve the needs of the students.

2. Police and Fire Protection

Existing Conditions. The County of Maui's Police Department is headquartered in Wailuku. The project site is served by the Wailuku Patrol, District I. The Department of Fire Control provides fire prevention, suppression, and protection services and is headquartered in Kahului. The project site is served by the Wailuku Station, No.1.

Potential Impacts and Mitigation Measures. In the context of the overall growth of the Wailuku-Kahului area, the proposed project is not anticipated to substantially increase demand for emergency services nor extend emergency service area limits.

3. Medical Facilities

Existing Conditions. Maui Memorial Medical Center, located in Wailuku, is the island's only acute care hospital. It is a 231 bed hospital. Various private medical offices and facilities are also located in the Wailuku-Kahului area.

Potential Impacts and Mitigation Measures. In the context of the overall growth of the Wailuku-Kahului area, the proposed project is not anticipated to substantially increase demand for medical services

4. Schools

Existing Conditions. Public education in the project area is provided by the State of Hawaii's Department of Education (DOE). The project area is located within the DOE's Baldwin Complex, which is part of the larger Baldwin-Kekaulike-Maui Complex Area. Schools in the Maui Complex include Waihee Elementary (2005 to 2006 enrollment of 784 students), Wailuku Elementary (2005 to 2006 enrollment of 875), Iao Intermediate (2005 to 2006 enrollment of 742 students), and Baldwin High School (2005 to 2006 enrollment of 1349 students). Many of these schools are near or over ideal capacity.

Private schools in the project area include the existing Emmanuel Lutheran school, serving grades pre-K through 8 (estimated enrollment of 213 students); Christ the King, serving grades pre-K through 6 (estimated enrollment of 165 students); Victory Christian Academy, serving grades pre-K through 12 (estimated enrollment of 90 students); and St. Anthony's schools, serving grades K through 12 (estimated enrollment of 565 students).

Potential Impacts and Mitigation Measures. The proposed project will increase educational opportunities for the community by effectively doubling school capacity to 490 students. This increase in capacity is anticipated to reduce some of the burden on the existing public school system.

5. Solid Waste

Existing Conditions. Residential solid waste in the project area is collected by the County and delivered to the Central Maui landfill. This facility also accepts waste from private refuse collectors.

Potential Impacts and Mitigation Measures. The new campus will be served by a private collection service and is not anticipated to substantially impact landfill capacity. In addition, the applicant shall continue existing recycling and responsible disposal of green waste and increase such activities where opportunities exist. The additional students drawn to the school are anticipated to be locally based and will not increase waste volumes.

D. Infrastructure

1. Roadways

Existing Conditions. The project site is located immediately to the east of Honoapiilani Highway, a two-way, two-lane undivided highway in the project vicinity, with posted speed limits ranging from 30 to 55 miles per hour (mph). The highway is the major thoroughfare nearest to the project site. Honoapiilani Highway connects West Maui with the central part of the island, running from Wailuku Town in the north to Ma`alaea in the south and then west to the Lahaina region. There is an existing left turn pocket from the Highway onto Kuikahi Drive.

Kuihelani Highway is located approximately one (1) mile southeast of the project site. Kuihelani Highway is a two-way, four-lane State arterial roadway with posted speed limits ranging from 30 to 55 mph. This highway runs in a generally southwest to northeast direction from its intersection with Honoapiilani Highway to the point at which it merges with Dairy Road in Kahului. A traffic signal controls access to the highway from East Waiko Road.

East Waiko Road is a two-way, two-lane County roadway connecting Honoapiilani Highway and Kuihelani Highway with a posted speed limit of 20 mph. East Waiko Road serves residential developments below Honoapiilani Highway.

Waiale Road is a two-way, two-lane former cane haul road in its segment running north from Waiko Road to Kuikahi Drive. This segment is being improved. Beyond that point, Waiale Road becomes a paved roadway until it merges with Lower Main Street in Wailuku.

A traffic impact analysis report (TIAR) was prepared for the project. See Appendix E. The TIAR analyses traffic operations in the vicinity of the subject property using Level of Service (LOS) ratings as determined by the Highway Capacity Manual—HCM 2000 methodology. This is a qualitative measurement ranging from "A" through "F" with LOS A representing ideal or free-flowing traffic operating conditions, LOS C representing average and acceptable traffic delays, and LOS F representing unacceptable or potentially congested traffic operating conditions. The LOS for the analyzed intersections was determined for both the morning (AM) and afternoon (PM) peak periods.

The TIAR analyzed the following intersections:

- Honoapiilani Highway at East Waiko Road (unsignalized, State roadway)
- Honoapiilani Highway at Waiolu Road (unsignalized, State roadway)

- Honoapiilani Highway at Pilikana Street (unsignalized, State roadway)
- Honoapiilani Highway at Kuikahi Drive (signalized, State roadway)
- Waiale Road at Kuikahi Drive (unsignalized, County roadway)
- Waiale Road at Road A (in development for Waikapu Affordable Housing project)
- Waiale Road at Road C (in development for Waikapu Affordable Housing project)
- Waiale Road at East Waiko Road (in development for Waikapu Affordable Housing project)

The results of that analysis are presented below:

	AM Peak	PM Peak	Sunday Peak
Honoapiilani Hwy at Kuikahi Drive	D	D	C
Eastbound Left	D	D	B
Eastbound Thru	D	D	B
Eastbound Right	D	D	B
Westbound Left	C	C	B
Westbound Thru & Right	B	B	B
Northbound Left	D	D	C
Northbound Thru	D	D	C
Northbound Right	C	C	B
Southbound Left	D	D	C
Southbound Thru	D	D	C
Southbound Right	C	C	B
Honoapiilani Highway at East Waiko Road			
Northbound Left	A	A	A
Southbound Left	A	A	A
Westbound Left, Thru & Right	F	F	C
Eastbound Left & Thru	F	F	C
Eastbound Right	B	B	B
Honoapiilani Highway at Waiolu Road			
Southbound Left	A	A	A
Westbound Left & Right	C	C	B

Honoapiilani Highway at Pilikana Road			
Northbound Left	A	A	A
Eastbound Left	F	F	C
Eastbound Right	C	C	B

Potential Impacts. During the week, the new school is anticipated to generate 460 trips, in- or out-bound, during the AM peak period and 305 trips during the PM peak period. At the same time, the new church facility is anticipated to generate 10 trips, in- or out-bound, during both the Am and PM peak periods. On Sundays, the school will be closed and church activity will increase. The church is anticipated to generate 60 trips, in- or out-bound, during the Sunday peak period.

Vehicular access to the new church and school will be through a driveway off of Waiale Road, approximately midway between Kuikahi Drive and the north boundary of the Waikapu Affordable Housing subdivision. In the present stage of the project conception, a second, gated driveway from Honoapiilani Highway would also provide right-in, right-out access for emergency needs only. The location of this second, limited driveway will be determined in coordination with the State Department of Transportation, Highways Division (DOT). The applicant may eventually seek DOT approval for unlimited access from this second driveway.

Interior roadways and parking will comply with applicable County requirements, such as a 24 foot roadway width and paved parking stalls.

The TIAR analyzed applicable LOS in the Year 2010 both with and without the project implementation, in order to gauge the project's traffic impacts. Both general traffic growth rates and area-specific data were used to estimate traffic increases.

In general, the project is not anticipated to produce substantial adverse impacts to traffic movements. All of the intersections analyzed in the TIAR are expected to operate at the same LOS with and without the project, with the following exceptions:

- **Honoapiilani Highway and East Waiko Road**
  Approaches during the AM peak period deteriorate from LOS C to D.

- **Honoapiilani Highway and Pilikana Road**
  Southbound through movements during both the AM and PM peak periods deteriorate from LOS C to D.

- **Honoapiilani Highway and Waiolu Road**
  Southbound, left turns during the AM peak period deteriorate from LOS A to B.

- **Waiale Road and Kuikahi Drive**
  Northbound, left turns during the AM peak period deteriorate from LOS A to B. Eastbound, right turns during the AM peak period deteriorate from LOS A to B. Eastbound, left turns during the Sunday peak period deteriorate from LOS E to LOS F.

All movements at signalized intersections will operate at LOS D or better. As LOS D is the minimum acceptable level-of-service, no mitigation of the signalized intersections is required. With the exception of the intersection of Waiale Road and Kuikahi Drive, all controlled lane groups will operate at LOS C or better during all peak periods.

It is noted that long-range plans for the areas include the extension of Waiale Road to Honoapiilani Highway. When that occurs, traffic movements in the project vicinity will be altered as significant numbers of trips are expected to be diverted from Honoapiilani Highway to Waiale Road.

Mitigation Measures. At the intersection of Waiale Road and Kuikahi Drive, the eastbound to northbound left turn will operate at LOS F during both weekday peak periods, even without project implementation. Mitigation will be required for this intersection to operate at an acceptable LOS. The traffic report discusses three potential mitigation measures:

1. **Intersection Widening**
   Widening of the intersection to provide a second lane for the eastbound to northbound left turn would require widening of Waiale Road northbound in order to accommodate the second left turn lane. This does not appear to be a viable option because of right-of-way constraints. It is also understood that the community has expressed its desire that Waiale Road remain at two lanes.

2. **Signalization**
   The peak hour warrants for a traffic signal are satisfied for both morning and afternoon peak hour conditions without the project. The warrants will also be satisfied for peak hour conditions with the project. As a signalized intersection, all movements will operate at LOS C, or better, during morning and afternoon peak hours.

3. **Roundabout**
   An analysis of the intersection as a roundabout was performed. This analysis concluded that the intersection would have a volume-to-capacity ratio of 1.08 during the morning weekday peak hour. This implies that the intersection would operate a LOS F if converted to a roundabout. The conclusion is that a roundabout at the intersection is not a viable mitigation measure.

The report further recommends that a separate left turn lane along northbound Waiale Road would be warranted at the project entrance. The widening required for the left turn lane would also provide widening for a left turn refuge lane. This would improve the level-of-service and safety of traffic exiting the project onto Waiale Road.

The provision of a secondary access road from Honoapiilani Highway, limited to right-in and right-out movements, is suggested by the TIAR. This roadway would divert traffic from Kuikahi Drive and improve LOS at several intersections of that roadway.

2. Water

Existing Conditions. No waterlines serve the subject property. There are 12-inch lines along Honoapiilani Highway and Waiale Road to the north; the line along Honoapiilani Highway terminates at Kehalani Makai Parkway and the line along Waiale Road terminates at its intersection with Kuikahi Drive.

Water storage in this area of Maui is provided by a 3.0 million gallon reservoir located at the intersection of West Alu Road, Iao Valley Road, and Main Street. The sources for the system are from Iao Valley and the Mokuhau wells in Happy Valley.

The existing ELCM School, with an enrollment of 231 students, requires approximately 12,780 gpd.

Potential Impacts and Mitigation Measures. A Preliminary Engineering Report was prepared for the project by Otomo Engineering. See Appendix F. The report estimates domestic water demand for the project at approximately 42,947 gallons per day (gpd), as determined by land area, and 29,400 gpd, as determined by the maximum number of 490 students. This latter is considered the more accurate estimate by the engineer since the applicant has an agreement with Wailuku Agribusiness for the provision of irrigation water from their non-potable source.

According to the Department of Water Supply, there is storage available in the 3.0 million gallon reservoir for new projects. Hawaii Land & Farming, Inc. (HLFI) is currently constructing a 1.5 million gallon mid-level tank on Kuikahi Drive.

In accordance with Department of Water Supply standards, the fire flow demand for schools is 2,000 gallons per minute for two (2) hour duration. Fire hydrants will be installed with a maximum spacing of 250 feet.

3. Wastewater

Existing Conditions. The existing system begins as an 8-inch sewer line at Waiko Road, heads north towards Waiale Road and increases to 12-inches in size. This 12-inch sewer line traverses the southeastern corner of the project site.

Wastewater collected in the Waikapu area is transported to the Kahului-Wailuku Wastewater Reclamation Facility in Naska. According to the Wastewater Reclamation Division, as of June 30, 2005, the cumulative flow allocated to that facility was 6.3 million gpd and the average daily flow was 4.64 million gpd; the design capacity for the facility is 7.9 million gpd.

The existing ELCM School, with an enrollment of 231 students, generates approximately 4360 gpd.

Potential Impacts and Mitigation Measures. Full buildout of the campus will generate an estimated wastewater flow of 10,050 gpd. Refer to Appendix F. This wastewater will be collected onsite by a gravity sewer system connected to the existing 12-inch line. The existing area system and the Kahului-Wailuku Wastewater Reclamation Facility are of sufficient capacity to accommodate the project's wastewater flows.

4. Drainage

Existing Conditions. A drainage channel crosses the property along its north and east boundaries, isolating approximately three (3) acres abutting Waiale Road from the remainder of the site. Runoff from approximately 9.35 acres of the site sheet flows into this channel. The rate of this runoff is estimated at 11.30 cubic feet per second (cfs). The remaining runoff, from the more southerly portion of the site, is estimated at 17.42 cfs and sheet flows onto the Waiale Road extension. Total onsite runoff sheet flowing onto Waiale Road is estimated at 19.30 cfs, including runoff from the makai portion of Honoapiilani Highway, which flows across the project site.

Estimated present on-site runoff for a 50-year, one-hour storm is 30.60 cfs.

Potential Impacts and Mitigation Measures. Onsite runoff will be collected by grated catch basins located at appropriate intervals along driveways and landscaped areas. This runoff will then be conveyed to onsite retention basins located within the playfields and landscaped areas. Offsite runoff from Honoapiilani Highway will be intercepted by the project's drainage systems and conveyed to the retention basins.

Retention basins will be sized to accommodate the increase in runoff from a 50-year, one-hour storm. There will be no increase in runoff sheet flowing into the drainage channel or onto Waiale Road.

Estimated post-development runoff from the site is 45.15 cfs, which represents a net increase of 14.55 cfs.

5. Electrical and Telephone Systems

Existing Conditions. There are existing power, telephone, and cable television transmission facilities along Honoapiilani Highway. 25-foot wide electrical easements exist along the western and northern boundaries of the property. Existing overhead power lines traverse the property within those easements.

Potential Impacts and Mitigation Measures. Proposed electrical, telephone, and cable television distribution systems will be served from the existing facilities along Honoapiilani Highway. Within the project site, all distribution systems will be installed underground. Streetlights will be installed at intervals determined by the project's electrical engineer.

E. Cumulative and Secondary Impacts

Cumulative impacts are defined as the impact on the environment, which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions.

The proposed project is not part of a larger action. The new campus is planned for an area that is seeing substantial residential development and can be seen, in part, as a response to that growth. Moreover, approval of the project would allow relocation of the existing school from a residential zoned neighborhood. There are, however, no direct community growth impacts resulting from or occurring with the project. There are no other public works projects anticipated within the project context.

Secondary impacts are those that have the potential to occur later in time or farther in distance, but which are reasonably foreseeable. They can be viewed as actions of others that are taken because of the presence of the project. Secondary impacts from highway projects, for example, can occur because they can induce development by removing transportation impediments to growth.

There are no foreseeable secondary impacts associated with the proposed project. It will not contribute to population growth, nor will it place additional burden upon infrastructure or the environment.

III. Relationship to Governmental Plans, Policies, and Controls

A. State Land Use District

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission, establishes four (4) major land use districts in which all lands in the state are placed. These districts are designated as "Urban", "Rural", "Agricultural", and "Conservation". The subject property is located within the "Agricultural" district. See Figure 7, State Land Use Map.

The proposed use of the land for school use is incompatible with what is allowed in the District, thus the applicant is seeking a district boundary amendment from "Agricultural" to "Urban". Development entitlements within the Urban District are delegated solely to the respective County Governments. The State Land Use Commission will act upon the application for a Land Use District Boundary Amendment.

The proposed boundary reclassification is consistent with the following standards of the Urban District, Sec 15-15-18, Hawaii Administrative Rules:

It shall include lands characterized by "city-like" concentrations of people, structures, streets, urban and other related land uses; streets, urban level of services and other related land uses.

Analysis. The project site is located in the Wailuku-Kahului area, the most urbanized region of Maui. Wailuku Town, located approximately one (1) mile from the project site, serves as the County seat while Kahului functions as the retail center of the island. While the immediate project vicinity is less urbanized than the region as a whole, it has been and continues to be the subject of urbanization. The nearby Waikapu Affordable Housing residential subdivision, Waikapu 28 residential subdivision, Maui Lani mixed-use development, and Consolidated Baseyard district boundary amendments demonstrate the urbanized nature of the surrounding environs.

It shall take into consideration the following specific factors:

(A) Proximity to centers of trading and employment except where the development would generate new centers of trading and employment;

(B) Availability of basic services such as schools, parks, wastewater systems, solid waste disposal, drainage, water, transportation systems, public utilities, and police and fire protection; and

(C) Sufficient reserve areas for foreseeable urban growth.

Analysis. As discussed above, the project is located in the Wailuku-Kahului area, a center of trading and employment. With the proposed infrastructure improvements, the project site will have all basic services available, such as wastewater systems, drainage, water, transportation systems and emergency protective services. The subject property is located in an area of existing and planned residential development as evidenced by the Wailuku-Kahului Community Plan. Development of the project's 25.263 acres will not significantly impact reserve areas for foreseeable urban growth.

It shall include lands with satisfactory topography, drainage, and reasonably free from the danger of any flood, tsunami, unstable soil condition, and other adverse environmental effects.

Analysis. The site has an average slope of approximately 6.2 percent. Drainage improvements will be designed to comply with County standards. The subject property is not located in a tsunami zone and is classified as Flood Zone C, an area of minimal flooding. There are no known unstable soil conditions nor or there any other adverse environmental conditions that would render it unsuitable or inappropriate for the proposed project.

Land contiguous with existing urban areas shall be given more consideration than non-contiguous land, and particularly when indicated for future urban use on state or county general plans.

Analysis. The project site is not contiguous with urbanized lands. It is, however, surrounded by urbanized lands, such as the Waikapu Affordable Housing Subdivision and the Waikapu 28 residential subdivision to the south; Wailuku Town to the north; and the Maui Lani mixed-used development to the northeast

It shall include lands in appropriate locations for new urban concentrations and shall give consideration to areas of urban growth as shown on the state and county general plans;

Analysis. The subject property is in an appropriate location for new urban concentration and growth as it is bordered by lands already in the Urban District. The site is identified in the Community Plan for Public/Quasi-public uses, such as those proposed by the applicant.

It may include lands which do not conform to the standards in paragraphs (1) to (5):
(A) When surrounded by or adjacent to existing urban development; and
(B) Only when those lands represent a minor portion of this district;

Analysis. Although the subject property conforms to paragraphs 1 through 5, it is noted that the project site is surrounded by urbanized land uses, including the Waikapu Affordable Housing subdivision, Waikapu 28 residential subdivision, Maui Lani mixed-use development, and Consolidated Baseyard. The 25.256 acres of the subject property represent only an approximate one (1) percent of the estimated 244,726 acres in Maui County designated for Agricultural uses.

It shall not include lands, the urbanization of which will contribute toward scattered spot urban development, necessitating unreasonable investment in public infrastructure or support services

Analysis. Development of the subject property will not contribute to scattered spot urban development given its location to the existing urban development of Wailuku-Kahului. There will be no unreasonable investment required for public infrastructure and support services.

It may include lands with a general slope of twenty per cent or more if the commission finds that those lands are desirable and suitable for urban purposes and that the design and construction controls, as adopted by any federal, state, or county agency, are adequate to protect the public health, welfare and safety, and the public's interests in the aesthetic quality of the landscape.

Analysis. The subject property does not include slopes of 20 percent or greater.

B. Hawaii State Plan

Chapter 226, Hawaii Revised Statutes establishes a State Plan to help direct development within the State of Hawaii. As stated in Section 226-1:

> *The purpose of this chapter is to set forth the Hawaii state plan that shall serve as a guide for the future long-range development of the State; identify the goals, objectives, policies, and priorities for the State; provide a basis for determining priorities and allocating limited resources, such as public funds, services, human resources, land, energy, water, and other resources; improve coordination of federal, state, and county plans, policies, programs, projects, and regulatory activities; and to establish a system for plan formulation and program coordination to provide for an integration of all major state, and county activities.*

The proposed project is in accord with the following State Plan Objectives and Policies:

Sec. 226-5 Objective and policies for population.
Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.

Sec. 226-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.
Take into account the physical attributes of areas when planning and designing activities and facilities.

Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.

Sec. 226-12 Objective and policies for the physical environment--scenic, natural beauty, and historic resources.
Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.

Encourage the design of developments and activities that complement the natural beauty of the islands.

Sec.226-21 Objective and policies for socio-cultural advancement—education.
Support educational programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.

Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.

Emphasize quality educational programs in Hawaii's institutions to promote academic excellence.

C. State Functional Plans

Chapter 226 further provides for the production of Functional Plans, which identify needs, problems, and issues and recommend policies and priority actions to address the areas of concern. The proposed reclassification request is in accord with the following State Functional Plans:

State Agriculture Functional Plan
The proposed project will reclassify 25.263 acres of land from the State Agricultural District to the State Urban District. This represents less than one (1) percent of the estimated 1,931,378 acres in the State of Hawaii currently designated as "Agricultural" by the State Land Use Commission (State of Hawaii Data Book). While the subject property was formerly utilized for industrial agricultural cultivation, it is now fallow. As such, the proposed action would not substantially impact agricultural productivity within the State of Hawaii or Maui County. Further, the proximity of the subject property to existing and planned urban land uses, coupled with its underlying Community Plan designation, provides a reasonable criterion for the reclassification request.

State Education Functional Plan
The effective doubling of the Emmanuel Lutheran School's student population will supply needed additional educational opportunities for Maui students. In so doing, it is in accord with the ultimate goals of the Education Functional Plan.

D. Maui County General Plan

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help guide the long-range development of the County. As stated in the Maui County Charter:

> *The general plan shall indicate desired population and physical development patterns for each island and region within the county; shall*

address the unique problems and needs of each island and region; shall explain the opportunities and the social, economic, and environmental consequences related to potential developments; and shall set forth the desired sequence, patterns, and characteristics of future developments. The general plan shall identify objectives to be achieved, and priorities, policies, and implementing actions to be pursued with respect to population density, land use maps, land use regulations, transportation systems, public and community facility locations, water and sewage systems, visitor destinations, urban design, and other matters related to development.

The proposed action is in accord with the following General Plan objectives and policies:

Objective: To plan the growth of resident and visitor population through a directed and managed growth plan so as to avoid social, economic and environmental disruptions.

> ***Policy:*** Balance population growth by achieving concurrency between the resident employee work force, the job inventory created by new industries, affordable resident/employee housing, constraints on the environment and its natural resources, public and private infrastructure, and essential social services such as schools, hospitals, etc.

Objective: To preserve for present and future generations existing geographic, cultural and traditional community lifestyles by limiting and managing growth through environmentally sensitive and effective use of land in accordance with the individual character of the various communities and regions of the County.

> ***Policy:*** Provide and maintain a range of land use districts sufficient to meet the social, physical, environmental and economic needs of the community.

Objective: To preserve and protect the county's unique and fragile environmental resources.

> *Policy:* Preserve scenic vistas and natural features.

Objective: To see that all developments are well designed and are in harmony with their surroundings.

> *Policy:* Require that appropriate principles of urban design be observed in the planning of all new developments.

Objective: To encourage developments which reflect the character and the culture of Maui County's people.

> *Policy:* Establish urban design guidelines and standards which will reflect the unique traditional architectural values of each community plan area.

Objective: To provide Maui residents with continually improving quality educational opportunities which can help them better understand themselves and their surroundings and help them realize their ambitions.

> *Policy:* Seek continual improvement in the quality of education at all levels for all residents.

D. Wailuku-Kahului Community Plan

Within Maui County, there are nine (9) community plan regions. From a General Plan implementation standpoint, each region is governed by a community plan which sets forth desired land use patterns, as well as goals, objectives, policies, and implementing actions for a number of functional areas including infrastructure-related parameters. The subject property is located within the Wailuku - Kahului Plan region. The Community Plan was adopted in 1987 and amended in 1992 and recently amended in 2002. The Community Plan designation for the subject property was changed in 2002 from Agriculture to Public / Quasi Public in support of the development of a private school site. See Figure 8, Community Plan Map, but note that the Community Plan map has not yet been updated to reflect the current designation.

No changes are needed to amend the Community Plan Designation. The project is in accord with its Community Plan designation.

E. County Zoning

The property is located in the County Agricultural Zone, which is required when the overlying State District is Agriculture. The purpose of this zone (generally) is to promote agricultural development and protect agricultural resources. Similar to the restrictions of the State District, uses in this county zone are restricted and specifically do not allow for the development of a school.

To proceed with the project, the County Zoning must be changed from Agricultural to "Public/Quasi-Public". Public/ Quasi-Public (P/QP) is a zoning district established for public, nonprofit or quasi-public uses. It allows for the development of schools and churches.

The application for a Change in Zoning (CIZ) will be processed by the Maui Planning Department and decided upon by the Maui County Council and Mayor. During the application process, State and County agencies, and the Maui Planning Commission will make comments on the application that may be incorporated into conditions of the CIZ.

It should be noted that the County of Maui is currently amending the P/QP zoning district. One relevant issue of the ordinance that is being addressed is the Zone's height limit of 35 feet. If the amendment is not completed prior to the construction of the new church, a height variance will be required. The ordinance may also be revised to allow faculty or elderly housing on P/QP zoned lands.

IV. Summary of Unavoidable Impacts on the Environment and Resources

Construction-related activities will generate moderate, unavoidable, short-term impacts. Once the construction is completed, the project is not anticipated to have substantial adverse impacts upon the environment or residents of the area.

The project will require the irretrievable commitment of time, energy, and land.

V. FINDINGS AND CONCLUSIONS

The proposed District Boundary Amendment has been analyzed for potential impacts in the following categories:

Preservation or maintenance of important natural systems or habitats. The proposed project involves the development of low-use and fallow agricultural fields and is not anticipated to result in any adverse impacts to important natural systems or habitats.

Maintenance of valued cultural, historical or natural resources. The proposed campus is not located in an area of valued cultural, historical, or natural resources and is not anticipated to have any adverse impacts upon such resources.

Maintenance of other natural resources relevant to Hawaii's economy, including but not limited to agricultural resources. The subject property's 25.263 acres represent a small fraction of State agricultural lands. Implementation of the project will not substantially impact agricultural or other resources.

Commitment of state funds and resources. The applicant is a self-supporting, non-profit, private entity. Project implementation will not involve any commitment of State funds or resources.

Provision for employment opportunities and economic development. Expansion of the school will provide opportunities for educational and operational employment.

Provision for housing opportunities for all income groups, particularly the low, low-moderate, and gap groups. The project does not involve housing or related residential components. Implementation will not impact housing opportunities.

The proposed project is not anticipated to result in any substantial environmental impacts to surrounding properties, near shore waters, natural resources, or archaeological or historical resources onsite or in the immediate area. Public infrastructure will not be overburdened by project implementation. The proposed campus is not anticipated to substantially impact public viewplanes or produce significant adverse impact to the visual character of the site and its surrounding environs.

The subject property is situated within the State Agricultural District, is County Zoned Agricultural, and is designated for Public/Quasi-public uses in the Community Plan. A Land Use District Boundary Amendment from will support and enhance the existing mixture of rural residential and industrial uses that characterize the immediate area. Additionally, the Change in County zoning would establish consistency with the Wailuku-Kahului Community Plan. The proposed action is consistent with the objectives and polices contained within the Community Plan, General Plan, and State Land Use law.

VI. References

County of Maui, *Maui County Data Book,* 2005.

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Figures

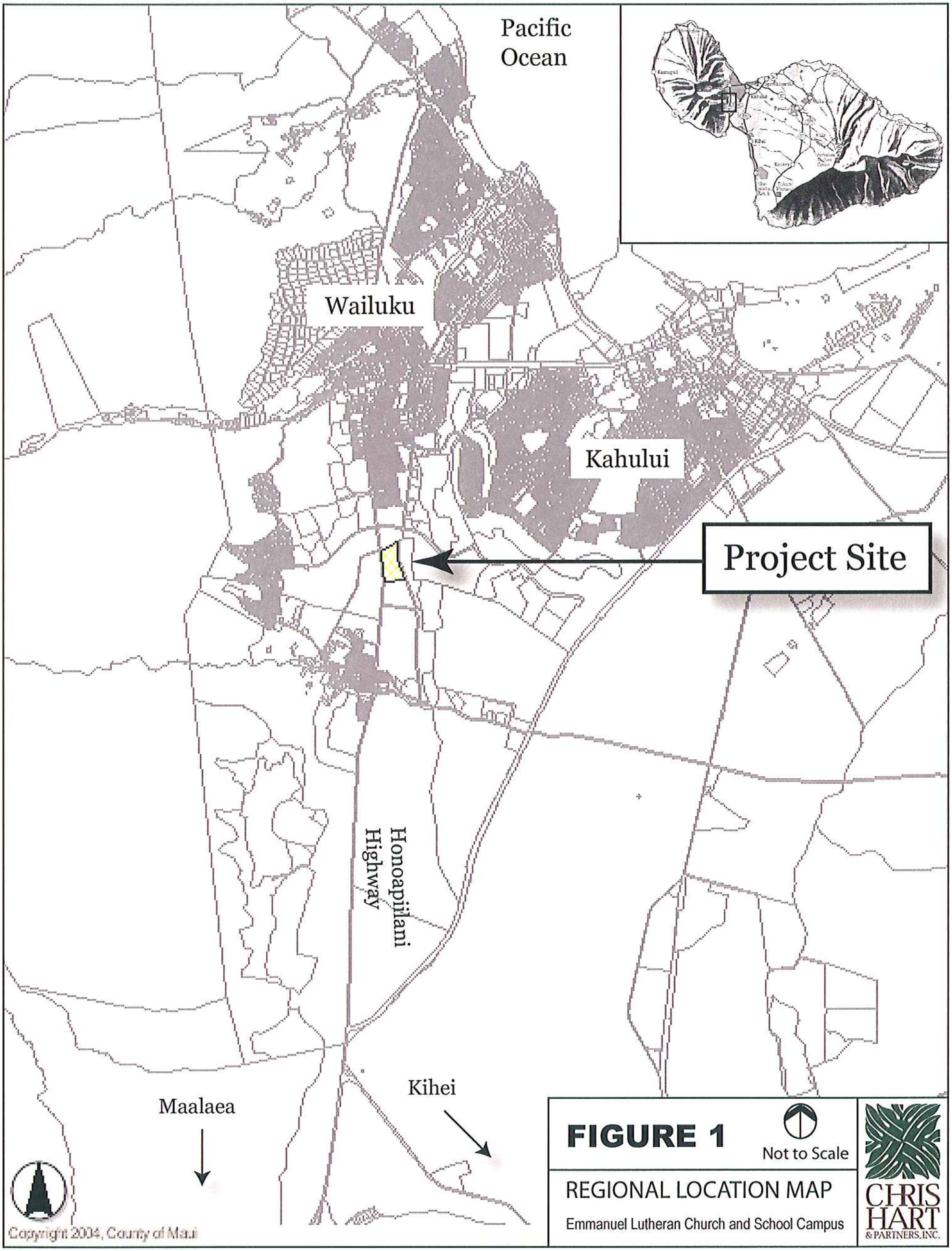


FIGURE 1

REGIONAL LOCATION MAP

Emmanuel Lutheran Church and School Campus

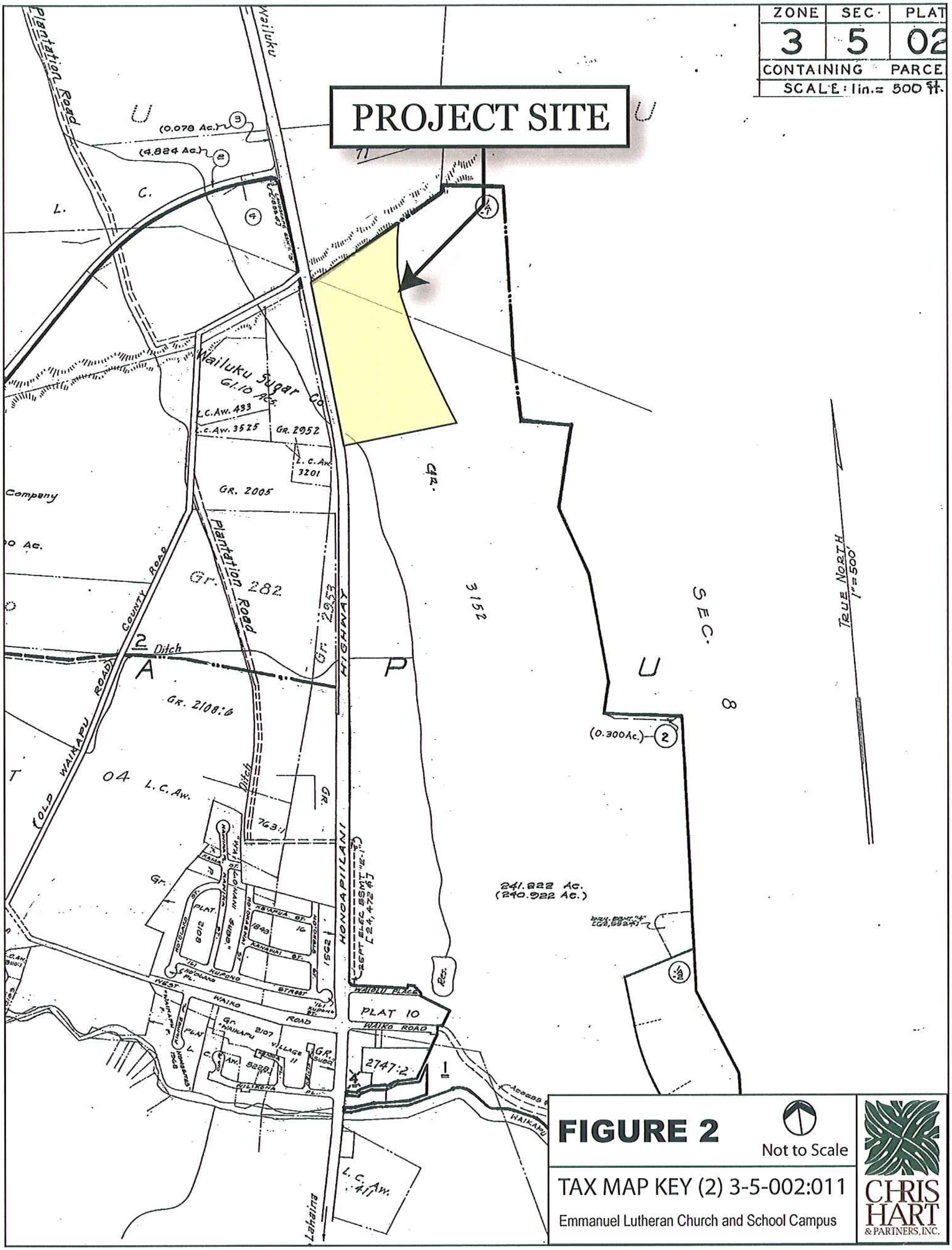


FIGURE 2

Not to Scale

TAX MAP KEY (2) 3-5-002:011

Emmanuel Lutheran Church and School Campus

CHRIS HART & PARTNERS, INC.

North View of Honoapiilani Highway edge of Property

East View of Subject Property

FIGURE 3a

SITE PHOTOGRAPHS

Emmanuel Lutheran Church and School Campus

CHRIS HART & PARTNERS, INC.

Northeast View of Subject Property

Northeast View of Subject Property

FIGURE 3b

SITE PHOTOGRAPHS

Emmanuel Lutheran Church and School Campus

CHRIS HART & PARTNERS, INC.

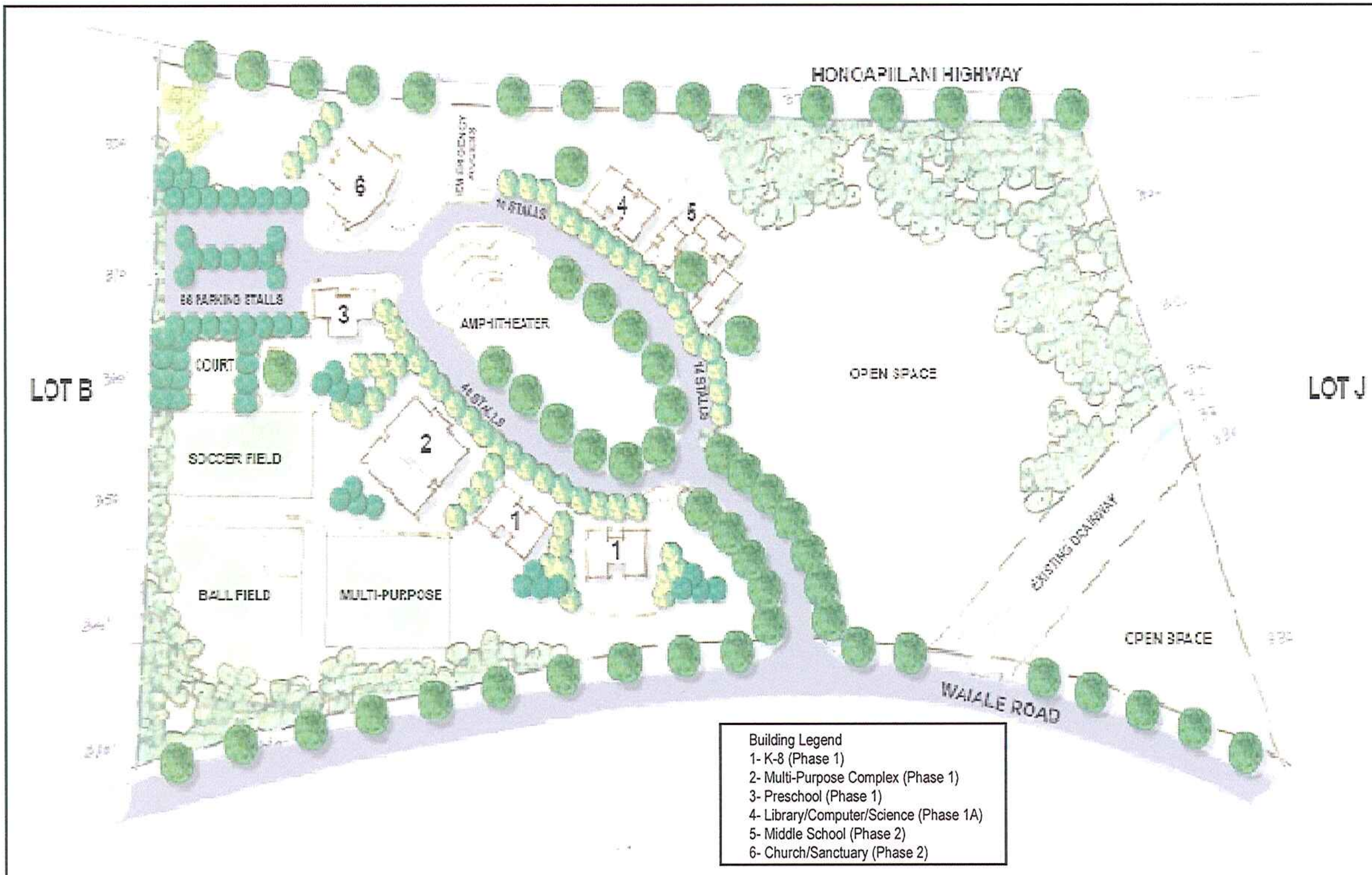


FIGURE 4

Not to Scale

Conceptual Master Plan

Emmanuel Lutheran Church and School Campus

CHRIS HART & PARTNERS, INC.

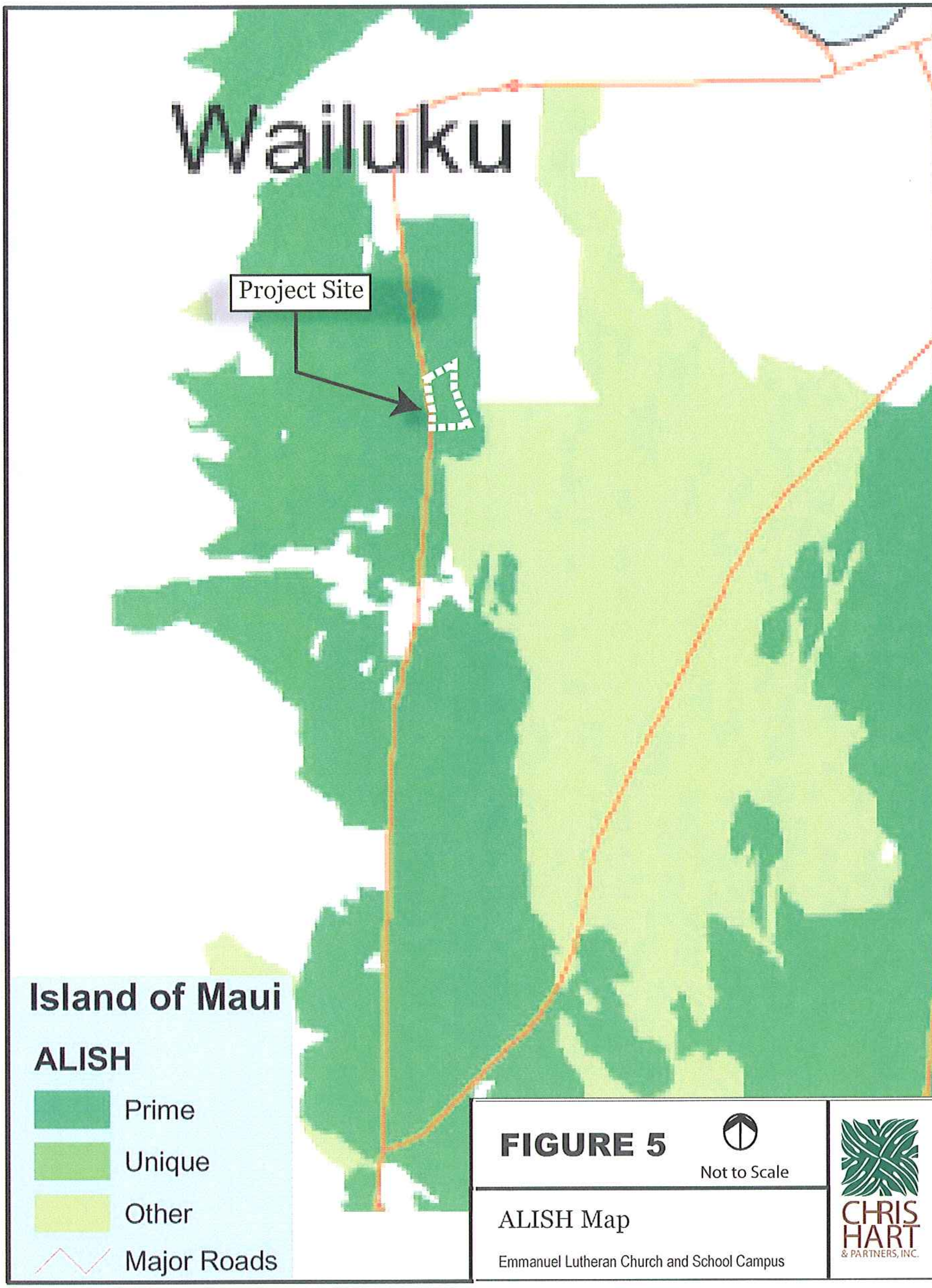


FIGURE 5

ALISH Map

Emmanuel Lutheran Church and School Campus

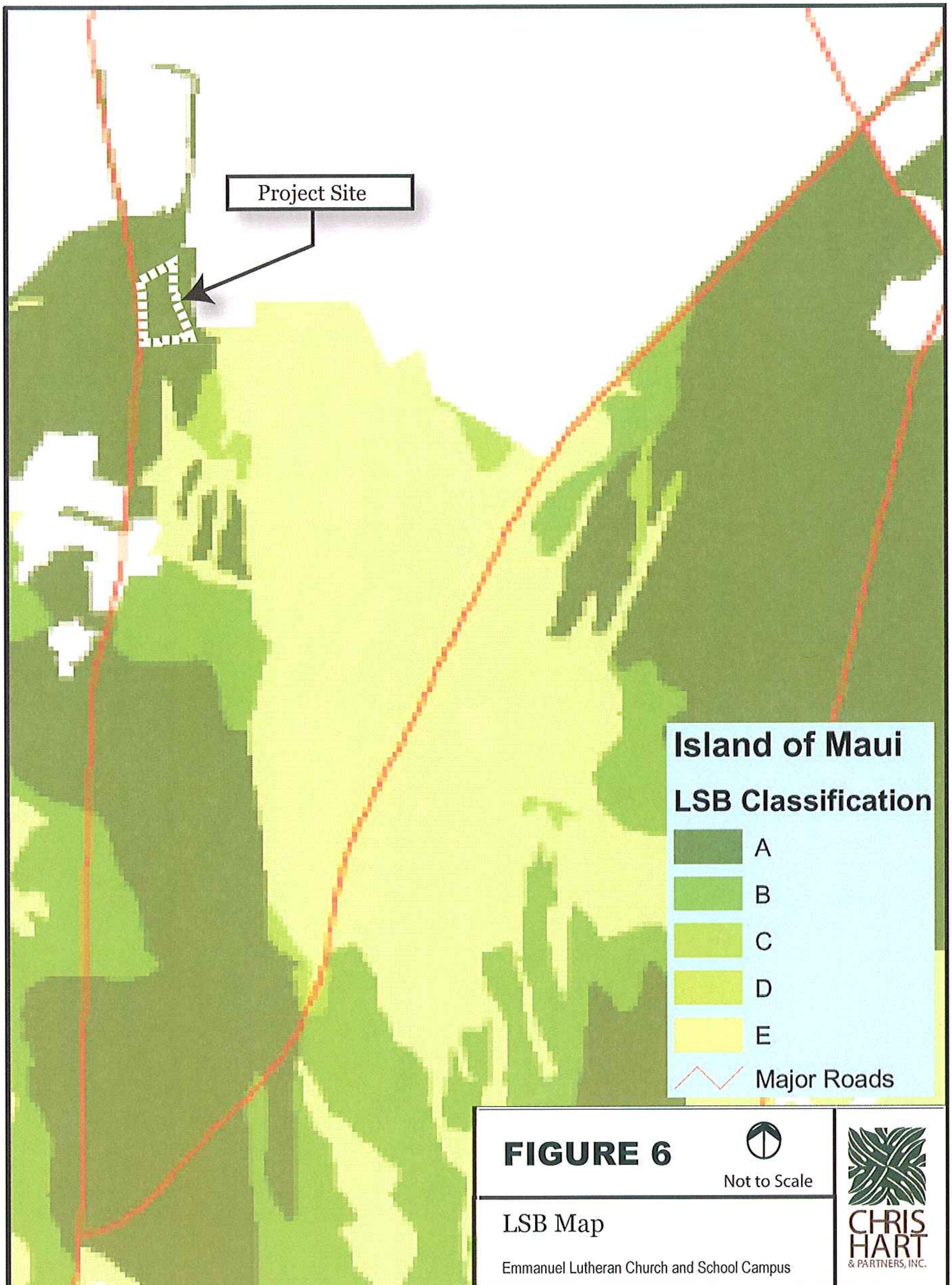


FIGURE 6

LSB Map

Emmanuel Lutheran Church and School Campus

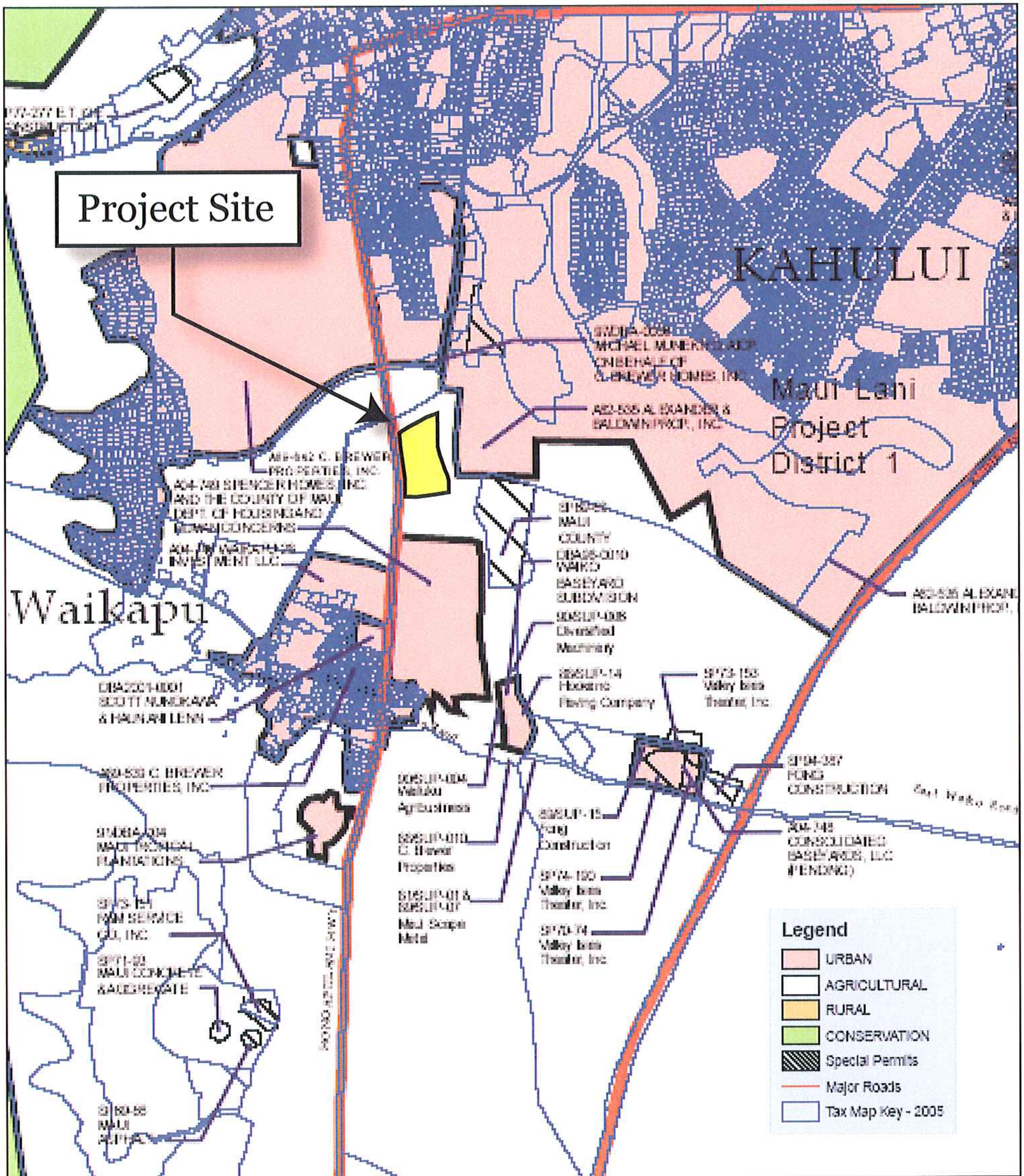
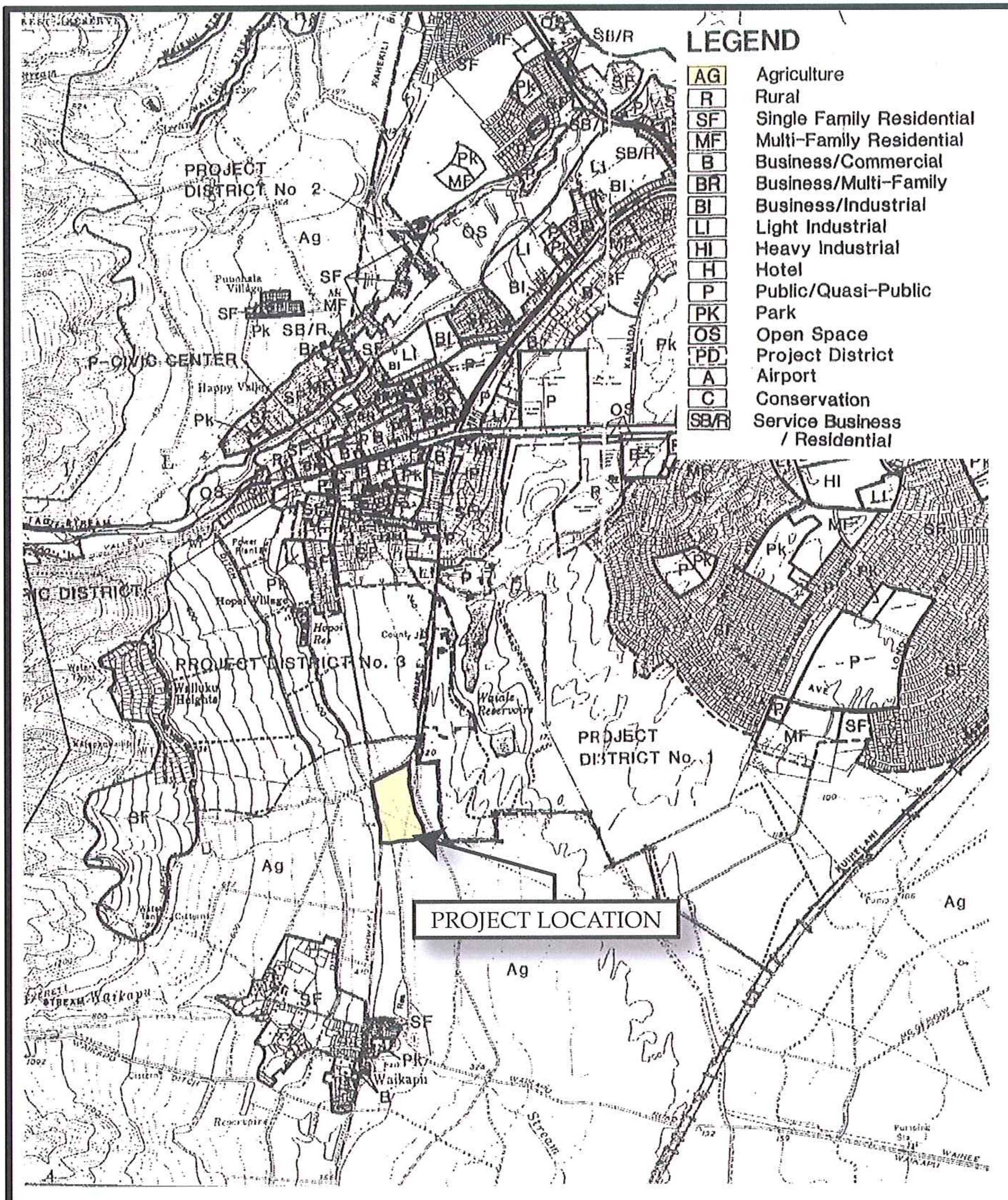


FIGURE 7

STATE LAND USE MAP

Emmanuel Lutheran Church and School Campus

CHRIS HART & PARTNERS, INC.



Note: Community Plan Map is in process of being updated to reflect current designation.

FIGURE 8

COMMUNITY PLAN MAP

Emmanuel Lutheran Church and School Campus

CHRIS HART & PARTNERS, INC.

Appendices

Appendix A
Conceptual Master Plan

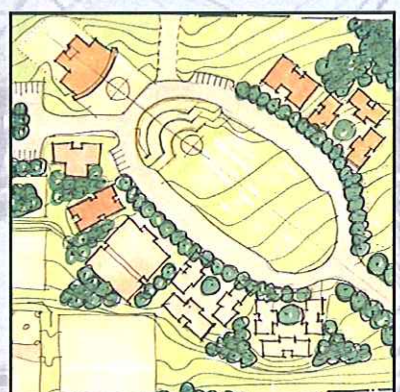
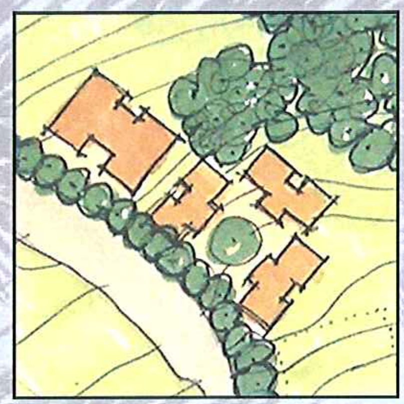
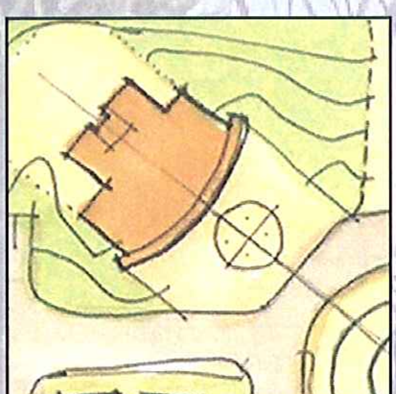
Emmanuel Lutheran Church and School

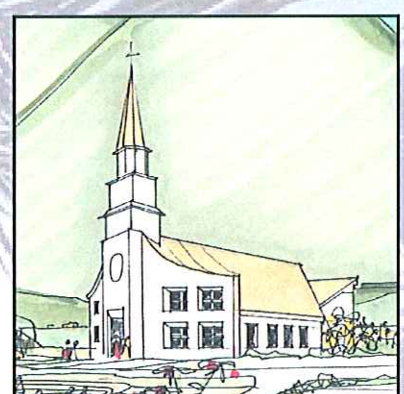
Master Plan

February 15, 2006







FLANSBURGH ASSOCIATES

ARCHITECTS

CONTENTS

EXECUTIVE SUMMARY

In June of 2005, Flansburgh Associates, Inc. of Boston Massachusetts was hired to help the Emmanuel Lutheran Church of Maui, (the Church) develop a ten-year master plan. Inspired by a beautiful 25-acre site in Wailuku, the Church selected a committee and engaged a consultant team. A series of meetings were held in August and September, 2005 to clarify project goals, needs, and challenges. The four main goals are the following: promote the Emmanuel Lutheran mission; grow the school and congregation with improved facility and educational quality; increase prominence and visibility of Emmanuel Lutheran; and create a new campus within the means of the Church.

Interviews and observation sessions occurred with school and church staff to fully understand space and adjacency requirements. A two-phase program was created with the first phase covering the first five years and the second phase covering beyond five years. The Church presently has about 16,000 gross square feet of space accommodating 213 children in grades Pre-K -8th. Phase one of a new campus could provide about 40,000 gross square feet and accommodate a 30% increase in school enrollment to 265 students. Phase two allows for a doubling of the school population with an added 14,000 gross square feet of space. The total facility at the end of phase two is projected to be about 56,000 gross square feet, which will include a new sanctuary building and educational space for a total school population, Pre-K - 8th grade, of 490 students.

The significant increase in gross square footage needed is due to the present over use and multi-use of many rooms and buildings in the present facility. The church building transforms into the pre-school Monday through Friday. All of the classrooms are undersized, and there is a lack of specialty classrooms to support the rich music and promising art programs provided by the school. Teachers work extremely hard to make due with present space and storage limitations. The projected program will ensure adequate space and support for all school and church activities.

The acquired land has many positive attributes for new campus development. Major new residential development has populated the area up the mountain, (mauka), from the site. There is existing access to agricultural water for athletic field irrigation. Existing power poles on Honoapiilani Highway for power and a 12" waterline from the county will support campus development. Wastewater will rely on a gravity fed system to an existing sewer easement on site. All new storm water generated from development will be held on the site in retention basins.

The master plan design chosen unanimously by the community in the September meeting formalizes the site by creating an open central green with church and school buildings surrounding it. The sanctuary is the highest point of the site. Vehicular access off Waiale Road is on axis with the church and the mountain view to the southwest. Athletic fields cascade down the gently sloped site and are near to the agricultural/irrigation water source at the south. On the right as you enter the campus is the middle school complex, 6 classrooms total, clustered as three small buildings around a middle-school courtyard. Next is the library, media center and science room building. At the head of the green is the church. Rounding the green is the pre-school, the administration building, the multipurpose complex and ten K -5 classrooms in five small buildings also situated around courtyards. Drop off areas are sensitively located to serve the school, church and handicap needs.
A landscaped parking lot is tucked behind the pre-school and church buildings with adequate space for church and school needs.

EXECUTIVE SUMMARY

Phasing of campus development is necessary to achieve the scope of buildings needed within the means of the church. Phase one provides utility infrastructure to the site, a single story pre-school building, 12 regular classrooms, and a multipurpose complex for art, music and athletics. This building will serve both the school and church until the later phased sanctuary building is built. Phase IA will consist of the administration building and specialty spaces for a library, computer lab and science room. The square footage in phase one, 40,000 gross square feet, will allow the school to operate in more than twice the space they have now with adequate space for growth and expansion till completion of phase two. Phase two will provide a 450-seat sanctuary. The school will grow to 18 total K – 8 classrooms accommodating 450 students.

At present costs, build out of the entire master plan is estimated at about $20 million. Historically prices for real estate and construction on Maui have never gone down. Recent fuel, steel and labor costs are rising at a historic pace. We cannot accurately project where costs will be a year from now. Phasing this project and beginning sooner than later if funds allow will be the most beneficial to the church coffers and spirit.

The first step in implementing the master plan is to obtain the required zoning changes for the site. Approvals from the State of Hawaii and the County of Maui, from agricultural land to public/quasi-public, is expected to take between 12 to 18 months. If funding is in place once the zoning has been changed, construction can start as early as Spring 2007 with completion of phase one in the summer of 2008. Phase IA and Two as described above could proceed when funding is available and would take about 13 months to construct..

Section 1 – The Vision

THE VISION

As part of the August and September meetings for this master plan; faculty, administrators, clergy and students gathered for a Vision Session. The purpose was to glean thoughts and ideas for a new Emmanuel Lutheran Church and School campus on a newly acquired, beautiful, 25-acre site in Wailuku, Maui. The following is a record of the input we received from the community.

Vision and Goals, Challenges and Assumptions

One exercise involved developing a list of goals for the community and this project in particular. The listed items are not necessarily final decisions, but are a record of comments from the session.

Community Vision & Goals:

1. Promote the mission of the Church
2. Improve the quality of the facility and education
3. Grow school and congregation by 100%
4. Increase Church involvement
5. Increase prominence/ visibility of the Church
6. Awesome, Traditional and Conservative aesthetic for new campus buildings
7. Sanctuary should be a focal point
8. Design and build within our means
9. Sustainability with short-term payback

Distilled, the following four the goals have the highest priority:

1. Promote the Mission
2. Growth of School and Congregation
   Improve Quality of Facility and of Education
3. Prominence and Visibility of the Church
4. "Within Our Means"
   Sanctuary as a Focal Point
   Design Excellence

Also discussed in the initial sessions were the challenges facing the ELC&S community. They are as follows:

Challenges:

1. Fundraising *
2. Achieving a unified Church vision & consensus*
3. Zoning change for new property*
4. Successfully obtaining grants*
5. Obtaining required permits*
6. Obtaining a site option agreement*
7. Planning transparency and public relations*
8. Project financing
9. Moving, changing, transitioning
10. Selling the current campus
11. Timeliness
12. Rising costs
13. Planning

* Most critical challenges facing community.

Assumptions:

From our meetings and observations with the church and school members and our team of consultants we have made the following assumptions to proceed with this planning effort:

Programming Assumptions:

1. Size: Presently at 173 students, the K-8 school will grow by 30% in Phase I to 225 students. Phase II provides for the population doubling to 450 students. The pre-school, presently serving 40 children, will stay the same or grow to a maximum of 48. It is anticipated that the church membership will nearly triple in size by Phase Two completion, 2015.

2. Phasing: The goal is to phase building and campus growth. Phase I will provide, three additional classrooms, specialty classrooms for art and music, a separate pre-school facility and a multi-purpose complex. Phase IA will provide an administration building, a library and technology center and a specialty science lab. Phase II will add additional school expansion, (six additional rooms), and a sanctuary sized to seat 450 people.

3. Class size: K-8 classes will have a maximum of 25 students per classroom, however 20 – 24 students is more likely. The pre-school will remain at 10-12 students per class. The pre-school is licensed for 48 children and will not seek to increase their licensing capacity.

4. Technology: The computer and technology center lab is a twice-weekly rotation for all grade levels. Students in lower grades learn keyboarding, word processing, Paintbrush, Power Point and basic research techniques. Middle school students have a journalism class and do independent work on the computer with advanced research methods taught by the instructor. Presently there are 18 computers and a teacher's station in the lab. In the new center the lab would increase in size to 24 - 25 computers and a teacher's station. Additionally, there are to be computers within the classroom.

5. Classroom Design: Rooms should be sized larger than existing classrooms, (875 s.f. vs. existing approximate 775s.f.) and incorporate computer stations, sinks and counters, and above all more storage space. In K – 2 classrooms cubbies, (student storage units), as well as toilet rooms should be inside classrooms. A more detailed list of requested classroom amenities could be found in Section 2, Program Summary.

Civil Assumptions:

1. Sewer on site and waste water will be gravity fed to sewer easement.
2. A new 12" waterline will be brought to the site.
3. There is accessible agricultural water at south border of site for irrigation use.
4. All excess storm water created from impervious surfaces must be held on site.
5. Electrical service will come from existing power poles along Honoapiilani Highway or from the north site boundary.
6. Athletic fields clustered and terraced to hold storm water on site

Permitting Assumptions:

1. Wailuku-Kahului Community Plan designates for Public/Quasi-Public use for this parcel
2. State Land Use District Boundary Amendment (SLUDB): From Agricultural use to Urban use
3. County change in zoning, (CIZ), from agricultural to public/quasi-public
4. Variance needed for height of church steeple, (possible)
5. Exemption from the need of an Environmental Impact Assessment is assumed.

Planning Assumptions:

1. No on-site housing shown, however the ordinance change could accommodate this possibility
2. Access to Honoapiilani Highway questionable, but should be pursued
3. Accessible agricultural water for irrigation
4. Zoning change to take 12 – 18 months from date of submission, January, 2006
5. The County of Maui will provide domestic water to the site.

Development Assumptions:

1. Balance cut and fill. Use natural grade as much as possible in orienting development.
2. Optimize views toward the mountains, (Mauka), and toward the sea, (Makai)
3. Optimize building orientation for natural cooling and ventilation
4. Provide a "special space" on site for the sanctuary
5. Locate athletic fields close to available agricultural irrigation source, south border.
6. Parking in phase I: 120 cars. Phase II parking: 60 cars
7. Minimize site impact in early phases.

8. Where appropriate sustainable, high performance design will be incorporated into the final design.
9. Mauka and makai view corridors from the site will be maintained and enhanced.
10. View corridors from Honoapiilani Highway to the site, church and beyond will be maintained.'"
11. A sufficient buffer zone between the buildings and the highway will be incorporated.

Scheduling Assumptions:

1. 0 - 5 years for Phase I, 2010
2. 5 – 10 years for Phases IA and Phase II completion, 2015

Section 2 – Building Programs

In September, Flansburgh Associates did a thorough analysis by observation of existing school classrooms and support spaces. The school facility is roughly 10,900 gross square feet. There is presently one classroom per grade with a range of 16 to 24 students per class. Rooms are on average 750 square feet with the 3rd grade classroom at less than 500 square feet. Storage within the classroom is minimal. Cubbies, (storage bins), for student's personal items are in the classroom. There is a sink in each room to support snack time and lunch which is eaten in the classroom. Rooms are carpeted, have ceiling fans and pendant 2 x 4 florescent light fixtures. All but three classrooms have windows on two walls however curtains are drawn and, in fact some windows are sealed off with tack boards on the inside wall. Air conditioners are employed for cooling and ventilation. Sun penetration and heat gain in the rooms seems to be an issue for user comfort.

The pre-school, with it's own director and staff independent from the K-8 school program, presently functions in the church building. Since it is a big open space with adjacent toilets, kitchen and a segregated outdoor play area basic needs are met. However, storage for a thriving pre-school program such as this one, is sorely lacking and staff is tasked with having to take down and set up each day to accommodate the multiple use of the church space.

From our visits to the existing facility and interviews with staff we were able to develop a building program for a new school and church campus. The following two pages show a tally of existing square footage, and what is needed for phases one, phase IA and phase II. We used these tables to size the proposed buildings on the new campus. Following the objective numbers we gathered is an explanation of each component of the campus for phases one and IA.

The summary of net and gross square footages is shown below:

Phase I	NET	GROSS	TOTAL
Preschool	3,500	4,900	
K - 2	3,500	4,900	
3,4,5th Grades	3,500	4,900	
6,7,8th Grades	3,500	4,900	
Specialty Spaces	10,250	12,300	
SUBTOTAL	24,250	31,900	31,900
Phase IA	5,900	8,260	8,260
Phase II	10,250	14,350	14,350
TOTAL	40,400	54,510	54,510

Current & Phase One Building Program

Emmanuel Lutheran Church & School
FAI Project No. 2514.00

Population 173/40 = 213 Students

CURRENT SPACE UTILIZATION 2005 Site Visit Use/Activity		Area in Net Sq. Ft.
Pre-School		
Existing space inside church	1	0
(double use as pre-school & sanctuary, see below)		
Subtotal		**0**
Kindergarten, 1st & 2nd Grades		
Kindergarten Classroom	1	768
1st Grade Classroom	1	768
2nd Grade Classroom	1	768
Subtotal		**2,304**
3rd, 4th & 5th Grades		
3rd Grade Classroom	1	480
4th Grade Classroom	1	772
5th Grade Classroom	1	772
Office/Storage	1	85
Subtotal		**2,109**
6th, 7th & 8th Grades		
6th Grade Classroom	1	772
7th Grade Classroom	1	708
8th Grade Classroom	1	708
Subtotal		**2,188**
Specialty Spaces		
Administration		365
Storage/work room		365
Computer/Technology		450
Subtotal		**1,180**
Existing Sanctuary		**3,500**
Existing Total NSF		**11,281**
Multiplier of 1.4		
Total Estimated Existing GSF		**15,793**

Population 225/40 = 265 Students

PHASE ONE PROGRAM 2005 -2010 Use/Activity		Area in Net Sq. Ft.
Pre-School		
Pre School Classroom #1	1	800
Pre School Classroom #2	1	800
Pre School Classroom #3	1	800
Pre School Classroom #4	1	800
Director's office & storage		300
Subtotal		**3,500**
3,500 x 1.4 multiplier		**4,900**
Kindergarten, 1st & 2nd Grades		
Kindergarten Classroom	1	875
1st Grade Classroom	1	875
2nd Grade Classroom	1	875
Expansion Classroom	1	875
Subtotal		**3,500**
3,500 x 1.4 multiplier		**4,900**
3rd, 4th & 5th Grades		
3rd Grade Classroom	1	875
4th Grade Classroom	1	875
5th Grade Classroom	1	875
Expansion Classroom	1	875
Subtotal		**3,500**
3,500 x 1.4 multiplier		**4,900**
6th, 7th & 8th Grades		
6th Grade Classroom	1	875
7th Grade Classroom	1	875
8th Grade Classroom	1	875
Expansion Classroom	1	875
Subtotal		**3,500**
3,500 x 1.4 multiplier		**4,900**
Specialty Spaces		
Multipurpose Room/Stage/Kitchen		7,200
Art Room		1,000
Choral/Band		1,000
Ensemble for K-5		900
Music Practice Room/Storage		150
Subtotal		**10,250**
10,250 x 1.2 multiplier		**12,300**
Phase One New NSF		**24,250**
Multiplier of 1.2/1.4		
Total Phase One GSF		**31,900**

Phase 1A and Phase Two Building Program

Emmanuel Lutheran Church & School
FAI Project No. 2514.00

Population 225/40 = 265 Students

PHASE 1A PROGRAM PROJECTED 2010 Use/Activity		Area in Net Sq. Ft.
Pre-School		
Pre School Classroom #1	1	800
Pre School Classroom #2	1	800
Pre School Classroom #3	1	800
Pre School Classroom #4	1	800
Director's office & storage		300
Subtotal		**3,500**
Kindergarten, 1st & 2nd Grades		
Kindergarten Classroom	1	875
1st Grade Classroom	1	875
2nd Grade Classroom	1	875
Expansion classroom	1	875
Subtotal		**3,500**
3rd, 4th & 5th Grades		
3rd Grade Classroom	1	875
4th Grade Classroom	1	875
5th Grade Classroom	1	875
Expansion Classroom	1	875
Subtotal		**3,500**
6th, 7th & 8th Grades		
6th Grade Classroom	1	875
7th Grade Classroom	1	875
8th Grade Classroom	1	875
Expansion Classrooms	1	875
Subtotal		**3,500**
SpecialtySpaces		
Multipurpose Room/Stage/Kitchen		7,200
Art Room		1,000
Choral/Band		1,000
Ensemble for K-5		900
Music Practice Room/Storage		150
Computer/Technology		***1,000***
Science Classroom		***1,000***
Library		***1,600***
Administration/church & school		***2,300***
Subtotal		**16,150**
Total facility NSF		**30,150**
Multiplier of 1.4		
Total GSF at end of Phase 1A		**42,210**
Phase1A New NSF		***5,900***
Multiplier of 1.4		
Total New GSF added in Phase1A		***8,260***

Population 450/40 = 490 Students

PHASE TWO PROGRAM PROJECTED 2015 Use/Activity		Area in Net Sq. Ft.
Pre-School		
Pre School Classroom #1	1	800
Pre School Classroom #2	1	800
Pre School Classroom #3	1	800
Pre School Classroom #4	1	800
Director's office & storage		300
Subtotal		**3,500**
Kindergarten, 1st & 2nd Grades		
Kindergarten Classroom	1	875
1st Grade Classroom	1	875
2nd Grade Classroom	1	875
Phase 1 Expansion Classroom	1	875
Phase 2 Expansion Classroom	***2***	***1,750***
Subtotal		**5,250**
3rd, 4th & 5th Grades		
3rd Grade Classroom	1	875
4th Grade Classroom	1	875
5th Grade Classroom	1	875
Phase 1 Expansion Classroom	1	875
Phase 2 Expansion Classroom	***2***	***1,750***
		5,250
6th, 7th & 8th Grades		
6th Grade Classroom	1	875
7th Grade Classroom	1	875
8th Grade Classroom	1	875
Phase 1 Expansion Classroom	1	875
Phase 2 Expansion Classrooms	***2***	***1,750***
Subtotal		**5,250**
SpecialtySpaces		
Multipurpose Room/Stage/Kitchen		7,200
Art Room		1,000
Choral/Band		1,000
Ensemble for K-5		900
Music Practice Room/Storage		150
Computer/Technology		1,000
Science Classroom		1,000
Library		1,600
Administration/church & school		2,300
Phase 2 - Church for 450		***5,000***
Subtotal		**21,150**
Total facility NSF		**40,400**
Multiplier of 1.4		
Total GSF at end of Phase 2		**56,560**
Phase 2 New Net Square footage		***10,250***
Multiplier of 1.4		
Total New GSF added in Phase II		***12,350***

Multi-Purpose Complex

The Multi-purpose Complex will have a full court high school sized basketball court. This large space will double as an assembly/performance space for the school and a weekend worship space for the church until the sanctuary is built in Phase II. The complex will also accommodate specialty classrooms for art, music and band classes. A commercial kitchen will be an important part of the complex for church and school functions. (see the following planning scheme)

Space	Square Footage
Multi-purpose gym (50' x 84' Gym)	5,700 Square Feet
Stage/storage	1,200
Art Room	1,000
Band/Choral Room	1,000
Music Ensemble (K-5 Music)	900
Music Practice Rooms (3 @ 50)	150
Kitchen	300
Net s.f.	10,250
Gross s.f.	12,300 (1.2 multiplier)

Classrooms, Phase I

Through observation of existing classrooms and speaking with teachers and students FAI concluded that the general classroom space for this age group should first of all be consistent and secondly increase to 875 square feet. The maximum student capacity will be 25 students. The idea of a shared storage room between two classrooms is a good one since upon observation storage of learning materials is short. As a prototype building design evolves in the future the idea of shared store room or "prep" room should be explored further to offer more clear space for movement in the classroom.

Space	Square Footage
Kindergarten, 1st & 2nd Grades (3 classrooms)	2,625 s.f.
3rd, 4th & 5th Grades (3 classrooms)	2,625
6th, 7th & 8th Grades (3 classrooms)	2,625
3 Expansion classrooms, 1 per division	2,625
Net s.f.	10,500
Gross s.f.	14,700 (1.4 multiplier)

Emmanuel Lutheran Pre-School: Phase I

The pre-school requires a separate building apart from the K – 8 school facility. Although many campus wide amenities can be shared, the pre-school serves a developmentally unique age group requiring longer hours of operation and more stringent program regulations enforced by state and county agencies. The pre-school is currently licensed for 48 children, and will not increase in size. Each teacher will have a group of 10 to 12 children maximum.

Based on academic departmentalization and team teaching, the Emmanuel Lutheran Pre-school requires a unique physical indoor space and safe and secure soft and hard outdoor play zones away from traffic and public access. (See planning diagram in Appendix).

In addition to the fields and play spaces listed on the following page for total campus athletic needs, the pre-school requires separate hard and soft play areas adjacent to their classrooms. Incorporated into the pre-school play area should be age appropriate gross motor play structures and swings, a large playhouse, (80+ square feet in size), hard surface for bike riding, (1500 square feet), and approximately 3600 square feet for grassy open play space.

Space	Square Footage
4 "Classrooms"	3200 s.f.
Pre-school storage	150
Pre-School Director Office	150
Net s.f.	3,500
Gross s.f.	4,900 (1.4 multiplier)

Athletic Areas

Grades K – 2 and 3 – 5 require play spaces adjacent to their rooms for recess and play times. A combination of hard and soft areas is preferred with allowance for tether-ball, four-square, hopscotch and other primary outdoor games.

Space	Square Footage
Middle School Soccer Field	approx. 1.5 acres
Lower/Upper School Soccer Field	1 acre
Hard Surface Play areas, 1 – 2 Basketball courts	4,500 – 9,000 s.f.
Little League Softball field	40,000 + s.f.

Phase II – (Volley ball, running track, par course, High School fields)

Specialty Academic Areas: IA

Library, computer technology and a science room are additional spaces to broaden and improve the academic depth of the Emmanuel Lutheran school program for the future. A library and computer technology classroom could comprise the program for one campus building. The science classroom could be grouped within the middle school complex. On a temporary basis however, these functions could operate in the added classroom spaces in phase I.

Space	Square Footage
Library	1,600
Computer Technology	1,000
Science Classroom	1,000
Net s.f.	3,600
Gross s.f.	5,040 (1.4 multiplier)

Administration: Phase IA

The Administration area will house administration for both the school and the church communities. In its own building, the administration functions should be located close to both church and the school to assure effective operation for both entities. See the following planning scheme.

Space	Square Footage
Reception	500
Secretarial Space	180
Conference Room	350
Principal	150
Vice Principal	120
Work room	300
Business Office	100
Health Room	80
Volunteer Office	120
Records/Storage	200
Pastor's Office	200, (in sanctuary when built in Phase II)
Net s.f.	2,300
Gross s.f.	3,220 (1.4 multiplier)

Section 3 – Site Analysis

Site analysis

The property acquired for development of the new Emmanuel Lutheran Church and School is a relatively undeveloped 25-acre parcel located approximately midway between the towns of Wailuku and Waikapu. The property abuts and lies just below the Honoapiilani Highway. The shape of the parcel is an irregular rectangle, with its long axis running north-south, parallel to the highway. The lower boundary of the property is currently being improved as a two-lane extension of Waiale Road. All abutting properties are currently vacant or have the vestiges of low-intensity agricultural production.

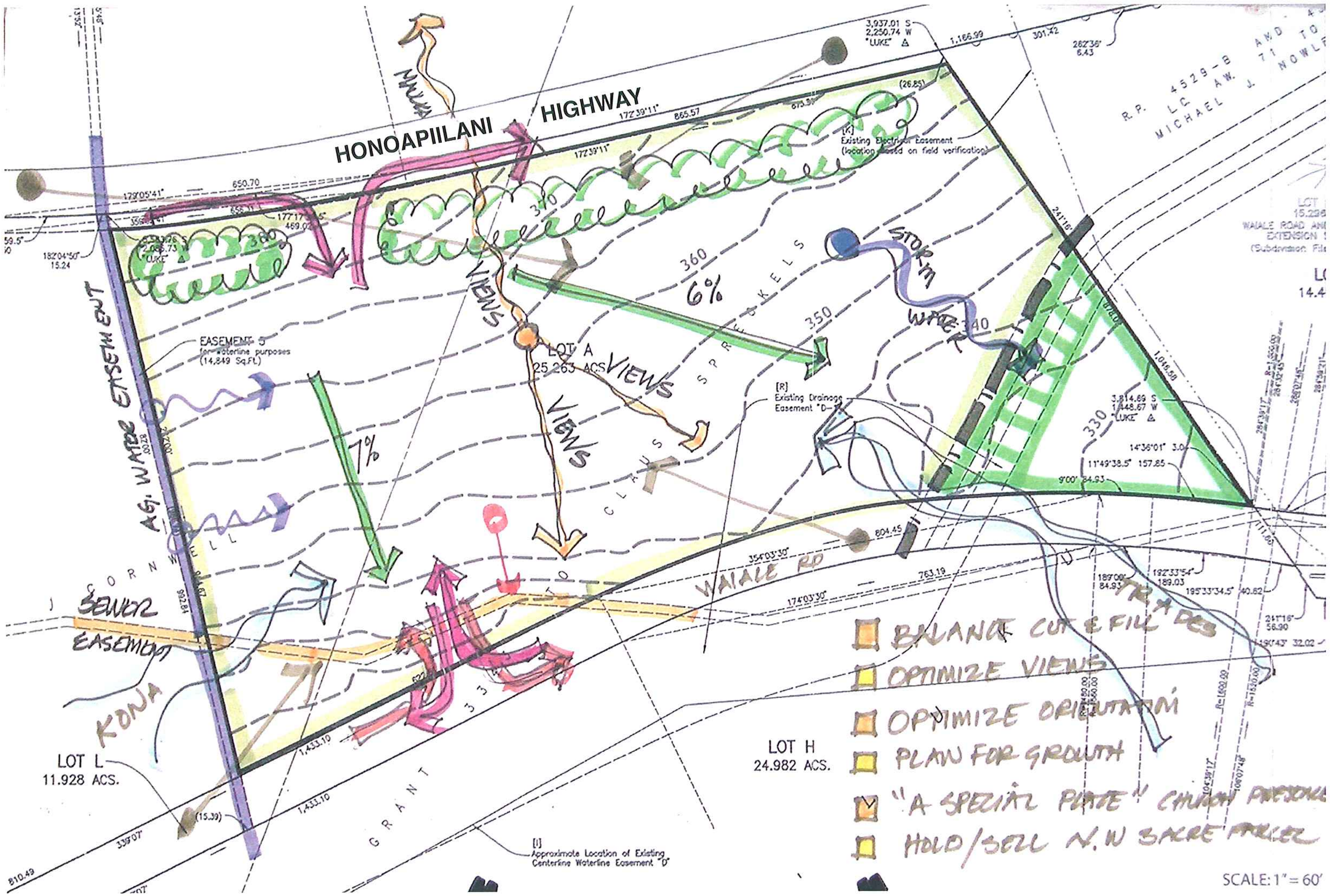
The property's high boundary along Honoapiilani Highway ranges in elevation from approximately 390 to 370 feet above sea level. The lower boundary along the Waiale Road extension is at an approximate elevation of 330 feet above sea level. The grade across the property is generally 6 to 7%.

A drainage channel crosses the property along its north and east boundaries, isolating approximately 3 acres of the site. This triangular portion of the property abuts the Waiale Road extension. The topography of the drainage channel, along with obligations to fence-off the drainage area, create a significant barrier for this section of the property to easily interact with the uses on the remaining 21+ acres.

Views from the property are spectacular. The most prominent visual features are the undeveloped highlands of the West Maui Mountains, which due to their proximity and magnitude provide the dominant backdrop west of the property. The northward view reveals the town of Wailuku and the Pacific Ocean along Maui's north shore. Generally eastward are views of Upcountry Maui against the distant yet substantial Mt. Haleakala.

Dominant winds arrive from the northeast. These "trade winds" originating off of Maui's north shore generally provide a cooling breeze for inland areas.

The following pages, 3.2, 3.3, and 3.4, graphically explain site atributes and topography and suggest the best and most economical ways to develop the land to take advantage of grading, slope, views and water, power and road access.



SITE ANALYSIS

EMMANUEL LUTHERAN CHURCH + SCHOOL

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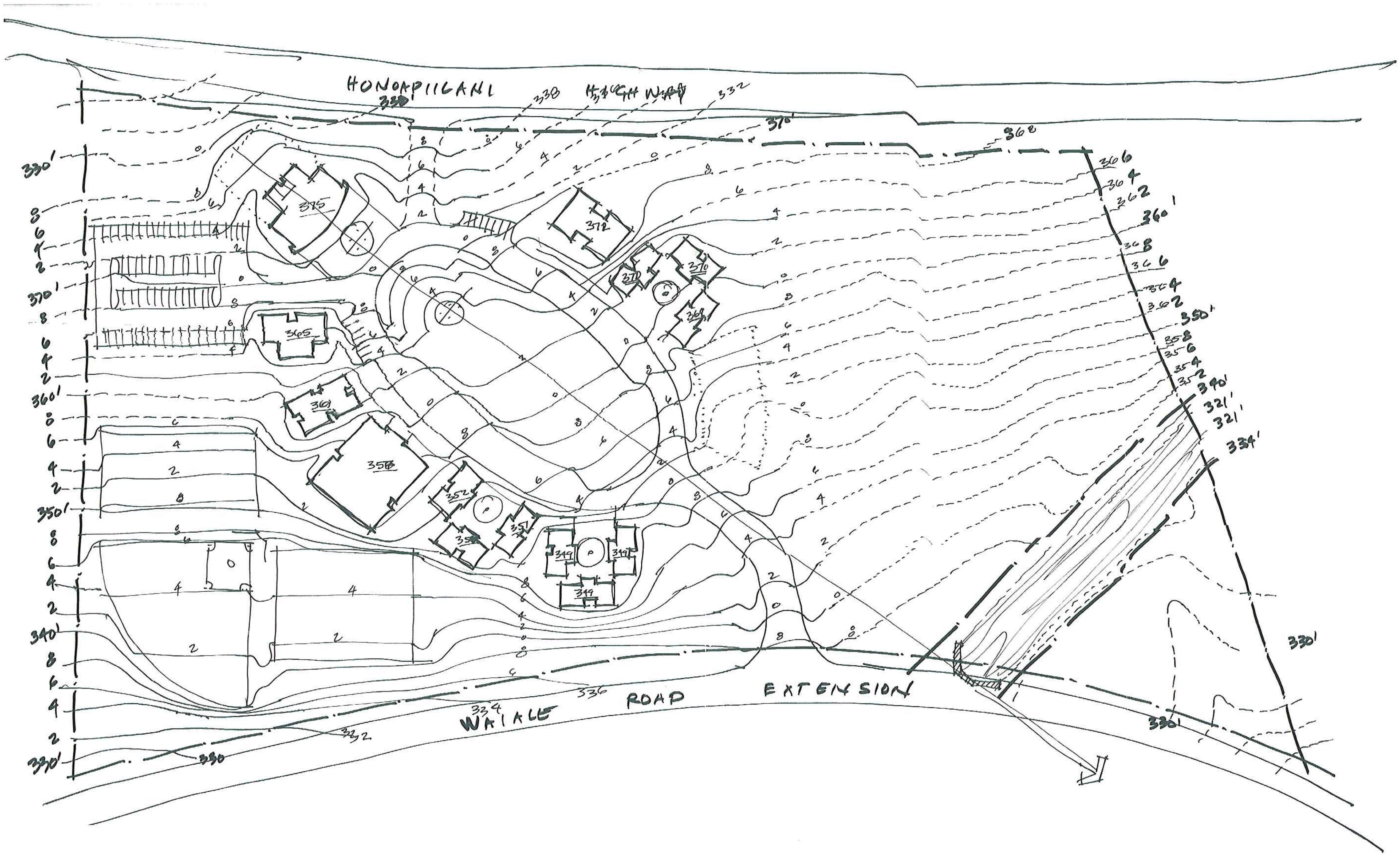
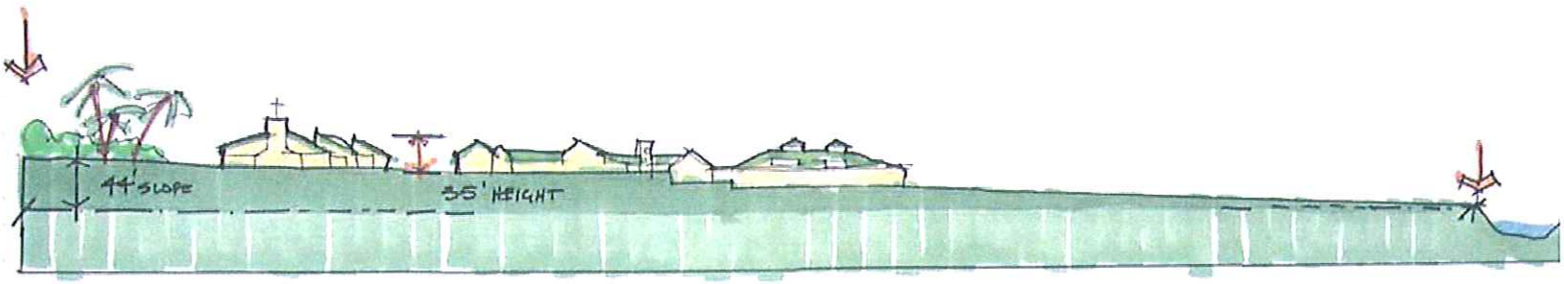


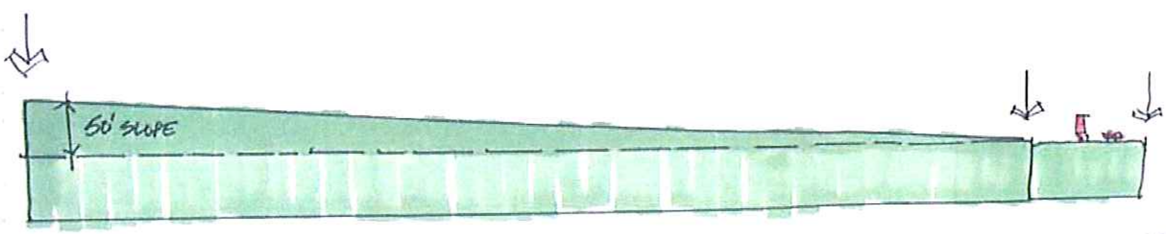
TOPOGRAPHY PLAN

EMMANUEL LUTHERAN CHURCH + SCHOOL

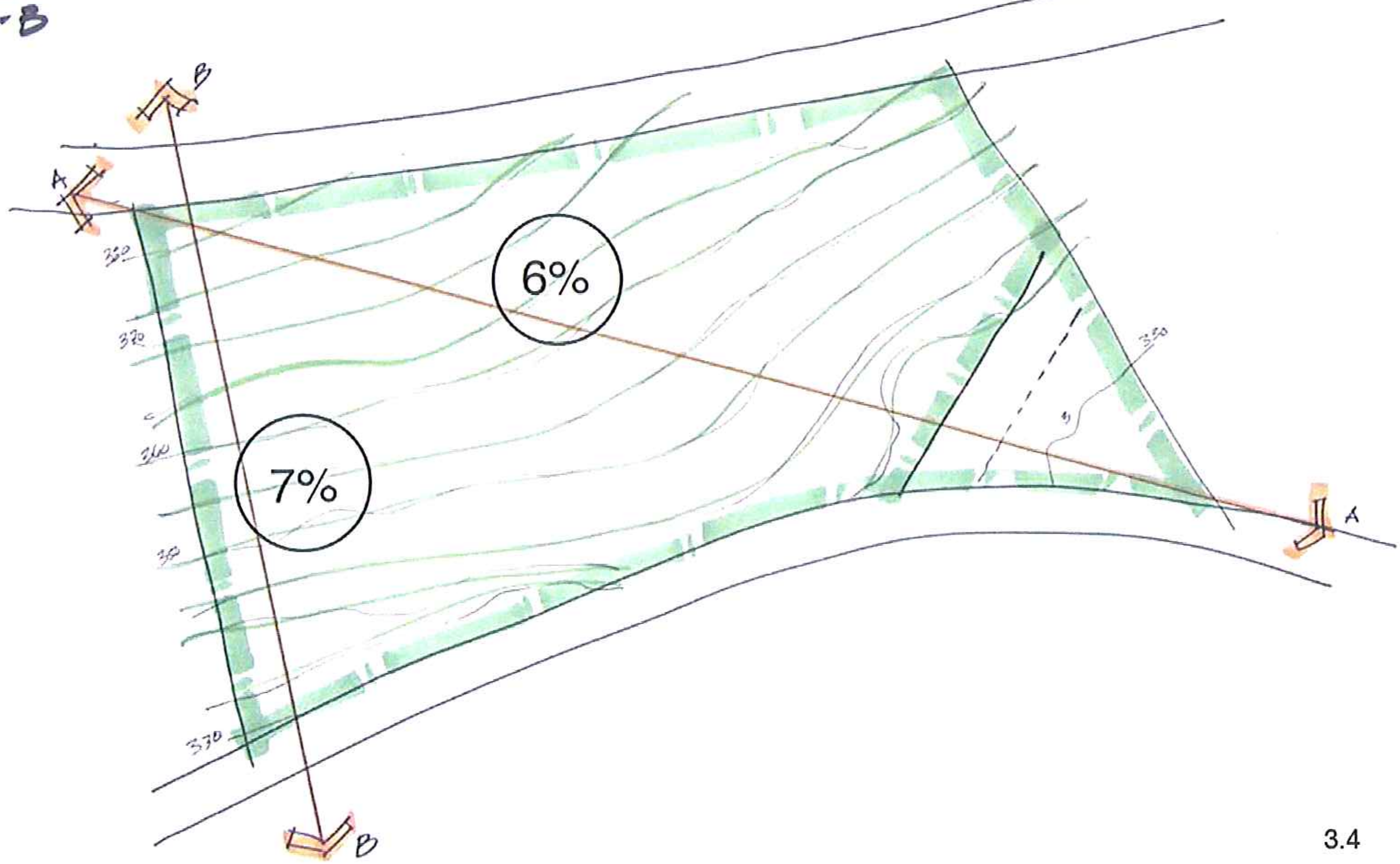
SLOPE / HEIGHT



A-A



B-B



A. STATE

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission, establishes four major land use districts into which all lands in the State are placed. These districts are designated Urban, Rural, Agricultural, and Conservation. The 25-acre parcel owned by the Church is within the Agricultural District. Development entitlements within the Agricultural District are administered by both the State and County Governments.

The proposed use of the land for church and school use is incompatible with what is allowed in the District, thus the designation must be changed from Agricultural to "Urban". Development entitlements within the Urban District are delegated solely to the respective County Governments. The application for a Land Use District Boundary Amendment will be acted upon by the State Land Use Commission.

B. MAUI COUNTY ZONING

The property is located in the County Agricultural Zone, which is required when the overlying State District is Agriculture. The purpose of this zone (generally) is to promote agricultural development and protect agricultural resources. Similar to the restrictions of the State District, uses in this county zone are restricted and specifically do not allow for the development of a school.

To proceed with the project, the County Zoning must be changed from Agricultural to "Public/Quasi-Public". Public/ Quasi-Public (P/QP) is a zoning district established for public, nonprofit or quasi-public uses. It allows for the development of schools and churches.

The application for a Change in Zoning (CIZ) will be processed by the Maui Planning Department and decided upon by the Maui County Council and Mayor. During the application process, State and County agencies, and the Maui Planning Commission will make comments on the application that may be incorporated into conditions of the CIZ.

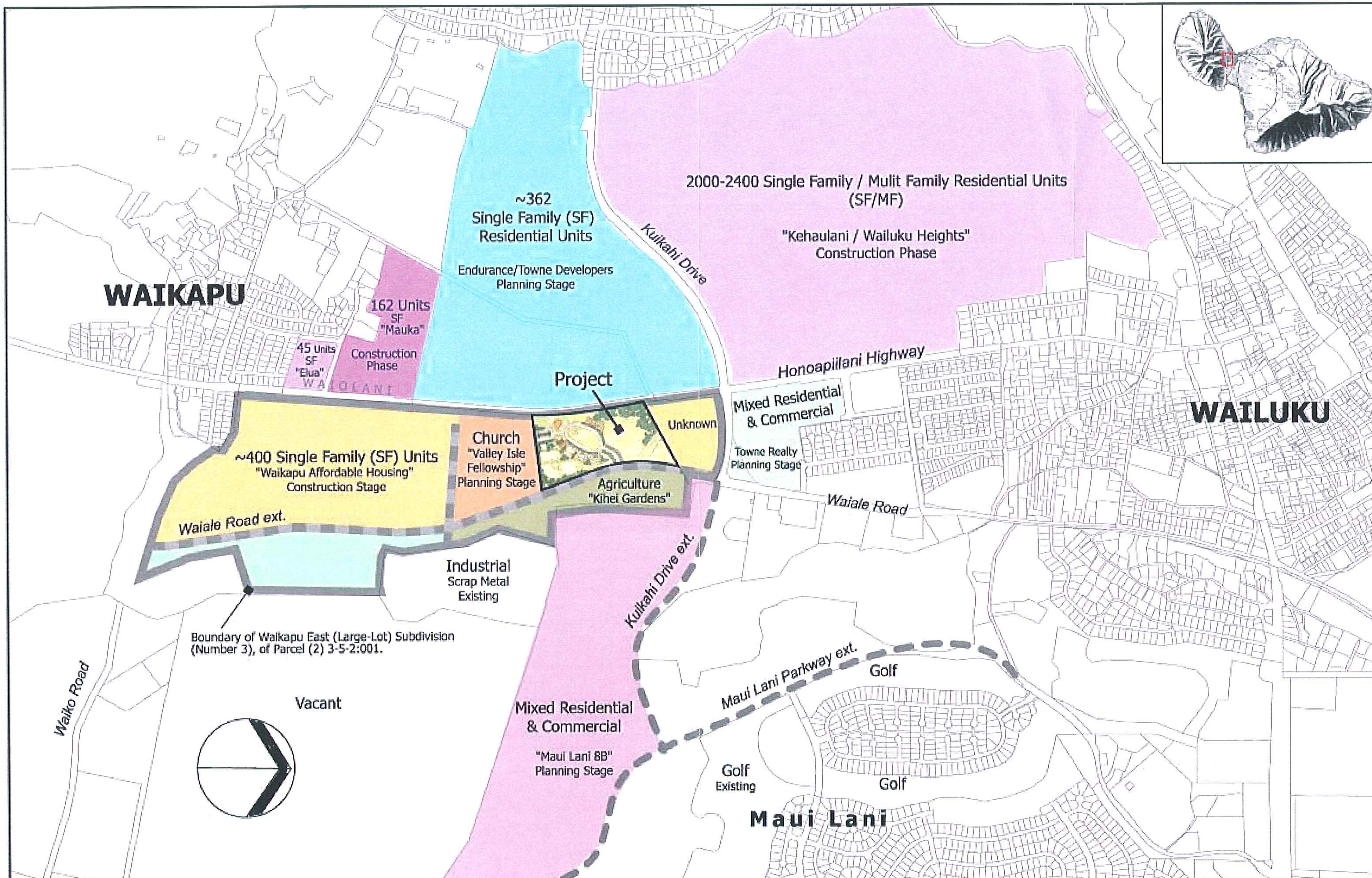
It should be noted that the P/QP zoning district is currently being amended by the County of Maui. One relevant issue of the ordinance that is being addressed is the Zone's height limit of 35 feet. If the amendment is not completed prior to the construction of the new church, a height variance will be required. The ordinance may also be revised to allow faculty or elderly housing on P/QP zoned lands.

C. WAILUKU – KAHULUI COMMUNITY PLAN

Nine community plan regions have been established in Maui County. Each region's growth and development is guided by a community plan that contains objectives and policies in accordance with the Maui County General Plan. The purpose of the community plan is to outline a relatively detailed agenda for carrying out these objectives.

The subject property is located within the Wailuku - Kahului Plan region. The Community Plan was adopted in 1987 and amended in 1992 and recently amended in 2002. The Community Plan designation for the subject property was changed in 2002 from Agriculture to Public / Quasi Public in support of the development of a private school site.

No changes are needed to amend the Community Plan Designation.



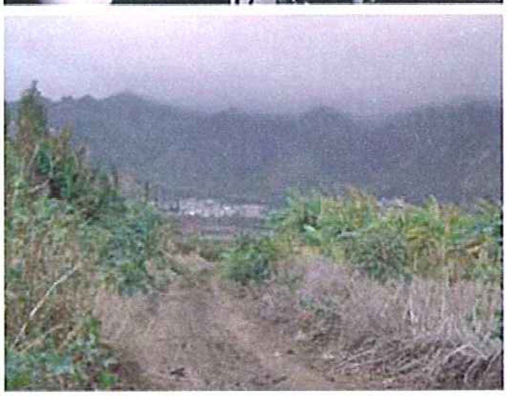
WAIKAPU
WAILUKU
~362
Single Family (SF)
Residential Units
Endurance/Towne Developers
Planning Stage
2000-2400 Single Family / Mulit Family Residential Units
(SF/MF)
"Kehaulani / Wailuku Heights"
Construction Phase
Kuikahi Drive
162 Units
SF
"Mauka"
Construction
Phase
45 Units
SF
"Elua"
WAIOLANI
Honoapiilani Highway
Project
Mixed Residential
& Commercial
Towne Realty
Planning Stage
Unknown
~400 Single Family (SF) Units
"Waikapu Affordable Housing"
Construction Stage
Church
"Valley Isle
Fellowship"
Planning Stage
Agriculture
"Kihei Gardens"
Waiale Road
Waiale Road ext.
Industrial
Scrap Metal
Existing
Kuikahi Drive ext.
Boundary of Waikapu East (Large-Lot) Subdivision
(Number 3), of Parcel (2) 3-5-2:001.
Maui Lani Parkway ext.
Golf
Waiko Road
Vacant
Mixed Residential
& Commercial
"Maui Lani 8B"
Planning Stage
Golf
Existing
Golf
Maui Lani












Section 4 –Campus Master Plan

CAMPUS MASTER PLAN

The Emmanuel Lutheran Church has approached site planning as a low-density development between the Wailuku and Waikapu towns. Open space on this 25-acre parcel will provide a relief to the density of single-family residential units to the north of Honoapiilani Highway.

The Campus Master Plan shown on the following page illustrates the eventual expected build-out of the Emmanuel Lutheran Church and School campus. The plan has been developed to preserve views to mountains to the west, and northeast views to the sea and Mt. Haleakala. Of critical importance was planning a village community with low density, open space and view corridors from the site and Honoapiilani Highway.

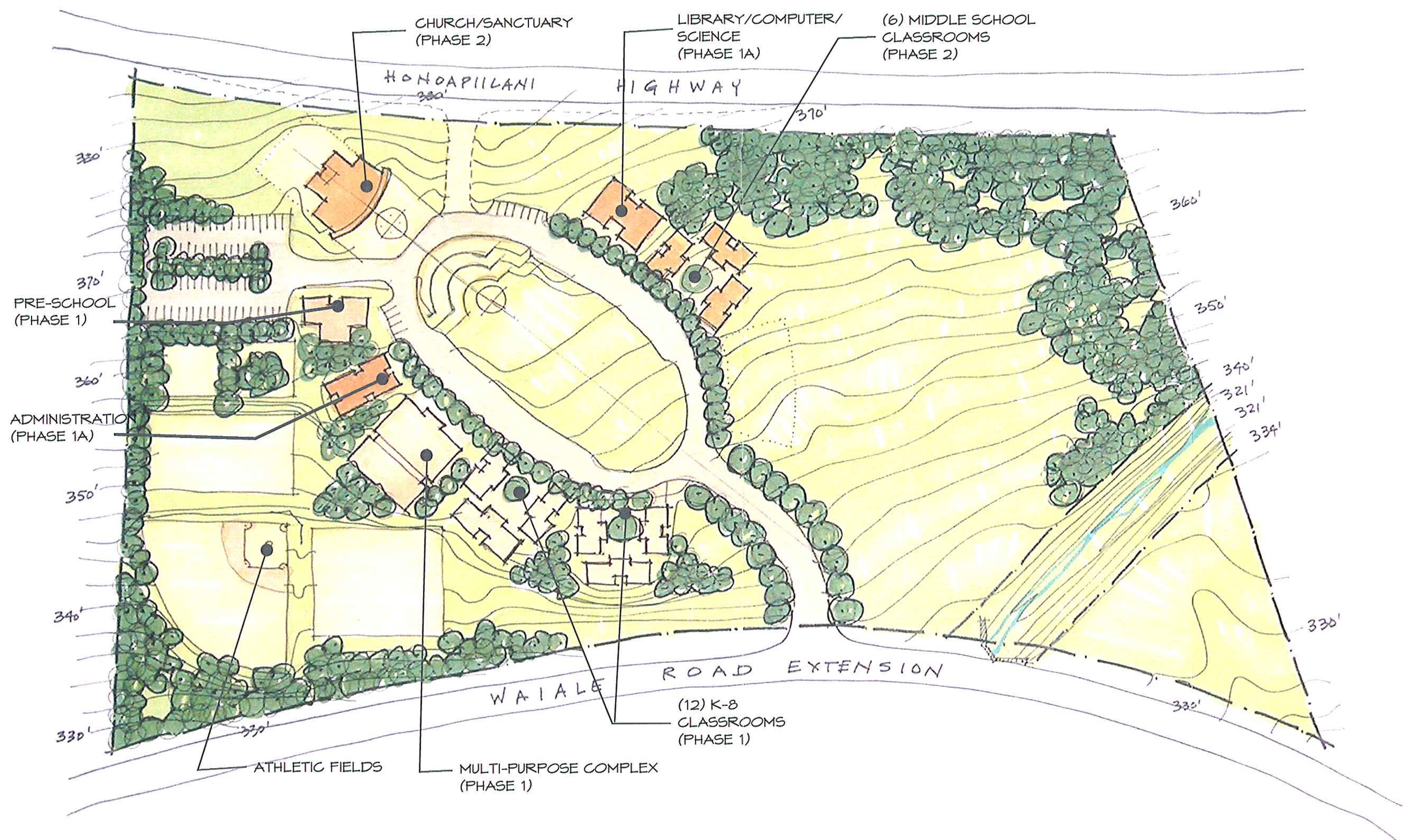
A plan has been developed on a number of assumptions, optimizing mountain,(mauka) and sea, (makai) views; optimizing building orientation for natural cooling and ventilation and minimizing site impact in early phases. View corridors from Honoapiilani Highway to the site, church, and beyond will be maintained. A sufficient buffer zone between buildings and the highway is planned.

The scale of the project is low-density. All buildings planned for the campus will be one story and will meet current planning and zoning height requirements. The sanctuary, the focus of the entire campus plan, will require a zoning variance for the steeple. The Master Plan represents a breath of fresh air for what is now a very congested community located in Wailuku on less than 3 acres. This new Master Plan centered around the campus green provides a village concept of single, independent one story buildings oriented towards open space and cooled by the trade winds.

Sustainable development and high performance design are key aspects of the Master Plan. Minimum energy use and minimum environmental impact on the site as well as green construction techniques will be utilized to lower long term operational costs and incorporate environmentally sound construction practices.

Vehicular circulation is kept surrounding the major campus green. The majority of parking is held outside of the pedestrian campus village area. Visitor and handicap parking will be allowed for buildings fronting the village common.

Preservation of at least half of the 25-acre site for potential future use is anticipated. The phasing build out currently shown will take approximately 10 to 15 years. Remaining development will occur beyond this time. The intent for any future development would be to follow the low-density guidelines developed in the current Master Plan.



THE CAMPUS PLAN

EMMANUEL LUTHERAN CHURCH + SCHOOL

0 60 120

N

Overview of Phasing Program

Phase I

Phase I will be the largest of the three phases and will include twelve classrooms, the pre-school, and a multi-purpose complex. Building these buildings first will provide space for all existing programs to continue in their own space. Twelve classrooms will house students in K - 8th grades at one classroom per grade. The additional 3 classrooms could be used for a library, computer lab and science classroom.

The pre-school, being self-contained and independent in schedule will be in it's own building.

The multi-purpose complex will provide an indoor athletic space for the community during the week and double as a large gathering space, (sanctuary), on weekends and holidays. Ensemble and band will share one of two music rooms. Art will operate in the art room. School and church administration will temporarily be located in the second music room. The community kitchen will be in operation and serve the community.

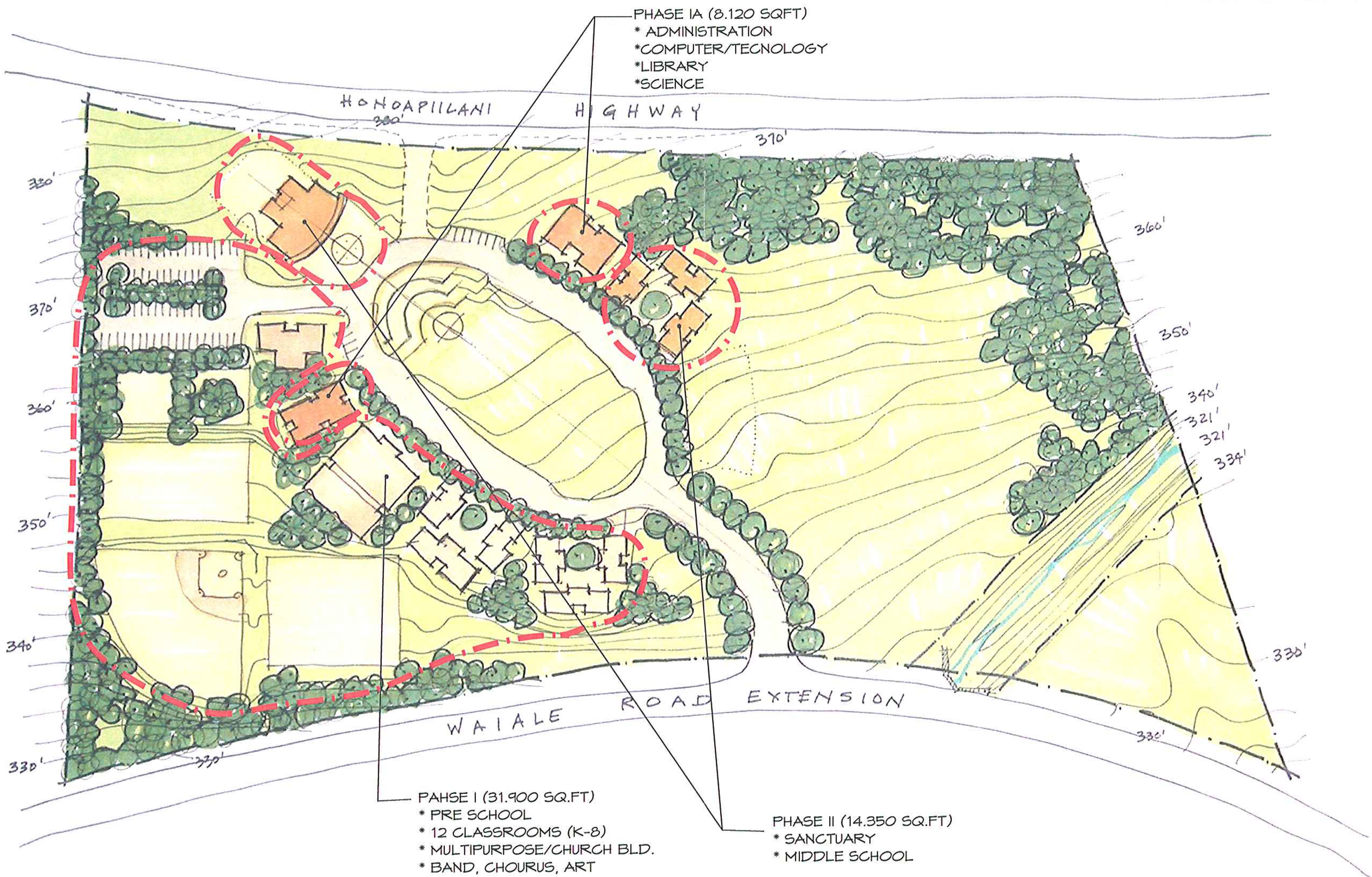
Phase IA

Phase IA, the smallest of the three phases, will establish an administration building located between the multi-purpose and pre-school buildings in phase one. Administration will move out of their temporary quarters in the multi-purpose complex providing a second music classroom. This phase will also build a building to house the library, computer/technology lab, and a science classroom/lab, freeing 3 classrooms for K-8 program expansion. Having additional classrooms will give enrollment expansion capability at the early years. It will also provide flexibility if one grade level should need an additional class due to population bubbles. This phase is in line with the fundamental community vision and goals established at the beginning of our study.

Phase II

Phase II completes the master plan. By this time school enrollment and Maui community involvement are strong. The Church has strengthened it's community presence. A six-classroom, (two per grade), middle school is established. Six classrooms in the K - 5 program are freed, allowing for a full two classrooms per grade in K through 5th grades.

A sanctuary seating 450 is built. It is physically and metaphorically at the center of the church and school complex. Church membership and school enrollment, (490 students) are possible. The following drawing on page 4.4 illustrates this phasing plan of development.



PHASING PLAN

EMMANUEL LUTHERAN CHURCH + SCHOOL

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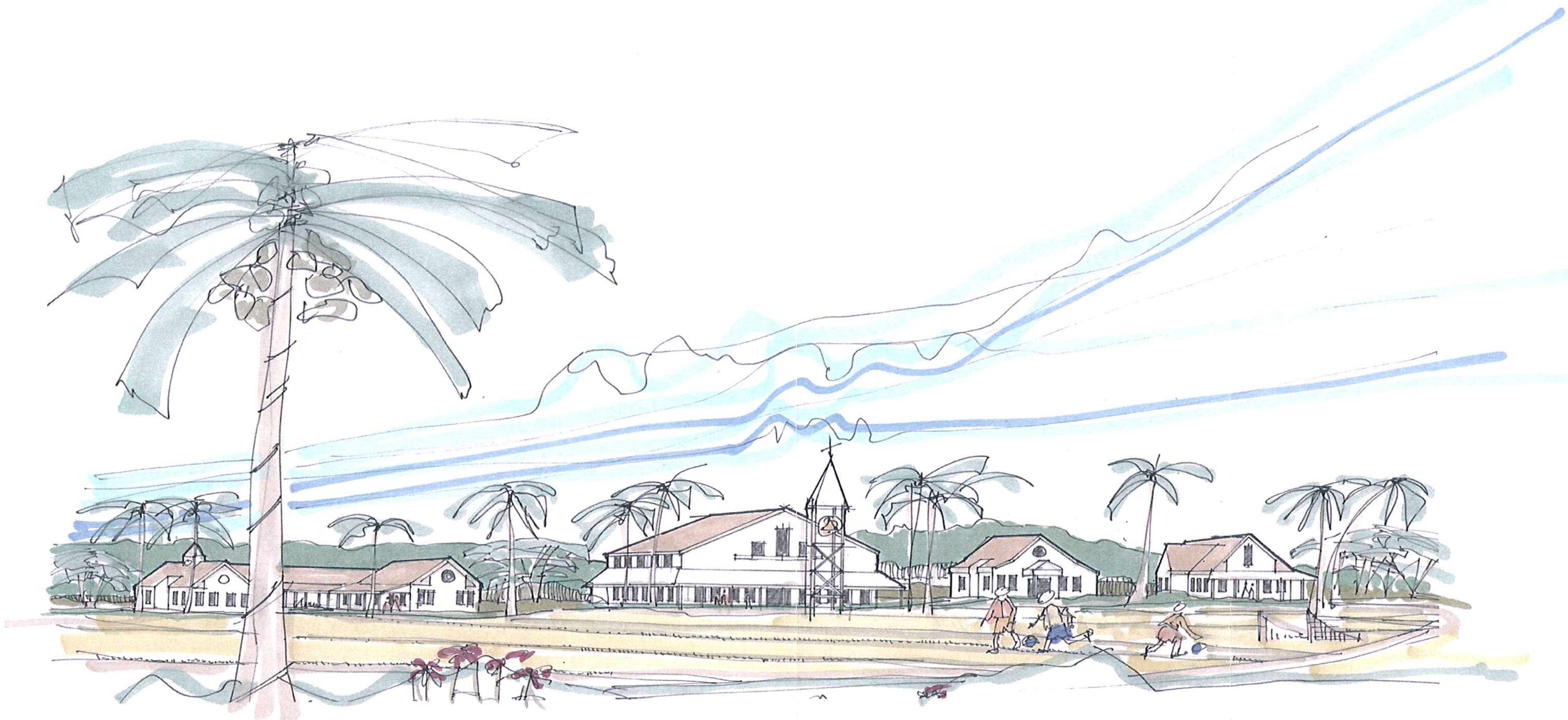
VIEW OF CENTRAL GREEN, SANCTUARY
AND WEST MAUI MOUNTAINS

EMMANUEL LUTHERAN CHURCH + SCHOOL

N



VIEW OF CLASSROOMS, MULTI-PURPOSE
COMPLEX, ADMINISTRATION, AND PRE-SCHOOL
CAMPUS GREEN IN FOREGROUND

EMMANUEL LUTHERAN CHURCH + SCHOOL

N

VIEW OF COVERED WALKWAYS AND
CLASSROOM COURTYARD

Section 5 Preliminary Project Budget

Summary

Current project costs for the ELC and S Master Plan are presented in this section. The budget has been developed as a total project budget providing the Emmanuel Lutheran Church with turn-key costs for the project. The budget has been broken down into the phases outlined in the Master Plan. Specific elements of each phase are included in the total construction cost spreadsheet. Due to the vagaries of inflation, particularly on Maui, evidenced in the sharp construction cost increase in the last year and a half, estimates for all phases assume a Spring 2007 construction start.

The Master Plan has been designed to be a dynamic and flexible instrument to be used as a road-map for future phased construction. Assuming Phase I is developed as scheduled, the budgets for Phase 1A and Phase II will require updating to accommodate inflation costs. This total project budget summary, therefore, provides a snapshot of what we believe the total build-out of all phases would be if they began construction in Spring of 2007.

Construction Budget Assumptions:

The construction budget assumptions developed for individual building types in each phase are based on similar recent construction projects on Maui. These construction costs have been escalated o the spring of 2007. We believe the range given for low to high per foot provides a good basis of actual project costs on which to base ELCs construction budgets of future phases beyond the Spring of 2007.

Site costs have been estimated by Goodfellow Brothers, based on the current Master Plan. Site development costs involving utility infrastructure, site grading, walks and roadways and landscaping have been estimated for Phase I with a construction start projected for the Spring of 2007.

Assumptions:

Budget assumptions shown on the following spreadsheet are as follows:

1. Site development cost based on Goodfellow's estimate, dated 12/2005.

2. Individual building construction costs- range from a low of $220 to high of $240 based upon structural, mechanical, architectural and building finish elements, particular to each building type.

3. Soft costs have been included for each phase. These costs include but are not limited to construction and owner contingency, design and engineering fees, surveying, civil engineering, landscape design, permitting costs, testing, reimbursable expenses, cost estimating, furniture and equipment, etc. From past projects, our experience is that soft costs should be planned for between 20 and 25 % percent of actual construction costs.

The total project budget spreadsheet on the following page provides ranges of total project costs for all three Phases (Phase I, Phase IA, and Phase II). These numbers will require an inflation increase for all work begun after the Spring of 2007. These construction and total project costs, based on similar projects on Maui, should provide realistic targets for the capital campaign by the Emmanuel Lutheran Church. Total campaign goals must be adjusted for inflation after the completion of Phase I.

EMMANUEL LUTHERAN CHURCH & SCHOOL - WAILUKU, MAUI

Prelimenary Total Project Budget

Flansburgh Associates Architects
Date: 1/6/06

The Campus Master Plan	Program GSF	x $'s/SF		Construction Costs		Soft Costs		Total Project Cost Range Spring 2007	
						20%	25%		
		Low	High	Low	High	Low	High	Low	High
Phase I									
Pre-School	4,900	$220	$240	$1,078,000	$1,176,000	$215,600	$294,000	$1,293,600	$1,470,000
12 Classrooms	14,700	$220	$240	$3,234,000	$3,528,000	$646,800	$882,000	$3,880,800	$4,410,000
Multi-purpose complex	12,300	$247	$277	$3,038,100	$3,407,100	$607,620	$851,775	$3,645,720	$4,258,875
				$7,350,100	**$8,111,100**	**$1,470,020**	**$2,027,775**	**$8,820,120**	**$10,138,875**
Phase IA									
Administration Building	3,220	$220	$265	$708,400	$853,300	$141,680	$213,325	$850,080	$1,066,625
Specialty classrooms/Library	5,000	$220	$265	$1,100,000	$1,325,000	$220,000	$331,250	$1,320,000	$1,656,250
				$1,808,400	**$2,178,300**	**$361,680**	**$544,575**	**$2,170,080**	**$2,722,875**
Phase II									
Sanctuary	7,000	$247	$277	$1,729,000	$1,939,000	$345,800	$484,750	$2,074,800	$2,423,750
Six Classrooms	7,350	$220	$240	$1,617,000	$1,764,000	$323,400	$441,000	$1,940,400	$2,205,000
				$3,346,000	**$3,703,000**	**$669,200**	**$925,750**	**$4,015,200**	**$4,628,750**
Sitework									
Based on preliminary estimate from Goodfellow Brothers 12/2005								$2,000,000	$2,900,000
								$2,000,000	**$2,900,000**
TOTALS				**$12,504,500**	**$13,992,400**	**$2,500,900**	**$3,498,100**	**$17,005,400**	**$20,390,500**

***Assumption:**
Costs of all phases are based on a Spring 2007 Construction start.
Inflation cost of project starting after Spring 2007 should be increased by at least 5% per year

***Soft Costs Include:**
Construction and Owners Contingency
Design and Engineering Fees
Surveying, Geotechnical Consultant and Testing
Civil Engineering
Landscape Design
Cost Estimating
Technology Consultant
Furniture & Equipment Consultant
Cost Estimating
Acoustical & Daylighting Consultants
Bid Document Printing
Reimbursable Expenses
Consultant Mark-up

Section 6 – Project Schedules

These schedules are preliminary and should be considered as guidelines that reflect a reasonable timeline for the design and construction of buildings of this size.

The schedules are based on a Design-Bid-Build scenario. However, there are other project delivery methods worthy of consideration, including Design-Build, which may shorten the construction schedule.

LONG RANGE PLANNING SCHEDULE

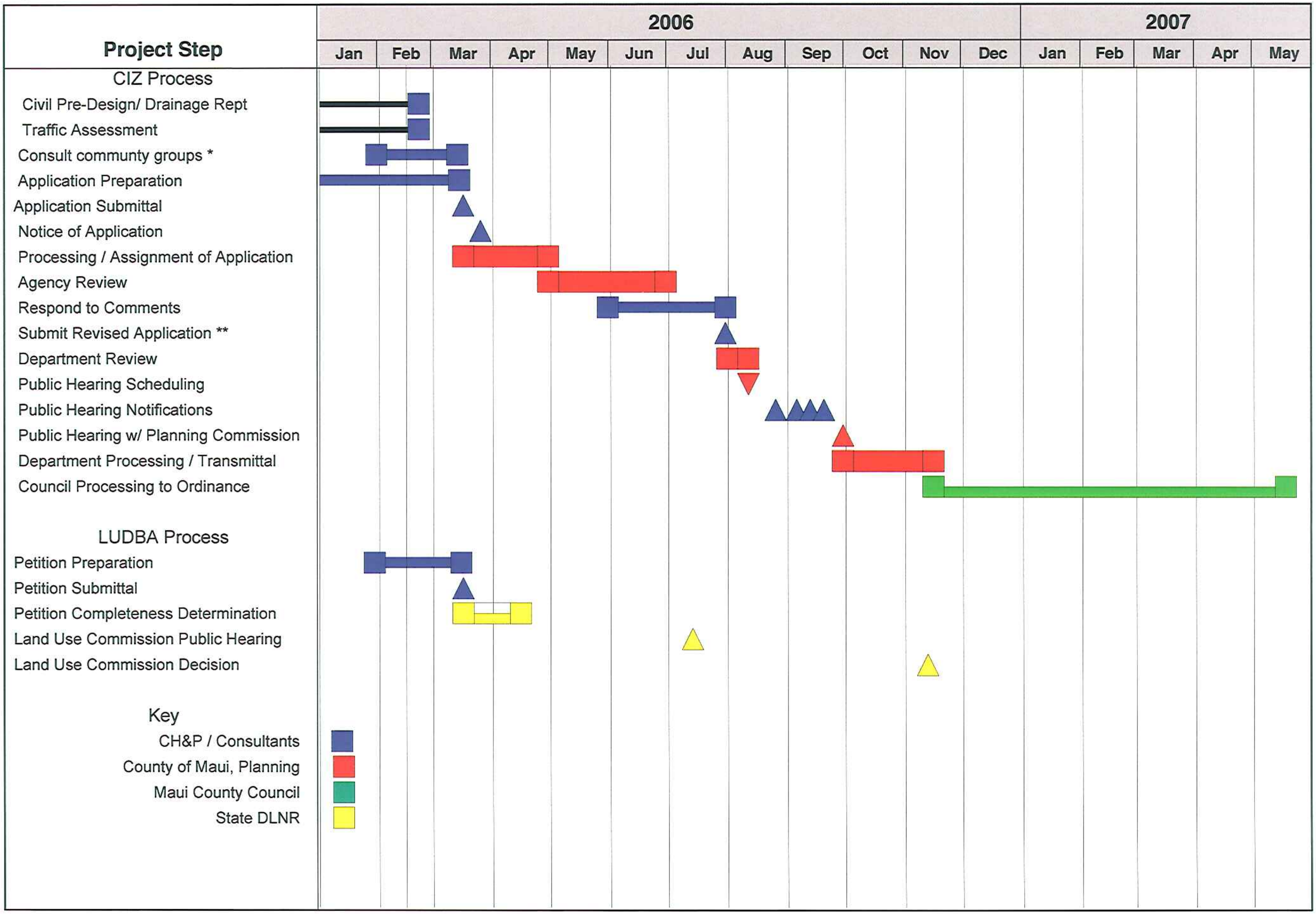
EMMANUEL LUTHERAN CHURCH & SCHOOL

	Activity Name	Start Date	Finish Date
1	Campus Master Planning (FAI)	8/1/05	1/16/06
2	Planning, Zoning & Permitting (CHP)	8/1/05	6/15/07
3	Submit zoning change Application	11/15/05	1/16/06
4	Approval waiting period	1/16/06	6/16/07
5			
6	Phase I and 1A Design & Documentation	6/15/06	3/15/07
7	Begin Phase 1 Construction	5/15/07	8/13/08
8	Begin Phase 1A Construction	6/15/09	3/8/10
9	Phase II Design & documentation	6/15/13	3/15/14
10	Begin Phase II construction	4/15/14	5/15/15

Emmanuel Lutheran Church

Concept Schedule by Chris Hart & Partners

2/14/06



Section 7 – Appendix

Meeting Notes

DATE: 10 November 2005

PROJECT: ELC Master Plan

PROJECT NO: 2514.00

PRESENT: ELC Land Use Planning Committee Members
David Soleau FAI

DISTRIBUTION: Rich Sudheimer, Zach Brewer, Rev. Milton Fricke, Valerie Curtis, and David Soleau

1. The meeting was held to review the draft Church and School Master Plan and to review the permitting schedule for zoning change.

2. Comments, Suggestions and Corrections: on the draft were received and will be incorporated into the final report.

3. Community Consensus: Focusing on the selection and development of Option B into the Final option was requested by Zack Brewer. At a pervious meeting with the teaching staff there was not a consensus about the chosen option. After discussion the committee agreed to move ahead with the finalization of Option B for the Final Report and application process keeping the final submission on schedule. Copies of all three planning options will be given to the staff for further review. Zach Brewer will collect staff comments and convey them to the committee within 1-2 weeks.

4. A Site Trip: For all staff was scheduled for 11 November 2005 to help bring consensus to the option selection.

5. Schedule: Completion of the final master plan will be the first week of December 2005. This will allow for the traffic and civil engineers to complete their work. It will also allow additional time to receive further input from the staff. The filing with the county for zoning change will be 15 December 2005.

6. Cost Estimating: the site and grading plan as developed will be estimated will be included into the preliminary total project budget being prepared by FAI.

7. Section 3: Site Analysis, will be extensively modified by Chris Hart and Partners to include additional context and zoning information.

8. Draft Revisions: All suggested revisions to the draft Master Plan dated 9 November 2005 should be given to Richard Sudheimer for conveyance to FAI.

FLANSBURGH ASSOCIATES

Meeting Notes

DATE:	10 November 2005
PROJECT:	ELC Master Plan
PROJECT NO:	2514.00
PRESENT:	Steve Pawlak — Goodfellow Brothers Inc.: Estimator Richard Sudheimer — ELC David Soleau — FAI
DISTRIBUTION:	All present, Valerie Curtis, Stacy Otomo

1. The site plan was reviewed with expected phasing and utilities described to Steve Pawlak for estimating purposes.

2. The colored Master Plan and Preliminary Grading plan were provided. RS to send the survey to SP. DSS will email the two plans provided to Goodfellow Brothers.

3. Schedule: Goodfellow will attempt to have the site grading and site development estimate completed by 7 December 2005. They will assume an early site package and provide a full estimate with the loop road included. An alternate deduct cost will cover the possible elimination of the north side of the oval. Utility stubs for further phases (IA & II) will be included under roadways in Phase I.

4. Civil Engineering drawings from Stacy Otomo will follow but will not be available for this preliminary estimate.

5. Estimate will assume a 1 January 2006 start date with estimates for inflation costs per month for a period of 12-14 months out.

FAI RAID:FAI Projects:2005 Projects:2514.00 Emmanuel Lutheran:03 MEETING NOTES:ELC Mtg Notes 11.10.05 MP.doc

Meeting Notes

DATE:	10 November 2005	
PROJECT:	ELC Master Plan	
PROJECT NO:	2514.00	
PRESENT:	Richard Sudheimer Chris Hart David Soleau	ELC FAI
DISTRIBUTION:	All present	

1. The meeting was held to review the zoning application submission and the draft Master Plan dated 9 November 2005.

2. Assumption: Section 1.4: Chris Hart and Partners and Stacy Otomo will review and finalize the civil, permitting, planning and development assumptions.

3. Traffic Report: The traffic report is not yet complete: Chris Hart will contact Phil Rowell to request the report be completed by 1 December 2005.

4. Section 3: Site - Chris Hart and Partners will revise this section extensively and add additional information. Section responsibilities are as follows:

Section		Responsibility
Site: Overview: Text	3.1	FAI
Location Map and Text	3.2	CH&P
Site Analysis: Graphic	3.3	FAI
Topography: Survey	3.4	FAI
Community Plan	3.5	CH&P
Land Use District	3.6	CH&P
County Zoning Issues	3.7	CH&P
Regional Context Map	3.8	CH&P
Site Photos	3.9-3.10 FAI	

5. Schedule: The final Master Plan will be completed the first week of December. The zoning application will be submitted by 15 December 2005. Community meetings will be scheduled prior to 15 December 2005.

6. Civil Engineering: FAI to send grading and site Master Plan to Stacy Otomo. Chris Hart to request that the drainage report and preliminary civic site plan be completed by 1 December 2005.

Meeting Notes

DATE: 23 September 2005

PROJECT: ELC: Meeting with Michael Foley - Maui County Director of Planning

PROJECT NO: 2514.00

PRESENT:

Richard Sudheimer	ELC
Rev. Milton Fricke	ELC
Philip Rowell	P. Rowell Associates
Chris Hart	Chris Hart & Partners
Robb Cole	Chris Hart & Partners
David Soleau	FAI
Valerie Curtis	FAI

DISTRIBUTION: ATTENDEES

1. Height restriction should be changed before zoning change goes through.
2. Faculty or employee housing should be added to ordinance. Do not include in scheme but good idea, and ELC would like that
3. They would support right turn in/right turn out only
    - Department of Transportation would be against in and out traffic.
    - Steve Kupuchi - contact Geven Hiragg Coffee Plantation, get support, or advice from their application
4. County is encouraging use of non-potable water
5. Mike Foley Expressed Concern because of the proximity of church to highway
6. Trees required every 5 spaces in parking lot.
7. Traffic Report
   Letter from SHPD, Melissa Kirkewualf
    - Get letters from other agencies
    - Letters and support from community and neighbors
    - The County feels really strongly about community support
    - Contact Wailuku and Waikapu community groups
8. John Summers - status of community map, contact him; make sure ELC is on community map
    - Concept sketches to be included
    - Don't put "housing" on drawing
    - Include site plan
    - Plan should talk about water, sewage, and electricity
    - Touch base with county

Meeting Notes

DATE: 21 September 2005

PROJECT: ELC: Meeting with School and Church Community

PROJECT NO: 2514.00

PRESENT:

ELC Community	
Chris Hart	Chris Hart & Partners
Robb Cole	Chris Hart & Partners
David Soleau	FAI
Valerie Curtis	FAI

DISTRIBUTION: Richard Sudheimer, Rev. Milton Fricke, Zach Brewer, Chris Hart, Robb Cole, Valerie Curtis, and David Soleau

1. The meeting was held to review, prioritize, and distill vision & goals, and present 3 options for the master plan.

2. Should classrooms be larger?
   • 800 sq ft. in program, based on today's observation; rooms should be larger - Change to 875, 100 square feet larger than present

3. Criteria: Exposure to trades and storms.

   3.1 Option A - Community Comments
   - Should have parking at fields
   - Loop around all the buildings?
   - Sound isolation for pre-school- move away further

   3.2 Option B
   - Move road opposite church at quad - move pre-K to lower campus
   - Preschool next to church; middle school next to pre-school
   - Flip one pre-school and one science library
   - Least expensive - A + B
   - Option B Modified **(selected as plan to develop and present)**
   - Move one school to other side
   - Move entrance opposite divided entrance way
   - Close-off left side of ridged road during the day

   3.3 Option C

- Church shift to right/
- Parking good- good control over parking

4. General Comments

4.1 Which scheme is best for closed road policy during the day?

- A = Best
- B = Medium
- C = <u>No</u> - difficult

4.2 Should have security of property at site full time presence

4.3 <u>Retention Pond</u>

- Fields lower than building to feed to retention areas
- Storage of water for fire protection
- Could any building be used as hurricane shelter? Must add generator.

Meeting Notes

DATE: 2 August 2005

PROJECT: ELC Interview with Head of School

PROJECT NO: 2514.00

PRESENT:

PRESENT:	Zack Brewer	Principal
	Rev. Milton Fricke	Pastor
	Richard Sudheimer	Congregational President
	David Soleau	FAI

DISTRIBUTION: Zach Brewer, Rev. Milton Fricke, Richard Sudheimer, David Soleau, and Valerie Curtis

1. Overview: This meeting was held to review the proposed week's schedule and cover major project issues.

2. School Size: Current enrollment totals approximately 173 students K-8 with 38 additional preschoolers aged 3 & 4.

   K- 24
   1- 22
   2- 20
   3- 14
   4- 22
   5- 16
   6- 22
   7- 18
   8- 15
   173 Total

3. Projected School Size: Plan for a school of approximately 400 students K through 8 and 60 students Pre-K.

4. Assumed class sizes:

   K @ 20/class = 40
   1- 8th @ 25/class = 400
   440 total

			K-8 @ 20/class	= 360 total
Pre-K @ 10-12 x 5 classes	50-60 total	vs.	Pre-K 4 @ 10/class =	40 total
Total school	500		Total School	400

   Consensus appeared to plan for 400 total including Pre-K.

5. Multipurpose room:
   - 50' x 84' High School Court desired
   - Multiple use as Church sanctuary and school athletics

- Kitchen/Cafeteria
- Stage
- Divisible with movable bleachers
- 2 cross courts for basketball
- 2 cross court volleyball courts
- Plan building clear height for volleyball
- No showers or locker rooms for students or faculty
- Covered lanai space for dining
- Should seat 400 + staff, say 450

6. Project Phasing Assumptions:
   - Phase I- Build new Pre-K through 8th grade at one time with multipurpose building to serve as the church and for athletics. Total of 9 existing classrooms (k-8) plus one expansion classroom for each division, therefore 3 additional rooms- total of 12 classrooms.
   - Phase II- New Church to seat 400-450 people.

7. Athletics: Provide hard surface play and substantially increased green play areas-
   - 2 soccer fields (one for elementary, one for middle)
   - 1 Little League/softball field
   - Volleyball area
   - Hard surface play
   - 1-2 outdoor basketball courts
   - Separate play areas for: Pre- K, K-2, 3-5, 6-8

8. Parking: Parking is a huge issue. Currently there are 35 +/- spaces. Substantially more are needed. Final parking count to be worked out in relation to need and P & Z requirements.

9. Pick- up and Drop-off: Currently a major problem. Plan for a minimum of 3 pick-up/drop-off areas (depending on plan configuration). Pre-K area with curbside or short term parking, Elementary School drop-off, Middle School drop-off

10. Key Facility and Site Problem Areas:
    - Pick-up/ Drop-off space
    - Adequate play areas: both hard and soft
    - Lack of core specialty spaces i.e.: music, art, media center
    - Lack of adequate storage
    - Lack of multipurpose/gym/cafeteria

11. Additional Planning Considerations:
    - Put administration at the front of the school to monitor visitor access and circulation
    - Provide adequate general storage and a maintenance building with a shop and a 2 bay garage
    - Provide additional expanded teacher workroom and lounge space and additional meeting/seminar space

12. Revised School Directory: See attached.

FAI RAID:FAI Projects:2005 Projects:2514.00 Emmanuel Lutheran:03 MEETING NOTES:Mtg Notes 8.2.05 ELC Head.doc

SCHOOL SIZE

- K-8 @ 25×CLASS (18×25) = 450
- PRE-K @ 10/CLASS 4×10 = 40

TOTAL 490±

- PHASE I SIZE

K-8 - 9 ROOMS

9×25 = 225

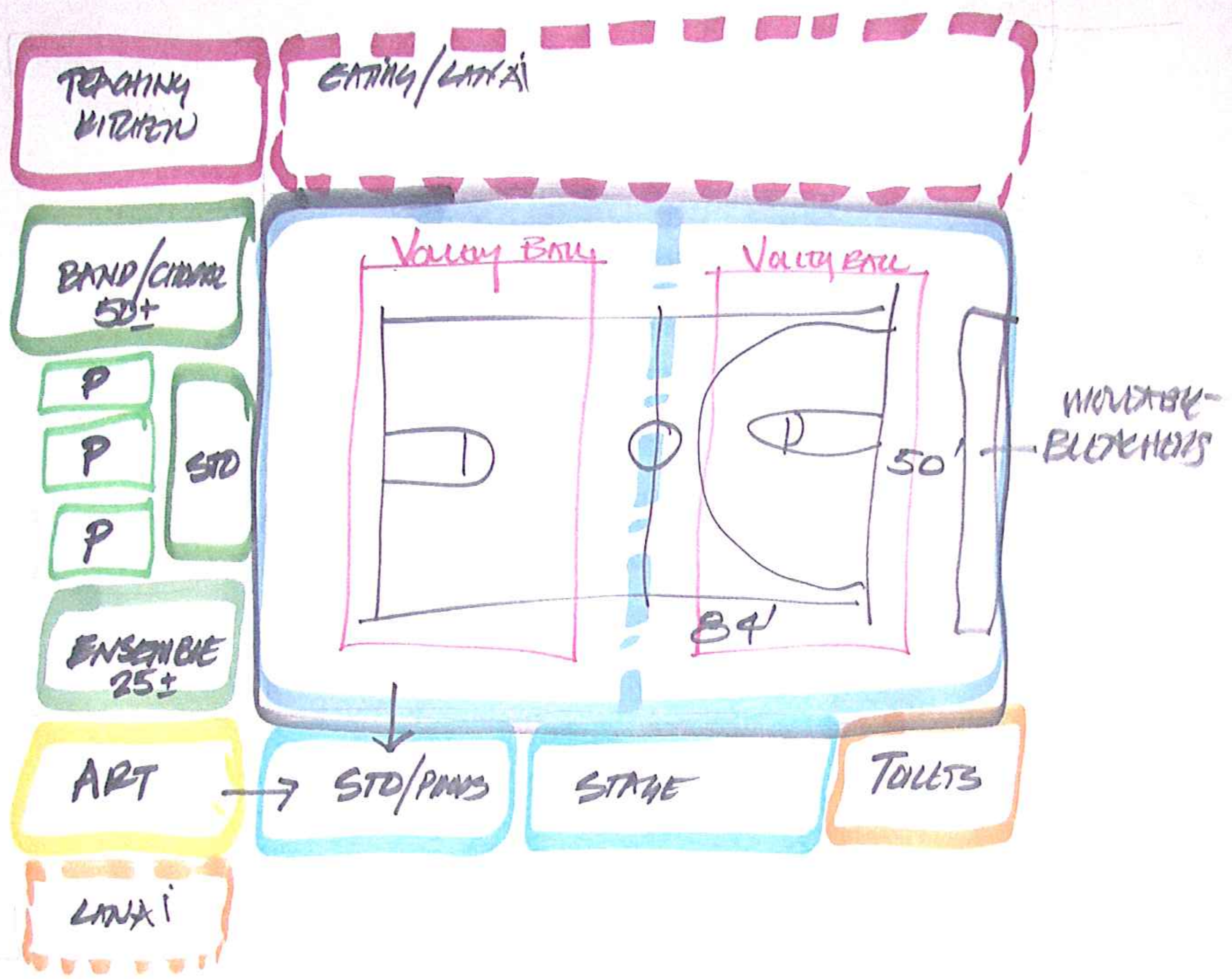
PRE-K 40 to 60 = 60

TOTAL 285

CHURCH CAPACITY

- 400-450 ~? 550+?
- LANAI SPACE

MULTI-PURPOSE BUILDING



SITE ISSUES / PROGRAM

ATHLETICS

- 1 MIDDLE SCHOOL SOCCER 50 x 100 YARDS
- 1 LOWER / UPPER SCHOOL SOCCER / PLAY
- 2 HARD SURFACE PLAY 1-2 B.BALL COURTS
- 3 SEPERATE PLAY AREAS FOR: PRE-K —
  K-2 —
  3-5 —
- 1 LITTLE LEAGUE / SOFT BALL FIELD
- 1-2 VOLLEY BALL

PHASE II

- FUTURE RUNNING TRACK
- PAR COURSE
- HIGH SCHOOL FIELDS

CHURCH: IDENTITY / VISIBILITY /

PICKUP-DROP OFF / PARKING

100-150 +

- PRE-K
- ELEMENTARY
- MIDDLE SCHOOL

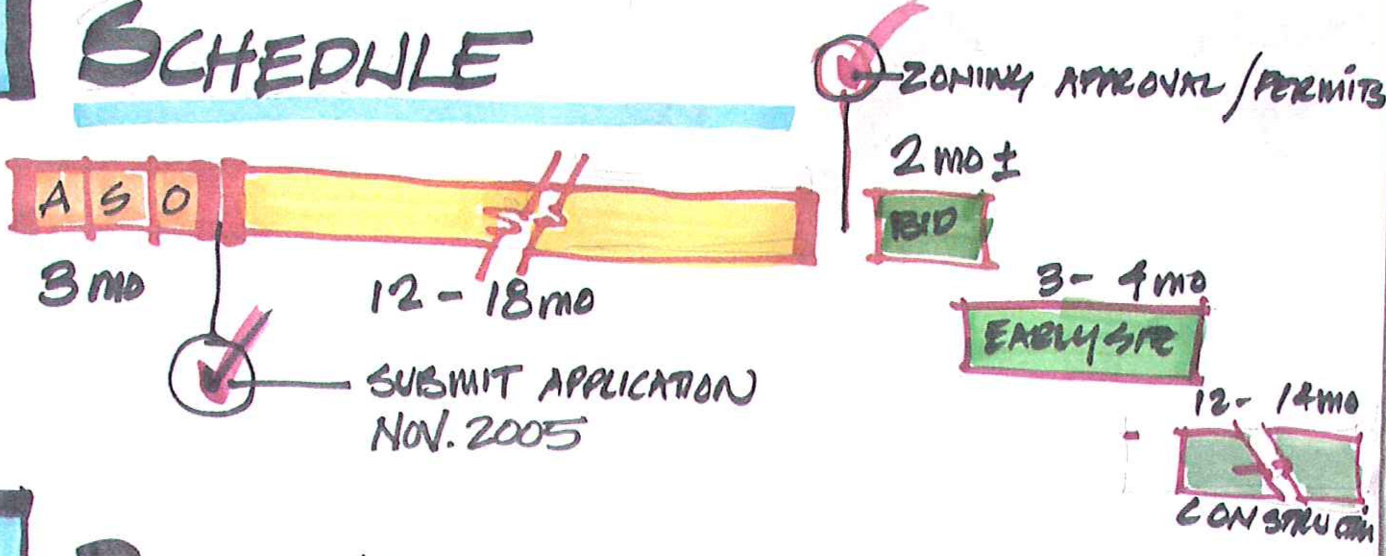
ASSUMPTIONS

- SIZE (SCHOOL)
- PHASING
- BUDGET
- CLASS SIZE
- TECHNOLOGY
- PROGRAM
- QUALITY
- SCHEDULE

KEY FACILITY & SITE PROBLEMS

1. PICKUP/DROPOFF SPACE & PARKING
2. ADEQUATE PLAY AREAS HARD & SOFT
3. LACK OF SPECIFIC CORE SPACE:
   GYM; CAF. ART, MUSIC, SCIENCE ETC.
4. LACK OF ADEQUATE STORAGE
5. SITE SIZE & DENSITY
6. CLASSROOM SIZE 777□ VS 900□
7. LACK OF ADMIN & TEACHER SUPPORT AREA

SCHEDULE



PHASING

PHASE I 0-5 YRS

- PREK - 8TH GRADE
  3+1 / 3+1 / 3+1 = 12 CLASSROOMS
- MULTIPURPOSE BUILDING / KITCH / CAF
- + ART / MUSIC / SCIENCE / COMPUTER
  ADMINISTRATION / MEDIA CENTER

PHASE II 5-10 YRS

- CHURCH BLD.
- + SCHOOL GROWTH 200-450

III ? ? HOUSING FOR FACULTY / ELDERLY / H.S. 300

EDUCATIONAL SPACE

- AC VS NO AC
- LINOLIUM BY SINKS
- TOILETS IN PREK - 2 RMS
- SINKS IN ALL ROOMS
- CARPET VS TILE
- WHITE BOARDS NOT CHALK
- MORE TACK BOARDS
- MORE DISPLAY SPACE
- COUNTER SPACE
- STORAGE / STORAGE / STORAGE
- INTERNET CONNECTIONS
- 4-6 COMPUTERS / CLASS
- TEACHER OFFICES ? / STO.
- MORE ELECTRICAL OUTLETS
- INCREASED SECURITY
- NIGHT LIGHTING
- TEACHER'S LOUNGE / WORK RM
- DARKEN CLASSROOMS
- VCR & TV'S VS DIGITAL

- TV'S ON CARTS - OK
- SCREEN ON WINDOWS
- MORE BOOK SHELVING
- CUBBIES (BIG) IN PRE K - 2 ROOMS
- LOCKERS IN HALL 6-8 14"x18" 1/2 HEIGHT
- MAPS & SCREENS
- MORE NATURAL LIGHT
- MORE LIGHT CONTROL
- LESS GLARE
- K-1/2 CLOSE TO ADMIN.
- NO LOUVERED WINDOWS
- CEILING FANS
- GALLERY & DISPLAY AREAS
- DUST A BIG ISSUE
- 3 FLAG POLES
- CURRICULUM STO. AREA
- SINKS IN ALL CLASSRMS

Meeting Notes

DATE:	4 August 2005
PROJECT:	ELC: Administration
PROJECT NO:	2514.00
PRESENT:	Richard Sudheimer — Congregational President Zach Brewer — Principal David Soleau — FAI
DISTRIBUTION:	Richard Sudheimer, Rev. Milton Fricke, Zach Brewer, Valerie Curtis, and David Soleau

1. Space Totals (Actual):
    - Head's Office- 171 Net square feet
    - Admin Area- 240 Net square feet
    - Work Room (Teachers)- 171 Net square feet

2. Needed space and relationships are shown on the attached diagram- both the church administration and the school administration should share the same area and be contiguous. The administration area is to be located at the entry to the school.

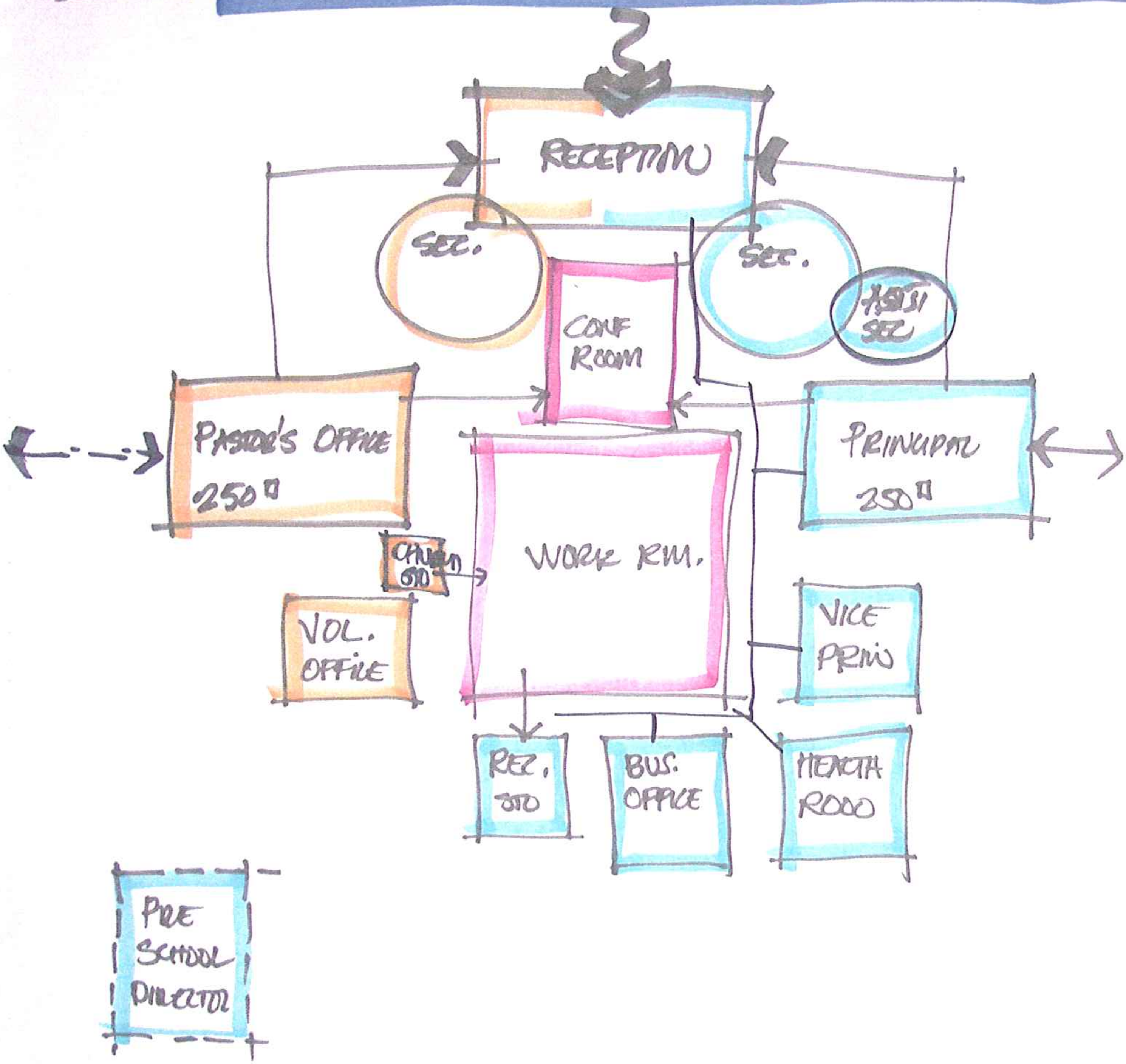
3. Pre-school director's office/admin area to be connected to the preschool. This does not need to be adjacent to the main office.

4. After School: After schools program includes about 25% of all students in the K-8 population. The majority of after school children are in the younger grades. 40 students are now in the program- for Phase I plan for 60 students in two rooms- older and younger children respectively.

5. Tuition Costs:

    - K-5 - $4,400
    - 6^{th}- $4,800
    - 7-8- $5,500

ADMINISTRATION



FLANSBURGH ASSOCIATES

Meeting Notes

DATE:	5 August 2005 /Revised 9.22.05	
PROJECT:	ELC: Preschool Interview	
PROJECT NO:	2514.00	
PRESENT:	Penny Spangler	Preschool Director
	Naomi Proctor	Former Preschool Director
	Judy Fricke	Preschool
	Iris Yamashige	Preschool
	Suzanne Bascar	Preschool
DISTRIBUTION:	Richard Sudheimer, Rev. Milton Fricke, Zach Brewer, Valerie Curtis, and David Soleau	

1. A meeting was held to review needs for the Pre-K program in a new building.
2. Preschool Overview:

   2.1 Currently using church nave 5 days/week. Each day all equipment is picked up, stored, and then set up the following day. **During the day, furnishings and equipment are moved and rearranged.**

   2.2 Uniqueness of the program centers on:
   - Academic departmentalization
   - Team Teaching
   - 45 minute period organization

   2.3 Hours of Operation:
   - 7 AM- 12:30 PM- 4 teachers
   - 12:30 PM- 2:30 PM- 3 teachers
   - 2:30 PM- 5:30 PM- **2 teachers, (24 kids stay till 5:30 p.m.)**

   2.4 Current license is for 48 children. This will not change in future phases. Thus, assume the same size, no growth for future phases. There are a growing number of new preschools on Maui- i.e.: competition is increasing.
3. Room Configuration/ Finishes/Equipment:
   - Doll corner with beds
   - Working kitchen- domestic scale
   - Bathrooms: 6-8 ideally- 2 for each class with a **shower facility worked in is needed. One toilet should be accessible from outside.**
   - Block corner
   - 4 identifiable class areas
   - Large open multi-purpose area and project area with 4 tables- 8 students each
   - Teacher and curriculum storage and lockers needed, **should be plentiful, large, well defined**
   - Cubbies in the room
   - Circle time area

- Bulletin/Tack areas
- Whiteboards
- TV on a stand, **used only at nap time**
- 4-6 computer stations
- Lots of low shelving
- Air Conditioning, naturally ventilated if orientation good.
- Lots of natural light
- Storage in "buckets." Cubbies by the entry
- Lending library, video and books, by entry
- Kitchen/stove needed in pre-school for cooking with the children and science experiments. Need 4 sinks, (sterilizing sink).

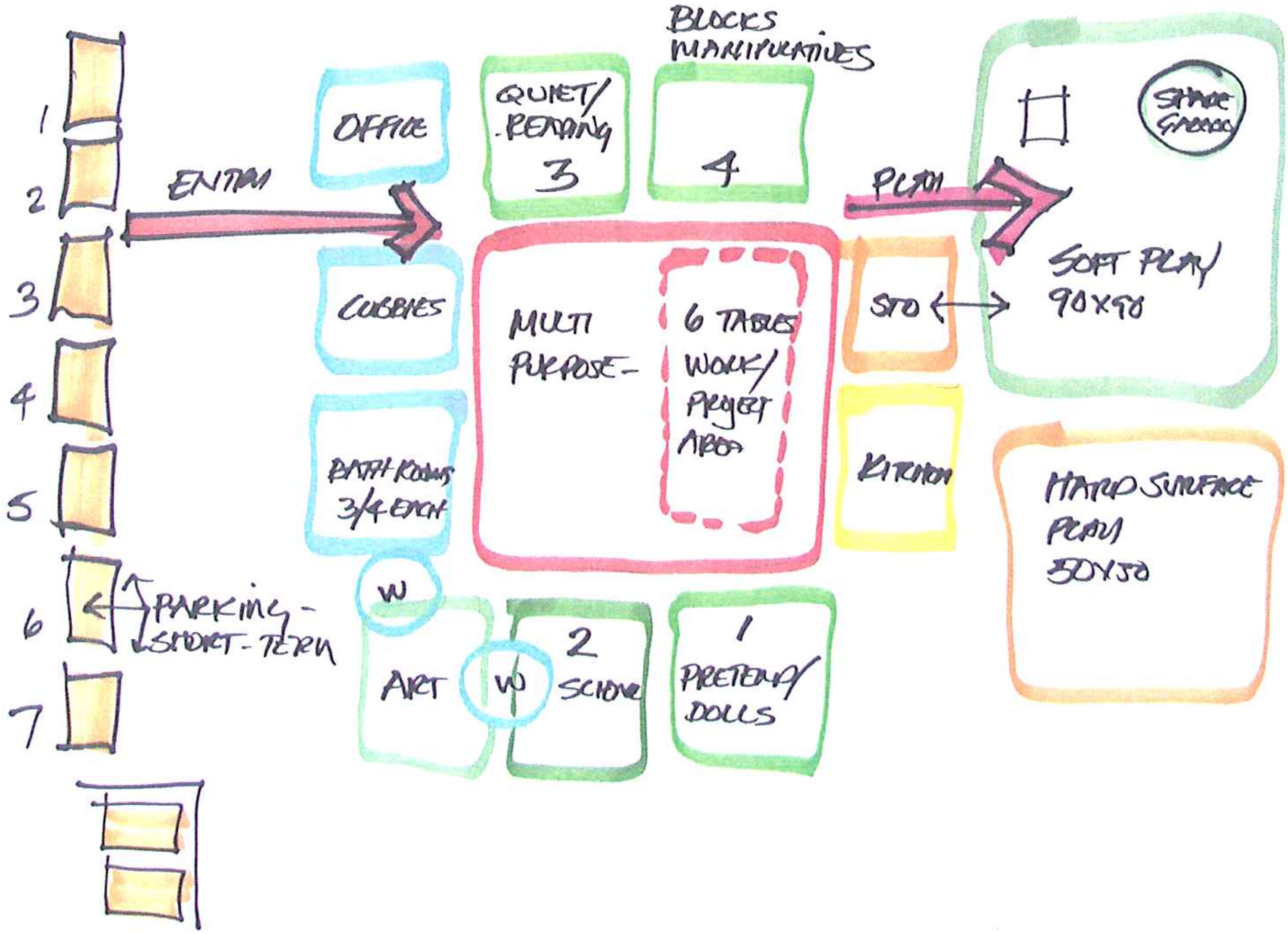
4. Outside Play
   - Visible from classroom for supervision **and separate from bigger kids play areas.**
   - Hard and soft play areas. Current areas: 90' x 90' soft, 40' x 40' hard. Need 50' x 50' hard minimum.
   - **Provide outdoor storage. Presently storage is 5 x 15, need 10 x 15. Currently vandalism is a problem. All equipment is locked up. New play area should be secure from theft, but also from strangers walking onto campus or into buildings.**
   - Hose bib for water play
   - Shaded area or lanai
   - Protection from the wind
   - Possible Dutch door to play ground area from classroom
   - **Toilet accessible from outside**
5. Pick-Up/ Drop-off
   - Pre-K needs a separate area
   - Parents are required to walk children to the classroom
   - 7+ short term waiting spaces required
   - Other visitor parking 7 +/- spaces required
6. Departments/ Curriculum
   - Art
   - Science
   - Social Studies
   - Reading Readiness
   - Math
   - Music
   - PE

7. Provide an office/conference room of approximately 150 SF for a teachers work area and joint conference space. **Director also requires an office of approximately 150 square feet.**

8. Valerie's observation: The children are orderly and quite independent. They have learned the schedule of the day well. 4 teachers have very good control of their "flock". The children are 3 and 4 y.o, turning 5 later in year. Class rotations are age based. Parents of each child provide lunches. Teachers work extremely hard moving, storing and arranging and maintaining furniture, equipment, toys, and learning tools and manipulatives on a daily basis. Weekly the space is further cleared and readied for the church community services.

PRE-K

- STAY AT MAX 48 (4X12)
- BIG OPEN SPACE
- LARGER OUT DOOR PLAY AREA
- DESIGN TO ACCOMODATE OUR PROGRA



Meeting Notes

DATE: 3 August 2005

PROJECT: ELC Interview with Kindergarten, 1st and 2nd Grade Teachers

PROJECT NO: 2514

PRESENT:

PRESENT:	Andrea Kaio	Kindergarten
	Amy Schafer	1st Grade
	Diane Wilson	2nd Grade

DISTRIBUTION: Zach Brewer, Rev. Milton Fricke, Richard Sudheimer, David Soleau, and Valerie Curtis

1. Room Configuration/ Finishes/Equipment
   - Toilets and sinks in all rooms K-2
   - Automatic sinks for water savings
   - Lockers larger in rooms (i.e. cubbies to hold backpacks)
   - More electrical outlets
   - Windows with screens not jalousie windows
   - Air conditioning- dust a big issue
   - Tile by the sink, majority of room carpeted
   - Shared storage room for K-2 classrooms
   - Internet connections in rooms
   - White boards 4'x8' minimum
   - Tack boards 4'x8' minimum area
   - Window darkening capability
   - TVs on carts Ok
   - TVs vs. digital projectors to be considered
   - Phones in each classroom
   - More counter space
   - More book shelving and cabinet storage
   - Teacher in room area with computer so that an aid can do work in the room
   - Substantially more storage
   - Screens and room maps
   - Sleeping mat storage
   - Divided project areas
   - Room interconnectivity not a high priority

2. Other School Components:
   - Preschool integrated, not separated, from the school
   - School cafeteria is important
   - K-2 classrooms close to school entry and administration

3. After School Care:
   - Have separate space
   - School-day runs from 8 AM- 2:45PM (1:45 on Wednesday) After-school classes go until 5:30 PM.
   - Approximately 25% of enrollment in aftercare with only a few middle school students
   - Used both before and after school
   - Current license for 40 K-8, soon to be increased to 60.

FAI RAID:FAI Projects:2005 Projects:2514.00 Emmanuel Lutheran:03 MEETING NOTES:Mtg Nts ELC 8.3.05 K,1,2.doc

Meeting Notes

DATE:	3 August 2005
PROJECT:	ELC Interview with 3rd, 4th, and 5th Grade Teachers
PROJECT NO:	2514
PRESENT:	Angela Brewer — 3rd Grade Gail Orde — 4th Grade Mary Reppun — 5th Grade Zach Brewer — Principal David Soleau — FAI
DISTRIBUTION:	Zach Brewer, Rev. Milton Fricke, Richard Sudheimer, David Soleau, and Valerie Curtis

1. Room Configuration/ Finishes/ Equipment
   - No louvered windows
   - Better room security (open window gives access to door handle)
   - More electrical outlets- currently fuses are blown
   - Ceiling fans in all classrooms
   - Tile at sinks
   - Water coolers not just bubblers
   - Map and flat file storage
   - Carpet in classrooms vs. tile no consensus
   - Class size adequate
   - Central air not individual AC units which cool room unevenly
   - TVs mounted on walls
   - Sinks in classrooms
   - Bathrooms in classrooms preferable
   - Lockers in rooms preferable
   - White boards and tack boards 4' x 10' each minimum
   - Lots of storage
   - Ability to darken the room
   - Dust is a big problem

2. Other School Components
   - Teacher work room requires expansion
   - Provide 3 flagpoles; American, State, and Christian Flag
   - Exterior security at night should be addressed by adequate exterior lighting
   - Central storage area is needed for curriculum and equipment storage
   - Current room size: 31'9" x 24'6" = 777 net sq ft
   - Proximity to K-2 rooms preferable to middle school- middle school location should be separate area/ not commingled with Upper Elementary

FLANSBURGH ASSOCIATES

Meeting Notes

DATE: 3 August 2005

PROJECT: ELC Interviews with 6th, 7th and 8th Grade Teachers

PROJECT NO: 2514

PRESENT:

Heather Mockler	6th grade
Melissa Cattau	7th grade
Dr. Orley Anderson	8th grade
David Soleau	FAI

DISTRIBUTION: Zach Brewer, Rev. Milton Fricke, Richard Sudheimer, David Soleau, and Valerie Curtis

1. Room configuration/ Finishes/ Equipment
   - 4-6 computers in each room desired
   - White board and more tack boards- perhaps ceiling to floor tack space
   - Natural light
   - Not carpet but tile
   - Provide a separate teachers' office space with visual access to room
   - Sinks in all classrooms
   - Bathrooms down the hall ok, but not too far; preferable to have a bathroom with each pod or module
   - Movable walls and connectivity between class rooms not particularly desired
   - Phone systems
   - Internet Connectivity

2. Other School Components
   - Cafeteria/ Dining needed with possible use of outdoor dining under a lanai or in the multipurpose building
   - Faculty work and lounge should have a small shower/s for faculty
   - Access to private phone for outside calls
   - Separate Pick-up/Drop-off areas ideally for Pre-K, K-5, and Middle School

3. Athletics

   -Sports to Plan For:
   - Hard Surface Play- Outdoor Basketball
   - Baseball field
   - Soccer fields- 2; one for middle school, smaller field for 3-5 grades
   - Possibly a track
   - Separate play areas for Pre-K/ K-2/ 3-5/ and middle school

   -Bike Racks: Presently no need, few children now ride to school, but this could change
   -Gym: Should accommodate a full sized high school basketball court
   -Volleyball: 2 cross courts should be planned for the gym
   -Movable Bleachers

FAI RAID:FAI Projects:2005 Projects:2514.00 Emmanuel Lutheran:03 MEETING NOTES:Mtg Nts ELC 8.3.05 6,7,8.doc

Meeting Notes

DATE: 4 August 2005

PROJECT: ELC Art

PROJECT NO: 2514

PRESENT:

	Heather Mockler:	Art/6th grade
	Alice Gau	Art/Music
	Art Gau	Art/Music
	David Soleau	FAI

DISTRIBUTION: Zach Brewer, Rev. Milton Fricke, Richard Sudheimer, David Soleau, and Valerie Curtis

1. Art taught in all classrooms without a separate space.

2. Phase I requires a single art room 1000-1200 net sq ft.

3. Room configuration/Finishes/ Equipment:

    - 2 double sinks-one high, one low for K-3
    - Natural light/ North, no glare
    - Tile or sealed concrete floor
    - No ceramics- 2D art program with half tables, half easels in main floor space – no kiln
    - Possibility of moving outdoors to a lanai space is interesting
    - Storage required: flat storage 22" x 30". Double height storage, open shelving etc, drying rack
    - Walls of tack board and white boards

4. Adjacencies:

    - Art room should be next to the stage and the multipurpose area. Room would be used for set making. Sufficient storage for sets, costumes, tool storage required next to stage and art room.
    - Sculpture courtyard and possibly gallery area to be incorporated into plan- display of children's work to be at or near school entry. Possible gallery space or display area should be considered for the multipurpose room.

Meeting Notes

DATE: 4 August 2005

PROJECT: Music: Band/Choir: School and Church

PROJECT NO: 2514

PRESENT:

Judy Fricke	Music/ Pre-K
Andres Kaio	Music/Kindergarten
Jill Goldammer	Music/Computer
David Soleau	FAI

DISTRIBUTION: Zach Brewer, Rev. Milton Fricke, Richard Sudheimer, David Soleau, and Valerie Curtis

1. Music spaces required for Phase I would be as follows:
   - Choral/band room- possibly tiered for 40-50 students – (1500-2000 sq ft)
   - Ensemble Room for K-5 and ensemble groups (800-900 sf) i.e.: elementary music lab
   - Music office with storage
   - Practice room- 2 or 3 (6' x 8')
   - Gown storage room (church)
2. Band and Ensemble Room criteria:
   - Instrument storage along walls or in separate locked room
   - Tile on floor
   - 1.5 room height with good acoustics and natural and artificial light
   - Sink in office or band room
   - Possible moveable risers to be used also on stage
3. Music space to be adjacent to the stage ad multipurpose room

4. Consider an amphitheater for school and community concerts/ 300-400 people seated plus overflow

5. Amplification and sound system- capabilities for electrical keyboarding, etc.

6. Church Music Program:
   - Pipe organ
   - Choir location to be studied- alcove, loft, rear of naive- better se the choir at the front or side of the church vs. rear location
   - Projection of hymn words on screens or walls is critical
   -
7. Phase II Church Configuration
   - Seating: 450, larger groups or usage would require 2-3 services
   - Chancellery to be flexible, a stage with movable alter, baptismal font, lectern/pulpit, etc., 3 risers up, minimum vertical separation
   - Sacristy with connected bathrooms/ robe storage and kitchen support

Meeting Notes

DATE:	4 August 2005
PROJECT:	ELC- Technology/Computer Lab
PROJECT NO:	2514
PRESENT:	Jill Goldammer — Computer Rev. Milton Fricke — Pastor David Soleau — FAI
DISTRIBUTION:	Zach Brewer, Rev. Milton Fricke, Richard Sudheimer, David Soleau, and Valerie Curtis

1. Current Computer Class Schedule:
   K-3 1 time/week
   4- 8 2 times/week
   Note: Some larger classes have 2 computer sessions due to class size and computer availability.

2. Current Equipment:
   12 PCs
   6 Macs
   2 Printers

3. Plan for: 25 computers, 2-3 printers

4. Additional Space Required:
   Technology Office/ Work Room
   Multi- media storage room
   Software Storage
   Possible graphics/multimedia lab with video production capability

5. Curriculum: keyboarding, spread sheets, internet, word processing, desk top publishing, etc.

6. Computer lab arrangement should have all computers facing one way for screen viewing with a single aisle down center or in rows. Teacher desk in rear with a screen and digital projector capabilities; DVD player.

7. Classrooms hard wired with future wireless Internet capacity. Internet throughout the school.

8. Computer lab and media center to be adjacent with visual connection.

9. Room size is currently 532 net sq. ft. 1000-1200 sq ft is required for 25 students and 1 teacher.

10. Reduce glare with indirect light and window placement. Light control is important.

11. White boards and a smart board are required.

12. An additional lab will be needed for school to double in size. To be planned for in phased growth.

13. Tile floor required.

FAI RAID:FAI Projects:2005 Projects:2514.00 Emmanuel Lutheran:03 MEETING NOTES:ELCMtg Notes 8.4.05 Tech.doc

FLANSBURGH ASSOCIATES

Meeting Notes

DATE:	4 August 2005
PROJECT:	ELC- Consultant Meeting
PROJECT NO:	2514.00

PRESENT:	Stacy Otomo	Otomo Engineering, Inc.
	Robb Cole	Chris Hart & Partners, Inc.
	Chris Hart	Chris Hart & Partners, Inc.
	Phillip Rowell	Traffic Consultant (by phone)
	Gary Zakian	ELC
	Richard Sudheimer	ELC
	David Soleau	FAI

DISTRIBUTION: All present, Pastor Milton Fricke, Valerie Curtis

1. The purpose of the meeting was to discuss the land use master plan, easements, and steps required to change the current site from agricultural zoning to an urban land use.

2. Approvals will involve the city council approving the change from agricultural to quasi-public zoning. State approval will additionally be required.

3. Schedule:
   3-4 months- preparation of application on filing
   12-18 months- review public hearings and approval

4. Traffic Issues:
   Phil Rowell currently doing traffic counts. This information is to be available by September 1, 2005. Access to site from Honoapiilani Highway possibly allowed with deceleration and acceleration lanes heading towards Wailuku. Major access in and out from the site will be from Waiale Road.

5. Additional information to be provided by ELC includes the following:
   - Average estimates of school attendance
   - Average estimates of church attendants
   - Evening Use Vehicular estimates

6. Sewer/ Easement runs to the North of the property. Project should be designed for gravity feed.

7. Water:
   - Domestic Water to be brought to site by new line.
   - Accessible agricultural water easement to the south to be investigated for irrigation

- Sprinklers may well be required for portions of the buildings. A water pump or significant pressure must be obtained.
- Storm water to be dealt with on site. Holding basin or the possibility of draining into the storm water right of way to be investigated.

8. Archeological Issues:
   An archeological study has been done stating the site is archeologically insignificant. This report should be sent to the state.

9. Environmental Issues:
   No environmental assessment will be needed.

10. Approval process:
    Hearings required:
    1. Land Use Committee (State)
    2. Maui County Planning Commission (County)
    3. City Council Vote after Mayor's recommendation. The entire package will go to the council for a hearing and then will be adopted by ordinance.

11. Planning and Zoning Issues:
    Chris Hart will send requirements for P and Z issues to FAI. Height restrictions appear to be two stories with a roof pitch (Up to 35 ft max). FAI to investigate with provided information.

12. Next Steps:
    - Team conference call scheduled for 25 August 2005 at 10 AM Maui time. (Chris Hart's Office with FAI). C. Hart to distribute conference call agenda. The meeting will be held to assess progress and plan an informal September Meeting with the county to present the project.
    - FAI will require a location map showing the site and adjacent parcels.
    - Format decision on site plan scale, orientation, title block, for ELC to be resolved for future presentations.
    - Project directory to be developed by FAI and submitted to attendees as a draft for final comments.

VISION / GOALS

- 6 | 1 | PROMOTE THE MISSION
- 4 | 2 | IMPROVE QUALITY OF FACILITY AND EDUCATION
- 4 | 2 | GROWTH OF SCHOOL & CONGREGATION
- 4 | 2 | INCREASE COMMUNITY INVOLVEMENT
- 3 | PROMINENCE / VISIBILITY OF THE CHURCH
- 6 | AWSOME / TRADITIONAL / CONSERVATIVE, (PLANTATION STYLE?) AESTHETICS
- 4 | CHURCH AS A FOCAL POINT
- IMPROVED PROXIMITY
- 5 | 'WITHIN OUR MEANS'
- 2A | INCREASED CONGREGATIONAL INVOLVEMENT
- SUSTAINABILITY - W SHORT PAYBACK.

CHALLENGES

7 1 FUNDRAISING

1 3 SELLING THE CURRENT PROPERTY & ZONE CHANGE

3 2 GRANT SUCCESS

1 4 OBTAIN REQUIRED PERMITS

6 MOVE/CHANGE & TRANSITION

3A PR & PLANNING TRANSPARENCY

2 2 PROJECT FINANCING

5 SITE OPTION AGREEMENT

7 TIMELINESS

6 1A UNIFIED VISION-CONSENSUS.

Project Team Directory

Project: Emmanuel Lutheran Church & School
FAI Project Number: 2514.00
2005

ARCHITECT/ENGINEERS/SPECIALTY CONSULTANTS

Flansburgh Associates, Inc.
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David Soleau, Principal-in-Charge
Valerie M. Curtis, Project Manager

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(617) 720-7873 fax

dsoleau@faiarchitects.com
vcurtis@faiarchitects.com

LANDSCAPE ARCHITECS, LAND USE PLANNING

Chris Hart & Partners, Inc.
1955 Main Street
Wailuku, Maui, Hawaii 96793-1706
Chris Hart, Principal in Charge
Robb Cole, Project Manager

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(808) 242-1956 fax

mailto:rcole@chpmaui.com

CIVIL ENGINEER

Otomo Engineering, Inc.
305 S. High Street, Suite 102
Wailuku, Maui, Hawaii 96793-1706
Stacy Otomo, P.E.

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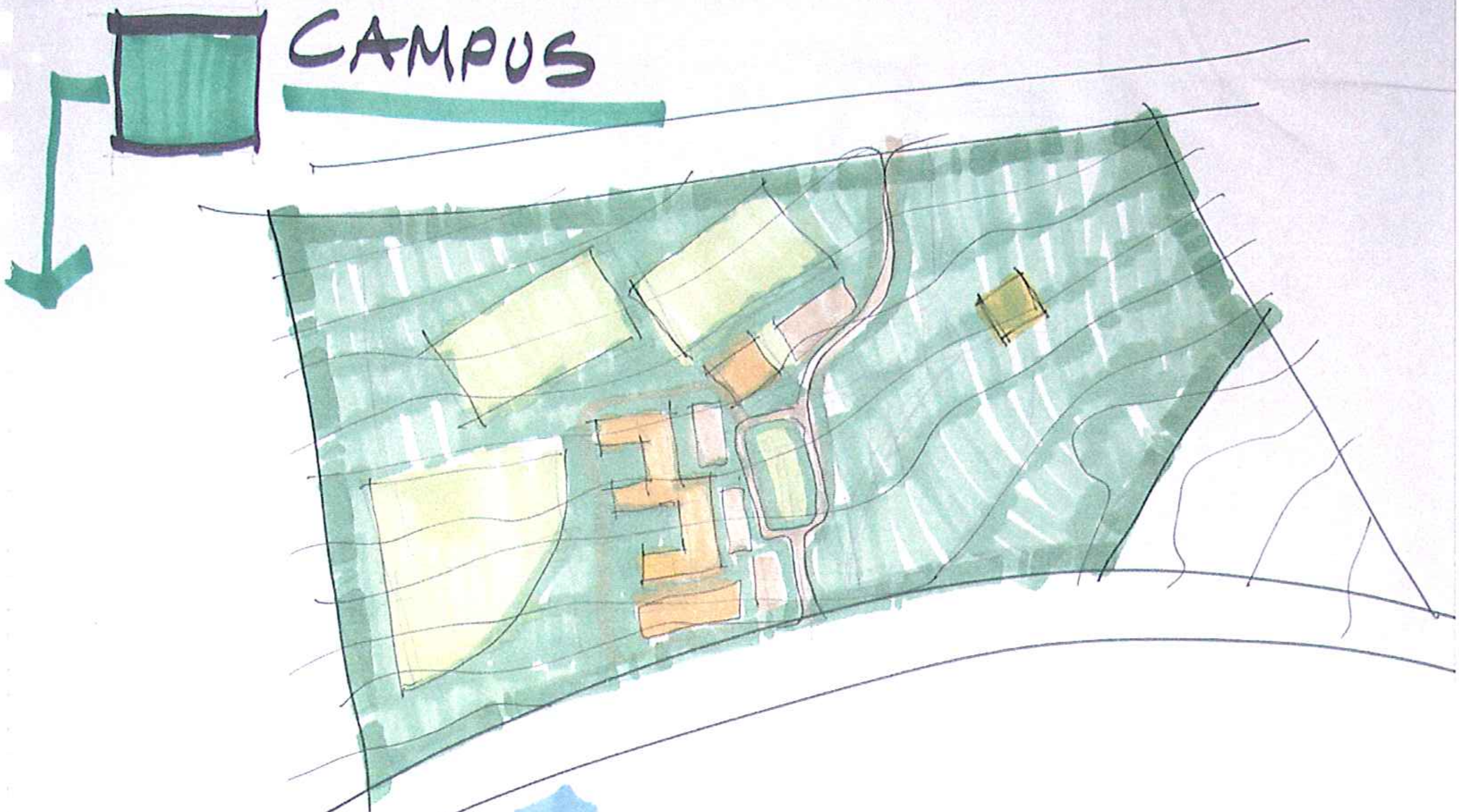
(808) 242-5779 fax

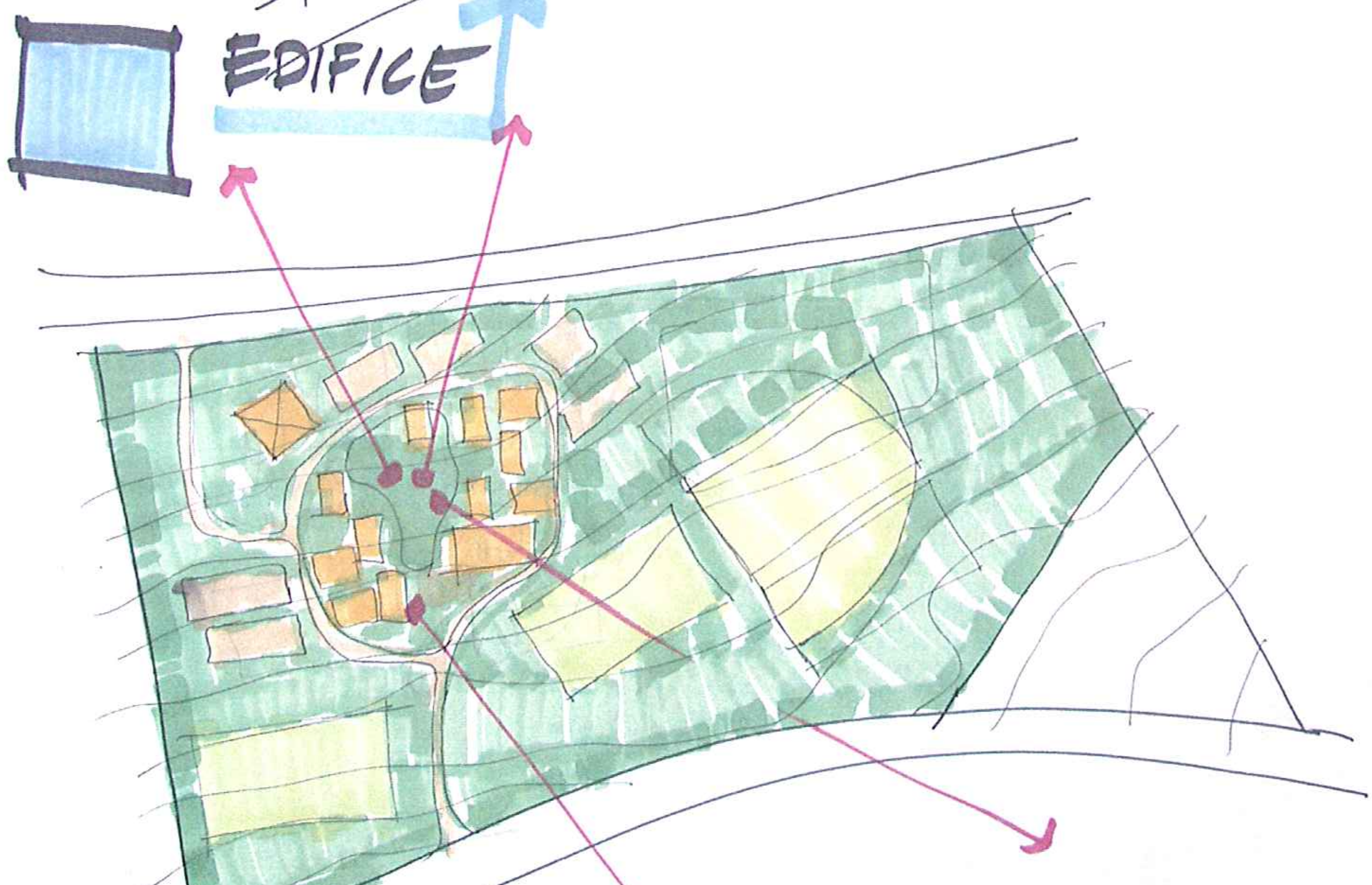
stacy@otomoengineering.com

TRAFFIC ENGINEER

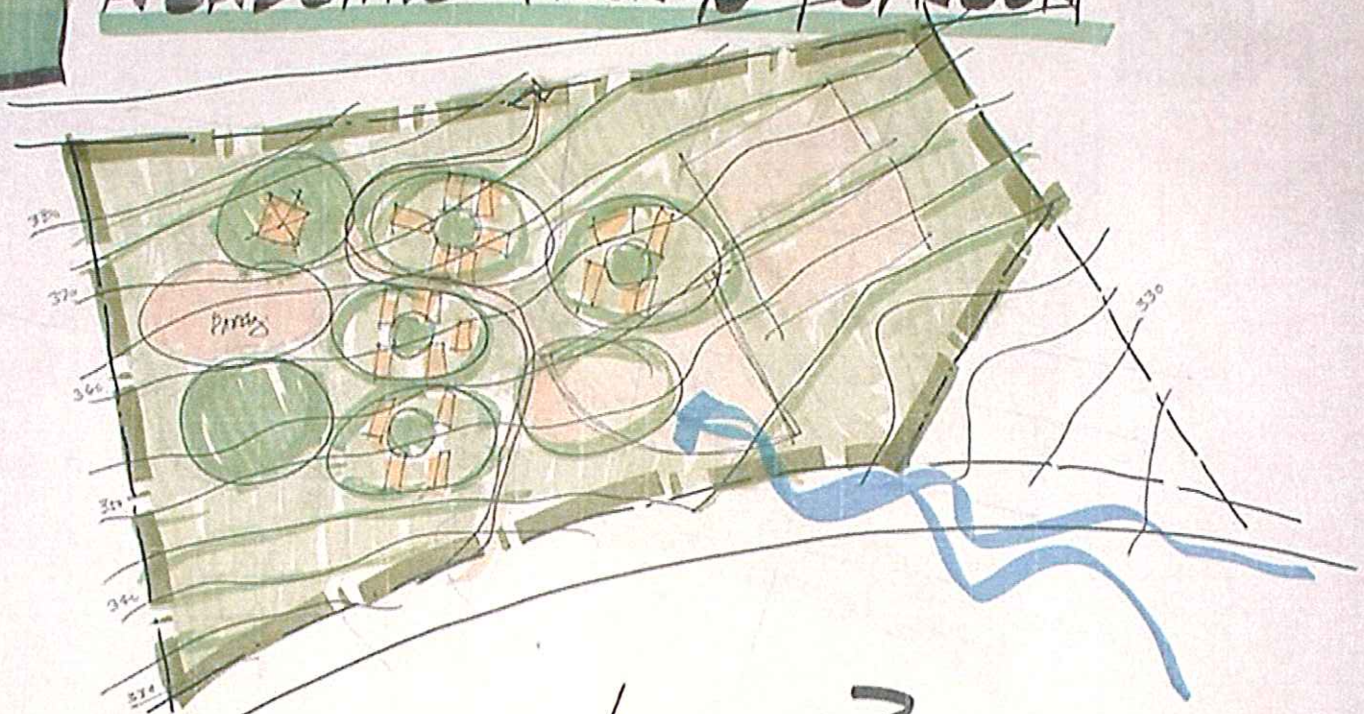
Phil Rowell
42-273 "D" Huilwa Street
Kaneohe, HI 96744

(808) 239-8206 tel
(808) 239-4173 fax
mailto:prowell@gte.net

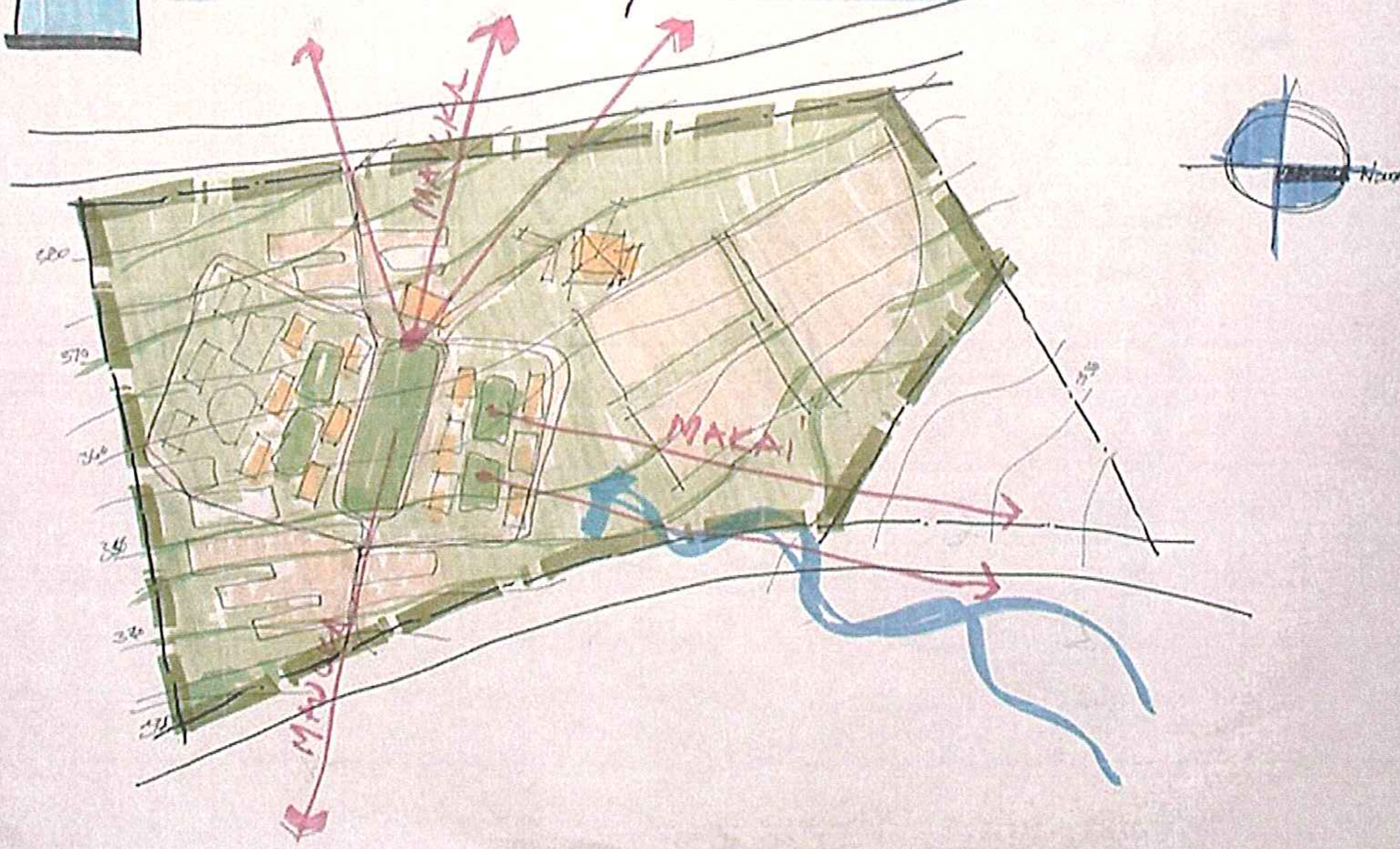

CAMPUS


EDIFICE

ACADEMIC VILLAGE / GREEN



BEAUX-ARTS / GREEN?



An efficient "campus scheme" is created by providing four main buildings: a classroom building, multi-purpose complex, Pre-school and Sanctuary. Entering the campus from Waiale Road, to the left is parking for 120 cars and storm drainage retention ponds. To the right is the classroom building with three distinct wings for K – 2 , 3 – 5, and 6 – 8 grades. Adjacent to the classroom building is the multi-purpose complex. Athletic fields, hardscaped play areas and basketball courts are readily accessible from the classrooms and the Multi-purpose building. The preschool building is separate from the other classrooms and includes its own parking, and outdoor hard and soft play areas. The Sanctuary, at the core of the scheme, is at the high point of the site. Plenty of open space surrounds the sanctuary maintaining mountain and ocean views. This option is quite compact and uses the least area on the 25-acre site.

OPTION A

EMMANUEL LUTHERAN CHURCH + SCHOOL

This Beaux-arts/Village Green Scheme organizes the 25-acre site into an elegant campus. Set around a large oval, open green space, the sanctuary sits at the site highest point and on axis with the campus entrance road and views to the ocean. On the left are twelve of the eighteen classrooms, all single-story and clustered around landscaped courtyards. Next to the twelve K – 5 classrooms, the multi-purpose complex is a central element in the campus organization, close to multiple playfields and parking. This option offers separate buildings for administration and specialty classrooms and the library, both buildings have frontage on the green. The pre-school is next to the sanctuary and close to the multipurpose complex for ease of access for the youngest children. Middle school classrooms are single stoy and clustered around a courtyard also on the green. Option B develops a little more than half of the 25-acre site and supports magnificent views of the ocean and mountains.

OPTION B

EMMANUEL LUTHERAN CHURCH + SCHOOL

0 60 120

N

This option spreads the campus luxuriously over three-quarters of the 25-acre site. The Sanctuary is separate from the school, multi-purpose and athletic facilities, making it a quite and contemplative zone within the plan. The rest of the campus buildings are situated in the most gently sloping area, with landscaped parking areas convenient to both sanctuary and school campus. The multi-purpose building in this option is actually part of and at the center of the classroom building complex. The preschool and administration are in separate stand-alone buildings close to parking and furthest away from the athletic fields at the north end of the site. Because of it low-density and sprawling nature, this option protects open views to the mountains and the ocean all around.

OPTION C

EMMANUEL LUTHERAN CHURCH + SCHOOL

0 60 120 N

ARCHAEOLOGICAL SERVICES HAWAII, LLC.,
16 S. Market St. Ste. G; Wailuku, HI; 96793
Ph.808-244-2012; Fx. 808-244-9592

11 May 04

Mr. Richard Sudheimer
Mr. Dick Drayson
Mr. Nathan Kwee
C/o Mr. Tom Leuteneker
Carlsmith Ball LLP
One Main Plaza Ste 400
Wailuku, Hi 96793

Subject: Post Field Summary Letter During Due Diligence at Wailuku Agribusiness, TMK 3-5-02: 01 pors.

Dear Sirs:

Per your request, Archaeological Services Hawaii, LLC., conducted a pedestrian survey with subsurface backhoe testing within 50 acres at the above referenced project area (Figure 1). The work was performed from 5-7 May 04 by Mr. Paul Titchenal (M.A.), and supervisor Ms. Diane Guerriero (B.A.), under the overall direction of Ms. Lisa Rotunno-Hazuka (B.A.) and Mr. Jeffrey Pantaleo (M.A.). A total of 25 backhoe trenches were selectively placed in areas that contained no active farming. No subsurface cultural remains were recovered in any of the trenches, however one surface site, the Kama Ditch, was identified. The ditch is from the historic period sugar cane era and consists of a concrete line ditch that is oriented north-south.

The project area is located between Honoapiilani Highway and Waiale Road within a highly sensitive area for traditional Native Hawaiian sites. The Wailale/Lower Main corridor from Kahului Harbor to Waiko Road, has contained numerous sand dune burials, habitation layers as well as some clay pit burials. Thus, the parcels within the project area had the potential to contain significant subsurface sites; unfortunately the project area has been heavily impacted by compounded surface disturbances from sugar cane, sand mining and farming tenements, and as such, contains little of its original landscape. Due to these compounded disturbances, the likelihood of recovering intact pre-Contact deposits was minimal.

Details of the parcels conditions, the findings of the archaeological investigation, and recommendations are presented below.

Project Area

The project area consists of two adjoining 25-acre parcels within a portion of Wailuku Agribusiness landholdings at TMK 3-5-02: 01 pors in Wailuku *ahupua'a* and District, in the isthmus of Maui. The parcels are bounded by Honoapiilani Highway to the northwest, Waiale Road to the southeast and the proposed retention basin along Kuikahi Avenue to the north. A sewer easement and the Kama ditch run north-south within the central portions of the project area (See Figure 1). The parcel closest to the northern boundary is owned by Emmanuel Lutheran Church and contains numerous individual farm plots with bananas, papayas and sweet potatoes. The southern parcel owned by Valley Isle Fellowship consists of bananas, sweet potatoes, and fallow sugar cane and a sod farm. Both parcels have undergone substantial surface disturbances, where most of the sand dune has been removed. An elongate portion (approximately one-third of the project area) between the sewer line easement and the Kama ditch consisted of a thick deposit of alluvial sand (highlighted in yellow). The remaining two-thirds of the parcel contained a cobbly, silt along Honoapiilani Highway, and a silty sand along Waiale Road. Again, all areas were tested by backhoe trenching, were no subsurface cultural deposits were identified.

Results

A total of 25 backhoe test trenches were executed within the two parcels in areas that would not disrupt active farming (See attached Table 1). Trenches 1-6, 15,16 and 23-25 were excavated within the northern parcel, and trenches 7-14 and, 17 –22 were excavated within the southern parcel. Trenching was not conducted within the extreme central portion of the project area, due to dense active farming.

The trenches were oriented either north-south or east-west and averaged 6.0 meters in length by 2.0 meters in depth. No subsurface cultural deposits or features were identified within the trenches. In general, a three layer stratigraphic sequence was identified within the trenches, where Layer I was usually disturbed at least 2.0 ft. below the surface.

The pedestrian survey, coupled with the test excavations results, exemplified that the project area has been severely altered in historic times.

Discussion

The project area, located within the isthmus of Maui, would have contained high knolls and ridges and undulating inland sand dunes in the past. Traditionally, Native Hawaiian habitation sites and burial grounds have been documented within this type of landscape. The project area, though located within the isthmus, has undergone a substantial amount of clearing, grubbing and grading, resulting in the removal of the former sand dune ridge system (recall sand was present at the surface in the elongate portion and continues to a depth of 9.0 ft. below the surface). Due to these disturbances, the potential for identifying subsurface features consisting of burials has been reduced.

Recommendation

For the project area, no further archaeological testing is warranted, however archaeological monitoring is recommended during all construction related activities. Archaeological monitoring is the standard protocol in areas with the potential for subsurface sites (even though the probability of subsurface features has been reduced, the potential does exist). Monitoring is currently being conducted within adjoining parcels to the project area (Wailuku Agribusiness, Kehalani off sites, Hawaiian Cement, Waiko Baseyard LLC, Consolidated Baseyard LLC, Ameron and Maui Lani).

The testing conducted to date is intended to fulfill the requirements for an Inventory Survey under the guidelines set forth in Chapter 13-276, Hawaii Administrative Rules, Rules Governing Standards for Inventory Surveys and Reports. The testing and other pertinent data will be presented in an Inventory Survey report which will be submitted to the State Historic Preservation Division (SHPD) for their review.

Thank you very much for giving ASH the opportunity to conduct work in this area, if you should have any questions and or comments, please do not hesitate to call me. The Inventory Survey Report shall be submitted within 60 days to SHPD.

Respectfully,

Lisa Rotunno-Hazuka
Consulting Archaeologist

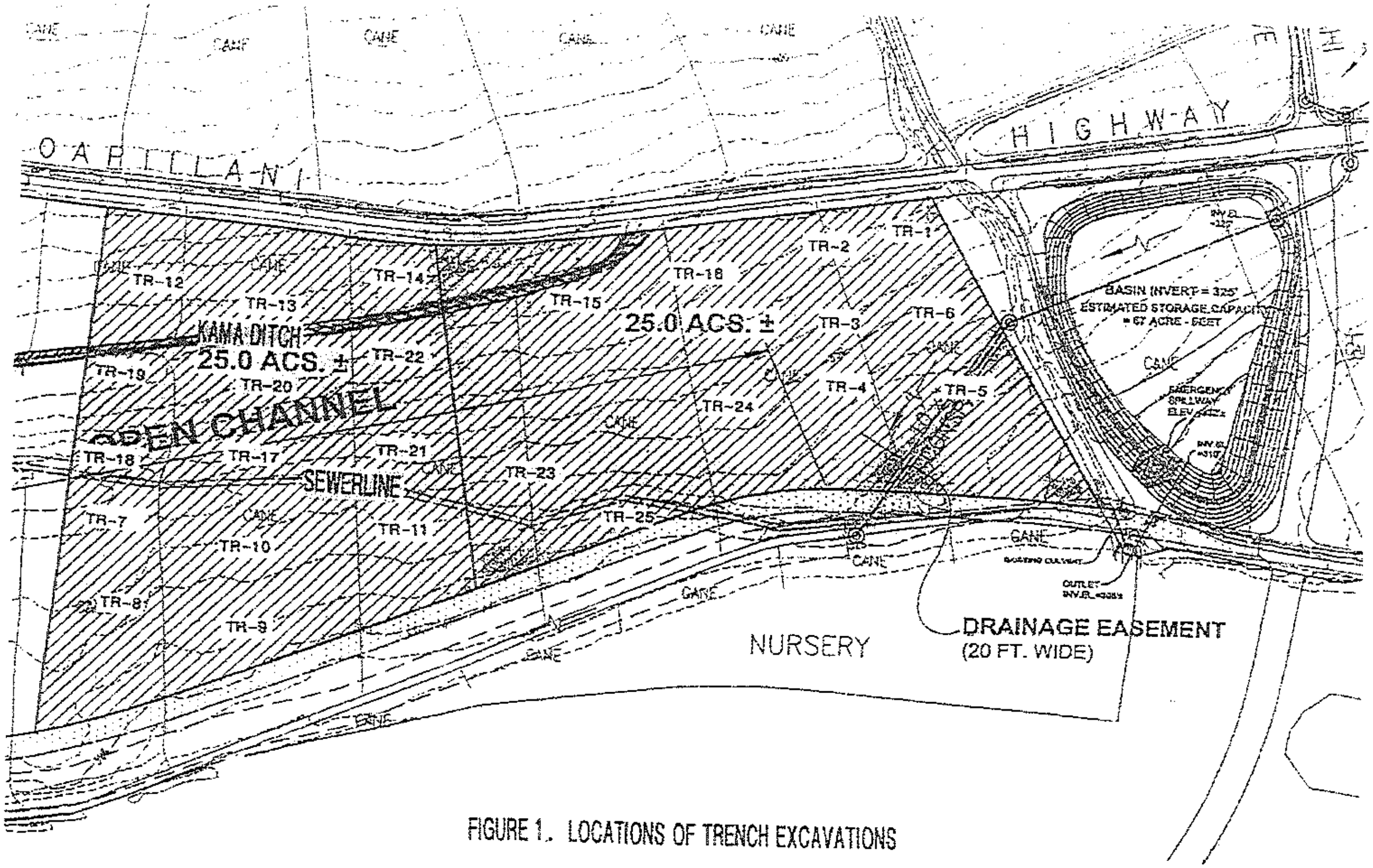


FIGURE 1. LOCATIONS OF TRENCH EXCAVATIONS

STRATIGRAPHIC SUMMARY TABLE

TRENCH (TR)	LOCATION	ORIENT.	DIMENSION	STRATIGRAPHY	COMMENTS
1	Located in the extreme northwest portion of project area. East of Honoapiilani Highway	80 / 260 Az	6.6 m (L) x .80 cm (W) x 1.5 m (H)	Layer I - Fine, Silt, Dark Brown, (10YR3/3), agricultural layer. Layer II - Very Fine Silt, Dark Grayish Brown (10YR 3/2). Layer III - Fine, Silt, Dark Grayish Brown (10YR 3/2), colluvial deposited with water affected pebbles, cobbles and small boulders	Previous surface disturbance with past and present agriculture farming. Level surface area North Profile. No cultural remains identified
2	South of TR 1. East of Honoapiilani Highway	90 / 270 Az	7 m (L) x .80 m (W) x1.5 m (H)	Layer I - Fine, Silt, Dark Brown, (10YR3/3); agricultural layer. Layer II - Very Fine, Silt; Dark Grayish Brown (10YR 3/2) with gravel inclusions. Layer III - Fine, Silt; Dark Grayish Brwn (10YR 3/2), colluvial deposit with water affected pebbles and cobbles.	Previous surface disturbance with past and present agriculture farming. On level surface area East Profile. No cultural remains identified
3	Southeast of TR 2 and TR 1. East of Honoapiilani Highway.	70 / 250 Az.	5 m (L) x .80m (W) x 1.4 m (H)	Layer I - Fine, Silt, Dark Brown, (10YR3/3), agricultural layer. Layer II - Very Fine, Silt, Dark Grayish Brown (10YR 3/2); Layer III - Fine, Silt; Dark Grayish Brown (10YR 3/2); gravelly	Previous surface disturbance with past and present agriculture farming. On slight slope towards east. North Profile. No cultural remains identified.
4	East of TR 3. East of Honoapiilani Highway and west of existing sugar cane hauling road	80 / 260 Az	6.2 m (L) x .80 m (W) x 1.3 - 1.6 m (H)	Layer I - Fine, Silt; with sand inclusions, Dark Brown to Dark Yellowish Brown (10YR 3/3-3/4); agricultural layer. Layer II - Fine, Silt; Dark Brown (10YR 3/3).	Previous surface disturbance with past and present agriculture farming. On level surface area South Profile. No cultural remains identified
5	Located in the extreme northeast portion of the project area. North of TR 4 and east of TR-6	70 / 250 Az	6 m (L) x .80 m (W) x 1.5 m (H)	Same as TR-4 without sand inclusions identified in TR 4 Layer I	Previous surface disturbance with past and present agriculture farming. On level surface area North Profile. No cultural remains identified
6	Located along the northern project area boundary, west of TR-5 and east of TR-1	90 / 270 Az.	4.8 m (L) x .80 cm (W) x 1.6 (H)	Same as TR-3	Previous surface disturbance with past and present agriculture farming. On slight slope towards east. South Profile. No cultural remains identified. No cultural remains identified
7	Located in the extreme southern portion of project area. East of Honoapiilani Highway and adjacent to east of the existing sewerline easement.	100 / 280 Az	5.5 m (L) x .80 cm (W) x 1.4 (H)	Layer I - Fine, Silt; with sand inclusions, Dark Brown to Dark Yellowish Brown (10YR 3/3-3/4); agricultural layer. Layer II - Fine, Silt, with sand and gravel inclusion, river bed inclusions noted in North and South Profiles, Dark Brown (10YR 3/3). Layer III - Fine Silt; Dark Brown to Dark Yellowish Brown (10YR 3/3 - 3/4).	Previous surface disturbance with past sand mining activities and agriculture farming. Historic debris noted within area. Level surface area South Profile. No cultural remains identified
8	Located in the extreme southeastern portion of project area East of Honoapiilani Highway and TR-7	60 / 240 AZ	5.5 m (L) x .80 cm (W) x 1.5 m (H)	Layer I - Fine, Silt; with sand inclusions, Dark Brown to Dark Yellowish Brown (10YR 3/3-3/4), agricultural layer. Layer II - Fine, Silt; Dark Brown (10YR 3/3). Layer III same as Layer II with many water affected and sub-angular cobbles and pebbles	Level ground surface. North Profile. No cultural remains identified
9	North of TR 8 and west of sugar cane hauling road	90 / 270 Az.	6 m (L) x .80 cm (W) x 1.5 m (H)	Layer I - mottled Silt; with sand inclusions, Brown (7.5 5/2); agricultural layer. Layer II - remnant Aeolian Sand, (10YR 5/4), Yellowish Brown. Layer II / III - Transitional Layer, Sandy Silt; Brown (10YR 5/3). Layer III - Silt, Dark Brown (10YR 3/3	Level ground surface in open fallow field of sweet potatoes. South Profile. No cultural remains identified
10	West of TR 9. Adjacent to, east of the existing sewerline easement	180 / 360 Az	6 m (L) x .80cm (W) x 1.5 m (H)	Layer I - Mottled Silty Sand, Very Dark Grayish Brown; (10YR 3/2) with charcoal flecks. Layer II - Sand Silt, Brown to Dark Brown (10YR 5/3-4/3). Layer III - Aeolian Sand/Silt Vry Drk Graysh Brwn (10YR 3/2); Layer IV - Very Fine Grain Sand Pale Brwn (10YR 6/3), Layer V - BOE- Coarse Sand Light Brwn Gray(10YR 6/2).	Previous surface disturbance with past and present agriculture farming. West Profile. No cultural remains identified
11	East of TR 10. Adjacent to, east of the existing sewerline easement	180 / 360 Az	6 m (L) x .80cm (W) x 1.5 (H)	Layer I - Silty Loam; Very Dark Grayish Brown (10YR 3/2), Layer II - Silt, Dark Brown (10YR 3/3), Layer III - Silt; Dark Brown (10YR 3/3)	Previous surface disturbance with past and present agriculture farming. Level ground surface area. South Profile. No cultural remains identified

STRATIGRAPHIC SUMMARY TABLE

TRENCH (TR)	LOCATION	ORIENT.	DIMENSION	STRATIGRAPHY	COMMENTS
12	Located in the extreme southeast portion of project area. Adjacent to east of, Honapiilani Highway	110 / 290 Az	8 m (L) x 80cm (W) x 1.8 (H)	Layer I - Silty Loam, Very Dark Grayish Brown (10YR 3/2); Layer II - Silt, Dark Brown, (10YR 3/3), Layer III - Silt, Dark Brown (10YR 3/3), with many water affected basalt cobbles and pebbles	Level ground surface area on upper slope. North. Previous surface disturbance with past agricultural farming. North Profile. No cultural remains identified
13	North of TR 12. Adjacent to; east of Honoapiilani Highway	100 / 280 Az	5.5 m (L) x 80 cm (W) x 1.8 (H)	Same as TR - 12	Level ground surface area on upper slope. North. Previous surface disturbance with past agricultural farming. East Profile. No cultural remains identified
14	North of TR 13. Adjacent to east of, Honoapiilani Highway	100 / 280 Az	5 m (L) x 80 cm (W) x 1.7 m (H)	Same as TR - 12, and 13	Level ground surface area on upper slope. North. Previous surface disturbance with past agricultural farming. North Profile. No cultural remains identified.
15	North of TR 14. Adjacent to east of Honoapiilani Highway	100 / 280 Az	8 m (L) x 80cm (W) x 2 m (H)	Same as TR - 12, 13, 14	Level ground surface area on upper slope. North. Previous surface disturbance with past agricultural farming. East Profile. No cultural remains identified
16	North of TR 15. Adjacent to east of, Honoapiilani Highway	180 / 360 Az.	5 m (L) x 80cm (W) x 1.8 m (H)	Same as TR - 12, 13, 14 and 15	Level ground surface area on upper slope. North. Previous surface disturbance with past agricultural farming. Profile. No cultural remains identified
17	West of TR 10. Adjacent to, west of, the sewerline easement and east Honoapiilani Highway	170 / 350 Az	6 m (L) x 80 cm (W) x 1.7 m (H)	Layer I - Silty Sand, Grayish Brown (10YR 3/4), Layer II - Aeolian Sand, Yellowish Brown (10YR 5/6); Layer III - Silt, Very Dark Brown	On slope surface area, below a field of agricultural farming of sweet potatoes. East Profile No cultural remains identified
18	South of TR 17 and east of TR 7. Adjacent to; east of, Honoapiilani Highway and the existing sewerline.	180 / 360 Az	5 m (L) x 80 m (W) x 1.8 m (H)	Same as TR - 17 with the exception of a disturbed sand layer below Layer I	On slope surface area. East Profile. No cultural remains identified
19	West of TR 18 and east of TR - 12. Adjacent to east of the Kama Ditch	180 / 360 Az	5 m (L) x 80cm (W) x 2.2 m (H)	Same as TR - 18	Level ground surface on farm access road along upper slope. East Profile. No cultural remains identified
20	North of TR 19. Adjacent to, east of the Kama Ditch	180 / 360 Az	5.8 m (L) x 80 cm (W) x 2.8 m (H)	Same as TR - 18 and 19	On slope surface area along upper slope. West Profile. No cultural remains identified
21	East of 22. Adjacent to, West of the sewerline easement	120 / 300 Az	5.5 m (L) x 1.6 m (W) x 2.5 m (H)	Same as TR - 18, 19 and 20	Level ground surface. West Profile. No cultural remains identified
22	West of TR 21. Adjacent to east of the Kama Ditch	90 / 270 Az.	6 m (L) x 80 cm (W) x 2.5 m (H)	Same as TR - 18 thru 21	Level ground surface. East Profile. No cultural remains identified
23	North of TR. 21. Adjacent to, west of the sewerline easement	90 / 270 Az	6.5 m (L) x 80 cm (W) x 3.5 m (H)	Same as TR - 18 thru 22	Level ground surface. East Profile. No cultural remains identified.
24	Northwest of TR 23. Placed in an open unplanted agricultural field. West of existing sewer line easement	180 / 360 Az	4 m (L) x 2 m (W) x 2 m (H)	Same as TR - 4 and 5	Level ground surface. West Profile. No cultural remains identified
25	East of TR 24. Adjacent to, east of existing sewerline easement. Placed in a fallow sweet potatoe field.	90 / 270 Az	4.8 m (L) x 1.2 m (W) x 1.9 m (H)	Same as TR - 4 and 5	Level ground surface. North / northwest Profile. No cultural remains identified

2010

Proposed Matrix for Emmanuel Church, Pre-school, and Elementary/Middle School

Event	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Sep → July Preschool/		40 7AM → 5PM	40	40	40	40 7:AM → 5PM	
Aug → May Day School		200 7:30AM → 3:30PM	200	200	200	200 7:30AM → 3:30PM	
Aug → May After School		60 3:30 → 5:30 PM	60	60	60	60 3:30 → 5:30PM	
Early Church Service	150 8 AM → 9:15 AM						
Sunday School	50-75 9:30 → 10:30 AM						
Late Church Service	75 10:45 → 12:00 AM						
Feb, Mar, Apr Lenten Service	~~6 → 8 PM~~			50 → 75 6 → 8 PM			
Dec Advent Service				50-75 6 → 8 PM			
Board Meetings					10 → 40 5 → 8 PM		
Maintenance							10 8AM-2 PM
On Demand Weddings							15 → 50 10AM → 7 PM
Other Education		40 7:30AM → 3:30 PM	40	4	40	40	
On Demand Church Events		15 7 → 9 PM		15 7 → 9PM		15 7 → 9PM	

2015

Proposed Matrix for Emmanuel Church, Pre-school, and Elementary/Middle School

Event	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Preschool/		~~80~~ 7AM → 5PM	~~80~~	~~80~~	~~80~~	~~80~~ 7:30AM → 5PM	
Day School		400 7:30AM → 3:30PM	~~400~~	~~400~~	400	400 7:30AM - 3:30PM	
After School		120 3:30 → 5:30PM	120	120	120	120 3:30 → 5:30PM	
Early Church Service	225 8 → 9:15AM	~~225~~					
Sunday School	75 → 90 9:30 → 10:30AM						
Late Church Service	110 10:45 → 11:45AM						
Feb, Mar, Apr Lenten Service				60 → 80 6 → 8PM			
Dec Advent Service				60 → 80 6 → 8PM			
Board Meetings					10 → 50 5 → 8PM		
Maintenance							12 8AM → 3PM
On Demand Weddings							10 → 60 10AM → 7PM
Other Education		40 7:30AM → 3:30PM	40	40	40	40 7:30AM-3:30PM	
Church Events		15 7 → 9PM		15 7 → 9PM		15 7 → 9PM	

Appendix B
Preliminary Drainage Report

PRELIMINARY DRAINAGE REPORT

FOR

EMMANUEL LUTHERAN CHURCH & SCHOOL

Waikapu, Wailuku, Maui, Hawaii

T.M.K.: (2) 3-5-002: Por. 001

Prepared for:

Emmanuel Lutheran Church.
c/o Chris Hart & Partners, Inc.
1955 Main St., Ste. 200
Wailuku, Maui, Hawaii 96793

STACY A. OTOMO
LICENSED PROFESSIONAL ENGINEER
No. 5115-C
HAWAII, U.S.A.

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April 2006

TABLE OF CONTENTS

PRELIMINARY DRAINAGE REPORT
FOR
EMMANUEL LUTHERAN CHURCH & SCHOOL
Waikapu, Wailuku, Maui, Hawaii

I. INTRODUCTION

The purpose of this report is to examine both the existing and proposed drainage conditions for the proposed project.

II. SITE LOCATION AND PROJECT DESCRIPTION

The subject parcel is identified as T.M.K.: (2) 3-5-002: portion of Parcel 001. It is also known as Lot A of the Waikapu East (Large Lot) Subdivision No. 3, encompassing an area of 25.263 acres. It is bordered by Lot J of the Waikapu East (Large Lot) Subdivision No. 3 to the north, the Waiale Road Extension to the east; Lot B of the Waikapu East (Large Lot) Subdivision No. 3 to the south; and Honoapiilani Highway to the west. Lot J is currently being used as a field office by Stanford Carr Development and Goodfellow Brothers, Inc.

The proposed project consists of two phases which will create approximately 56,000 gross square feet. The total facility will include a new sanctuary building and educational space for pre-school to 8th grade which will accommodate approximately 490 students. Associated improvements include paved roadways and parking areas, landscaping, and underground water, sewer, drainage, electrical, and telephone systems.

III. EXISTING TOPOGRAPHY AND SOIL CONDITIONS

The existing ground slopes in a west to east direction from elevation 384 feet above mean sea level at Honoapiilani Highway (southwesterly corner of the property) to elevation 323 feet at the Waiale Road Extension (northeasterly corner of the property), with an average slope of approximately 6.2%. The project site is currently vacant and was previously used for farming of bananas and other types of vegetables by private farmers.

According to the "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (August, 1972)," prepared by the United States Department of Agriculture Soil Conservation Service, the soils within the project site are classified as Iao clay (IaA and IcB). Iao clay is characterized as having slow runoff and no more than slight erosion hazard for 0 to 3 percent slopes; a moderately slow permeability, medium runoff, and a slight to moderate erosion hazard 3 to 7 percent slopes; and medium runoff and moderate erosion hazard for 7 to 15 percent slopes.

IV. EXISTING DRAINAGE CONDITIONS

As part of the Kehalani Offsite Drainage System project, an open-channel was constructed within the subject property, It traverses diagonally through the northeastern corner of the project site. The channel created a separation of the parcel where approximately 1.5 acres of the project site is separated at the northeast corner. Approximately 1.88 cfs of onsite runoff sheet flows from this area onto the Waiale Road Extension.

A Wailuku Agribusiness irrigation ditch known as the Kama Ditch traverses across the southwesterly corner of the project site. The ditch is overgrown and covered with soil within the site.

Presently, runoff from approximately 9.35 acres of the project site (11.30 cfs) sheet flows into the open-channel. The remainder of the runoff from the southern portion of the site (17.42 cfs) sheet flows onto the Waiale Road Extension. The total onsite runoff which sheet flows onto the Waiale Road Extension is 19.30 cfs. Runoff from the makai half of Honoapiilani Highway sheet flows across the project site.

It is estimated that the present onsite runoff for a 50-year, 1-hour storm from the entire project site is 30.60 cfs.

V. FLOOD AND TSUNAMI ZONE

According to Panel Number 150003 0190 D of the Flood Insurance Rate Map, March 16, 1995, prepared by the United States Federal Emergency Management Agency, the project site is situated in Flood Zone C. Flood Zone C represents areas of minimal flooding.

VI. PROPOSED DRAINAGE PLAN

Onsite runoff from the project site will be collected by grated catch basins located at appropriate intervals along the driveways and landscaped areas. The runoff will then be conveyed to onsite retention basins which will be located within the play fields and landscaped areas.

Offsite runoff from the makai half of Honoapiilani Highway will be intercepted by the project's drainage system and conveyed to the onsite retention basins. The retention basins will be sized to accommodate the increase in runoff from a 50-year,1-hour storm. As a result, no additional runoff will sheet flow into the existing open-channel or onto the Waiale Road Extension. This is in accordance with Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui.

It is estimated that the post development runoff from the project site will be 45.15 cfs, with a net increase of 14.55 cfs.

VII. HYDROLOGIC CALCULATIONS

The hydrologic calculations are based on the "Chapter 4 - Rules for the Design of Storm Drainage Facilities in the County of Maui," and the "Rainfall Frequency Atlas of the Hawaiian Islands," Technical Paper No. 43, U.S. Department of Commerce, Weather Bureau.

Rational Formula Used: $Q = CIA$

Where Q = rate of flow (cfs)

C = rainfall coefficient

I = rainfall intensity for a duration equal to the time of concentration (inches/hour)

A = drainage area (Acres)

See Appendix A for Hydrologic Calculations

VIII. CONCLUSION

After the build out of the proposed project, it is estimated that the 50-year storm runoff will be 45.15 cfs, with an increase of 14.55 cfs. The onsite runoff will be intercepted by grated catch basins and conveyed to retention basins. The proposed play fields will also be used as shallow retention basins. The retention basins will be sized to accommodate the increase in runoff for a 50-year, 1-hour runoff from the development. There will be no increase in runoff sheet flowing from the project site into the existing open channel or onto the Waiale Road Extension. This is in accordance with Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui.

Therefore, it is our professional opinion that the proposed development will not have an adverse effect on the adjoining or downstream properties.

IX. REFERENCES

A. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, prepared by U.S. Department of Agriculture, Soil Conservation Service, August, 1972.

B. Erosion and Sediment Control Guide for Hawaii, prepared by U.S. Department of Agriculture, Soil Conservation Service, March, 1981.

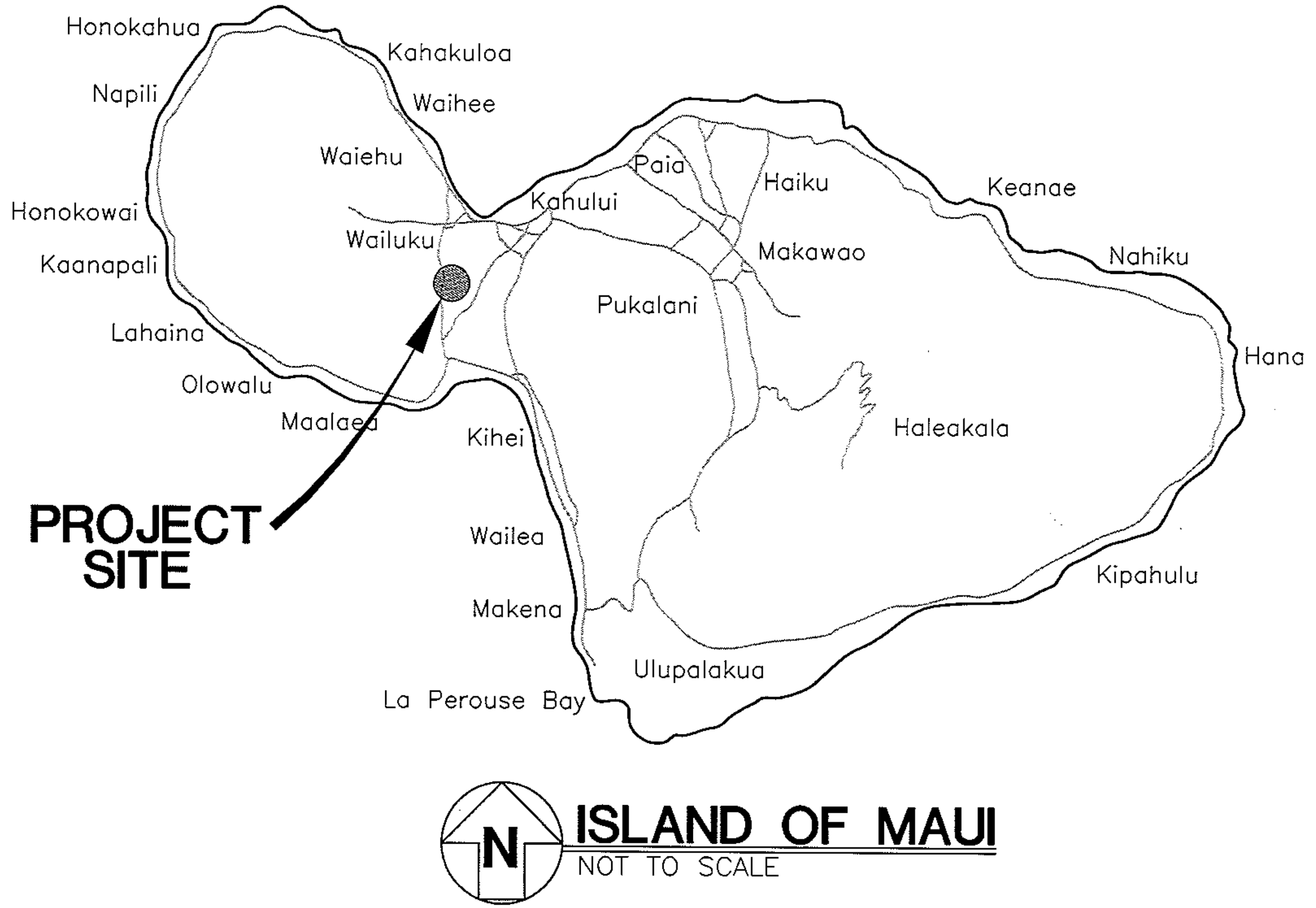
C. Rainfall-Frequency Atlas of the Hawaiian Islands, Technical Paper No. 43, U.S. Department of Commerce, Weather Bureau, 1962.

D. Flood Insurance Rate Maps of the County of Maui, March 1995.

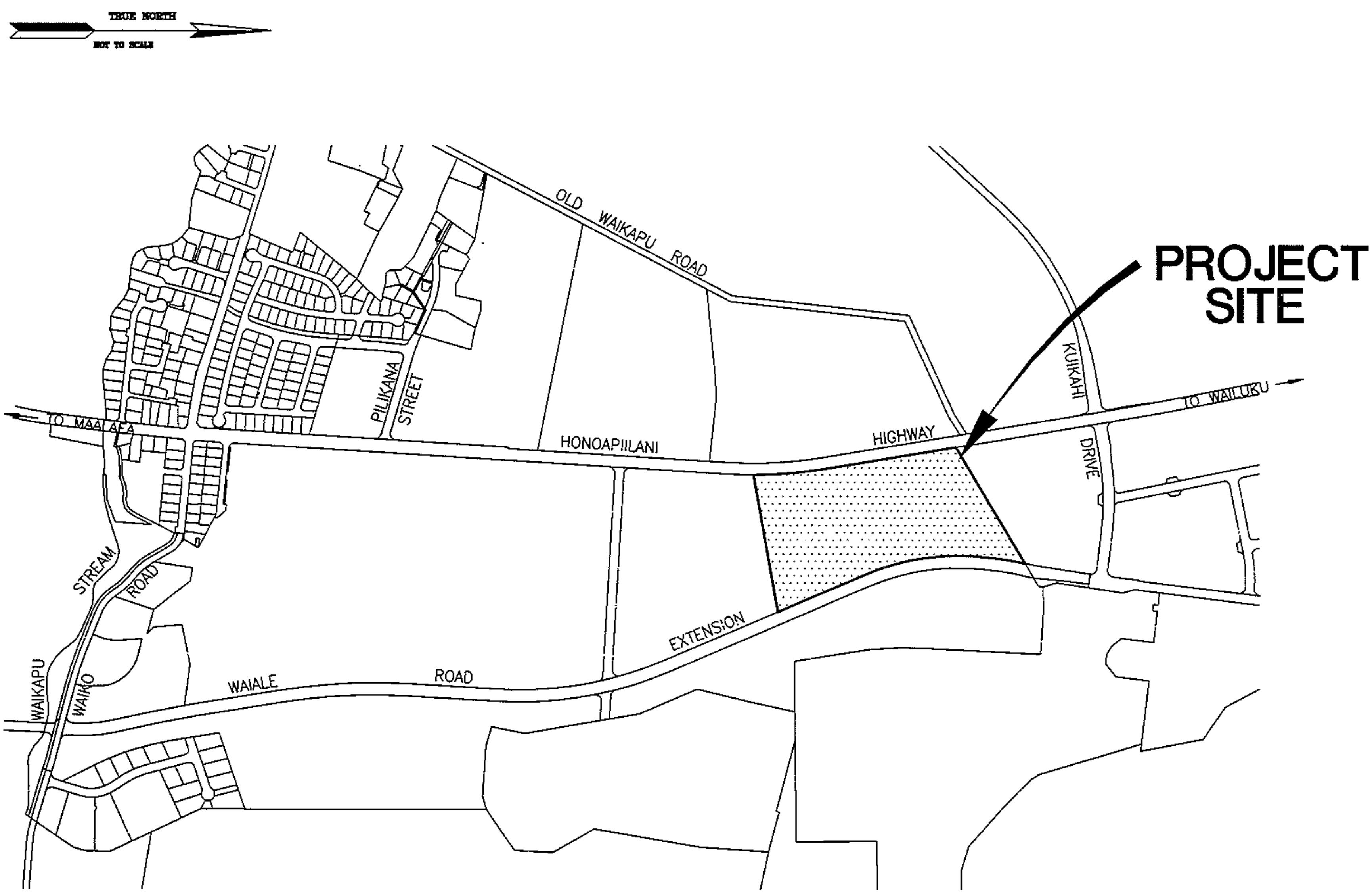
E. Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui, prepared by the Department of Public Works and Waste Management, County of Maui, 1995.

EXHIBITS

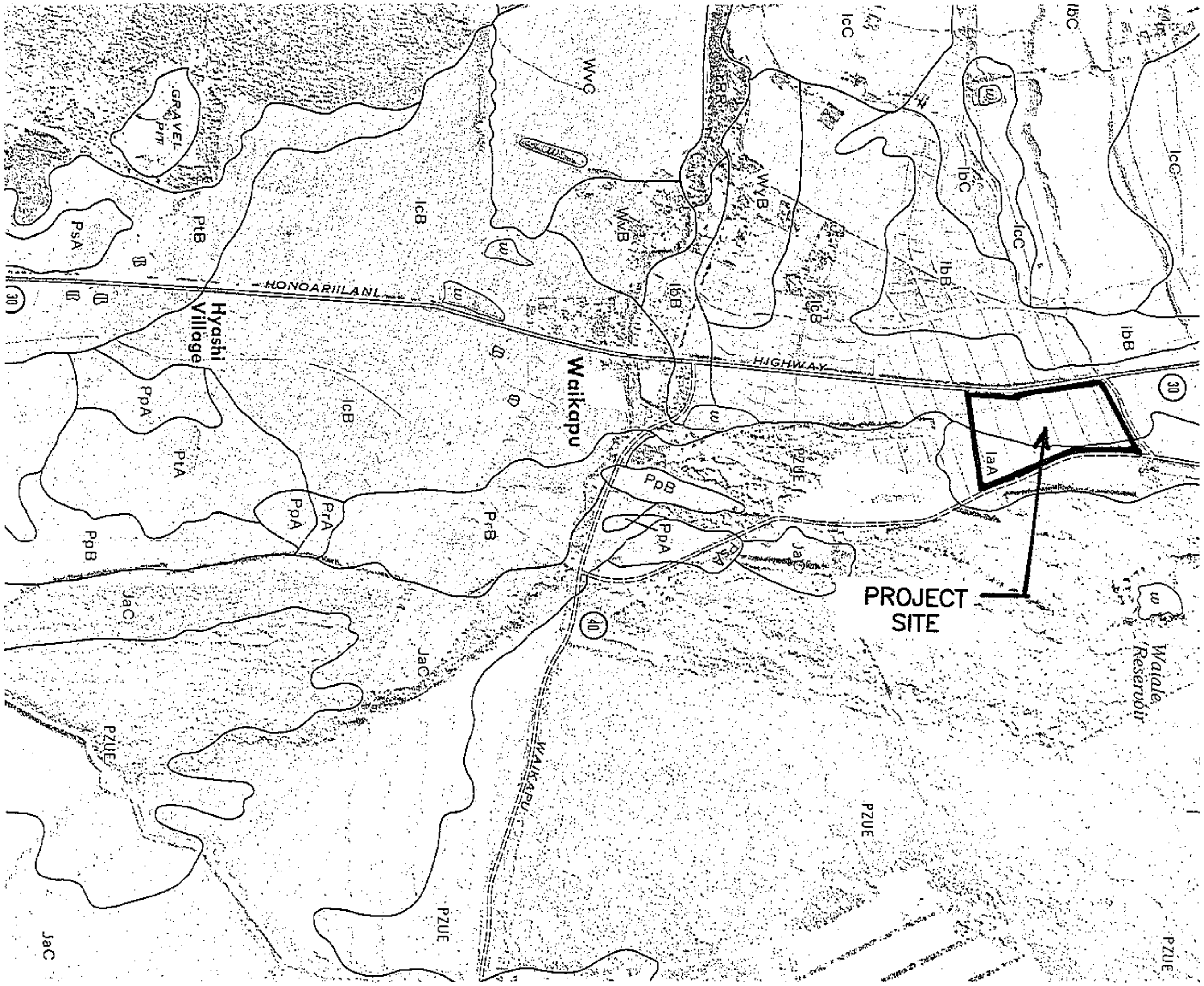
1. Location Map
2. Vicinity Map
3. Soil Survey Map
4. Flood Insurance Rate Map
5. Drainage Area Map



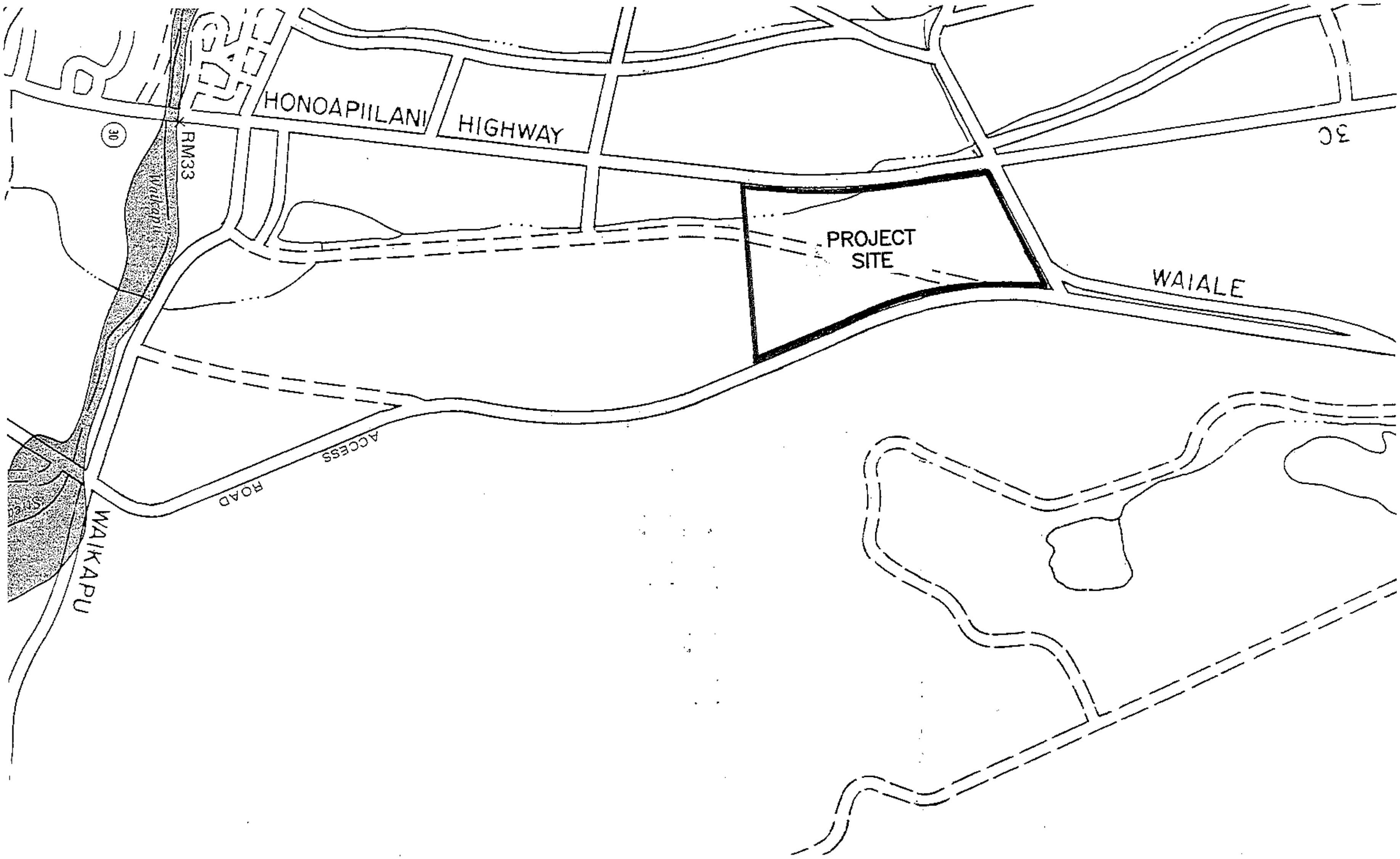
LOCATION MAP
EXHIBIT 1



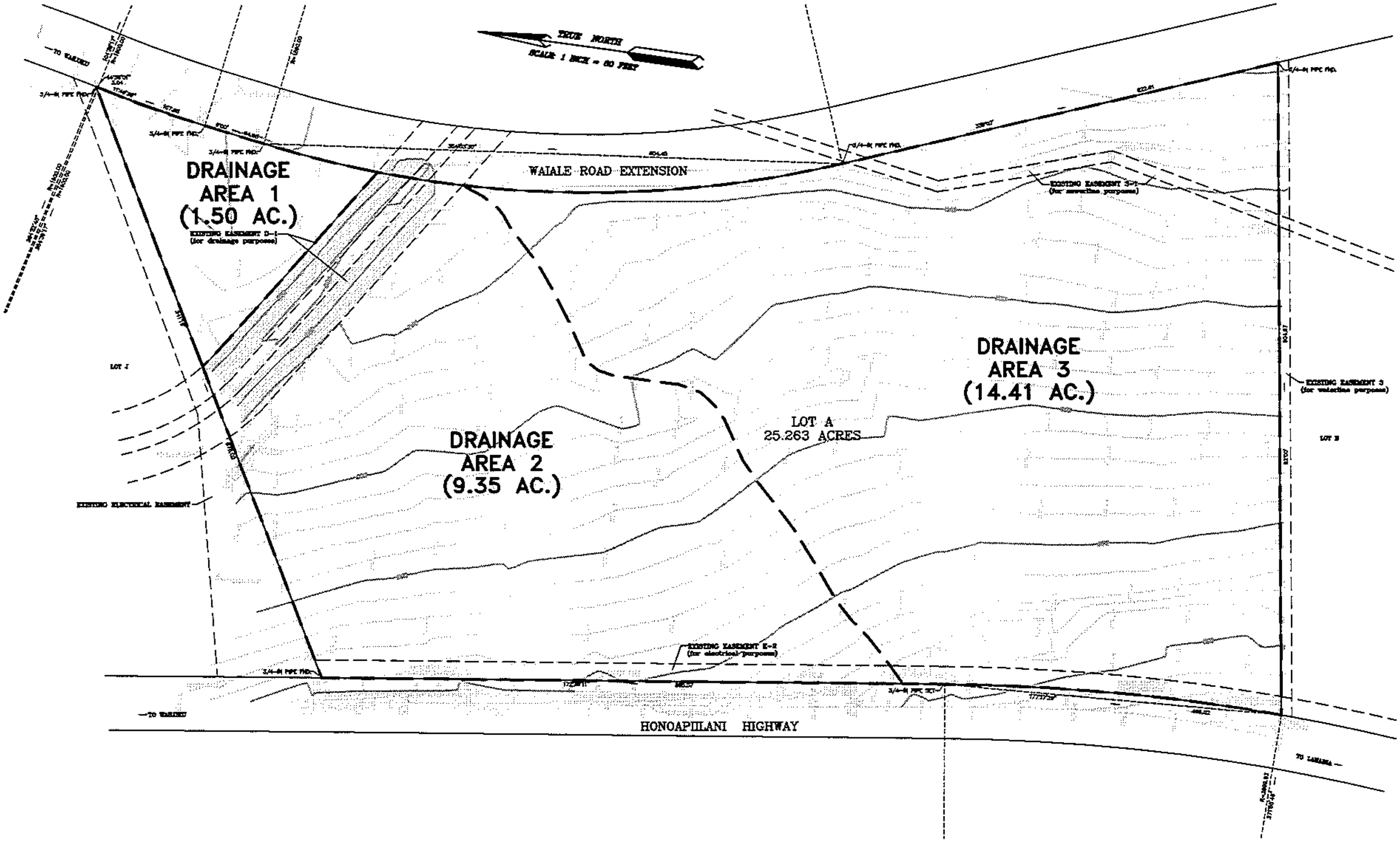
VICINITY MAP
EXHIBIT 2



SOIL SURVEY MAP
EXHIBIT 3



FLOOD INSURANCE
RATE MAP
EXHIBIT 4



DRAINAGE AREA MAP
EXHIBIT 5

APPENDIX A

HYDROLOGIC CALCULATIONS

Hydrologic Calculations

Purpose: Determine the increase in surface runoff from the development of the proposed project based on a 50-year storm.

A. Determine the Runoff Coefficient (C):

EXISTING CONDITIONS:

Infiltration (Medium)	=	0.07
Relief (Rolling)	=	0.03
Vegetal Cover (Good)	=	0.03
Development Type (Open)	=	<u>0.15</u>
C	=	0.28

DEVELOPED CONDITIONS:

ROOF AREAS:

Infiltration (Negligible)	=	0.20
Relief (Hilly)	=	0.06
Vegetal Cover (None)	=	0.07
Development Type (Roof)	=	<u>0.55</u>
C	=	0.88

PAVED AREAS:

Infiltration (Negligible)	=	0.20
Relief (Rolling)	=	0.03
Vegetal Cover (None)	=	0.07
Development Type (Pavement)	=	<u>0.55</u>
C	=	0.85

LANDSCAPED AREAS:

Infiltration (Medium)	=	0.07
Relief (Rolling)	=	0.03
Vegetal Cover (High)	=	0.00
Development Type (Landscape)	=	<u>0.15</u>
C	=	0.25

EXISTING CONDITION:

C = 0.28

DEVELOPED CONDITIONS:

Paved Area = 2.50 Acres

Roof Area = 1.50 Acres

Landscaped Area = 21.263 acres

WEIGHTED C = 0.35

B. Determine the 50-year 1-hour rainfall:

i_{50} = 2.8 inches

Adjust for time of concentration to compute Rainfall Intensity (I):

Existing Condition:

Drainage Area No. 1:

T_c = 22 minutes

I = 4.48 inches/hour

Drainage Area No. 2:

T_c = 24 minutes

I = 4.32 inches/hour

Drainage Area No. 3:

T_c = 24 minutes

I = 4.32 inches/hour

Developed Condition:

T_c = 16 minutes

I = 5.11 inches/hour

C. Total Drainage Area (A) = 25.263 Acres

Drainage Area No. 1 = 1.50 Acres

Drainage Area No. 2 = 9.35 Acres

Drainage Area No. 3 = 14.41 Acres

D. Compute the 50-year storm runoff volume (Q):

Q = CIA

Existing Conditions:

Drainage Area No. 1:

Q = (0.28)(4.48)(1.50)

= 1.88 cfs

Drainage Area No. 2:

Q = (0.28)(4.32)(9.35)

= 11.30 cfs

Drainage Area No. 1:

Q = (0.28)(4.32)(14.4)

= 17.42 cfs

Developed Conditions:

Q = (0.35)(5.11)(25.263)

= 45.15 cfs

Total existing runoff from the project site = 1.88 cfs + 11.30 cfs + 17.42 cfs = 30.60 cfs. The increase in runoff due to the proposed development is 45.15 cfs - 30.60 cfs = 14.55 cfs.

Hydrograph Plot

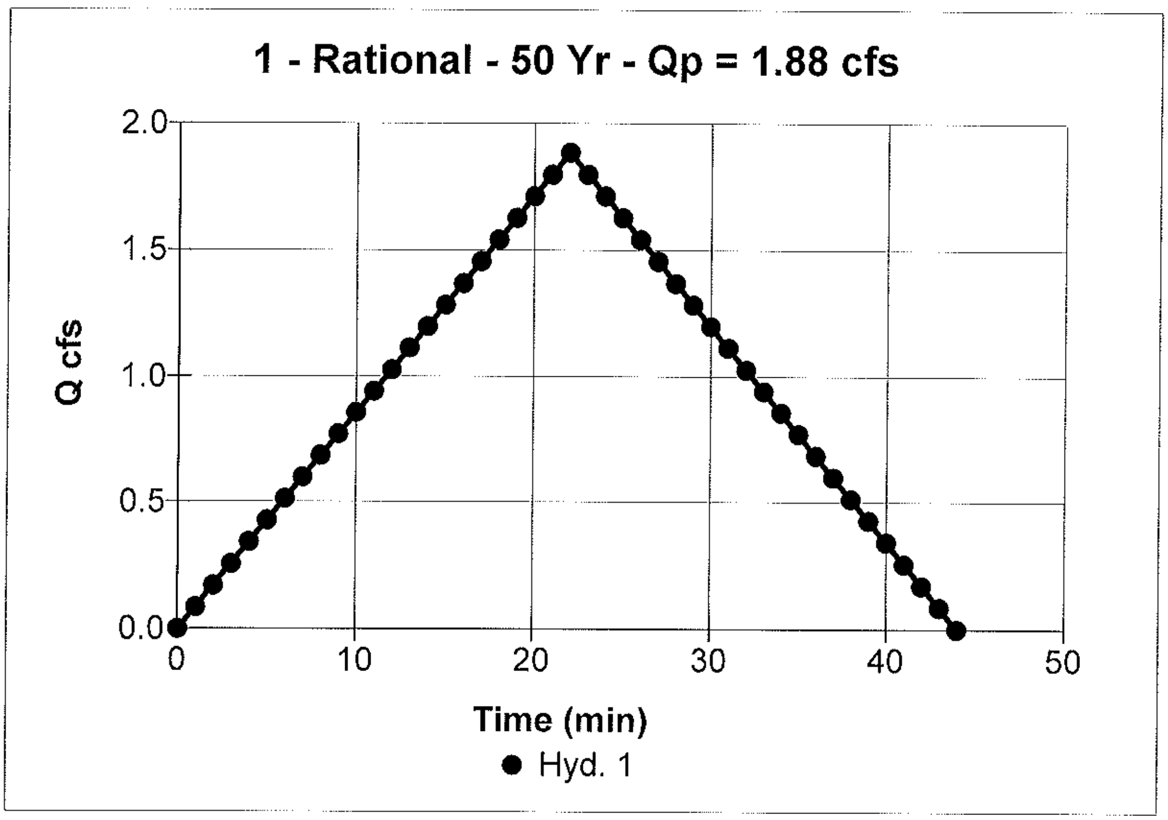
English

Hyd. No. 1

EXISTING CONDITIONS - DRAINAGE AREA NO. 1

Hydrograph type	= Rational	Peak discharge	= 1.88 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 1.5 ac	Runoff coeff.	= 0.28
Intensity	= 4.48 in	Time of conc. (Tc)	= 22 min
I-D-F Curve	= 2.8.IDF	Reced. limb factor	= 1

Total Volume = 2,486 cuft



Hydrograph Plot

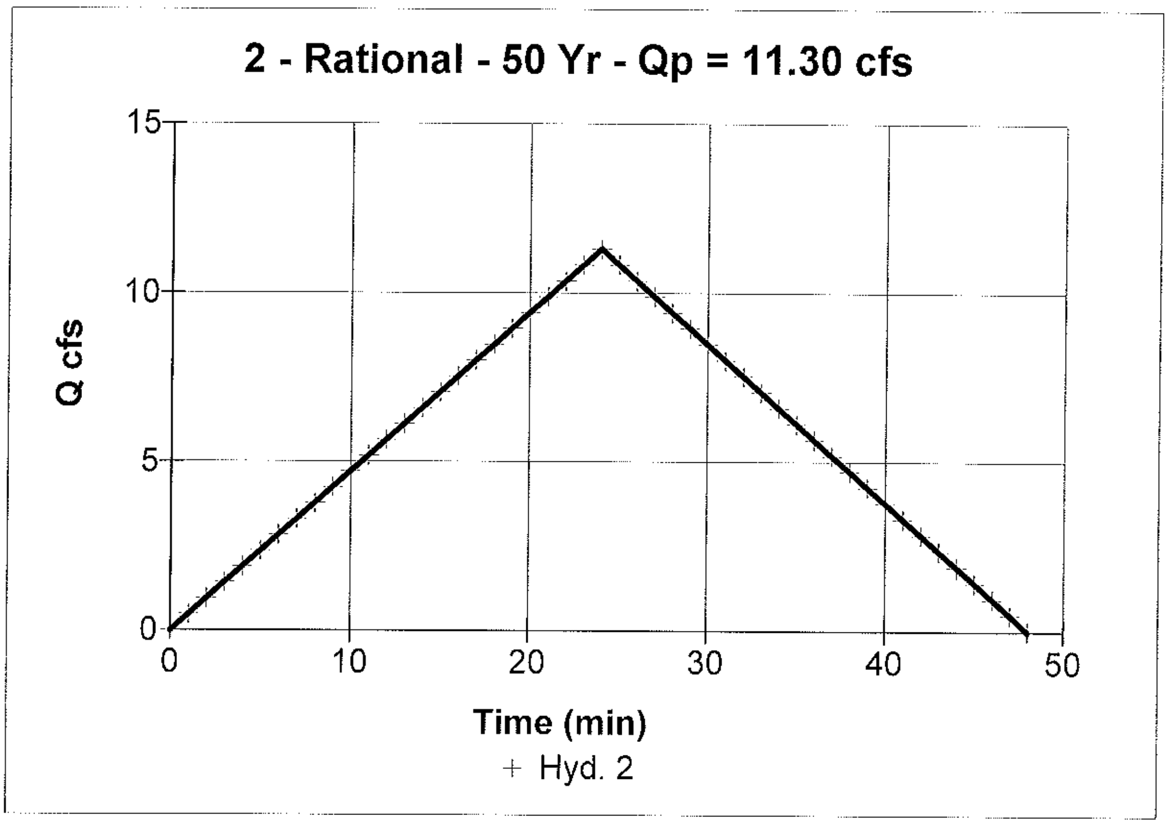
English

Hyd. No. 2

EXISTING CONDITIONS - DRAINAGE AREA NO. 2

Hydrograph type	= Rational	Peak discharge	= 11.30 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 9.4 ac	Runoff coeff.	= 0.28
Intensity	= 4.32 in	Time of conc. (Tc)	= 24 min
I-D-F Curve	= 2.8.IDF	Reced. limb factor	= 1

Total Volume = 16,275 cuft



Hydrograph Plot

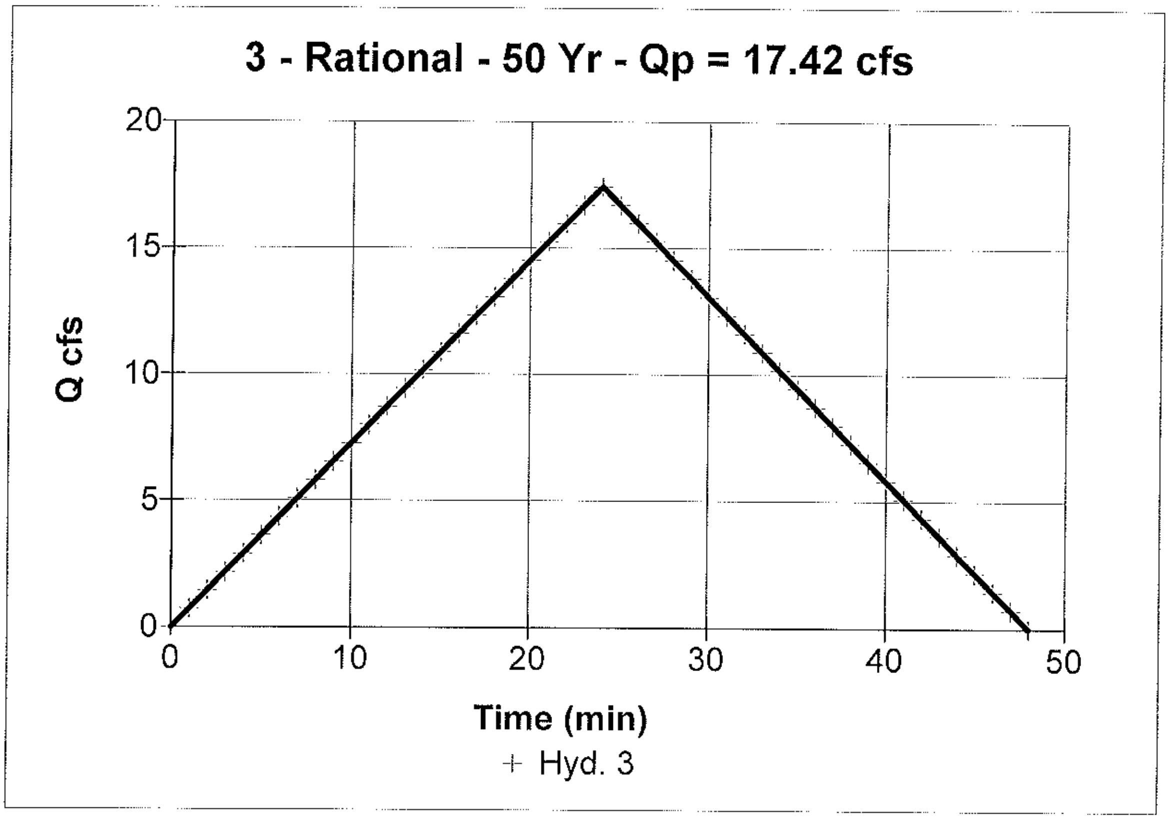
English

Hyd. No. 3

EXISTING CONDITIONS - DRAINAGE AREA NO. 3

Hydrograph type	= Rational	Peak discharge	= 17.42 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 14.4 ac	Runoff coeff.	= 0.28
Intensity	= 4.32 in	Time of conc. (Tc)	= 24 min
I-D-F Curve	= 2.8.IDF	Reced. limb factor	= 1

Total Volume = 25,083 cuft



Hydrograph Plot

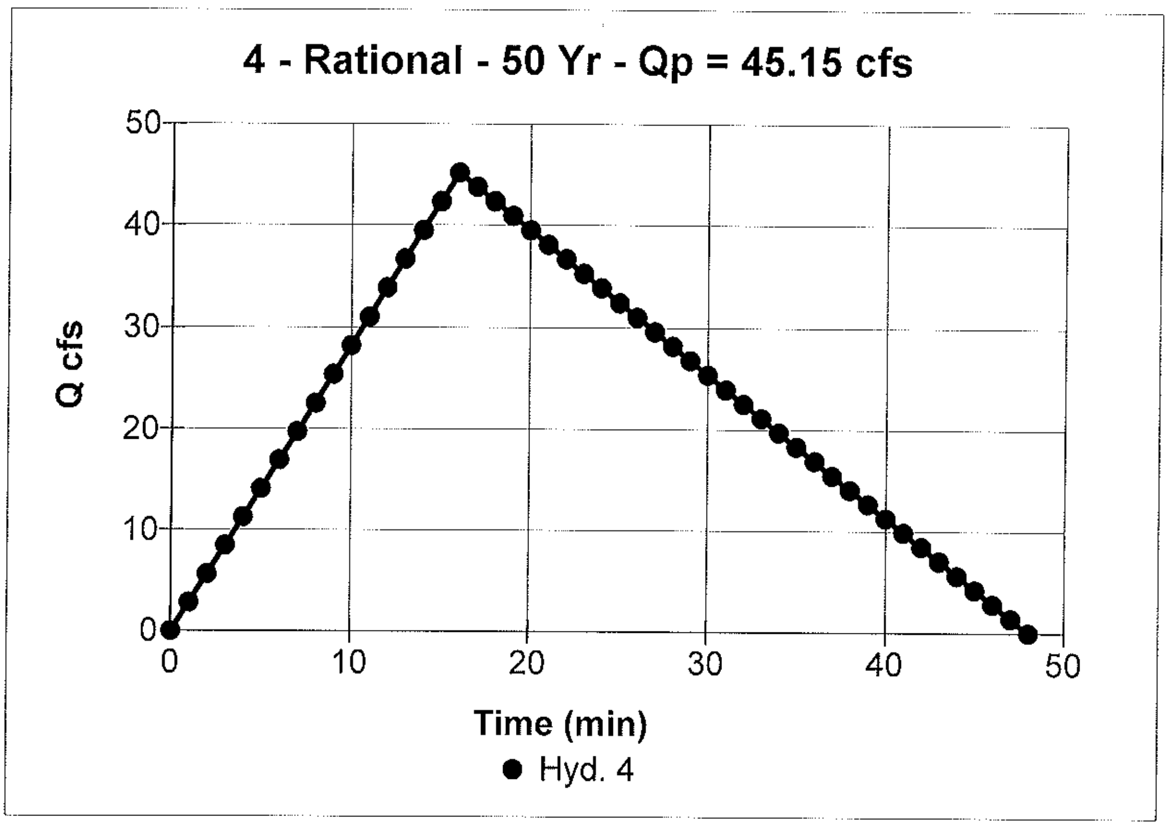
English

Hyd. No. 4

DEVELOPED CONDITIONS

Hydrograph type	= Rational	Peak discharge	= 45.15 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 25.3 ac	Runoff coeff.	= 0.35
Intensity	= 5.11 in	Time of conc. (Tc)	= 16 min
I-D-F Curve	= 2.8.IDF	Reced. limb factor	= 2

Total Volume = 65,023 cuft



Appendix C
Phase I, Environmental Site Assessment

Vuich Environmental Consultants, Inc.

Environmental Site Assessment:
Phase I Investigation

Subject Site:

UNDEVELOPED, AGRICULTURAL LAND
Honoapiilani Highway
(Southeast of Kuikahi Drive)
Wailuku, Hawaii
T.M.K. (2) 3-5-02:1

Prepared for:

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Conducted and Compiled by:
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VEC Project Number #0403-760
May 14, 2004

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Vuich Environmental Consultants, Inc.

Environmental Site Assessment:
Phase I Investigation

Property: UNDEVELOPED, AGRICULTURAL LAND
Honoapiilani Highway
(Southeast of Kuikahi Drive)
Wailuku, Hawaii
T.M.K. (2) 3-5-02:1

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Wailuku, Hawaii 96793
Attn: Mr. Tom Leuteneker

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been prepared by the investigator under direct supervision and provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state and local statutes, regulations and ordinances.

Joseph Beaulieu, Site Investigator — 5/13/04 **Date**

- B.A. (Environmental Science and Geography)

Jeffrey E. Kermode, Project Manager — 5/13/04 **Date**

- B.A. (Geography), B.Tech. (Environmental Engineering)
- Lead-Based Paint Inspector (EPA Accredited Course)
  EPA Certification No. HI-03-0920045008
- Asbestos Building Inspector (AHERA Accredited Course)
  State of Hawaii Certification No. HIASB-0351

John S. Vuich, M.S., Project Supervisor — 5/13/04 **Date**

- Registered Environmental Assessor
  Registration No. 1433 (State of California)

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Vuich Environmental **End of Section**

Disclosure

This document contains the results of services performed on this Project by **Vuich Environmental Consultants, Inc. (VEC)** pursuant to Agreement. The results represent the application of a variety of scientific and analytical disciplines that have been rendered using the standard of care, skill, and diligence normally provided by professionals in the performance of similar services under similar circumstances.

VEC assessments are intended to reduce, but not eliminate, uncertainty regarding recognized environmental conditions in connection with the Subject Site, as conducted within reasonable limits of time and cost. A general consensus of EPA's guidance on landowner liability is that *no environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property.*

The use of this document and the results reported are limited to the services performed and areas examined as described in this document and no inferences are intended with respect to anything not described herein.

VEC is not responsible for conditions or consequences arising from relevant data, facts, and information that were concealed, missing, withheld, not fully disclosed, or not reasonably available at the time these services were performed. **VEC** is not responsible for any indirect, incidental, or consequential damages of any nature arising from any cause.

VEC has no beneficial economic interest in the Project other than as an independent professional organization performing the agreed services. **VEC's** warranties are as described above and there are no other warranties of any kind, expressed or implied, regarding the services.

Executive Summary

Introduction

This Phase I Environmental Site Assessment (ESA) has been prepared for Mr. Thomas Leuteneker and was conducted pursuant to Vuich Environmental Consultants, Inc.'s (VEC's) written proposal and contract accepted by Mr. Richard H. Sudheimer on March 25, 2004. This investigation and report format follows the guidelines of the American Society of Testing and Materials (ASTM) Publication E1527-00.

Site Description

The subject site is located approximately one (1) mile south of the community of Wailuku, Maui, Hawaii. The property lies on the east (makai) side of Honoapiilani Highway near the intersection of Kuikahi Drive. The property consists of two (2) parcels of land, irregular in shape, measuring approximately twenty-five (25) acres each. The site is further described on the Tax Maps of the State of Hawaii as being two (2) portions of Division 2, Zone 3, Section 5, Plat 02, Parcel 01 (See Tax Map, Appendix B). Property access is from Honoapiilani Highway and Waiale Rd.

The property is essentially agricultural land. Small tenant farmers use approximately eighty (80) percent of the property with the remainder being fallow fields. The predominant vegetation consists of grasses and fruit trees. A network of unpaved roads has been established on the property. (See Figure 2, Appendix A). No commercial or industrial activities are currently taking place on the subject site.

Historically, the land has been used for sugarcane and pineapple cultivation. Surrounding land use consists of a commercial nursery, a former county landfill and fallow fields.

Wailuku is located on the east side of West Maui at the base of the West Maui Mountains. (See Figure 1, Appendix A).

Records Review

The purpose of a records review is to obtain and review records that will help identify ***recognized environmental conditions*** in connection with the subject property. The services of Environmental Data Resources, Inc. were utilized to compile the database listings.

Our records review did not discover any current investigation of the subject site under any programs conducted by a federal, state, or local environmental agency.

The initial EDR report did not record any listings for the nearby or adjacent properties. However, VEC supplied additional information to EDR on a nearby property that resulted in EDR producing an amended report located in Appendix B. The amended records review indicates that one (1) risk site is located adjacent to the subject site. Waikapu Dump is listed in the amended report and is located adjacent to the subject site's southeastern property boundary.

The above listed neighboring property listed within the designated radial distance has or has had the ability to impact the subject property due to its current status, distance and/or geographic position in relationship to the subject property. The main concern would be the potential negative impact to the groundwater and surface soils from both sites.

Site Reconnaissance

A site investigation focuses on obtaining information indicating the likelihood of identifying physical ***recognized environmental conditions*** in connection with the property and assessing the subject property in relation to surrounding land uses and natural surface features. It includes a physical inspection of the real property and any on-site facilities.

On April 27 and May 13, 2004 VEC personnel, Mr. Jeffrey Kermode and Mr. Joseph Beaulieu, conducted an overall site inspection of the subject site. Accessible areas of the property were visually and physically inspected. Some private residential areas were not accessed by VEC due to the lack of permission. Dense ground vegetation limited the investigators' ability to effectively observe the surface soils.

The following are significant observations of field conditions: (See Site Plan, Figure 2)

- Evidence of historical agricultural landuse was noted;
- A moderate amount of miscellaneous and landscape debris dumping and regulated items were noted;
- Several earthen/fill stockpiles were noted on the subject parcel;
- Several banana shacks and chicken coops were noted;
- Two (2) shacks which appeared to be temporary residences were noted;
- Abandoned vehicles and trailers are located on the subject property;
- Several empty plastic 55 gallon drums were noted;
- An unpaved road network has been established on-site.

Conclusions

Recognized environmental conditions, as defined by ASTM Standard E1527-00, are the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. ***Recognized environmental conditions*** are described with regard to (1) the nature and extent of the environmental condition, (2) potential or actual environmental threat, (3) potential for transport (migration) of any environmental conditions, and (4) consideration for further investigation. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

VEC has performed this Phase I Environmental Site Assessment in conformance with the scope and limitations of the ASTM Practice E 1527-00 for the property located southeast of the intersection of Honoapiilani Highway and Kuikahi Drive in the community of Wailuku, Maui (TMK Number (2) 3-5-02:01 Portion), defined as the subject property. Any exceptions to or deletions from this practice are described in Section 1.4, Limitations and Exceptions, of this report. **This assessment has revealed no evidence of *recognized environmental conditions* in connection with the property, except for the following:**

- ***Database Listings*** *(See Section 4.0 & EDR Report, Appendix B).*

  The subject site is <u>not</u> listed. Due to the close proximity of the former Waikapu Landfill relative to Lot 2 of the subject property it is possible that this site has or has had reasonable potential to adversely impact the environmental condition of Lot 2 of the subject property. However, due to the down gradient and predominantly down wind location of this landfill relative to Lot 2 of the subject property it is less likely that groundwater and or surface soils would contain contamination above regulated levels.

- ***Current and Historic Use or Storage of Hazardous and Regulated Substances*** *(See Section 5.3.2).*

  There is no evidence of any historic misuse or significant spills of hazardous or regulated substances on the subject property.

  Sugarcane and pineapple agriculture had been previously active on and adjacent to the subject property for several decades. Both pesticide and fertilizer use are related to the above noted activities.

  While the use of pesticides and fertilizers on a property does not necessarily result in an adverse impact to the environmental condition of the subject site, it is possible (yet unlikely) for residual amounts of these substances to accumulate to concentrations that present a potential threat to human health or the environment.

Soil and groundwater sampling and laboratory testing would provide additional information to evaluate potential environmental effects from these historic agricultural activities.

The concerns listed below may not be considered ***recognized environmental conditions*** *by ASTM definition, however, they may be considered regulated under other environmental laws and ordinances and may present a potential liability to the property owner.*

- ***Solid Waste Management*** *(See Section 5.5.4)*

  A moderate amount of historical dumping (construction, landscaping and miscellaneous debris including special waste) was evident on the subject property. Management of these wastes should be performed in a manner that complies with all local, state, and federal regulations as applicable to the waste type.

  Due to dumping of landscaping debris and heavily vegetated areas, the entire subject site and underlying soils were not visibly inspected. It is important to ensure that if additional clearing of the property commences and large amounts of construction debris or unidentifiable substances (containers) are further discovered, proper waste identification, testing and applicable waste handling/disposal procedures are followed.

- ***Surface Waters and Area Aquifer Protection*** *(See Section 5.5.5)*

  If future land use includes developing the land for residential or commercial use, the developer and property owner should be aware of the potential for contaminants to run off-site and into nearby water courses (including adjacent storm drains and ditches). Products of concern relating to any future development, or land-clearing activity would be earthen material (silt), paints, oils, antifreezes and other fluids from automobile or on-site machinery, or leaks from on-site stocked items.

  Future land clearing of greater than one (1) acre will likely require both a County of Maui grading/grubbing permit and a National Pollution Discharge Elimination System (NPDES) General Permit (State of Hawaii, Department of Health).

The conclusions stated above should not be construed to mean that any regulatory agency would have the same opinion as this author, nor is any implication proposed therefrom. The results of this environmental assessment are intended for general reference purposes only and are not intended as legal advice. The advice of legal counsel should be sought in regard to individual facts, circumstances and interpretation of environmental liability.

Environmental Site Assessment

Phase 1 Investigation

1.0 INTRODUCTION

A Phase I Environmental Site Assessment (ESA) is conducted to determine if a site may be contaminated with hazardous or toxic substances or wastes resulting from current or past site activities, unauthorized dumping or disposal, or migration of contaminants from adjacent or nearby properties. Its goal is to identify ***recognized environmental conditions*** on a property that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products. These release conditions apply to structures on the property as well as the soil, groundwater, or surface water of the property. The American Society of Testing and Materials (ASTM) Standard 1527-00, Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process, is used to "...define good commercial and customary practices for conducting an environmental site assessment of a parcel of commercial real estate".

1.1 Purpose

The study objectives are to characterize the environmental setting of the subject property, to identify any obvious activity of environmental concern that may have occurred at or near the site, and to evaluate potential migration pathways for any identified contaminants. It may also address any activities that affect future considerations for potential environmental impairment to the property.

Another function of this Phase I ESA is to conduct an *appropriate environmental inquiry* in response to the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, its amendments, and similar state and local regulations. An ESA "appropriate inquiry" may provide the buyer, receiver, or lender making a loan secured by the subject real property with a basis to qualify for the *innocent landowner defense* should any legal action be initiated for environmental impairment to the property.

1.2 Detailed Scope of Services

This Phase I Environmental Site Assessment (ESA) has been prepared for Mr. Thomas Leuteneker and was conducted pursuant to Vuich Environmental Consultants, Inc.'s (VEC's) written proposal and contract accepted by Mr. Richard H. Sudheimer on March 25, 2004.

There were no other additional services requested of VEC by the Client.

1.3 Significant Assumptions

The assessment of ***recognized environmental conditions*** relies on: 1) sources of actual knowledge, 2) thorough appropriate inquiry, 3) reviewing reasonably ascertainable documents and records, and 4) conducting a visual and olfactory reconnaissance. In conducting this ESA, VEC has relied on the truthfulness of its inquiry sources and the validity of reviewed records. If obvious indications or VEC actual knowledge contradicted the reported/reviewed information sources, it has been so stated in the appropriate sections of this report.

1.4 Limitations and Exceptions

The investigation performed for this report includes the components of an *appropriate inquiry* regarding the potential for contamination to exist or have occurred at this site. This investigation is also the basis of an *appropriate inquiry* into the presence or likely presence, release or threatened release, of hazardous substances and petroleum products at this real property. This Phase I Environmental Site Assessment was prepared according to guidelines presented in the American Society of Testing and Materials Document entitled *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E-1527-00).

Since no ESA can eliminate uncertainty regarding the potential for ***recognized environmental conditions*** in connection with a property, the limiting intent of this investigation is to reduce the uncertainty to an appropriate level. Minimal requirements for the Phase I ESA include a review of historical records, a review of files and databases compiled by regulatory agencies, interviews with current owners and/or occupants of the property, and a field reconnaissance of the subject site and adjacent areas.

This ESA also takes into consideration the evaluation of other substances and products that are or may be interpreted as excluded under CERCLA. Commonly, these substances are of concern in commercial real estate transactions under current custom and usage and may include, but are not limited to, Radon, Lead-in-Drinking Water and Special Environmental Resources. Where appropriate, VEC has considered environmental concerns of other federal, state, and local regulations.

Some data base resources developed for Maui County are in their infancy or are not cross-referenced in a manner as to be readily discernible. The Maui County Fire Department maintains historical file material that is not on a database.

Databases and records utilized for this investigation were limited to those that are reasonably ascertainable; that is, they had to be publicly available, obtainable from its source within reasonable time and cost constraints, and practically reviewable with regard to volume, sorting, and organization. Additionally, the services of *Environmental Data Resources, Inc.* (EDR) were utilized to compile the environmental database listings. (See Appendix B).

VEC was unable to access all of the subject property as of the completion of this report. Two (2) shacks that appeared to be temporary personal residences were observed on site. To date, VEC's attempts to have access granted to these shacks and the surrounding area have been unsuccessful. If, in the future, access is granted and VEC's inspection discovers a recognized environmental condition, VEC will notify the client.

1.5 Special Terms and Conditions

As a standard practice, a confidential client privilege was initiated by VEC for the work performed and the contents of this report. VEC shall ensure that its officers, employees, agents, and independent contractors do not disclose this report or any information contained therein to any person without the proper knowledge and written consent from the Client (or as otherwise required by law). VEC shall ensure that each of its officers, employees, agents, and independent contractors understand these requirements.

The information and opinions provided herein are intended as background data and planning guidance to interested parties. This should not be construed to mean that any regulatory agency would have the same opinion as VEC, nor is any implication proposed.

VEC has performed this study in a competent and professional manner. Since there may be hidden or unknown conditions that may be missed during this inspection, VEC cannot warrant the actual site conditions described in this report.

Vuich Environmental End of Section

2.0 SITE AND REGIONAL DESCRIPTION

Refer to Figure 1, Regional Setting Map, in Appendix A, for a depiction of the general site setting of the subject property in relation to topographic features. Also depicted are the projected groundwater flows, regional surface water flows, and locations of other significant physical features or structures.

2.1 Location and Legal Description

The subject site is located one (1) mile south of the community of Wailuku, Maui, Hawaii. It lies on the east side of Honoapiilani Highway, southeast of the intersection of Kuikahi Drive. The site is further described on the Tax Maps of the State of Hawaii as a portion of Division 2, Zone 3, Section 5, Plat 02, Parcel 01 (See Figure 3, Appendix B). Property access is from Honoapiilani Highway and Waiale Road.

2.2 Site and Vicinity General Characteristics

The property consists of two (2) parcels of land, irregular in shape, measuring approximately twenty-five (25) acres each. The property is essentially agricultural land. Small tenant farmers use approximately eighty (80) percent of the property with the remainder being fallow fields. The predominant vegetation consists of tall grasses, fruit trees and mixed agricultural fields (See Figure 2, Appendix A). No commercial or industrial activities are currently taking place on the subject site.

The northern adjoining property is being used temporarily as a construction field office area for Goodfellow Brothers. Beyond this to the north is Kuikahi Drive. The eastern adoining property is the future Waikapu Bypass beyond which are a commercial nursery and a former county landfill. Some trenching and earth moving has begun for this future roadway. The southern adjoining property consists of fallow fields. The Honoapiilani Highway is located along the western property boundary beyond which is fallow agricultural land. (See Figure 2, Appendix A).

Wailuku is Maui's traditional population center located on the eastern slopes of the West Maui Mountains. (See Figure 1, Appendix A). Kahului Bay on the Pacific Ocean is located approximately two (2) miles northeast of the subject property.

2.3 Description of Structures, Roads, Other Improvements

A network of unpaved agricultural roads has been established on the property. Several building structures were located on-site at the time of VEC's site reconnaissance. The majority of these are wood frame and plywood banana shacks. Two (2) more substantial buildings appeared to be residential. Several chicken coops were also located on site (See Figure 2 and Photo # 1, 15, and 16, Appendix A).

2.4 Current Use of the Property

The subject site consists primarily of mixed use tenant farming operations and heavily vegetated fallow agricultural land. No commercial or industrial activities are currently being conducted on-site. Some banana shacks located on-site appear to be residential in nature. The Maui County Planning Department currently describes the land's zoning as "Agricultural".

2.5 Current Uses of the Adjoining Properties

The current uses of the adjoining properties as observed by the investigator during the site reconnaissance are as follows (see also Figure 2, Site Plan, in Appendix A):

▪ *Northern Adjoining Property:*	Goodfellow Brothers construction office area beyond which is Kuikahi Drive.
▪ *Eastern Adjacent Property:*	Planned Waikapu Bypass, beyond which is a plant nursery and a former county landfill (Waikapu Landfill).
▪ *Southern Adjoining Property:*	Fallow agricultural land.
▪ *Western Adjacent Property:*	Honoapiilani Highway, beyond which is fallow agricultural land.

Vuich Environmental **End of Section**

3.0 USER PROVIDED INFORMATION

As a standard of practice, the following information was requested from the Client during the preliminary phases of this investigation:

- Title records and knowledge of environmental liens;
- Personal, specialized knowledge or experience in regard to ***recognized environmental conditions*** concerning the property; and
- If applicable, actual knowledge of a significant, low purchase price for the property, and explanation for the lower price.

The purpose of this information is to help identify the possibility of ***recognized environmental conditions*** in connection with the property. These tasks do not require the technical expertise of an environmental professional and are generally not performed by environmental professionals performing the Phase I ESA. VEC submits a Preliminary Environmental Investigation questionnaire to the Client for this information. The completed questionnaire is attached in Appendix B.

According to information provided by the Client in the Preliminary Environmental Investigation, the Client is not aware of any environmental liens, proceedings, or investigations against the subject property as of the date of this ESA.

Vuich Environmental End of Section

4.0 RECORDS REVIEW

The purpose of a record review is to obtain and review records that will help identify ***recognized environmental conditions*** in connection with the subject property. The service of Environmental Data Resources, Inc. (EDR) was utilized to compile the database listings.

4.1 Standard Environmental Record Sources

The subject property and properties within the minimum search distances were reviewed from the following record sources (see below). Risk sites, if any, that may be located on or adjacent to the subject property, or are within close proximity to the subject site are described. Refer to Appendix B, EDR Radius Map Report, for a complete listing and description of all sites located within the designated search distances, details, and government agency database release dates.

The EDR Report bases the location of the listed risk sites on longitude/latitude information provided by the respective government agency. VEC confirms the locations of risk sites within close proximity to the subject site during the site visit. When the VEC site visit contradicts the EDR Report, it has been so stated.

THE SUBJECT SITE IS NOT LISTED ON ANY OF THE FOLLOWING FEDERAL OR STATE DATABASE LISTINGS OF THE EDR REPORT.

Federal Database Listings

- ▼ **National Priorities List (NPL or Superfund) and Proposed NPL, EPA.** The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program.
  - *The EDR database report indicates no listings within the one-mile search radius of the subject site.*
- ▼ **Comprehensive Environmental Response, Compensation and Liability Information System List (CERCLIS), EPA.** The CERCLIS list contains data on potentially hazardous waste sites that have been reported to EPA by states, municipalities, private companies and private persons, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites that are either proposed to or on the NPL and sites, which are in the screening and assessment phase for possible inclusion on the NPL.
  - *The EDR Report indicates no listing within the 1/2-mile search radius of the subject site.*
- ► **CERCLIS – No Further Remedial Action Planned (NFRAP), EPA.** NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration.
  - *The EDR Report indicates one (1) listing within the ¼-mile search radius of the subject site.*

  The EDR Report (amended) indicates one (1) listing within the ¼-mile search radius of the subject site. The former Maui County Waikapu Dump is located immediately southeast of the subject site. See the amended EDR Report, Appendix B. CERCLIS listings indicate facilities that have a known or suspect abandoned, inactive or uncontrolled hazardous waste site.
- ▼ **Corrective Action Report (CORRACTS), EPA.** The CORRACTS report lists hazardous waste handlers with RCRA corrective action activity.
  - *The EDR Report indicates no listings within the one-mile search radius of the subject site.*
- ▼ **Resource Conservation and Recovery Information System (RCRIS), EPA/NTIS.** RCRIS includes selective information on sites that generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

- *The EDR Report indicates no listings of RCRIS treatment, storage and disposal (TSD) site within the ½-mile search radius of the subject site.*
- *The EDR Report indicates no listing for the subject property and no listing for a RCRIS large quantity generators within the ¼-mile search radius of the subject site. Large quantity generators are entities that generate at least 1,000 kg/month of non-acutely hazardous waste or 1.0 kg/month of acutely hazardous waste (Lg. Quan. Gen. - LQG).*
- *The EDR Report indicates no listing for the subject property and no listings for a RCRIS small quantity generator (Sm. Quan. Gen. - SQG) within 1/4-mile of the subject site. RCRIS small quantity generators are entities that generate less than 1,000 kg/month of non-acutely hazardous waste.*

▼ **Emergency Response Notification System (ERNS), EPA/NTIS.** Records and stores information on reported releases of oil and hazardous substances.

- *The subject site is not listed.*

State of Hawaii Database Listings

► **Sites List (SHWS), DOH.** A list of facilities, sites, or areas in which the Office of Hazard Evaluation and Emergency Response (HEER) has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

- *The subject site is not listed.*
- *The EDR Report indicates one (1) listing within the 1-mile search radius of the subject site.*

The Waiale Ash Pile is located northeast of the subject property (See EDR report, Appendix B). Also, see CERCLIS (NFRAP) listing above.

► **Permitted Landfills in the State of Hawaii (SWF/LF), DOH.** An inventory of solid waste disposal facilities or landfills in the State of Hawaii. These may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

- *The subject site is not listed.*
- *The EDR Report indicates no listing within the ½-mile search radius of the subject site.*

See amended EDR Report, Waikapu Dump (Appendix B) and CERCLIS (NFRAP) listing above.

▼ **Leaking Underground Storage Tank (LUST) database, DOH.** An inventory of reported leaking underground storage tank incidents.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within a 1/2-mile radius of the subject site.*

▼ **Underground Storage Tank (UST) database, DOH.** USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with DOH.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within ¼-mile of the subject property.*

4.2 Additional Environmental Record Sources

The subject property and properties within the minimum search distances were reviewed from the following record sources. Refer to Appendix B, EDR Radius Map Report, for a complete listing and description of all sites located within the designated search distances, details, and database release dates.

Federal Database Listings

▼ **Superfund (CERCLA) Consent Decrees (CONSENT), EPA Regional Offices.** Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **Records of Decisions (ROD), EPA.** ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **National Priority List Deletions (De-listed NPL), EPA.** A list of sites that have been deleted from the NPL where no further response is appropriate.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **Facility Index System/Facility Identification Initiative Program Summary Report (FINDS), EPA.** Contains both facility information and 'pointers' to other sources that contain more detail.

- *The subject site is not listed.*

▼ **Hazardous Materials Information Reporting System (HMIRS) DOT.** A list of hazardous material spill incidents reported to DOT.

- *The subject site is not listed.*

▼ **Material Licensing Tracking System (MLTS), Nuclear Regulatory Commission (NRC).** A list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements.

- *The subject site is not listed.*

▼ **Mines Master Index File (MINES), Department of Labor, Mine Safety and Health Administration.** Contains both facility information and 'pointers' to other sources that contain more detail.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the ¼-mile search radius of the subject site.*

▼ **Federal Superfund Liens (NPL Liens), EPA.** A list of properties whereby the EPA has filed liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability.

- *The subject site is not listed.*

▼ **PCB Activity Database System (PADS).** Identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify EPA of such activities.

- *The subject site is not listed.*

▼ **RCRA Administrative Action Tracking System (RAATS), EPA.** A historical archived database containing records on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by EPA. The database was discontinued on September 30, 1995.

- *The subject site is not listed.*

▼ **Toxic Chemical Release Inventory System (TRIS), EPA.** A list of facilities which release toxic chemicals to the air, water, and land in reportable quantities under SARA Title III, Section 313.

- *The subject site is not listed.*

- ▼ **Toxic Substances Control Act (TSCA), EPA.** Identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list.
  - *The subject site is not listed.*
- ▼ **Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA)/TSCA Tracking System (FTTS INSP and FTTS), EPA – Office of Prevention, Pesticides and Toxic Substances.** FTTS tracks administrative cases, pesticide enforcement actions, and compliance activities related to FIFRA, TSCA, and Emergency Planning and Community Right-to-Know Act (EPCRA).
  - *The subject site is not listed.*

State of Hawaii Database Listings

- ▼ **Release Notifications (SPILLS), DOH.** Releases of hazardous substances to the environment reported to the HEER Office. The following databases are included in the HEER Spill List:

  Release Notification Report: a compilation of releases reported to HEER.

  Hawaii Emergency Planning and Community Right-to-Know Act (HEPCRA): a list of facilities that have submitted Tier II and Form Rs as a reporting requirement.
  - *The subject site is not listed.*
- ▼ **Registered Wells and Dry Wells, DLNR.** (See Section 5.5.6). There are no registered wells listed for the subject property. *(2002 DLNR data).*
- ▼ **Air Quality Permit, DOH.** Current activities conducted on-site do not require an air quality permit.
- ▼ **Storm Water Discharge (NPDES) Permit, DOH.** Current activities conducted on-site do not require a NPDES permit.

County and Other Database Listings

Other local records of environmental interest that were reviewed or considered for review by VEC included:

- ▼ **Fire Department, County of Maui.** The Maui County Fire Department (MCFD) maintains file material that is not on a database. MCFD was contacted for an inquiry on the subject property.
- ▼ **Former Manufactured Gas (Coal Gas) Sites.** EDR provides exclusive information regarding the existence and location of Coal Gas sites.
  - The EDR Report indicates no listings within the one-mile search radius.
- ▼ **Grading/Grubbing Permit, County of Maui.** The current activities being conducted on-site do not require a grading/grubbing permit.
- ▼ **Hazardous Waste Disposal Documents.** VEC did not review any hazardous waste disposal documents.
- ▼ **Maui Electric Company.** Maintains records on county power transformers regarding PCB-containing equipment and equipment maintenance. One (1) pole-mounted electrical transformer was observed at the northeast corner of Lot 1 of the subject property (See Photo #20 and Figure 2, Appendix A).
- ▼ **Other Environmental Reports.** Environmental site assessment reports that were previously completed by VEC in close proximity to the subject site were reviewed.
- ▼ **Planning & Zoning, County of Maui.** According to the Maui County Department of Planning, the subject site's zoning is "Agricultural" and **is not** within the boundaries of the Special Management Area (SMA).

- ▼ **Property Tax Office, County of Maui.** The Maui County Property Tax Office maintains records of past ownership, maps, sketches and other information as it pertains to the subject property. (See also Section 7.1). The property owner is listed as Wailuku Agribusiness Company, Inc.
- ▼ **Wastewater Discharge Permit, County of Maui.** VEC did not identify any wastewater discharge permits registered to the subject property.

4.3 Physical Setting Source(s)

The following sources were reviewed for physical setting information (refer to Section 7.0 for a complete listing):

- Atlas of Hawaii;
- Civil Defense Tsunami Evacuation Map;
- Geologic and Topographic Map (Hawaii Atlas & Gazetteer);
- Groundwater Map and Water Quality Plan for State of Hawaii;
- U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, HI;
- U.S. Geological Survey, 7.5 Minute Topographic Map, Wailuku Quadrangle, 1983.

These data sources were used to provide information regarding physical characteristics of the subject site and surrounding area. This information is typically used in analysis of potential geological trends, which might impact environmental conditions of the subject site. Note that this investigation is not intended to identify geologic hazards associated with the subject property.

4.4 Historical Use Information Regarding the Property and Adjoining Properties

The following historical data sources were reviewed for this report (refer to Section 7.0 for a complete listing):

- Aerial Photographs;
- Department of Planning and Zoning, County of Maui;
- Maui County Fire Department (Fire Prevention Bureau / Hazardous Materials Division);
- Maui County Real Property Tax Records;
- Personal Interviews;
- Sanborn Maps (no coverage);
- State of Hawaii, Department of Health, Environmental Management Division;
- Environmental Date Resources (EDR).

Historic Aerial Photographs

A series of aerial photographs with coverage of the subject property and surrounding areas were examined. See Figure 2, Appendix A, for clarification of specific locations.

Table 1.0. Historical Aerial Photograph Analysis.

Date		Aerial Photo Analysis
12/20/50	SS:	Agricultural land use (sugarcane).
	N, S, W:	Agricultural land use (sugarcane).
	E:	Undeveloped vegetated land.
	RG:	Agricultural land use with undeveloped land to the east.
6/2/64	SS:	No changes noted.
	N, E, S, W:	No changes noted.
	RG:	No changes noted.
1/30/77	SS:	No changes noted.
	N, S, W:	No changes noted.
	E:	Agricultural land use (sugarcane). County landfill noted to the southeast.
	RG:	Water tank noted to the northeast.
9/11/85	SS:	No changes noted.
	N:	Kuikahi Drive added.
	E, S, W:	No changes noted.
	RG:	Agricultural land with increasing residential growth.
10/8/90	SS:	Crop changed from sugarcane to pineapple.
	N, S, W:	Crop changed from sugarcane to pineapple.
	E:	Agricultural landuse changed to commercial nursery. County landfill appears to be closed.
	RG:	Agricultural land with increasing residential.
5/3/97	SS:	Agricultural use has changed to small fields with banana shacks evident.
	N, S, W:	No changes noted.
	E:	Agricultural use has changed to small fields with banana shacks evident.
	RG:	Agricultural use with increased residential development.

Notes:

SS	Subject Site	S	Southern Adjoining Property
N	Northern Adjoining Property	W	Western Adjacent Property
E	Eastern Adjoining Property	RG	Regional Area

VEC did not observe any features on aerial photographs examined that would suggest the presence of significant vegetative stress, soil staining, or bulk storage of chemicals such as drums or tanks.

Vuich Environmental **End of Section**

5.0 SITE RECONNAISSANCE

Information regarding the storm water flow, property layout, physical characteristics, and adjoining property conditions are presented in Figure 2, Site Plan, and site photographs. (See Appendix A).

5.1 Methodology and Limiting Conditions

A site investigation focuses on obtaining information indicating the likelihood of identifying ***recognized environmental conditions*** in connection with the property and assessing the subject property in relation to surrounding land uses and natural surface features. It includes a physical inspection of the real property and any on-site building structures.

On April 27 and May 13, 2004, VEC personnel, Mr. Jeffrey Kermode and Joseph Beaulieu conducted an overall site inspection of the subject site. The method used to observe the subject property included: (1) walking the perimeter of the subject property; (2) conducting random and non-random traverses across the property; (3) walking along all noted access roads; and (4) thoroughly inspecting all areas of observed dumping. The property boundaries were not clearly defined, and the VEC investigator made estimates based on the property TMK map and aerial photography.

Certain physical obstructions limited the investigators from total property observations of native surface soils. Approximately twenty percent (20%) of the subject property's native surface soils were obscured by the presence of dense vegetation. The majority of the remaining property is covered with agricultural crops or tall grass.

VEC was unable to access all of the subject property as of the completion of this report. Two (2) shacks that appeared to be temporary personal residences were observed on site. To date, VEC's attempts to have access granted to these shacks and the surrounding area have been unsuccessful. If, in the future, access is granted and VEC's inspection discovers a recognized environmental condition, VEC will notify the client.

Any environmental conditions reported here are not intended to include minimal conditions that 1) generally do not present a material risk of harm to public health or the environment and 2) generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

5.2 General Site Setting

5.2.1 Current and Past Use(s) of the Property

Current Uses

According to the Maui County Tax Office, the current owners are listed as Wailuku Agribusiness Co., Inc.

The property is predominantly mixed use tenant agricultural fields and is currently not being used for industrial purposes. (See Figure 2, Appendix A).

Information presented here represents those items visually or physically observed or identified in the interviews or records review.

Past Uses

County Tax records indicate that historically the subject property was owned by Wailuku Sugar Company. In addition to sugarcane cultivation, the land was leased for several years to Maui Pineapple Company who used the land for pineapple cultivation.

The knowledge of past uses of the property was primarily made from aerial photographs and interviews. Topographic maps and the Hawaii Atlas provided limited regional information.

5.2.2 Current and Past Uses(s) of the Adjoining Properties and Surrounding Area

VEC has researched current uses of adjoining properties and at its discretion, past uses of the adjoining properties and the surrounding areas. Information presented here represents those items visually or physically observed or identified in the interviews or records review. The information is described herein as items that may indicate ***recognized environmental conditions*** with adjoining properties and those conditions that may indicate a high probability of migration of hazardous substances or petroleum products to the subject property.

Adjoining Property	Period	Land/Property Use	Concerns	Comments
North of Subject Site	Past	Sugarcane and pineapple cultivation.	Historical pesticide and fertilizer application on sugarcane and pineapple crops leading to possible soil and groundwater contamination.	Sugarcane and then pineapple cultivation have been active on this site for several years up until the late 1990's. During this time agricultural pest control chemicals and fertilizers, which have been long recognized by the U.S. Environmental Protection Agency (EPA) for contributing to the potential contamination of surface soils and groundwater systems have been used. Although chemicals used for sugarcane and pineapple crops could have been regularly used in significant quantities, they degrade with time in soil. Most agricultural chemical concerns typically arise when bulk (full strength) products leak or are spilled onto soils. However, it is possible that chemicals in long-term use remain at, or above, regulated levels.
	Present	Goodfellow Brothers field construction office.	Improper management or use of regulated or petroleum substances.	No evidence was obtained indicating improper management or use of regulated or petroleum substances.
East of subject site	Past	Maui County's Waikapu Landfill	Historical solid waste dumping leading to possible soil and groundwater contamination.	Due to the down gradient and predominantly down wind position of the landfill in relation to Lot 2 of the subject property, it is unlikely, yet possible for groundwater contamination to have potentially impacted the subject property. Additionally, the Waikapu Landfill is listed as NFRAP (See EDR Report addendum, Appendix B).
	Present	Future Waikapu Bypass and a commercial nursery operation.	None.	None.
South of subject site	Past	Sugarcane and pineapple cultivation.	Historical pesticide and fertilizer application on sugarcane and pineapple crops leading to possible soil and groundwater contamination.	See comments above (North of subject site, Past).
	Present	Fallow fields.	None.	None.
West of subject site	Past	Sugarcane and pineapple cultivation.	Historical pesticide and fertilizer application on sugarcane and pineapple crops leading to possible soil and groundwater contamination.	See comments above (North of subject site, Past).
	Present	Fallow fields.	Potential Pesticide migration onto the subject site via ground and surface water.	See comments above (North of subject site, Past).

The development of past uses of the adjoining properties was primarily made from interviews, VEC site reconnaissance, and aerial photographs. Topographic maps and the Hawaii Atlas provided limited regional information.

5.2.3 Topography

The regional area lies on the eastern lower slopes of the West Maui Mountains. Its physiographic type feature is named Kahului Isthmus. An isthmus is described as a low land link between former islands.

Locally, the elevation ranges from approximately three hundred and twenty (320) feet to three hundred and ninety (390) feet above mean sea level and is characterized by moderate topographic relief (6% slope) towards the east. On-site relief directs storm water towards the eastern portion of the property (See Figure 2). Storm water flow along Honoapiilani Highway is in a southerly direction. Flow along Waiale Road is in an easterly direction.

The nearest prominent natural feature is the Iao Stream located approximately one (1) mile to the north.

5.2.4 Geology and Soils

According to the U.S. Department of Agriculture, the following soil series underlies the subject site:

- Iao clay, 3 to 7 percent slope (IcB). Iao series soils consist of well-drained soils on alluvial fans and valley fill. These soils developed in alluvium derived from basic igneous rock. Permeability is moderately slow. Runoff is described as medium, and the erosion hazard is slight to moderate.

Other common, surface geologic phenomena investigated in an environmental site assessment are faults, landslides, rock falls, and volcanic eruptions. After examination of the relevant data, it has been determined by VEC that these geologic phenomena are not a factor to the subject site.

In 1992, the USGS reevaluated the seismic hazards for the State of Hawaii, and Maui County was classified as Zone 2B. This indicates that in any given year within a 50-year period (average building life span) there is a 10% chance that a .20g (force of gravity) horizontal ground acceleration may take place during the peak wave of an earthquake. Engineering design codes for this area should have considered this acceleration prior to construction. Buildings not in compliance with the Uniform Building Code (UBC) seismic provisions may be subject to some level of damage from earthquakes that exceed the .20g acceleration.

However, it should be noted that this is not an investigation for geological hazards.

5.2.5 Hydrology

The subject site area has an annual average rainfall of approximately 30 inches. The average temperature range from the annual high to the annual low is 81 degrees and 64 degrees Fahrenheit, respectively. The pre-development vegetation zone within this temperature and rainfall range is characterized as Lantana-koa haole shrubs. Characteristic plants consist of Lantana, koa haole, klu, panini, ilima and Natal redtop grass.

On-site drainage is in an easterly direction toward Waiale Road. A ditch transects the property from northwest to southwest and flows beyond the southern property line. (See Figure 2, Appendix A).

The pertinent Federal Insurance Rate Map (FEMA FIRM MAP #150003 0170 B dated map on June 1, 1981) depicts the area as minimal flooding (Zone C).

The Civil Defense Tsunami Evacuation Maps indicate the subject property **is not** within the Tsunami reach-zone. The Pacific Ocean is located approximately two (2) miles northwest of the subject site.

5.2.6 Hydrogeology

As with all islands of the United States, Maui is regulated by the Coastal Zone Management Act of the Clean Water Act. These two designations require protective comprehensive plans for groundwater management and limit the extent of certain types of development and land use. One important management criterion is the disposal of wastewater. The Water Resources Research Center has designated the groundwater management area as the *Iao Aquifer System* within the *Wailuku Aquifer Sector*. The groundwater underlying the subject site is defined as follows:

Table 4.0. Aquifer Classification of the subject site.

Aquifer	Aquifer Type: Hydrology & Geology	Status of Groundwater				
		Development Status	Utility	Salinity (mg/l Cl^-)	Uniqueness	Vulnerability to Contamination
Upper	Unconfined basal aquifer occurring in horizontally extensive lavas (Flank)	Currently Used	Drinking	Fresh	Irreplaceable	High

The following are descriptions of the aquifer classification codes, according to Water Quality Plan of 1992:

Aquifer Type Hydrogeology (basal, high level, unconfined, confined, or confined/unconfined: basal – freshwater in contact with seawater; *high level* – freshwater not in contact with seawater; *unconfined* – water table is the upper surface of the saturated aquifer; *confined* – aquifer is bounded by impermeable or poorly permeable formations; and *confined or unconfined* – the actual condition is uncertain.

Aquifer Type Geology: flank, dike, flank/dike, perched, dike/perched, and sedimentary.

Development Stage – currently used, potential use, no potential use: Aquifers are differentiated according to those already being used (currently used), those with potential utility (potential use), and those having no potential for development.

Utility – drinking, ecologically important, neither: Identifies aquifers by use.

Salinity – fresh, low, moderate, high and seawater: The gradation of groundwater from fresh to seawater is a feature of all basal aquifers in Hawaii. The upper limit of the standard for drinking water is 250 mg/l Chlorine (Cl^-) (fresh) and true seawater has a chloride content of 18,980 mg/l.

Uniqueness – irreplaceable and replaceable: The classes irreplaceable and replaceable are direct EPA derivatives. Virtually all-potable water in the state of Hawaii should be considered irreplaceable over the long term.

Vulnerability to Contamination – high, moderate, low, none: Because of the geographical limits of resources, interconnection among groundwater sources and the relatively rapid time of groundwater travel, aquifers can be described as being either vulnerable or not vulnerable to contamination.

The estimated depth to the basal groundwater ranges from approximately 300 to 350 feet below the ground surface, depending on the location on the subject property. The flow direction is expected to be in an easterly direction.

The subject site is located makai (below) of the Underground Injection Control (UIC) line. The UIC line is the designated boundary that divides protected inland areas situated over drinking water sources from seaward areas located over non-potable water sources. Sites makai of the UIC line are not considered drinking water sources and permit limitations are imposed by Maui County, Clean Water Branch (CWB).

5.2.7 Potable Water Supply and Sewage Disposal System

The property is undeveloped at this time. The shacks on-site could not be accessed to determine what water supply and sewage disposal systems they used, if any.

5.3 Interior and Exterior Observations

5.3.1 Hazardous/Regulated Substances and Petroleum Products in Connection with Identified Uses.

VEC did not identify any hazardous/regulated substances and/or petroleum products in connection with identified current uses as visually and physically observed on the property at the time of the site visit. However, VEC was limited in their investigation of the entire site (See Section 1.4). While no bulk storage of regulated substances was observed, it should be noted that small farming operations, like those observed on-site, do commonly use fertilizers and pesticides. VEC observed limited containers of petroleum products that were empty. No bulk storage of petroleum products and associated soil staining was noted.

5.3.2 Hazardous/Regulated Substances and Petroleum Products/Containers (not in connection with identified current uses).

VEC did not identify any hazardous/regulated substances and/or petroleum products that are not in connection with identified current uses as visually and physically observed on the property at the time of the site visit. There is no evidence of any historic misuse, improper bulk storage, or significant spills of hazardous or regulated substances on the subject property. However, VEC was limited in their investigation of the entire site (See Section 1.4).

A review of the historical information identified the subject property to be part of the Wailuku Sugar Company's Plantation that has been operating in this area for several decades. It was also discovered that Maui Land and Pineapple company leased the property for pineapple cultivation for several years up until 1998. Hazardous materials potentially associated with sugarcane and pineapple cultivation include pesticides and herbicides. The U.S. Environmental Protection Agency (EPA) has long recognized these chemicals as a contaminant to surface soils and ground water. Clayton Suzuki, Land Manager for Wailuku Agribusiness has provided a list of chemicals potentially used on site (See letter in Appendix B).

5.3.3 Unidentified Substance Containers

VEC did not observe any unidentified substances suspected of being possible hazardous/regulated substances or petroleum products as visually and physically observed on the property at the time of the site visit.

5.3.4 Storage Tanks

No indication regarding the historic or current presence of underground storage tanks (USTs) on the subject site was obtained through our review of regulatory databases, interviews or through VEC's site reconnaissance.

5.3.5 Odors

VEC identified no suspect odors on the subject property.

5.3.6 Pools of Liquid

The investigators did not observe any pools or sumps of liquids likely to be hazardous substances or petroleum products to the extent visually and/or physically observed on the subject property at the time of the site visit or from interviews or records review.

5.3.7 Indications of PCBs

Pole or pad-mounted transformers numbered 7777 or above are considered non-PCB containing by the Maui Electric Company. One (1) pole-mounted electrical transformer was observed on the subject property at the northeast corner of Lot 1. This transformer was determined to be non-PCB containing based on its ID number (See Photo # 20 and Figure 2 in Appendix A). This transformer appeared to be in good condition with no sign of leaking or staining.

Background Information:

Polychlorinated biphenyls (PCBs) are groups of manufactured organic chemicals that contain 209 individual chlorinated chemicals (known as congeners) and were introduced in 1929. PCBs have been used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. Products containing PCBs are old fluorescent lighting fixtures, electrical appliances containing PCB capacitors, old microscope oil, and hydraulic fluids.

The manufacture of PCBs stopped in the United States in 1977 because of evidence that they build up in the environment and cause harmful effects. The distribution in commerce of PCB containing items was banned in 1979 (40 CFR 761.20). The EPA aggressively enforces regulations concerning PCB manufacturing, use, distribution, release and disposal under the Toxic Substance Control Act (TSCA). This federal agency extensively regulates the use, servicing, and disposal of PCBs in electrical equipment by enforcing marking, notification, inspection, and record keeping requirements.

5.4 Interior Observations

5.4.1 Heating and Cooling Systems of On-site Building Structures

VEC identified several small shacks related to the tenant farming activities that did not have any heating or cooling systems. However, VEC was limited in their investigation of the entire site (See Section 1.4).

5.4.2 Stains and Corrosion

VEC did not identify any significant staining or corrosion in the shacks on the subject property. However, VEC was limited in their investigation of the entire site (See Section 1.4).

5.4.3 Indoor Wastewater Drains, Sumps and Grease Interceptors

No drains, sumps or grease interceptors were noted by VEC during the site reconnaissance.

5.5 Exterior Observations

5.5.1 Pits, Ponds, and Lagoons

There were no areas identified as man-made or natural depressions that are, or would have been, likely to hold waste liquids or sludge from industrial operations or other activities.

5.5.2 Stained Soil or Pavement

No significant petroleum-like staining was noted on the subject property. However, VEC was limited in their investigation of the entire site (See Section 1.4).

5.5.3 Stressed Vegetation

There were no areas of stressed vegetation identified on the subject property at the time of the site visit that are, or would have been, likely caused from something other than insufficient water (or flooding).

5.5.4 Solid Waste

There were no indications of significant solid waste dumping or suspect fill materials, mounds, depressions or excavations, observed on this property during the site reconnaissance, nor on historic aerial photographs. Historical on-site disposal practices are unknown. A limited amount of earth moving and filling activities have been undertaken by Goodfellow Brothers in the northeast corner of Lot 1. This is related to adjacent infrastructure improvements and is not considered a significant environmental concern. Agricultural tilling and grading has taken place on the subject property.

The following solid wastes were noted during the site reconnaissance (See Photos #4, #17, #19, #21):

- Landscape debris (i.e. tree limbs, palm fronds, grasses, shrubs, etc.);
- Construction debris (i.e. concrete, lumber, metal, plastics);
- Soil stockpiles of less than 10 square meters (no odors or staining were detected);
- Road material stockpile of less than 10 square meters (tarmac odor detected);

- White goods (discarded washers, dryers or refrigerators, etc.);
- Several abandoned vehicles are located on the subject property.

Some wastes may be considered "Special Wastes" according to the Hawaii Administrative Rules (HAR) on Solid Waste, Title 11, Chapter 58.1. Special wastes are those wastes that do not fit in the mixed municipal solid waste (MMSW) category, either by general nature or because of special handling requirements. Special waste categories include: asbestos, sludge, medical waste, used oil, batteries, agricultural wastes, tires, derelict vehicles and white goods (i.e., appliances). Locally, the County of Maui, Department of Public Works, Solid Waste Division administers the disposal of these materials. These wastes need to be disposed of in a permitted solid waste landfill such as the Maui County Central Landfill. Special wastes' management needs to be performed in a manner that complies with all local, state, and federal regulations as applicable to the specific waste type.

5.5.5 Wastewater or Storm Water – Discharge Drains, Dry Wells, Drainage Ways, and Retention Basins

VEC did not identify any storm water drains located along the property boundaries. Some ditches and sewer manholes were noted along the eastern property boundary. These relate to the future Waikapu Bypass (See Figure 2, Appendix A).

Any future grubbing or grading activity that may take place on the subject site (especially if > 1 acre of soil disturbance) will likely require, both a Maui County Grading Permit and a Department of Health, Clean Water Branch, NPDES (National Pollutant Discharge Elimination System) permit.

5.5.6 Wells

From VEC's observations and database search, there are no production, domestic, abandoned, irrigation or monitor wells located on the subject site. Wells located near the subject property are mainly used for irrigation purposes or are unused at this time. See Figure 1, Appendix A for well locations.

5.5.7 Septic and Cesspool Systems

VEC did not obtain evidence of any current or historic septic or cesspool system located on the subject site. However, VEC was limited in their investigation of the entire site (See Section 1.4).

5.6 Non-Scope Considerations

The concerns listed below are not normally considered relevant under CERCLA, however, they may be considered regulated under other environmental laws and ordinances and may present a potential liability to the property owner.

5.6.1 Asbestos-Containing Materials (ACM)

The on-site structures inspected by VEC did not appear to consist of any asbestos-containing building materials. VEC did not note any significant quantities of construction debris that may contain asbestos. However, VEC was limited in their investigation of the entire site (See Section 1.4).

Background Information:

Asbestos was widely used in building materials and in fire retardant applications up through the 1980s. Asbestos use in the United States did not start to decline until the EPA banned the spray-applied materials during 1973-1978. Further restrictions on U.S. manufactured asbestos products continued into the 1990s. The EPA ban rule and phase-out of all asbestos-containing materials (ACMs) was to be implemented in stages from 1990 to 1997, but the Rule was overturned in federal court.

Asbestos is a known health hazard causing progressive lung scaring and cancer. Asbestos related conditions usually develop within 15 to 40 years after exposure. Exposed smokers have an increased risk factor of 50 to 90 times that of the non-smoking population.

State and federal rules have established standards for the use and control of ACM. These standards apply to worker protection, notification procedures, renovation/demolition activities, and construction debris (waste) management.

Under the EPA's Asbestos Hazard Emergency Response Act (AHERA), 40CFR763, asbestos-containing material (ACM) is defined as any substance whose asbestos content exceeds one percent (1%) of the total volume as determined by Polarized Light Microscopy (PLM) analysis. Building inspector training, sampling procedures and laboratory analysis are also addressed under this rule. Some aspects of this rule have been extended to public and commercial buildings. The Hawaii Administrative Rules 11-502 have essentially adopted EPA's AHERA standard.

Current OSHA regulations for occupational exposure to asbestos hazards require commercial building owners to *presume* all thermal system insulation, sprayed or textured surfacing materials and asphaltic and vinyl flooring installed in buildings constructed before 1981 to contain ACM. The Federal Occupational Safety and Health Act (OSHA) Construction Standard for Asbestos requires that building owners communicate any potential or actual asbestos hazards (29CFR1926.1101(k)). Owner/Operators must inform in-house employees and any outside contractor (workers) who apply or bid for work in or adjacent to areas known or *presumed* to contain asbestos. Included asbestos materials are Thermal system insulation (TSI), sprayed or troweled-on surfacing materials, and asphalt or vinyl flooring material installed prior to 1981. Hawaii Occupational Safety and Health (HIOSH) under HAR 12-141.1 has adopted the federal standard.

Under EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) 40CFR Part 61, are requirements for renovation and demolition work involving ACM.

5.6.2 Lead-Based Paint

Due to the age of the structures noted by VEC, some of the buildings may contain lead-based paints. VEC did not note any significant quantities of construction debris that may contain lead-based paint. However, VEC was limited in their investigation of the entire site (See Section 1.4).

Background Information:
Lead is a metal element in pure form but is found in other chemical compounds used within manufactured and formulated products. Among these are pipe solder, paint and other coatings and water pipes - items commonly found in older buildings and homes.

Lead becomes toxic to the human body even in low levels by chronic over exposure. The exposure may occur by breathing dust, eating dust (on food, tobacco, fingers, or eating paint chips (children)). Lead poisoning affects the brain and central nervous system; especially susceptible are young children. Lead is also known to impact kidney and liver functions.

The EPA/HUD defines lead-based paint as paint or other coatings containing lead equal to or in excess of 0.5% lead by weight or 1.0 mg/cm^2. The prevalence of lead-based paint in housing built before 1940 is especially high according to research conducted by the U.S. Department of Housing and Urban Development (HUD). After 1940, its use diminished until 1972 when U.S. manufactured housing paint became regulated at 0.5 percent lead by weight and "banned" in 1978; this means that paint could not be manufactured and sold for housing use if it contained lead above the U.S. Consumer Products Safety Commission's (CC) 0.06 percent by weight. The "ban" provided a basis for using the cut-off date of 1978 when disclosing the possibility of lead-containing paint in sales and rentals of housing units.

Any detected lead-level in paint below HUD and the CPSC's criteria remains an environmental concern under the U.S. Occupational Safety and Health Administration's (OSHA) Lead Standard for Construction Workers, 29CFR1926.62 and the HIOSH equivalent, HAR 12-148.1. Communication of lead-levels in paint is required for worker safety, when conducting renovation or demolition, and for construction debris (waste) management.

5.6.3 Arsenic-Containing Substances

The on-site structures inspected by VEC did not appear to contain arsenic (canec). VEC did not note any significant quantities of construction debris that may contain elevated levels of arsenic. Pesticides historically used on-site could have included arsenic-containing compounds. However, VEC was limited in their investigation of the entire site (See Section 1.4).

Background Information

Arsenic, like several other heavy metals, tends to accumulate in the body. Ingestion of a small dose may seemingly exert no adverse effect at all, while ingestion of multiple small doses could cause death. In lesser amounts, arsenic-containing compounds cause other health problems, like mottling of the skin, skin lesions, nervous disorder, and severe, irreversible liver damage. Arsenic is a human carcinogen, causing skin tumors when ingested and lung tumors when inhaled.

Arsenic-containing compounds were once used as components of some inorganic pesticides. In the 1940s, these pesticides were used to control insects and rodents.

To protect against exposure to high arsenic concentrations, OSHA requires workers to use air-purifying respirators and to wear protective clothing in areas where airborne arsenic compounds are known to exist.

The Resource Conservation and Recovery Act (RCRA), Subtitle C lists arsenic and arsenic-containing compounds as a hazardous waste. Therefore, construction/demolition debris (waste) management should be conducted in accordance with all Federal, State, and Local regulations. This typically requires waste segregation into construction material and dust/debris waste. Sampling using the Toxicity Leach Characteristic Procedure (TCLP) for arsenic is required for hazardous waste determination.

5.6.4 Radon

VEC did not identify any man-made products on the subject property that are known or suspected to emit radioactive decay elements.

Background Information:

Radon is a colorless and odorless radioactive gas that can produce health effects such as cellular injury. Radon gas can occur in the natural environment as concentrations from certain rocks and geologic conditions have a high radon-emanation potential.

These surface rock types are not known to occur in Hawaii. It is possible that increased concentrations of Radon could occur in regions where geologic fault and volcanic rift zones may release gases from deeper earth sources. However, the State of Hawaii, Department of Health (DOH) has not addressed concerns for any significant levels of gas to occur anywhere in Hawaii. This was based on the 1992 and 1996 DOH investigations conducted in elementary schools throughout the State.

5.6.5 Lead in Drinking Water

The subject property is not developed for potable water. This section does not apply.

5.6.6 Ecological Resources, Endangered Species, Cultural and Historic Resources, and Wetlands

There are no known wetlands, critical habitats, or threatened and endangered species designated for the subject site. The subject site is not located within the County of Maui's Special Management Area (SMA).

5.6.7 Indoor Air Quality

VEC did not identify any building surfaces that had characteristics that resembled possible mold contamination at the time of the site visit. VEC did not observe any mold related odors. However, VEC was limited in their investigation of the entire site (See Section 1.4).

Background Information:
Indoor air quality (IAQ) problems primarily result from indoor pollution sources that release gases or airborne particles. The term "Sick Building Syndrome" (SBS) is used to describe situations in which building occupants experience acute health and discomfort effects that appear to be linked to time spent in a building and may be localized in a particular room or zone or may be widespread throughout the building. Frequently, problems result when a building is operated or maintained in a manner that is inconsistent with its original design or prescribed operating procedures or as a result of poor building design or occupant activities.
Sources of indoor air contaminants can originate from within the building or be drawn in from the outdoors. The following causes contribute to IAQ problems:

1. *Inadequate ventilation* – As a result of the oil embargo in 1973, national energy conservation measures called for a reduction in the amount of outdoor air provided for ventilation. In many cases the reduced outdoor air ventilation rates were found to be inadequate to maintain the health and comfort of building occupants. Potential air pollutant sources in ventilation or heating, ventilating, or air-conditioning (HVAC) systems include, but are not limited to: dust or dirt in ductwork; microbiological growth (i.e. mold, mildew, or bacteria); improper use of biocides, sealants, and cleaning compounds; improper venting of combustion products; and refrigerant leakage. Inadequate ventilation may increase the concentrations of these indoor air contaminants.
2. *Biological contaminants* – Bacteria, molds, pollen and viruses are types of biological contaminants. These contaminants may breed in stagnant water that has accumulated in ducts, humidifiers and drain pans, or where water has collected on ceiling tiles, carpeting, or insulation. Surfaces exposed to high humid conditions with limited air movement may also be subject to microbiological contamination.
3. *Chemical contaminants from indoor sources* – Most indoor air pollution comes from sources inside the building. Potential air pollutant sources of indoor chemical contaminants include, but are not limited to: adhesives, carpeting, upholstery, manufactured wood products, pesticides, combustion products (i.e. carbon monoxide, carbon dioxide, and nitrogen oxides), and cleaning agents emitting volatile organic compounds (VOCs). Tobacco smoke contributes high levels of VOCs, other toxic compounds, and respirable particulate matter. Research has shown that some VOCs can cause chronic and acute health effects at high concentrations, and some are known carcinogens.
4. *Chemical contaminants from outdoor sources* – The outdoor air that enters a building can be a source of indoor air pollution. Potential air pollutant sources of outdoor chemical contaminants include, but are not limited to: motor vehicle exhausts; plumbing vents; combustion products (i.e. carbon monoxide, carbon dioxide, and nitrogen oxides); and building exhausts (i.e. bathrooms and kitchens). These contaminants can enter the building through poorly located air intake vents, windows, and other openings.

Indicators of SBS or IAQ related health problems include, but are not limited to, headache, eye, nose, or throat irritation, dry cough, dry or itchy skin, dizziness or nausea, fatigue, and sensitivity to odors. Most complaints or symptoms are relieved soon after leaving the building.

5.6.8 High Voltage Transmission Lines

Transmission and or distribution lines are located along the northern, eastern and western property boundaries. These lines are not a concern to the subject property at this time and would unlikely be a concern for any future development on site. However, an EMF (Electromagnetic Frequency) survey can be conducted by MECO (Maui Electric Company) if there is client concern.

Vuich Environmental End of Section

6.0 FINDINGS, OPINIONS, AND CONCLUSIONS

6.1 Recognized Environmental Conditions

Recognized environmental conditions, as defined by ASTM Standard E1527-00, are the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. ***Recognized environmental conditions*** are described with regard to (1) the nature and extent of the environmental condition, (2) potential or actual environmental threat, (3) potential for transport (migration) of any environmental conditions, and (4) consideration for further investigation. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

VEC has performed this Phase I Environmental Site Assessment in conformance with the scope and limitations of the ASTM Practice E 1527-00 for the property located southeast of the intersection of Honoapiilani Highway and Kuikahi Drive in the community of Wailuku, Maui (TMK Number (2) 3-5-02:01 portion, defined as the subject property. Any exceptions to or deletions from, this practice are described in Section 1.4, Limitations and Exceptions, of this report.

This assessment has revealed no evidence of *recognized environmental conditions* in connection with the property, except for the following:

6.1.1 Database Listings (See Section 4.0 & EDR Report, Appendix B)

Findings/Concerns:

The subject site is not listed on any Federal, State or County databases as a site with any recognized environmental concerns. There is one (1) nearby listed site (Waiale Ash Pile), as indicated by the EDR Report, within the appropriate search distance from the subject property. In addition, a former county landfill (Waikapu Dump) is located adjacent to the subject property (See Figure 2, Appendix A and EDR Report Addendum, Appendix B). These sites are located down gradient of the subject site.

Opinions and Conclusions:

Due to the close proximity of the former Waikapu Landfill relative to Lot 2 of the subject property it is possible that this site has or has had reasonable potential to adversely impact the environmental condition of Lot 2 of the subject property. However, due to the down gradient and predominantly down wind location of this landfill relative to Lot 2 of the subject property it is less likely that groundwater and or surface soils would contain contamination above regulated levels. Groundwater and or soil sampling could be conducted to confirm this.

6.1.2 Current and Historic Use or Storage of Hazardous and Regulated Substances (See Section 5.3.2)

Findings/Concerns:

There is no evidence of any historic or current significant misuse of hazardous or regulated substances on the subject property. Historically, pineapple and sugarcane agriculture had been occurring on, and adjacent to, the subject property for several decades. These operations have been associated with the application of pesticides and fertilizers.

Opinions and Conclusions:

While the use of pesticides and herbicides on and near the property does not necessarily result in adverse impacts to the environmental condition of the subject site, it is possible (yet unlikely) for residual amounts of these substances to accumulate to concentrations that present a potential threat to human health or the environment. Soil sampling and laboratory testing would provide additional information to evaluate potential environmental effects from these agricultural activities. A standard, pro-active procedure would be to conduct such a survey prior to future development at this site. There is, however, no regulatory requirement to conduct this sampling.

6.2 Other Environmental Concerns

The concerns listed below may not be considered ***recognized environmental conditions*** by ASTM definition. However, they may be considered regulated under other environmental laws and ordinances and may present a potential liability to the property owner.

6.2.1 Solid Waste Management (See Section 5.5.4)

Findings/Concerns:

A moderate amount of "wildcat" dumping has taken place on-site. Some items noted included regulated items (white goods). Due to some heavily vegetated areas, the entire subject site and underlying soils were not visibly inspected.

Opinions and Conclusions:

Any waste disposal should be in a permitted solid waste landfill or recycled in a manner that complies with all local, state, and federal regulations as applicable to the specific waste type with special attention given to regulated items.

It is important to note that if additional clearing of the property commences and large amounts of construction debris or unidentifiable substances (containers) are further discovered, proper waste identification, testing and applicable waste handling/disposal procedures are followed.

6.2.2 Surface Waters and Area Aquifer Protection (See Section 5.5.5)

Findings/Concerns:

Development may be planned for the subject site. For any future grubbing and grading and construction activities planned for the site, the property owner should be aware of the potential for contaminants to run off-site and into on-site watercourses or adjacent storm water drains. Products of concern relating to any future development activity would be earthen material (silt), oils, antifreezes and other fluids from automobile or on-site machinery, or leaks from on-site stocked items.

Opinions and Conclusions:

Future land clearing projects will likely require a County of Maui grading/grubbing permit and if the size of a project creates greater than one (1) acre of soil disturbance, the developer will also require a National Pollution Discharge Elimination System (NPDES) General Permit (State of Hawaii, Department of Health, Clean Water Branch).

In order to minimize any potential regulatory profiling of the subject site as a potential responsible party for any newly discovered groundwater or surface water contamination, management may consider practicing conservative, proactive environmental policies. These policies might include written environmental protection contracts with any construction contractors and posted notices regarding any use, storage and handling of hazardous substances and/or petroleum product. Special attention should be addressed to storm water entering the nearby storm drains or drainageways.

Vuich Environmental **End of Section**

The conclusions stated above should not be construed to mean that any regulatory agency would have the same opinion as this author, nor is any implication proposed therefrom. The results of this environmental assessment are intended for general reference purposes only and are not intended as legal advice. The advice of legal counsel should be sought in regard to individual facts, circumstances and interpretation of environmental liability.

7.0 REFERENCES

7.1 Published References

1. American Standard of Testing and Materials, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, E1527-00, 2000.

2. "Atlas of Hawaii", 2nd Edition, Department of Geography, University of Hawaii at Hilo, 1983, University of Hawaii Press.

3. "Atlas of Hawaii", 3rd Edition, Department of Geography, University of Hawaii at Hilo, 1998, University of Hawaii Press.

4. County of Maui, Real Property Tax Division, Historical Records for TMK Number (2) 3-5-02:01 (portion). April 21, 2004.

5. Hawaii Administrative Rules, Title 11, Department of Health, Chapter 58.1, Solid Waste Management Control.

6. State of Hawaii, Department of Health, Solid and Hazardous Waste Branch, Underground Storage Tank Section, List of Leaking Underground Storage Tank Release Sites, August 2003.

7. State of Hawaii, Department of Health, Solid and Hazardous Waste Branch, Underground Storage Tank Section, List of Underground Storage Tank Facilities, August 2003.

8. State of Hawaii, Department of Health, Voluntary Response Program (VRP), List of Voluntary Response Program Sites, October 2003.

9. State of Hawaii, Department of Health, Office of Hazard Evaluation and Emergency Response, List of Release Notifications, September 2000.

10. State of Hawaii, Department of Health, Office of Hazard Evaluation and Emergency Response, List of Sites List, July 2001.

11. State of Hawaii, Department of Land and Natural Resources, Registered Wells and Dry Wells, 2002.

12. State of Hawaii, Department of Land and Natural Resources, "State of Hawaii Water Quality Plan and Groundwater Map", June 1990, Revised December 1991.

13. U.S. Department of Agriculture, Soil Conservation Service, "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii", 1972.

14. U.S. Environmental Protection Agency, Office of Air and Radiation et al., Indoor Air Facts No. 4 (revised) Sick Building Syndrome, April 1991.

15. U.S. Environmental Protection Agency, Building Air Quality: A Guide for Building Owners and Facility Managers, 1991.

7.2 Map and Other References

1. Environmental Data Resources, Inc., "The EDR Field Check Report", May 11, 2004.
2. Federal Emergency Management Agency, "Flood Insurance Rate Map", Number #150003 0170B dated June 1, 1981.
3. R.M. Towill Corporation, Aerial Photographs, Honolulu, Hawaii.
4. Air Survey Hawaii, Aerial Photographs, Honolulu, Hawaii.
5. Sanborn Maps (no coverage)
6. U.S. Geological Survey, 7.5 Minute Topographic Map, Wailuku Quadrangle, Hawaii 1983.
7. Site plan map provided by Carlsmith Ball, LLC.

7.3 Record of Personal Communications

Table 3.0. List of personal interviews conducted by VEC.

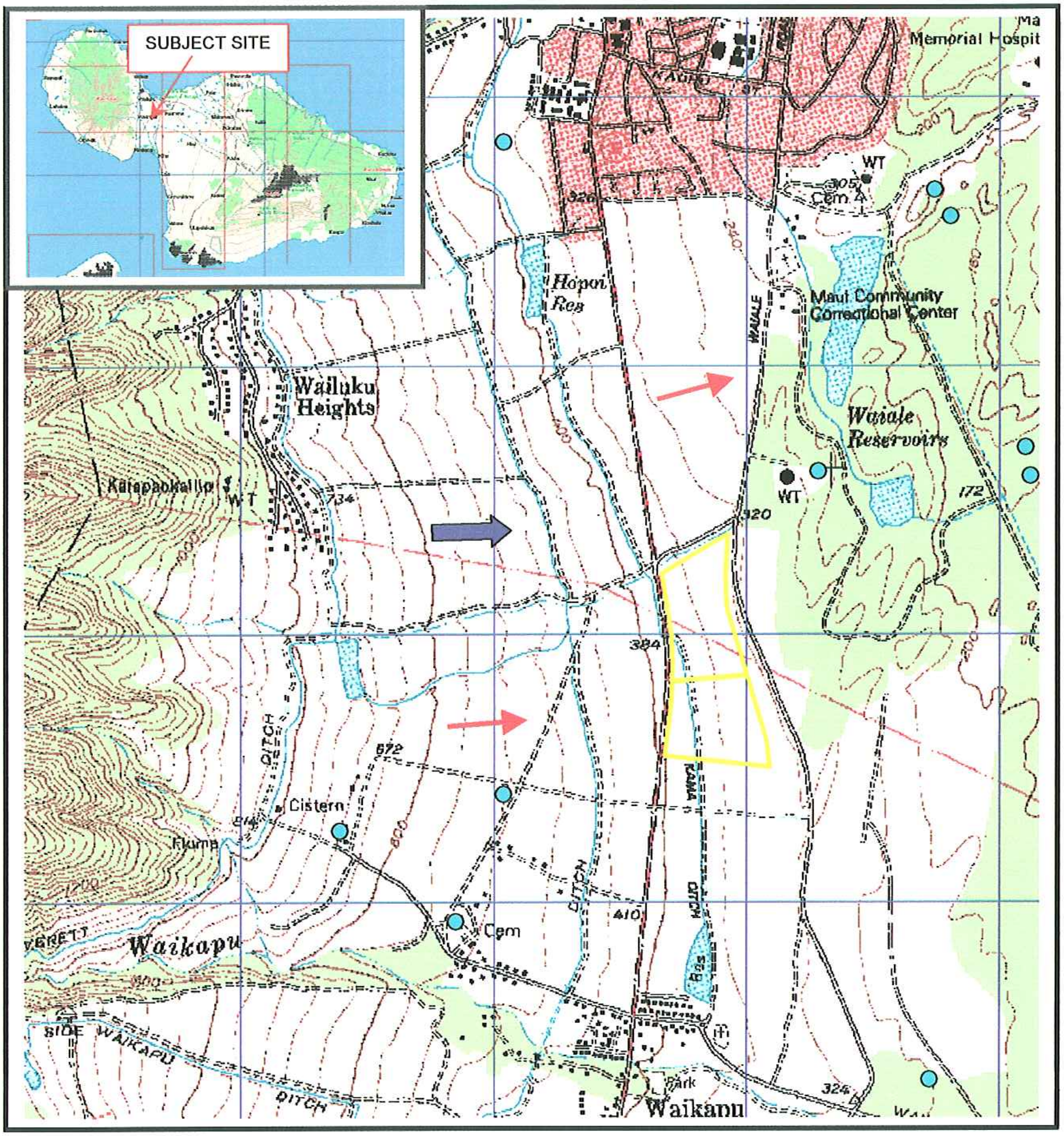
Date	Interviewee	Title & Organization	Address	Phone Number
4/14/04	Mr. Thomas Leuteneker	Counsel, Carlsmith Ball, LLC.	One Main Plaza, 2200 Main St., Wailuku, HI 96793	(808)242-4535
4/22/04	Mr. Clayton Suzuki	Land Manager, Wailuku Agribusiness	255 Waiko Rd Wailuku, HI 96793	(808)244-2208
4/22/04	Ms. Jackie Takakura	Administrative Officer, Maui County Department of Water Supply	200 South High Street Wailuku, HI 96793	(808) 270-8046
4/26/04	Mr. Randall Moore	Manager, Hawaii Commercial & Sugar Company	Puunene, HI	(808) 877-6968
4/28/04	Mr. Derrick Heafey	Environmental Manager, Hawaii Commercial & Sugar Company	Puunene, HI	(808) 877-2958

Vuich Environmental End of Section

Appendix A:

Maps, Plans, and Photographs

FIGURE 1: REGIONAL SETTING MAP



- Subject Property
- Projected Groundwater Flow
- Regional Surface Water Flow
- USGS Water Wells (10/2002)

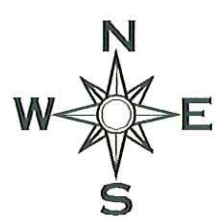
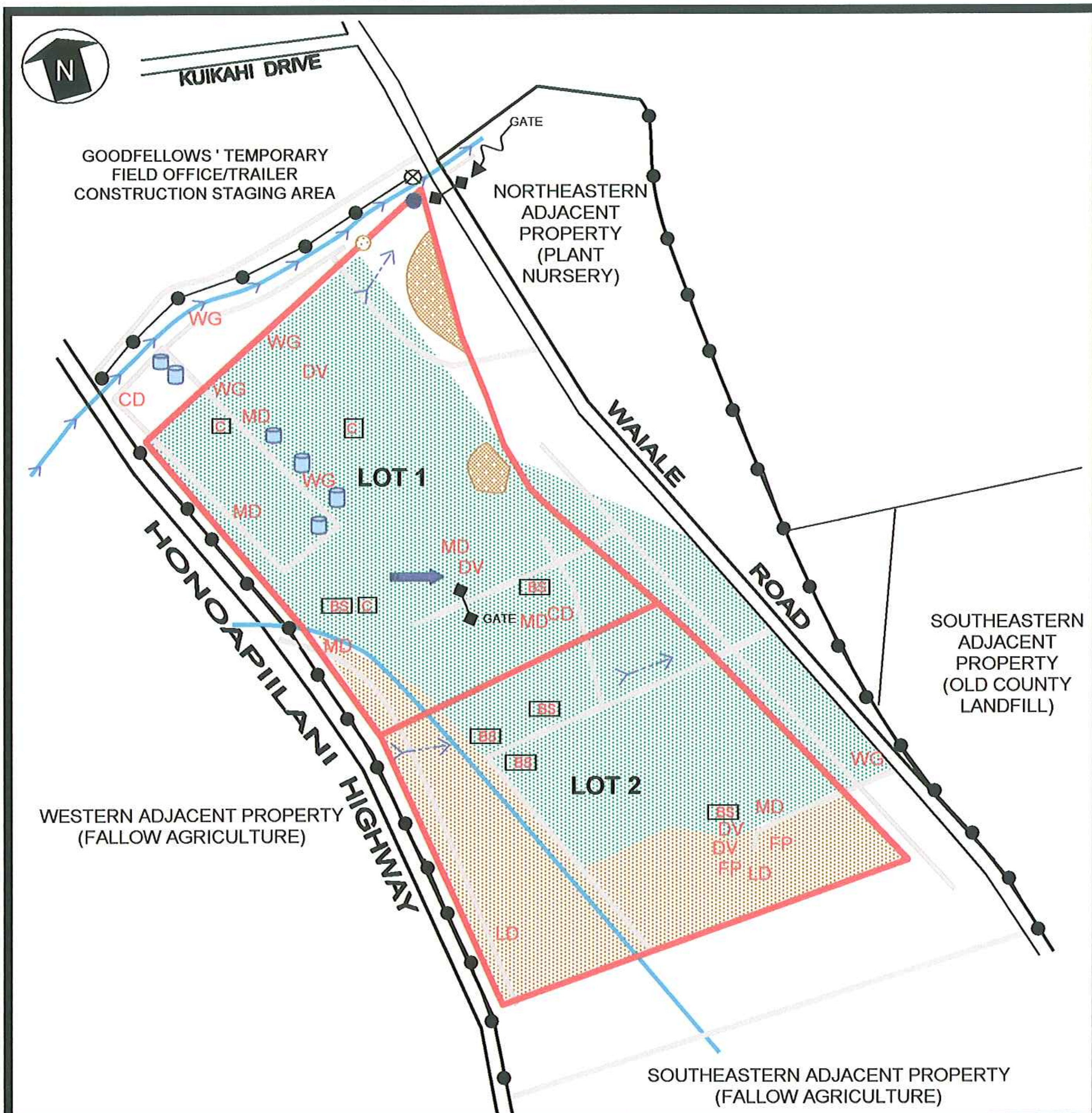


FIGURE 2: SITE PLAN



LEGEND

- SUBJECT PROPERTY BOUNDARIES
- ADJACENT PROPERTY BOUNDARIES
- PROJECTED GROUNDWATER FLOW
- PROJECTED STORMWATER FLOW
- UNPAVED ROAD
- CURRENT AGRICULTURE (BANANAS, PAPAYAS, ETC.)
- FALLOW AGRICULTURE
- FILL FOR ROAD WORK
- TELEPHONE TRANSMISSION CABLE

- CD CONSTRUCTION DEBRIS
- DV DERELICT VEHICLES
- FP FILL STOCKPILE
- LD LANDSCAPING DEBRIS
- MD MISCELLANEOUS DEBRIS
- WG WHITE GOOD

- POLE-MOUNTED TRANSFORMER
- SAND PILE
- SEWER MANHOLE
- 55 GALLON DRUM (EMPTY)
- C CHICKEN COUPS
- BS BANANA SHACK

SCALE	Not to scale
DATA BY	JB
DRAWN BY	MC
DATE	5/14/2004

FIGURE 3: TAX MAP KEY

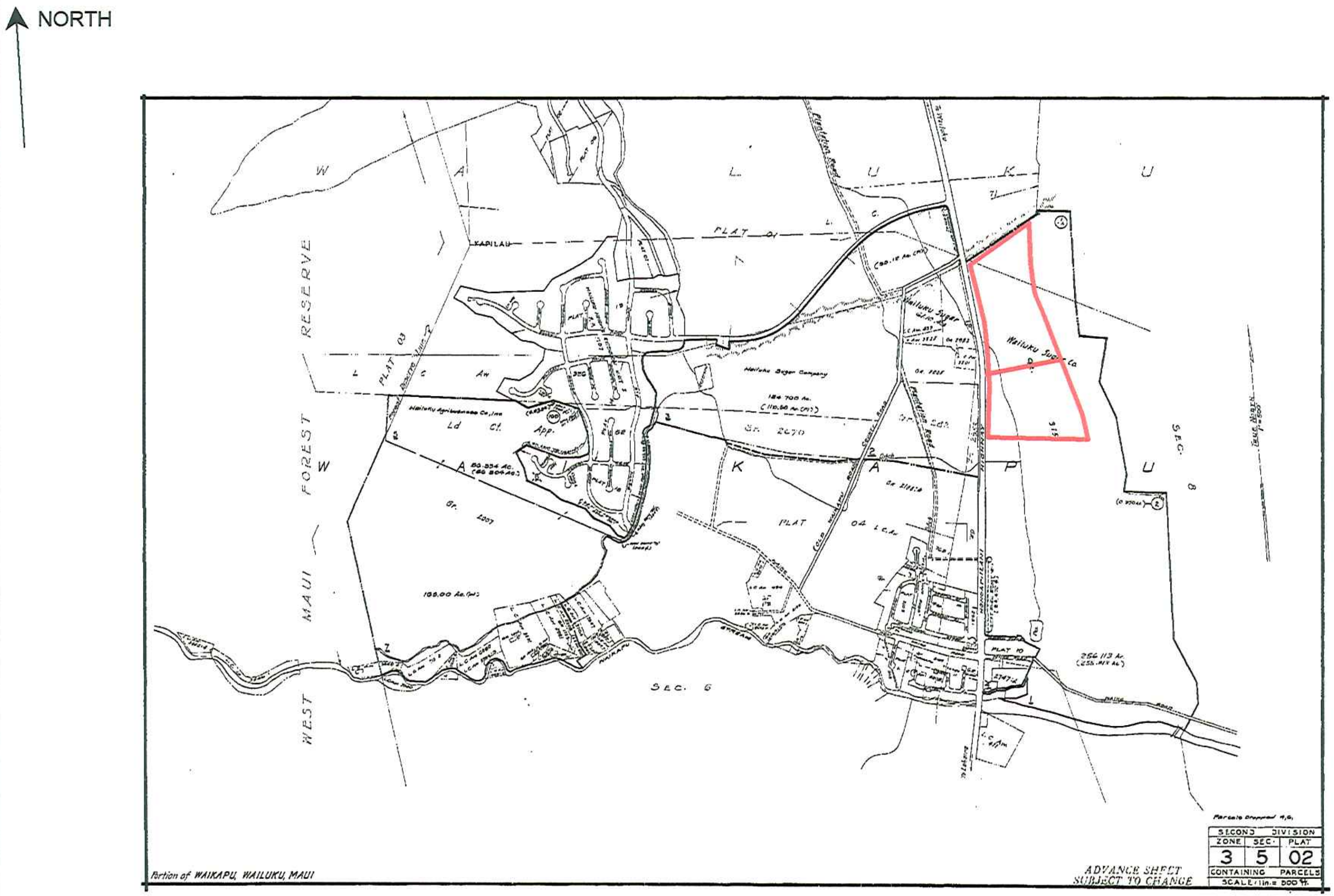


PHOTO 1

Northwesterly view of the central portion of Lot 1 of the subject property from the eastern property line.

PHOTO 2

Westerly view of the eastern portion of Lot 2 from the eastern property line.

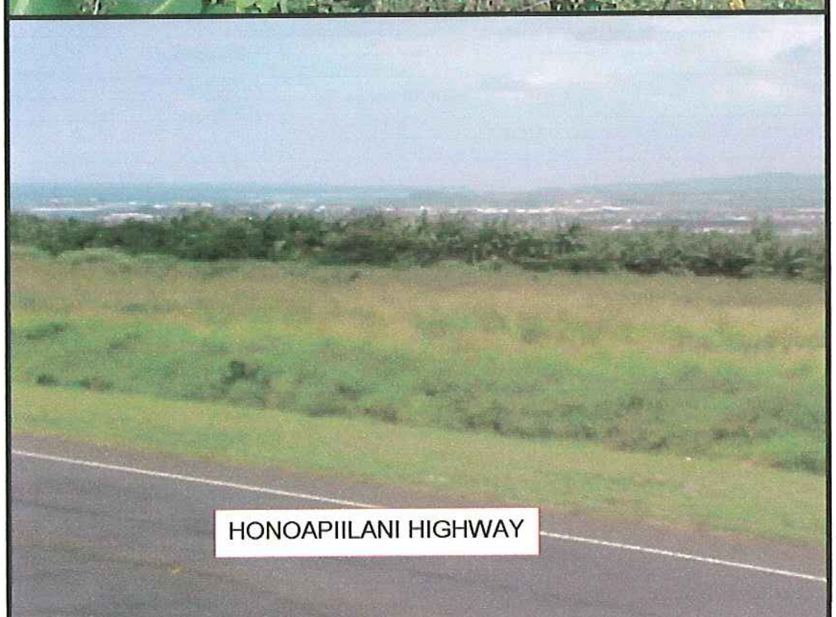


PHOTO 3

Northeasterly view of the south-western portion of Lot 2 of the subject property. The picture was taken from the southern portion of the western property line.

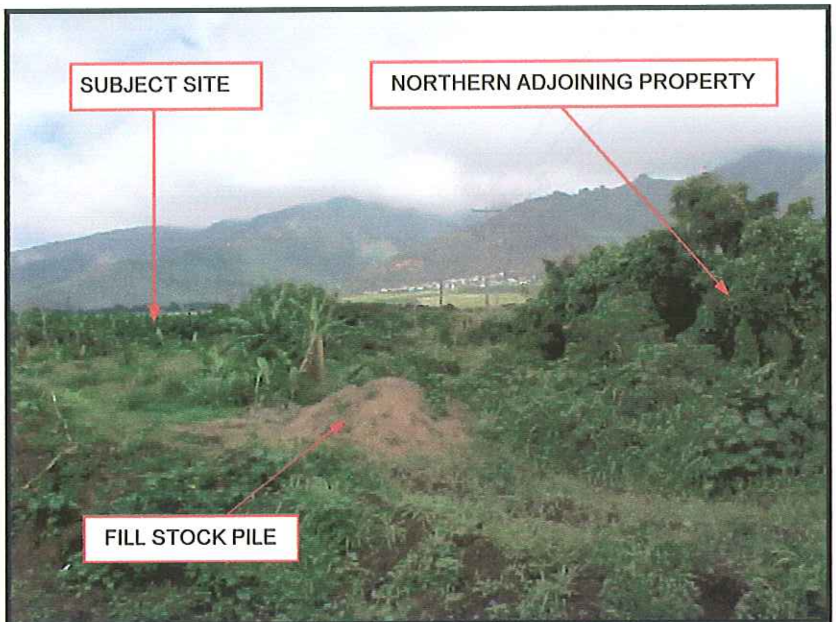


PHOTO 4

Westerly view of Lot 1's northern boundary line from the northeast property corner.

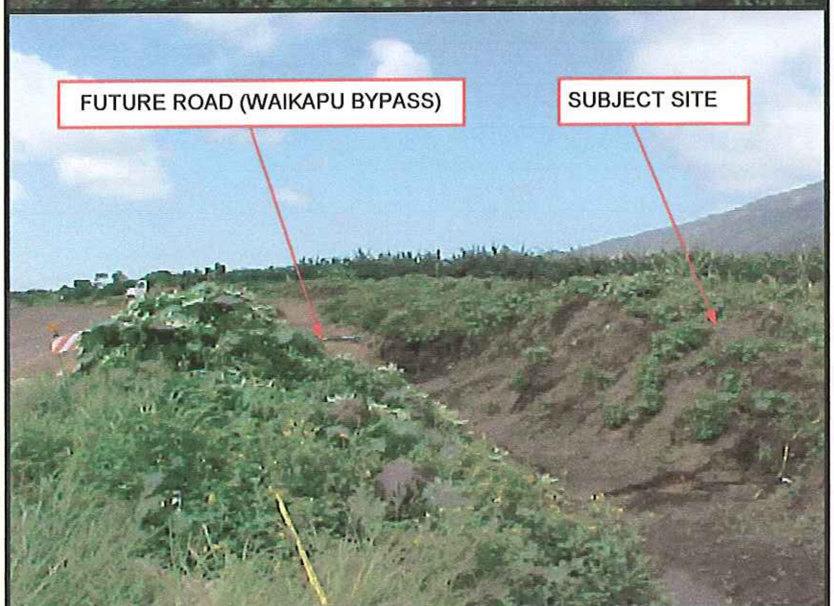


PHOTO 5

Southerly view of Lot 1's eastern property line from the northeast property corner.

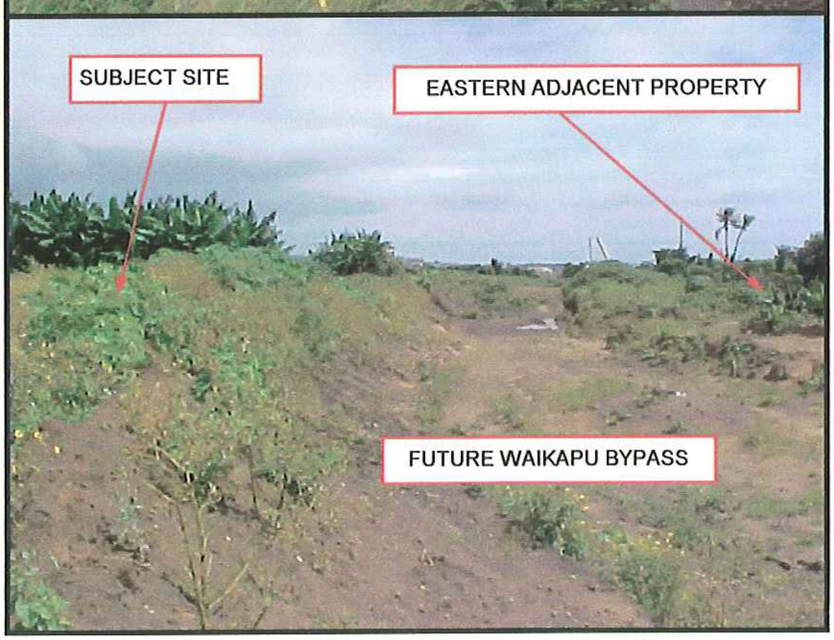


PHOTO 6

Northerly view of Lot 1's eastern property line from near the intersection of Lot 1 and Lot 2 on the eastern property line.

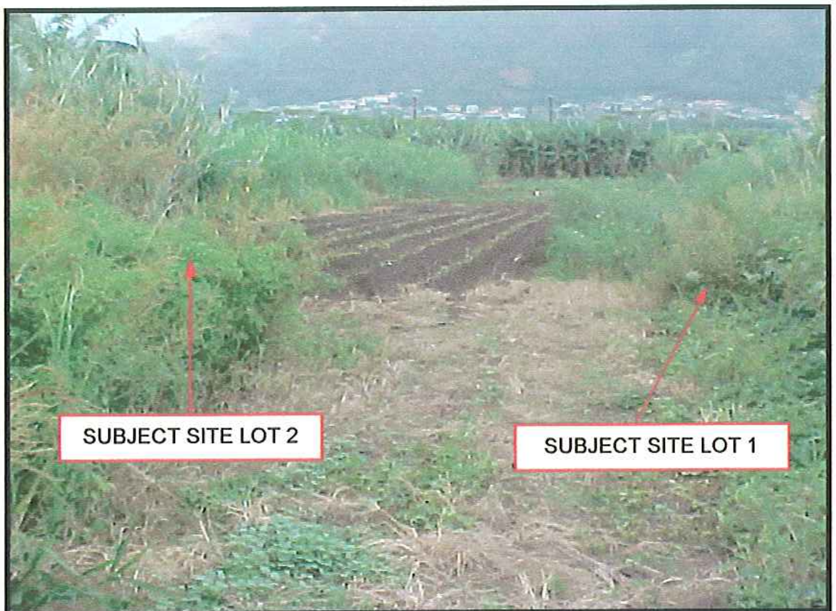


PHOTO 7

Easterly view along Lot 1's southern property line from the intersection of Lot 1 and Lot 2 on the eastern property line.

PHOTO 8

Northerly view of Lot 2's eastern property line from the southeast property corner.

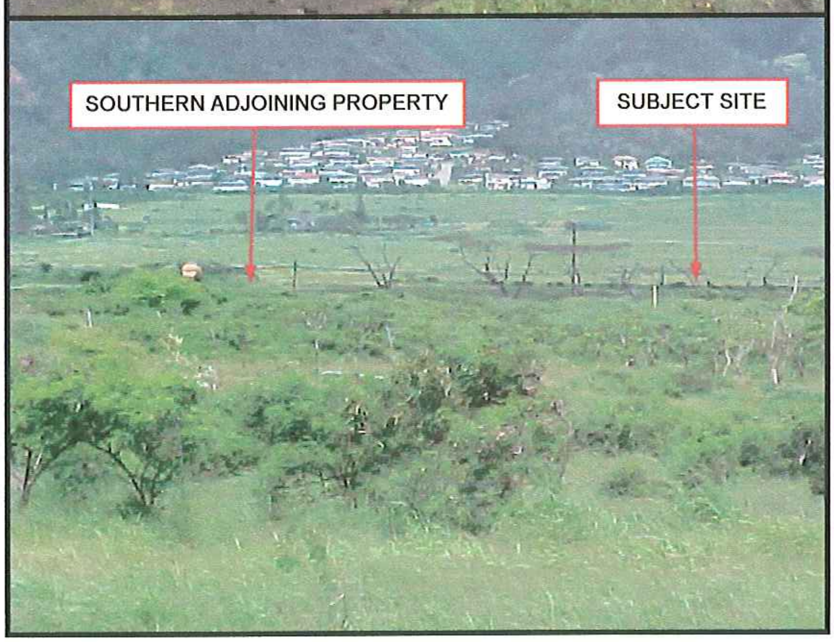


PHOTO 9

Easterly view along Lot 2's southern property line from the southeast property corner.

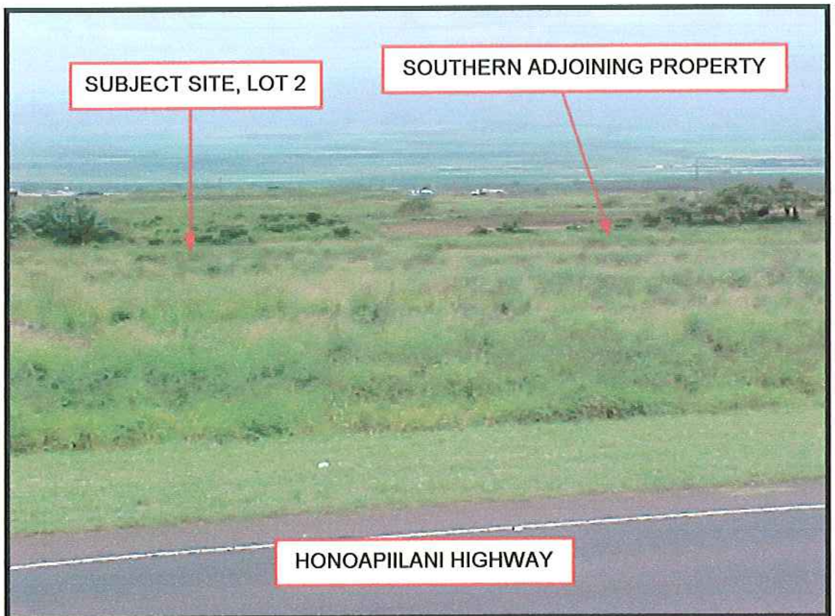


PHOTO 10

Easterly view of Lot 2's southern property line from the southwest property corner.

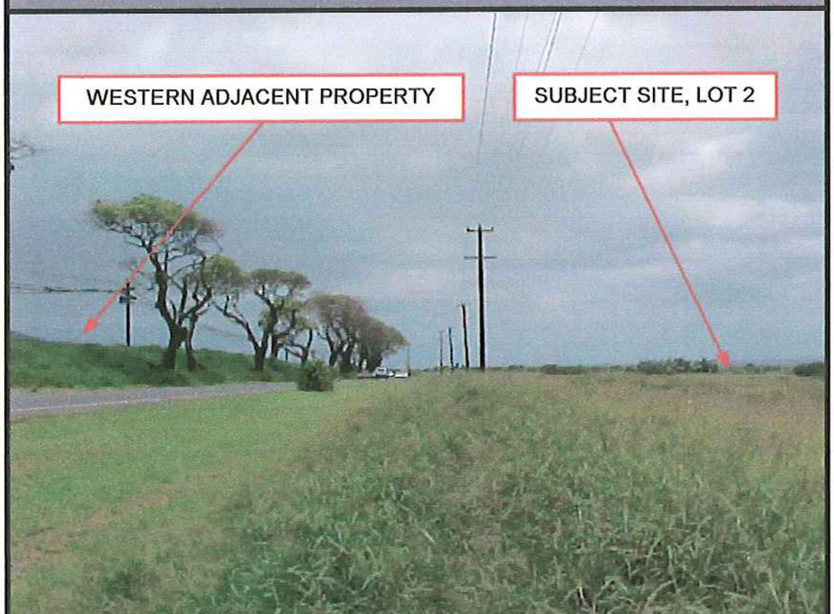


PHOTO 11

Northerly view of Lot 2's western boundary line from the southwest property corner.

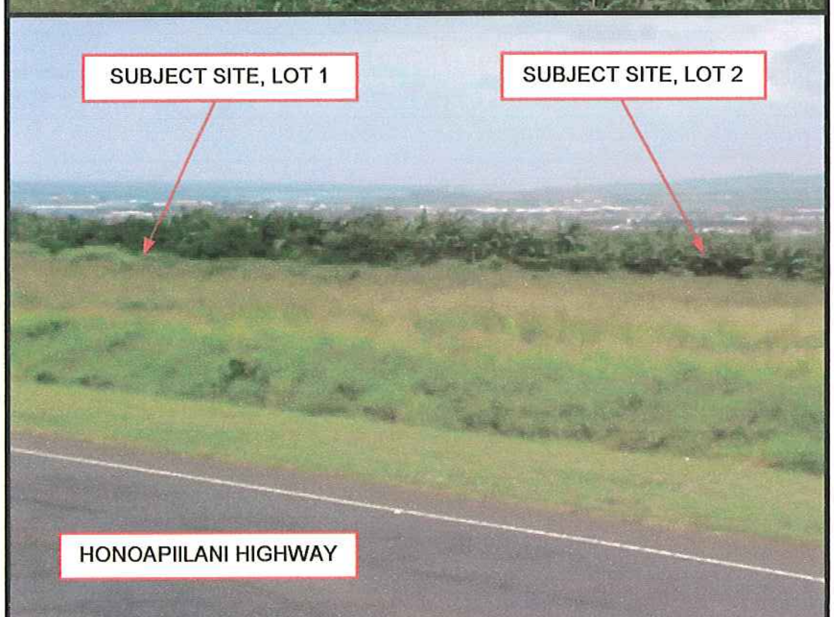


PHOTO 12

Easterly view along Lot 2's northern property line from near the intersection of Lot 1 and Lot 2 on the western property line.

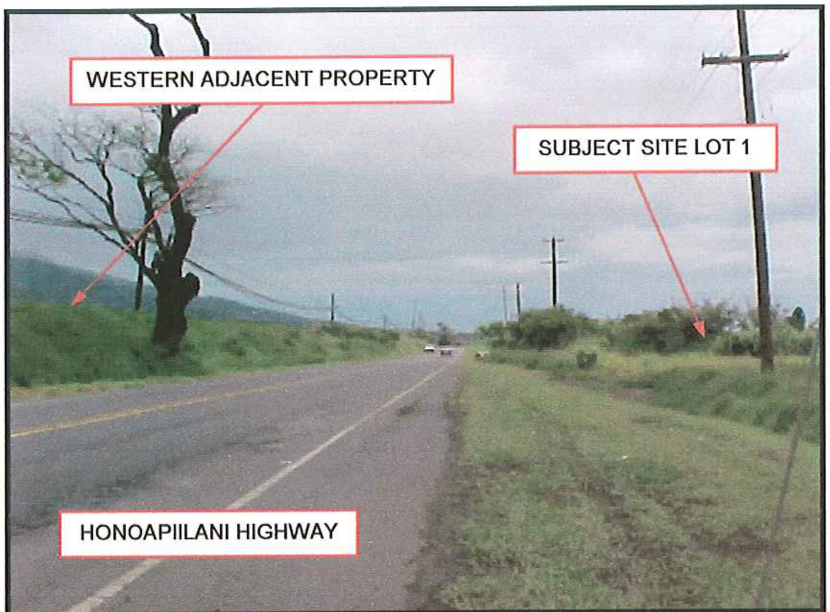


PHOTO 13

Northerly view along Lot 1's western property line from near the intersection of Lot 1 and Lot 2's western property line.

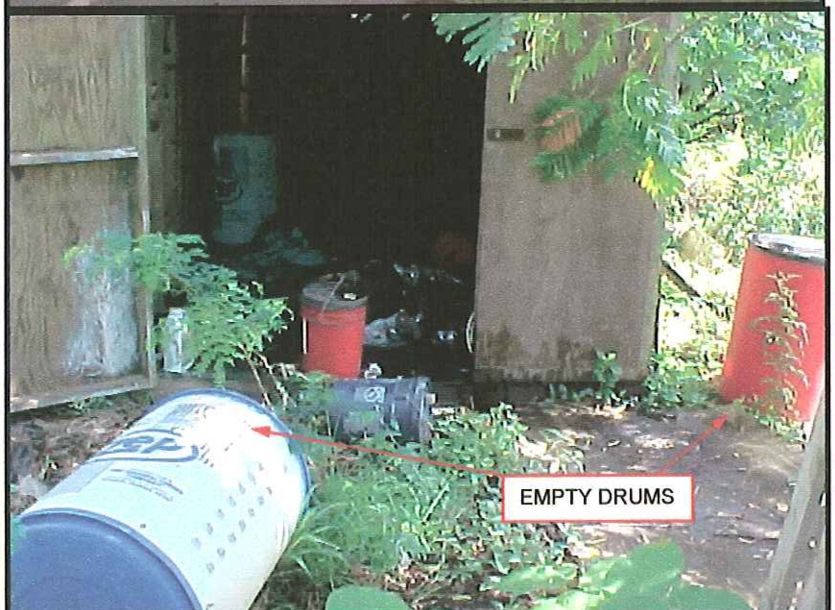


PHOTO 14

Agricultural shed located on the eastern portion of Lot 1. See Figure 2, Appendix A.

PHOTO 15

Typical small agricultural field located on Lot 1 and Lot 2 of the subject property.

PHOTO 16

Typical banana shack located on Lot 2 of the subject site.

PHOTO 17

Fill stockpile of tarmac material located on Lot 2. See Figure 2, Appendix A.

PHOTO 18

Derelict vehicles located on the southern portion of Lot 2.

PHOTO 19

Derelict vehicles located on the central southern portion of Lot 1 of the subject property.

PHOTO 20

Pole-mounted transformer located at the northeast corner of Lot 1 of the subject property.

PHOTO 21

Miscellaneous debris located on the southeastern portion of Lot 1.

Appendix B:

Regulatory Records Documentation
Site Specific Documentation

Vuich Environmental

Preliminary Environmental Investigation

According to ASTM Standard 1527-00, the user's (or client's) responsibility in this investigation is to help identify the possibility of recognized environmental conditions in connection with the property. Please assist us by responding to the following request for data and information you may have, or of which you may have some specialized knowledge. This questionnaire will be included in the Appendices of the final report as an indication of user assistance.

Please Supply As Many of the Following Documents As Possible

A. ☐ **Tax Map Key Number/Tax Code Number** 3-5-02-1(2)
B. ☐ **Title Information** *(Current, and any previous ownership.)* TITLE IS GOOD
C. ☐ **Property Legal Description** *(If Title Information is not available)* DO NOT HAVE
D. ☐ **Tax Map and/or Site Development Drawing/Plat** MAPS ENCLOSED
E. ☐ **Special Property Information** *(Well-development data, endangered species listings, historical registration or environmental deed restrictions.)* NONE
F. ☐ **Real Estate Appraisal Report** NONE
G. ☐ **Special Management Area Permit Report (SMA)** NOT NECESSARY

Please Provide the Following Information to The Best Of Your Ability

1. **Environmental Site Assessments (ESA):** Are you aware of any previous assessments: *Cleanup Closure Reports, Permit Characterization Reports, etc.* conducted on the subject site or *within the immediate area?* If yes, please supply details. NO

2. **Local-State-Federal Inspections:** Are you aware of any environmental inspections *conducted by any regulatory agency*, i.e., Hawaii Dept. of Health (Environmental Health Services), OSHA, U.S. Army Corps of Engineers, Department of Land & Natural Resources, Fish & Wildlife Services, HUD, EPA, or County Wastewater or Solid Waste Division of the Public Works/Waste Management Department etc.? If yes, please supply details. NO

3a. **Structures/Buildings:** Are there any as-built or other construction drawings available for review? *Contact Name and Telephone Number:* NO

3b. **Site improvements?** *(Renovation Date & Extent)* BANANA SHACKS ONLY

4. **Purchase Price:** Is the property's purchase price within a normal market range or *significantly lower? If lower, please supply details.*
PURCHASE PRICE IS $675,000 / $27,000 per acre - is below market
Buyer is a non-profit church and school

5. **Name of Current Owner:** WAILUKU AGRIBUSINESS

6. **Name of former Owner:**

7. **Proceedings Against the Property:** Are you aware of any administrative or legal proceedings against the property for environmental concerns i.e., Compliance Orders, Notices of Violation? If yes, please supply details. NO

8. **Property Liens:** Are there any recorded liens or consent decrees on the property that is environmentally related, i.e., property clean-up, waste removal, asbestos abatement, wastewater issues, etc.? If yes please supply details. NONE THAT WE KNOW ABOUT

9. Specialized **Historic Information:** Are you aware of any previous owner, neighbor, business affiliate or other individual who might have knowledge of any special or unusual historic use of, and/or previous operations conducted on the subject property? *Contact Name and Telephone Number:* KNOW OF NONE

10. **Manufacturing or Processing:** If there are manufacturing or processing activities conducted on-site, is there an operation flow chart, diagram or procedures manual available for review? *Contact Name and Telephone Number* LAND WAS IN SUGAR CANE

11. **This Report is Prepared For:** ***(Please Print)***
Attention: EMMANUEAL LUTHERAN CHURCH (north) VALLEY ISLE FELLOWSHIP (sout
Organization: to TOM LEUTENEKER
Address: POBOX 1086 Wailuku Maui HI 96790
Phone no.: 242-4535 Fax no.: 244-4974

12. **Please List Other Organizations (Lenders) Who Will Require a Listing as "Also Prepared For:" on the report cover and signature page.** NONE
(a) Attention:
Organization:
Address:
(b) Attention:
Organization:
Address:

We will submit 2 signed reports for each project. If additional copies are required, an additional fee will be charged for processing.

Who Prepared This Starter Package Information?

Name: (Please Print) TOM LEUTENEKER	**Title:**
Company/Organization:	
Address:	
Tel. No.:	**Fax No.:**
Signature: [signature]	**Date:** 4/7/2004

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD / CWB

04059ESM.04

April 21, 2004

Ms. Massy Cashen
Vuich Environmental Consultants, Inc.
1498 Lower Main Street, Suite C
Wailuku, Hawaii 96793

Dear Ms. Cashen:

Subject: Request for Public Records

The Department of Health, Clean Water Branch ("DOH-CWB") received your request for public records dated April 14, 2004. Our staff searched the DOH-CWB database and found a Notice of General Permit Coverage ("NGPC") No. R23A787 that maybe near to your following site(s):

(1) Address: Vacant Land, Honoapiilani Highway
TMK: (2)3-5-02:01

Should you have any questions, please contact Mr. Michael Tsuji, Supervisor of the Enforcement Section, for enforcement concerns and Mr. Alec Wong, Supervisor of the Engineering Section, for permitting concerns, Clean Water Branch, at (808) 586-4309.

Sincerely,

DENIS R. LAU, P.E., CHIEF
Clean Water Branch

Enclosure: NGPC No. R23A787

R23A787

EA 9? FILE COPY

MST

October 9, 1997

Mr. Fredrick H. Kubota
Vice President
Brewer Environmental Industries, LLC
311 Pacific Street
Honolulu, Hawaii 96817

Dear Mr. Kubota:

Subject: **Notice of General Permit Coverage (NGPC)**
Brewer Environmental Industries Wailuku Facility
275 East Waiko Road
Wailuku, Maui, Hawaii 96793
TMK: (2)5-02-01
File No. HI R23A787

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. § 1251 et seq.; the "Act") and Chapter 342D, Hawaii Revised Statutes, and Chapters 11-54 and 11-55, Hawaii Administrative Rules ("HAR"), Department of Health, State of Hawaii,

BREWER ENVIRONMENTAL INDUSTRIES LLC

(hereinafter "PERMITTEE")

is authorized to discharge storm water runoff associated with industrial activity from its facility located at 275 East Waiko Road, Wailuku, Maui, Hawaii, 96793, TMK: (2)5-02-01, to the receiving waters named the Waikapu Stream, at coordinates Latitude 20°50'55"N, Longitude 156°30'15"W.

This Notice of General Permit Coverage (NGPC) is subject to compliance with the following regulations and conditions:

1. HAR Chapter 11-55, Appendix B, NPDES General Permit Authorizing Discharges of Storm Water Associated With Industrial Activities;

2. HAR Chapter 11-55, Appendix A, Department of Health Standard General Permit Conditions;

3. HAR Sections 11-55-34.04(a), 11-55-34.07, 11-55-34.11, 11-55-34.12, and any other applicable sections of HAR Chapter 11-55;

4. Plans, reports, specifications and other related materials submitted in and with the Notice of Intent (NOI) dated September 25, 1997, and/or later amendments to the NOI;

5. A copy of this NGPC and its enclosures; and plans, reports, specifications and other related materials submitted in and with the NOI dated September 25, 1997, and/or later amendments to the NOI shall be kept at the facility until termination of subject activities;

6. Discharge quality data as required by NOI Form A shall be collected during the next representative rainfall event and submitted within 30 days of such sampling. Data shall include all parameters listed under Item 2.a and parameters listed under Item 2.b believed to be present in the discharge;

7. In accordance with HAR Chapter 11-55, Appendix B, Table 34.1, the discharge shall be limited and monitored by the Permittee as follows:

Parameter	Discharge Limitation	Cutoff Concentration	Units	Measurement Frequency	Type of Sample
Flow	N/L	N/A	MGD	Annually[1]	Calculated or Estimated
Biochemical Oxygen Demand (5-Day)	N/L	N/A	mg/l	Annually[1]	Composite or Grab
Chemical Oxygen Demand	N/L	N/A	mg/l	Annually[1]	Composite or Grab
Total Suspended Solids	N/L	N/A	mg/l	Annually[1]	Composite or Grab
Total Phosphorus	N/L	2.0	mg/l	Annually[1]	Composite or Grab
Total Nitrogen	N/L	N/A	mg/l	Annually[1]	Composite or Grab
Nitrate + Nitrite Nitrogen	N/L	0.68	mg/l	Annually[1]	Composite or Grab
Oil and Grease	15	N/A	mg/l	Annually[1]	Grab

Parameter	Discharge Limitation	Cutoff Concentration	Units	Measurement Frequency	Type of Sample
pH Range	5.5 to 8.0	N/A	Standard Units	Annually[1]	Grab
Iron	N/L	1.0	mg/l	Annually[1]	Grab
Lead	N/L	0.0816	mg/l	Annually[1]	Grab
Zinc	N/L	0.117	mg/l	Annually[1]	Grab

N/L No Limitation at this time. Only monitoring and reporting required.
N/A Not Applicable.
MGD Million gallons per day
mg/l Milligrams per liter
µg/l Micrograms per liter
1 The monitoring year shall start on the effective date of this NGPC.

8. Reporting of monitoring results shall be in accordance with HAR Chapter 11-55, Appendix B, Section 9;

9. The Director may specify additional monitoring requirements and limitations, in addition to the monitoring requirements specified in Item 7 of this NGPC;

10. The Permittee shall submit a Storm Water Pollution Control Plan in accordance with HAR Chapter 11-55, Appendix B, Sections 5 and/or 6 within 120 days of issuance of this NGPC;

11. The Permittee shall revise their SWPCP should any discharge limitation or cutoff concentration be exceeded. The revisions shall include measures to reduce the amount of pollutants found to be in exceedance from entering storm water runoff;

12. The Permittee shall notify the Department of Health upon termination of the subject activities; and

13. The Permittee shall be responsible for ensuring that anyone working under this NGPC understands the NGPC's terms and conditions.

This NGPC will take effect on the date of this notice. This NGPC will expire at midnight, September 21, 2002, or when amendments to HAR Chapter 11-55, Appendix B are adopted, whichever occurs first.

Should you have any questions regarding this NGPC, please contact Ms. Kris Poentis, Engineering Section of the Clean Water Branch, at (808)586-4309.

Sincerely,

Denis R Lau

for THOMAS E. ARIZUMI, P.E., CHIEF
Environmental Management Division

KP\cr

Enclosures:
1. HAR Chapter 11-55, Section 34, Appendices A and B
2. Discharge Monitoring Report Form
3. Title 40, Code of Federal Regulations Citations as referenced in Chapter 11-55, Appendix A

Vuich Environmental Consultants, Inc.

April 14, 2004

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 309
Honolulu, HI 96814
Phone: (808) 586-4200
Fax: (808) 586-5800
Attn: Clean Air Branch

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0403-760**
Tax Map Key No.:	**(2) 3-5-02:01**
Address:	**Vacant Land, Honoapiilani Highway**
Current Owner:	**Wailuku Agribusiness Company, Inc.**
Former Owner:	**N. A.**
Current Occupant:	**Banana farmers**
Type of Business:	**Agricultural**

Tax Map Key is enclosed.

Truly yours,

Massy Cashen

Vuich Environmental

Consultants, Inc.

April 14, 2004

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 301
Honolulu, HI 96814
Phone: (808) 586-4309
Attn: Clean Water Branch

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0403-760**
Tax Map Key No.:	**(2) 3-5-02:01**
Address:	**Vacant Land, Honoapiilani Highway**
Current Owner:	**Wailuku Agribusiness Company, Inc.**
Former Owner:	**N. A.**
Current Occupant:	**Banana farmers**
Type of Business:	**Agricultural**

Tax Map Key is enclosed.

Truly yours,

Massy Cashen

Vuich Environmental
Consultants, Inc.

4/14/2004

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 206
Honolulu, HI 96814
Phone: (808) 586-4249
Attn: Office of Hazard Evaluation
& Emergency Response (HEER)

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0403-760**
Tax Map Key No.:	**(2) 3-5-02:01**
Address:	**Vacant Land, Honoapiilani Highway**
Current Owner:	**Wailuku Agribusiness Company, Inc.**
Former Owner:	**N. A.**
Current Occupant:	**Banana farmers**
Type of Business:	**Agricultural**

Tax Map Key is enclosed.

Truly yours,

Massy Cashen

Vuich Environmental Consultants, Inc.

4/14/2004

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 308
Honolulu, HI 96814
Phone: (808) 586-4258
Fax: (808) 586-4370
Attn: Safe Drinking Water Branch

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0403-760**
Tax Map Key No.:	**(2) 3-5-02:01**
Address:	**Vacant Land, Honoapiilani Highway**
Current Owner:	**Wailuku Agribusiness Company, Inc.**
Former Owner:	**N. A.**
Current Occupant:	**Banana farmers**
Type of Business:	**Agricultural**

Tax Map Key is enclosed.

Truly yours,

Massy Cashen

Vuich Environmental
Consultants, Inc.

4/14/2004

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 212
Honolulu, HI 96814
Phone: (808) 586-4226
Attn: Solid & Hazardous Waste Branch

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0403-760**
Tax Map Key No.:	**(2) 3-5-02:01**
Address:	**Vacant Land, Honoapiilani Highway**
Current Owner:	**Wailuku Agribusiness Company, Inc.**
Former Owner:	**N. A.**
Current Occupant:	**Banana farmers**
Type of Business:	**Agricultural**

Tax Map Key is enclosed.

Truly yours,

Massy Cashen

Vuich Environmental
Consultants, Inc.

April 14, 2004

FAXED By: Date:

Maui County Fire Department
Fire Prevention Bureau
21 Kinipopo Street
Wailuku, Hawaii 96793
Attn: Capt. Neal Bal
Via Fax No: 270-7889

RE: Request for Public Records for Vuich Environmental Consultants (VEC)

Dear Capt. Bal:

VEC is requesting any past or present information of environmental concern pertaining to the subject site and adjacent sites from the Maui County Fire Department's database. This could include information on environmental releases (spills), permits, citations, inspections, etc.

SITE INFORMATION:

Project Number:	**0403-760**
Tax Map Key No.:	**(2) 3-5-02:01**
Address:	**Vacant Land, Honoapiilani Highway**
Current Owner:	**Wailuku Agribusiness Company, Inc.**
Former Owner:	**N. A.**
Current Occupant:	**Banana farmers**
Type of Business:	**Agricultural**

Thank you for your assistance.

Sincerely yours,

Massy Cashen

Attachment: TMK map

Maui (Corporate) Office: 1498 Lower Main Street, Suite C, Wailuku, Hawaii 96793 • (808) 249-2777 Phone / (808) 249-2778 Fax
Oahu Office: 650 Kakoi Street, Unit 3, Honolulu, Hawaii 96819 • (808) 836-1611 Phone / (808) 836-6299 Fax
Inter-Island: (800) 572-1165 • www.vuichenvironmental.com

Vuich Environmental Consultants, Inc.

April 14, 2004

Maui County Fire Department
Hazardous Materials Division
200 Dairy Road
Kahului, Hawaii 96732
Attn: Mr. Jeffrey M. Kihune
Acting Officer
Via Fax No: 270-7919

FAXED By: Date:

RE: Request for Public Records for Vuich Environmental Consultants (VEC)

Dear Mr. Kihune:

VEC is requesting any past or present information of environmental concern pertaining to the subject site and adjacent sites from the Maui County Fire Department's database. This could include information on environmental releases (spills), permits, citations, inspections, etc.

SITE INFORMATION:

Project Number:	**0403-760**
Tax Map Key No.:	**(2) 3-5-02:01**
Address:	**Vacant Land, Honoapiilani Highway**
Current Owner:	**Wailuku Agribusiness Company, Inc.**
Former Owner:	**N. A.**
Current Occupant:	**Banana farmers**
Type of Business:	**Agricultural**

Thank you for your assistance.

Sincerely yours,

Massy Cashen

Attachment: TMK map

EDR FieldCheck™ Report

Emmanuel Lutheran Church
Honoapiilani Hwy
Wailuku, HI 96793

Inquiry Number: 01189151.1r

May 11, 2004

EDR™ Environmental
Data Resources Inc

The Standard in Environmental Risk Management Information

440 Wheelers Farms Road
Milford, Connecticut 06460

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

TABLE OF CONTENTS

SECTION | **PAGE**

GEOCHECK ADDENDUM

GeoCheck - Not Requested

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Important Information about The EDR FieldCheck(TM) Report

This is The EDR FieldCheck (TM) Report. Through its continuing emphasis in online technological advancements, EDR has developed the FieldCheck (TM) system, which enables EDR's customers to make certain online modifications to the maps and text contained in EDR Radius Map Reports. With FieldCheck (TM), an EDR customer can relocate and/or delete plotted sites and/or plot or delete orphan sites that would otherwise appear or be noted with an EDR Radius Map Report. Such modifications may be based on site visits, independent data verification and/or other actions taken or decisions made by EDR's customer. As a result, the maps and text contained in The EDR FieldCheck (TM) Report that you receive may have been so modified. Please note: EDR has not taken any action to verify any such modifications, and this report and the findings set forth herein must be read in light of this fact. VUICH ENVIRONMENTAL should be contacted for information concerning all such modifications.

EXECUTIVE SUMMARY

At the request of VUICH ENVIRONMENTAL, a search of the environmental records covering the area detailed herein was conducted by Environmental Data Resources, Inc. (EDR). This report was derived from the results of such search, which, as conducted by EDR, met the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances were per ASTM standard or custom distances requested by the user.

NOTE: ALL MAPS AND TEXT INCLUDED HEREIN MAY HAVE BEEN MODIFIED BY VUICH ENVIRONMENTAL BASED ON SITE VISITS, INDEPENDENT DATA VERIFICATION AND/OR OTHER ACTIONS TAKEN OR DECISIONS MADE BY VUICH ENVIRONMENTAL. EDR HAS NOT TAKEN ANY ACTION TO VERIFY ANY OF SUCH MODIFICATIONS, AND THIS REPORT AND THE FINDINGS SET FORTH HEREIN MUST BE READ IN LIGHT OF THIS FACT. VUICH ENVIRONMENTAL SHOULD BE CONTACTED FOR INFORMATION CONCERNING ALL SUCH MODIFICATIONS.

TARGET PROPERTY INFORMATION

ADDRESS

HONOAPIILANI HWY
WAILUKU, HI 96793

COORDINATES

Latitude (North):	20.866800 - 20˚ 52' 0.5"
Longitude (West):	156.501300 - 156˚ 30' 4.7"
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	759982.6
UTM Y (Meters):	2309290.0
Elevation:	355 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	20156-G5 LAHAINA, HI
Source:	USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No sites were found in an online review and analysis by VUICH ENVIRONMENTAL of EDR's search of available ("reasonably ascertainable") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

FEDERAL ASTM STANDARD

NPL	National Priority List
Proposed NPL	Proposed National Priority List Sites
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System

EXECUTIVE SUMMARY

CERC-NFRAP	CERCLIS No Further Remedial Action Planned
CORRACTS	Corrective Action Report
RCRIS-TSD	Resource Conservation and Recovery Information System
RCRIS-LQG	Resource Conservation and Recovery Information System
RCRIS-SQG	Resource Conservation and Recovery Information System
ERNS	Emergency Response Notification System

STATE ASTM STANDARD

SWF/LF	Permitted Landfills in the State of Hawaii
LUST	Leaking Underground Storage Tank Database
UST	Underground Storage Tank Database
VCP	Voluntary Response Program Sites

FEDERAL ASTM SUPPLEMENTAL

CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
Delisted NPL	National Priority List Deletions
FINDS	Facility Index System/Facility Identification Initiative Program Summary Report
HMIRS	Hazardous Materials Information Reporting System
MLTS	Material Licensing Tracking System
MINES	Mines Master Index File
NPL Liens	Federal Superfund Liens
PADS	PCB Activity Database System
FUDS	Formerly Used Defense Sites
INDIAN RESERV	Indian Reservations
US BROWNFIELDS	A Listing of Brownfields Sites
DOD	Department of Defense Sites
RAATS	RCRA Administrative Action Tracking System
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
SSTS	Section 7 Tracking Systems
FTTS INSP	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

STATE OR LOCAL ASTM SUPPLEMENTAL

SPILLS	Release Notifications

EDR PROPRIETARY HISTORICAL DATABASES

Coal Gas	Former Manufactured Gas (Coal Gas) Sites

BROWNFIELDS DATABASES

US BROWNFIELDS	A Listing of Brownfields Sites
BROWNFIELDS	Brownfields Sites
VCP	Voluntary Response Program Sites

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

EXECUTIVE SUMMARY

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

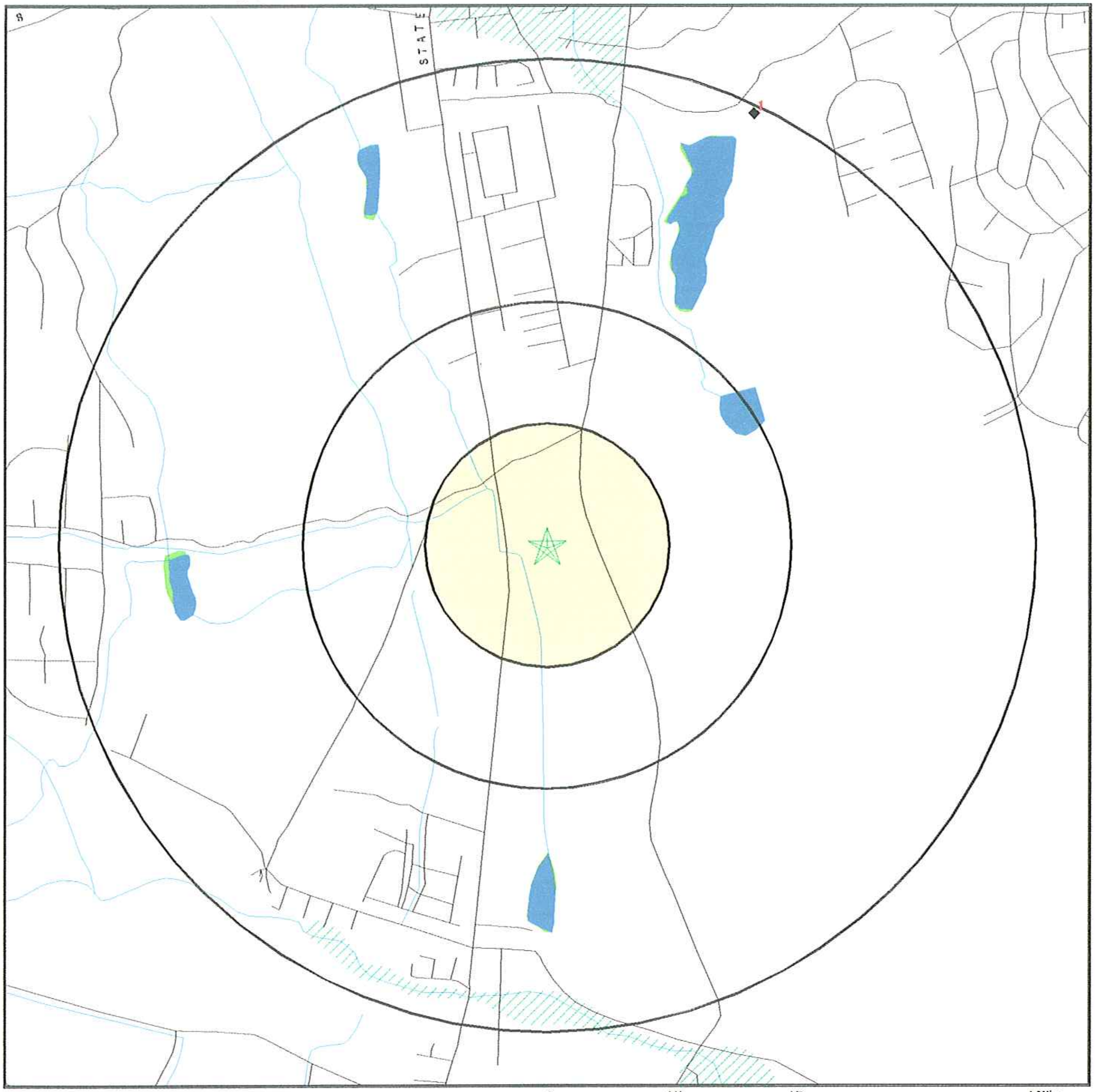
STATE ASTM STANDARD

SHWS: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Health.

An online review and analysis by VUICH ENVIRONMENTAL of the SHWS list, as provided by EDR, and dated 07/12/2001 has revealed that there is 1 SHWS site within approximately 1 mile of the target property.

Lower Elevation	Address	Dist / Dir	Map ID	Page
WAIALE ASH PILE	WAIALE STREET	1/2 - 1 NNE	1	6

OVERVIEW MAP - 01189151.1r - Vuich Environmental



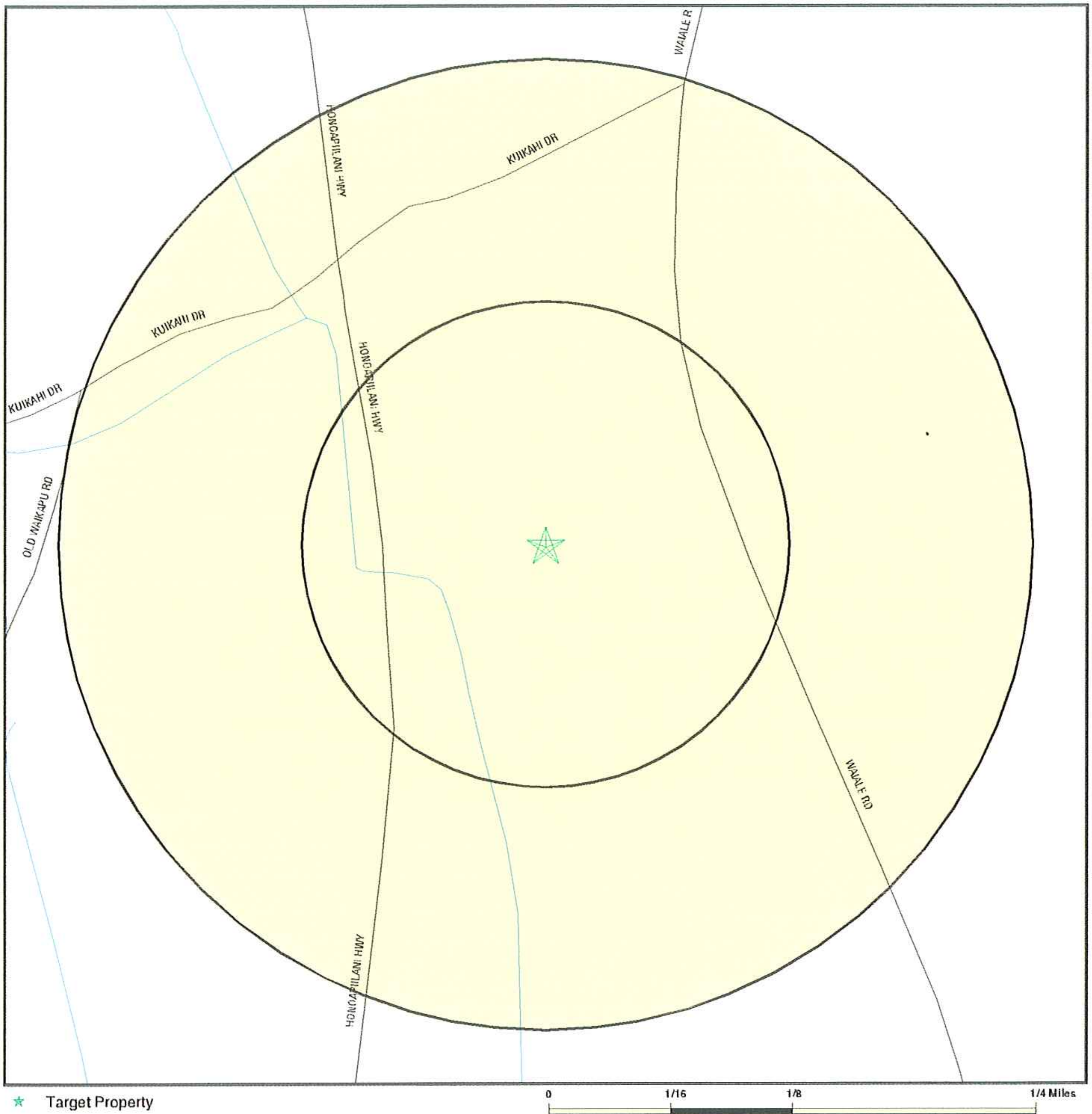
0 1/4 1/2 1 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Coal Gasification Sites
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Federal Wetlands

N

TARGET PROPERTY:	Emmanuel Lutheran Church	CUSTOMER:	Vuich Environmental
ADDRESS:	Honoapiilani Hwy	CONTACT:	Massy Cashen
CITY/STATE/ZIP:	Wailuku HI 96793	INQUIRY #:	01189151.1r
LAT/LONG:	20.8668 / 156.5013	DATE:	May 11, 2004 5:58 pm

DETAIL MAP - 01189151.1r - Vuich Environmental



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Coal Gasification Sites
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone

TARGET PROPERTY:	Emmanuel Lutheran Church	CUSTOMER:	Vuich Environmental
ADDRESS:	Honoapiilani Hwy	CONTACT:	Massy Cashen
CITY/STATE/ZIP:	Wailuku HI 96793	INQUIRY #:	01189151.1r
LAT/LONG:	20.8668 / 156.5013	DATE:	May 11, 2004 5:59 pm

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
SMILE'S AUTO SPECIALISTS	SHWS
KANAHA POND EAST	CERC-NFRAP, SHWS
RAINBOW HAULING	SHWS
E & E BLACK CONTRACTORS	SHWS
HOBRON AVENUE AREA	SHWS, SPILLS
MAUI PALMS HOTEL UST	SHWS
ALEXANDER AND BALDWIN DUMP SITE	SHWS
MAUI MEAT FACILITY-FORMER	SHWS
KALAMAULA LANDFILL	SHWS
KAHOOLAWE ISLAND	SHWS
BEN FRANKLIN STORES PROPERTY	SHWS
OLOWALU TRANSFER STATION	SHWS
PICRIC ACID AT MAUI COMMUNITY COLLE	SHWS
PICRIC ACID AT MAUI MEMORIAL HOSPIT	SHWS
MAALAEA	SWF/LF
KAKAMAULA LANDFILL	SWF/LF
KALUAKOI LANDFILL	SWF/LF
MAUNALOA LANDFILL	SWF/LF
CENTRAL MAUI LF, PHASE I&II LF-0034-95)	SWF/LF
DAVID PICO CESSPOOL DIGGING	LUST, UST
PAIA SEWER PUMP STATION	UST

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL ASTM STANDARD								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.250	0	0	NR	NR	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.250	0	0	NR	NR	NR	0
RCRIS Sm. Quan. Gen.		0.250	0	0	NR	NR	NR	0
ERNS		TP	NR	NR	NR	NR	NR	0
STATE ASTM STANDARD								
SHWS		1.000	0	0	0	1	NR	1
State Landfill		0.500	0	0	0	NR	NR	0
LUST		0.500	0	0	0	NR	NR	0
UST		0.250	0	0	NR	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0
FEDERAL ASTM SUPPLEMENTAL								
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
HMIRS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
NPL Liens		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
FUDS		1.000	0	0	0	0	NR	0
INDIAN RESERV		1.000	0	0	0	0	NR	0
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
STATE OR LOCAL ASTM SUPPLEMENTAL								
SPILLS		TP	NR	NR	NR	NR	NR	0
EDR PROPRIETARY HISTORICAL DATABASES								
Coal Gas		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
BROWNFIELDS DATABASES								
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
BROWNFIELDS		0.500	0	0	0	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Map ID Direction Distance Distance (ft.) Elevation	Site	Database(s)	EDR ID Number EPA ID Number

MAP FINDINGS

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

1 **NNE** **1/2-1** **5190 ft.**	**WAIALE ASH PILE** **WAIALE STREET** **WAILUKU, HI**	**SHWS**	**S104657531** **N/A**

Relative: **Lower**

Actual: **206 ft.**

SHWS:

File Section :	Central
Type :	Not reported
Department 1 :	Not reported
Department 2 :	Not reported
Department 3 :	Not reported
Table :	Sitelist
Island :	Maui
Zip :	Not reported
Discovery Assesment and Remediation :	6/14/99
Initial Site Screening Team Lead :	Laura Young
ISST Assigned :	3/9/00
ISST Date :	8/10/00
ISST Priority :	High
ISST Letter :	Not reported
Env Justice Eligible :	Not reported
Preliminary Assesment :	No
PA Lead :	Not reported
PA Date :	Not reported
PA Result :	Not reported
Site Investigation :	No
SI Lead :	Not reported
SI Date :	Not reported
SI Result :	Not reported
Remediation Action Planned :	Not reported
VRP :	Not reported
Brownfields :	Not reported
Agreement :	Not reported
Remedial Investigation :	Not reported
RAA :	Not reported
Response Action Memo :	Not reported
REM Lead :	Not reported
REM Date :	Not reported
REM Last Update :	8/14/00
Input By :	Bryce
Case :	Not reported
Fed Id :	Not reported
UST :	Not reported
Permits :	Not reported
RCRA :	Not reported
Program :	Not reported
Priority :	Not reported
Lat/Long :	Not reported
Cost :	Not reported
CU QNTY Site :	Not reported
Enforcement :	Not reported
CU Method :	Not reported
Ownership :	Not reported
Tax Map Key :	Not reported
Form :	Not reported

WAIALE ASH PILE (Continued) **S104657531**

EPCRA :	Not reported
EPCRA FIL :	Not reported
Pathways :	Not reported
Targets :	Not reported
Manager :	Not reported
REM Result :	Not reported
Identifier :	Not reported
Site Code :	Not reported
Event :	Not reported
Event Type :	Not reported
Notes :	Not reported
Site :	Not reported
Site_ :	Not reported
Operator :	Not reported
Current :	Not reported
Compounds :	Dioxins, heavy metals
Oname :	Not reported

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
KAHULUI	1000816953	SMILE'S AUTO SPECIALISTS	AMALA PLACE	96732	SHWS
KAHULUI	1001475719	KANAHA POND EAST	AMALA PLACE	96732	CERC-NFRAP, SHWS
KAHULUI	1000855952	RAINBOW HAULING	AMALA PL	96732	SHWS
KAHULUI	1000816952	E & E BLACK CONTRACTORS	AMALA PL	96732	SHWS
KAHULUI	S104534206	HOBRON AVENUE AREA	HOBRON AVE	96732	SHWS, SPILLS
KAHULUI	S104534290	MAUI PALMS HOTEL UST	150 KAAHUMANU AVE	96732	SHWS
KAHULUI	U001236769	DAVID PICO CESSPOOL DIGGING	OLD HALEAKALA HWY	96732	LUST, UST
KAHULUI	1001032388	ALEXANDER AND BALDWIN DUMP SITE	W PAPA AVE	96732	SHWS
KAHULUI	U003222223	PAIA SEWER PUMP STATION	PUNA RD/HANA HWY	96732	UST
KAHULUI	S104534289	MAUI MEAT FACILITY-FORMER	601 2ND ST	96732	SHWS
KALAMAULA	S104534228	KALAMAULA LANDFILL	SOUTH MOLOKAI, KALAMAULA	96793	SHWS
MAUI COUNTY	S106100522	MAALAEA	INTERSECTION OF KIHEI RD AND HONOAPIILANI HWY		SWF/LF
MAUI COUNTY	S104534222	KAHOOLAWE ISLAND	KAHOOLAWE ISLAND	96732	SHWS
MAUI COUNTY	S103763653	KAKAMAULA LANDFILL	KALAMAULA MOLOKAI		SWF/LF
MAUI COUNTY	S103763654	KALUAKOI LANDFILL	KALUAKOI ROAD MAUNALOA		SWF/LF
MAUI COUNTY	S104534094	BEN FRANKLIN STORES PROPERTY	KAUNAKAKAI, MOLOKAI		SHWS
MAUI COUNTY	S103763656	MAUNALOA LANDFILL	MAUNALOA MAUI		SWF/LF
MAUI COUNTY	S103763652	CENTRAL MAUI LF, PHASE I&II LF-0034-95)	PUNENE, MAUI		SWF/LF
OLOWALU	1000435092	OLOWALU TRANSFER STATION	OLOWALU	96793	SHWS
WAILUKU	S104657498	PICRIC ACID AT MAUI COMMUNITY COLLE	310 KAAHUMANU AVE	96793	SHWS
WAILUKU	S104657499	PICRIC ACID AT MAUI MEMORIAL HOSPIT	MAUI	96793	SHWS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List
Source: EPA
Telephone: N/A
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 01/29/04
Date Made Active at EDR: 02/27/04
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 02/06/04
Elapsed ASTM days: 21
Date of Last EDR Contact: 02/06/04

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 6
Telephone: 214-655-6659

EPA Region 8
Telephone: 303-312-6774

Proposed NPL: Proposed National Priority List Sites
Source: EPA
Telephone: N/A

Date of Government Version: 01/07/04
Date Made Active at EDR: 02/27/04
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 02/06/04
Elapsed ASTM days: 21
Date of Last EDR Contact: 02/06/04

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Source: EPA
Telephone: 703-413-0223
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/26/04
Date Made Active at EDR: 04/02/04
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 03/22/04
Elapsed ASTM days: 11
Date of Last EDR Contact: 03/22/04

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Source: EPA
Telephone: 703-413-0223
As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

Date of Government Version: 02/26/04
Date Made Active at EDR: 04/02/04
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 03/22/04
Elapsed ASTM days: 11
Date of Last EDR Contact: 03/22/04

CORRACTS: Corrective Action Report
Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/15/04
Date Made Active at EDR: 04/15/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 03/25/04
Elapsed ASTM days: 21
Date of Last EDR Contact: 03/08/04

RCRIS: Resource Conservation and Recovery Information System
Source: EPA
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs): generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs): generate between 100 kg and 1,000 kg of hazardous waste per month. Large quantity generators (LQGs): generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month. Transporters are individuals or entities that move hazardous waste from the generator off-site to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/09/04
Date Made Active at EDR: 04/02/04
Database Release Frequency: Varies

Date of Data Arrival at EDR: 03/18/04
Elapsed ASTM days: 15
Date of Last EDR Contact: 04/20/04

ERNS: Emergency Response Notification System
Source: National Response Center, United States Coast Guard
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/03
Date Made Active at EDR: 03/12/04
Database Release Frequency: Annually

Date of Data Arrival at EDR: 01/26/04
Elapsed ASTM days: 46
Date of Last EDR Contact: 04/26/04

FEDERAL ASTM SUPPLEMENTAL RECORDS

BRS: Biennial Reporting System
Source: EPA/NTIS
Telephone: 800-424-9346
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/01/01
Database Release Frequency: Biennially

Date of Last EDR Contact: 03/16/04
Date of Next Scheduled EDR Contact: 06/14/04

CONSENT: Superfund (CERCLA) Consent Decrees
Source: EPA Regional Offices
Telephone: Varies
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: N/A
Database Release Frequency: Varies

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

ROD: Records Of Decision
Source: EPA
Telephone: 703-416-0223
Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 01/09/04
Database Release Frequency: Annually
Date of Last EDR Contact: 04/05/04
Date of Next Scheduled EDR Contact: 07/05/04

DELISTED NPL: National Priority List Deletions
Source: EPA
Telephone: N/A
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 01/29/04
Database Release Frequency: Quarterly
Date of Last EDR Contact: 02/06/04
Date of Next Scheduled EDR Contact: 05/01/04

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report
Source: EPA
Telephone: N/A
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/08/04
Database Release Frequency: Quarterly
Date of Last EDR Contact: 04/05/04
Date of Next Scheduled EDR Contact: 07/05/04

HMIRS: Hazardous Materials Information Reporting System
Source: U.S. Department of Transportation
Telephone: 202-366-4555
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/18/03
Database Release Frequency: Annually
Date of Last EDR Contact: 04/20/04
Date of Next Scheduled EDR Contact: 07/19/04

MLTS: Material Licensing Tracking System
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 01/15/04
Database Release Frequency: Quarterly
Date of Last EDR Contact: 04/05/04
Date of Next Scheduled EDR Contact: 07/05/04

MINES: Mines Master Index File
Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959

Date of Government Version: 03/05/04
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 03/30/04
Date of Next Scheduled EDR Contact: 06/28/04

NPL LIENS: Federal Superfund Liens
Source: EPA
Telephone: 202-564-4267
Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/91
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 03/12/04
Date of Next Scheduled EDR Contact: 05/24/04

PADS: PCB Activity Database System
Source: EPA
Telephone: 202-564-3887
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 12/30/03
Database Release Frequency: Annually
Date of Last EDR Contact: 02/09/04
Date of Next Scheduled EDR Contact: 05/10/04

DOD: Department of Defense Sites
Source: USGS
Telephone: 703-692-8801
This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 10/01/03
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 02/02/04
Date of Next Scheduled EDR Contact: 05/10/04

STORMWATER: Storm Water General Permits
Source: Environmental Protection Agency
Telephone: 202 564-0746
A listing of all facilities with Storm Water General Permits.

Date of Government Version: N/A
Database Release Frequency: Quarterly
Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

INDIAN RESERV: Indian Reservations
Source: USGS
Telephone: 202-208-3710
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 10/01/03
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 02/02/04
Date of Next Scheduled EDR Contact: 05/10/04

US BROWNFIELDS: A Listing of Brownfields Sites
Source: Environmental Protection Agency
Telephone: 202-566-2777
Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become BCRLF cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 07/15/03
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 03/15/04
Date of Next Scheduled EDR Contact: 06/14/04

RMP: Risk Management Plans
Source: Environmental Protection Agency
Telephone: 202-564-8600
When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: N/A
Database Release Frequency: N/A
Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

FUDS: Formerly Used Defense Sites
Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 10/01/03
Database Release Frequency: Varies
Date of Last EDR Contact: 04/26/04
Date of Next Scheduled EDR Contact: 07/05/04

RAATS: RCRA Administrative Action Tracking System
Source: EPA
Telephone: 202-564-4104
RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 03/08/04
Date of Next Scheduled EDR Contact: 06/07/04

TRIS: Toxic Chemical Release Inventory System
Source: EPA
Telephone: 202-566-0250
Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/01
Database Release Frequency: Annually
Date of Last EDR Contact: 03/23/04
Date of Next Scheduled EDR Contact: 06/21/04

TSCA: Toxic Substances Control Act
Source: EPA
Telephone: 202-260-5521
Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/02
Database Release Frequency: Every 4 Years
Date of Last EDR Contact: 03/05/04
Date of Next Scheduled EDR Contact: 06/07/04

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA
Telephone: 202-564-2501

Date of Government Version: 01/21/04
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/22/04
Date of Next Scheduled EDR Contact: 06/21/04

SSTS: Section 7 Tracking Systems
Source: EPA
Telephone: 202-564-5008
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/01
Database Release Frequency: Annually
Date of Last EDR Contact: 04/19/04
Date of Next Scheduled EDR Contact: 07/19/04

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-564-2501
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 01/30/04
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/22/04
Date of Next Scheduled EDR Contact: 06/21/04

STATE OF HAWAII ASTM STANDARD RECORDS

SHWS: Sites List
Source: Department of Health
Telephone: 808-586-4249
Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 07/12/01
Date Made Active at EDR: 10/16/01
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 09/24/01
Elapsed ASTM days: 22
Date of Last EDR Contact: 03/25/04

SWF/LF: Permitted Landfills in the State of Hawaii
Source: Department of Health
Telephone: 808-586-4245
Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 11/01/03
Date Made Active at EDR: 01/13/04
Database Release Frequency: Varies
Date of Data Arrival at EDR: 11/24/03
Elapsed ASTM days: 50
Date of Last EDR Contact: 04/26/04

LUST: Leaking Underground Storage Tank Database
Source: Department of Health
Telephone: 808-586-4228
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/01/03
Date Made Active at EDR: 09/17/03
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 09/02/03
Elapsed ASTM days: 15
Date of Last EDR Contact: 03/30/04

UST: Underground Storage Tank Database
Source: Department of Health
Telephone: 808-586-4228
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/01/03
Date Made Active at EDR: 09/11/03
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 09/02/03
Elapsed ASTM days: 9
Date of Last EDR Contact: 03/30/04

VCP: Voluntary Response Program Sites
Source: Department of Health
Telephone: 808-586-4249

Date of Government Version: 10/10/03
Date Made Active at EDR: 10/21/03
Database Release Frequency: Varies

Date of Data Arrival at EDR: 10/13/03
Elapsed ASTM days: 8
Date of Last EDR Contact: 03/22/04

STATE OF HAWAII ASTM SUPPLEMENTAL RECORDS

SPILLS: Release Notifications
Source: Department of Health
Telephone: 808-586-4249
Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 09/01/00
Database Release Frequency: Varies

Date of Last EDR Contact: 03/25/04
Date of Next Scheduled EDR Contact: 06/21/04

EDR PROPRIETARY HISTORICAL DATABASES

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. ©Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

Disclaimer Provided by Real Property Scan, Inc.

The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

BROWNFIELDS DATABASES

BROWNFIELDS: Brownfields Sites
Source: Department of Health
Telephone: 808-586-4249

Date of Government Version: 10/10/03
Database Release Frequency: Varies

Date of Last EDR Contact: 03/22/04
Date of Next Scheduled EDR Contact: 06/21/04

VCP: Voluntary Response Program Sites
Source: Department of Health
Telephone: 808-586-4249

Date of Government Version: 10/04/03
Database Release Frequency: Varies

Date of Last EDR Contact: 03/22/04
Date of Next Scheduled EDR Contact: 06/21/04

US BROWNFIELDS: A Listing of Brownfields Sites
Source: Environmental Protection Agency
Telephone: 202-566-2777
Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become BCRLF cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: N/A
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: PennWell Corporation
Telephone: (800) 823-6277
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

STREET AND ADDRESS INFORMATION

EDR® Environmental Data Resources Inc

EDR Site Report™

WAIKAPU DUMP-MAUI COUNTY DUMP
CENTRAL MAUI
KAHULUI, HI 96732

Inquiry Number:

May 11, 2004

The Standard in Environmental Risk Management Information

440 Wheelers Farms Road
Milford, Connecticut 06460

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

TABLE OF CONTENTS

The EDR-Site Report™ is a comprehensive presentation of government filings on a facility identified in a search of over 4 million government records from more than 600 federal, state and local environmental databases. The report is divided into three sections:

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

SECTION 1: FACILITY SUMMARY

FACILITY AREA	FACILITY 1 WAIKAPU DUMP-MAUI COUNTY DUMP CENTRAL MAUI KAHULUI, HI 96732 EDR ID #1003879111 EPA #HID050340843
WASTE MANAGEMENT Facility generates hazardous waste (RCRIS)	NO
Facility treats, stores, or disposes of hazardous waste on-site (RCRIS/TSDF)	NO
Facility has received Notices of Violations (RCRIS/VIOL)	NO
Facility has been subject to RCRA administrative actions (RAATS)	NO
Facility has been subject to corrective actions (CORRACTS)	NO
Facility handles PCBs (PADS)	NO
Facility uses radioactive materials (MLTS)	NO
Facility manages registered aboveground storage tanks (AST)	NO
Facility manages registered underground storage tanks (UST)	NO
Facility has reported leaking underground storage tank incidents (LUST)	NO
Facility has reported emergency releases to the soil (ERNS)	NO
Facility has reported hazardous material incidents to DOT (HMIRS)	NO
WASTE DISPOSAL Facility is a Superfund Site (NPL)	NO
Facility has a known or suspect abandoned, inactive or uncontrolled hazardous waste site (CERCLIS)	**YES - p4 (NFRAP)**
Facility has a reported Superfund Lien on it (LIENS)	NO
Facility is listed as a state hazardous waste site (SHWS)	NO
Facility has disposed of solid waste on-site (SWF/LF)	NO
MULTIMEDIA Facility uses toxic chemicals and has notified EPA under SARA Title III, Section 313 (TRIS)	NO
Facility produces pesticides and has notified EPA under Section 7 of FIFRA (SSTS)	NO
Facility manufactures or imports toxic chemicals on the TSCA list (TSCA)	NO
Facility has inspections under FIFRA, TSCA or EPCRA (FTTS)	NO
Facility is listed in EPA's index system (FINDS)	NO
Facility is listed in a county/local unique database (LOCAL)	NO
POTENTIAL SUPERFUND LIABILITY Facility has a list of potentially responsible parties PRP	NO
TOTAL (YES)	1

SECTION 2: FACILITY DETAIL REPORTS

WASTE DISPOSAL

DATABASE: No Further Remedial Action Planned (CERCLIS/NFRAP)

WAIKAPU DUMP-MAUI COUNTY DUMP
CENTRAL MAUI
KAHULUI, HI 96732
EDR ID #1003879111

CERC-NFRAP Name:	WAIKAPU DUMP-MAUI COUNTY DUMP CENTRAL MAUI KAHULUI, HI 96732 MAUI County		
Congressional Dist:	Not reported	RCRA Facility:	Not reported
IFMS ID:	Not reported	SMSA Num:	Not reported
USGS Hydro Unit:	20020000	Federal Facility:	Not a Federal Facility
Non NPL Status:	NFRAP		
NPL Update Num: Fed Haz Waste:	Not Reported No	Federal Register Date: Site Incident:	Not Reported Not reported
EPA-ID:	HID050340843		
EPA Region:	Region 9 r9cerc01.r09tok.epa.gov 204.47.91.37 75 Hawthorne St. 94		
NPL Status:	Not on the NPL	Ownership Status:	Unknown
Classification: Site Description:	Not Reported Not Reported		

ENFORCEMENT ACTIVITY

Action Type: DISCOVERY
Action Anomaly: Not reported
Planning Status: Not reported
Priority Level: Not reported
Operable Unit: SITEWIDE
Urgency: Not reported
Actual Start Date: Not reported
Actual Complete Date: 19791101
Primary Responsibility: EPA Fund-Financed

Action Type: ARCHIVE SITE
Action Anomaly: Not reported
Planning Status: Not reported
Priority Level: Not reported
Operable Unit: SITEWIDE
Urgency: Not reported
Actual Start Date: Not reported
Actual Complete Date: 19850101
Primary Responsibility: EPA In-House

Action Type: PRELIMINARY ASSESSMENT
Action Anomaly: Not reported
Planning Status: Not reported
Priority Level: NFRAP (No Futher Remedial Action Planned
Operable Unit: SITEWIDE
Urgency: Not reported
Actual Start Date: 19841001
Actual Complete Date: 19850101
Primary Responsibility: State, Fund Financed

SECTION 3: DATABASES SEARCHED AND UPDATE DATES

To maintain currency of the following federal, state and local databases, EDR contacts the appropriate government agency on a monthly or quarterly basis as required.

Elapsed ASTM days: Provides confirmation that this report meets or exceeds the 90-day updating requirement of the ASTM standard.

WASTE MANAGEMENT

RCRIS: Resource Conservation and Recovery Information System
Source: EPA
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs): generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs): generate between 100 kg and 1,000 kg of hazardous waste per month. Large quantity generators (LQGs): generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month. Transporters are individuals or entities that move hazardous waste from the generator off-site to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/09/2004
Database Release Frequency: Varies
Date of Last EDR Contact: 04/20/2004
Date of Next Scheduled Update: 06/21/2004

BRS: Biennial Reporting System
Source: EPA/NTIS
Telephone: 800-424-9346
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/01/2001
Database Release Frequency: Biennially
Date of Last EDR Contact: 03/16/2004
Date of Next Scheduled Update: 06/14/2004

RAATS: RCRA Administrative Action Tracking System
Source: EPA
Telephone: 202-564-4104
RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 03/08/2004
Date of Next Scheduled Update: 06/07/2004

CORRACTS: Corrective Action Report
Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/15/2004
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 03/08/2004
Date of Next Scheduled Update: 06/07/2004

PADS: PCB Activity Database System
Source: EPA
Telephone: 202-564-3887
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 12/30/2003
Database Release Frequency: Annually
Date of Last EDR Contact: 02/09/2004
Date of Next Scheduled Update: 05/10/2004

MLTS: Material Licensing Tracking System
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 01/15/2004
Database Release Frequency: Quarterly
Date of Last EDR Contact: 04/05/2004
Date of Next Scheduled Update: 07/05/2004

HI UST: Underground Storage Tank Database
Source: Department of Health
Telephone: 808-586-4228
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/01/2003
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 03/30/2004
Date of Next Scheduled Update: 06/28/2004

HI LUST: Leaking Underground Storage Tank Database
Source: Department of Health
Telephone: 808-586-4228
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/01/2003
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 03/30/2004
Date of Next Scheduled Update: 06/28/2004

ERNS: Emergency Response Notification System
Source: National Response Center, United States Coast Guard
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2003
Database Release Frequency: Annually
Date of Last EDR Contact: 04/26/2004
Date of Next Scheduled Update: 07/26/2004

HMIRS: Hazardous Materials Information Reporting System
Source: U.S. Department of Transportation
Telephone: 202-366-4555
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/18/2003
Database Release Frequency: Annually
Date of Last EDR Contact: 04/20/2004
Date of Next Scheduled Update: 07/19/2004

WASTE DISPOSAL

NPL: National Priority List
Source: EPA
Telephone: Not reported
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 01/29/2004
Date Made Active at EDR: 02/27/2004
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 02/06/2004
Elapsed ASTM Days: 21
Date of Last EDR Contact: 02/06/2004

PROPOSED NPL: Proposed National Priority List Sites
Source: EPA
Telephone: Not reported

Date of Government Version: 01/07/2004
Date Made Active at EDR: 02/27/2004
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 02/06/2004
Elapsed ASTM Days: 21
Date of Last EDR Contact: 02/06/2004

DELISTED NPL: National Priority List Deletions
Source: EPA
Telephone: Not reported
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 01/29/2004
Date Made Active at EDR: 02/27/2004
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 02/06/2004
Elapsed ASTM Days: 21
Date of Last EDR Contact: 02/06/2004

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Source: EPA
Telephone: 703-413-0223
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/26/2004
Date Made Active at EDR: 04/02/2004
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 03/22/2004
Elapsed ASTM Days: 11
Date of Last EDR Contact: 03/22/2004

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Source: EPA
Telephone: 703-413-0223
As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

Date of Government Version: 02/26/2004
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/22/2004
Date of Next Scheduled Update: 06/21/2004

NPL LIENS: Federal Superfund Liens
Source: EPA
Telephone: 202-564-4267
Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Made Active at EDR: 03/30/1994
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 02/02/1994
Elapsed ASTM Days: 56
Date of Last EDR Contact: 03/12/2004

HI SHWS:

HI SWF/LF: Permitted Landfills in the State of Hawaii
Source: Department of Health
Telephone: 808-586-4245
Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 11/01/2003
Database Release Frequency: Varies
Date of Last EDR Contact: 04/26/2004
Date of Next Scheduled Update: 07/26/2004

SECTION 3: DATABASES SEARCHED AND UPDATE DATES

...Continued...

MULTIMEDIA

TRIS: Toxic Chemical Release Inventory System
Source: EPA
Telephone: 202-566-0250
Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2001
Database Release Frequency: Annually
Date of Last EDR Contact: 03/23/2004
Date of Next Scheduled Update: 06/21/2004

SSTS: Section 7 Tracking Systems
Source: EPA
Telephone: 202-564-5008
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2001
Database Release Frequency: Annually
Date of Last EDR Contact: 04/19/2004
Date of Next Scheduled Update: 07/19/2004

TSCA: Toxic Substances Control Act
Source: EPA
Telephone: 202-260-5521
Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2002
Database Release Frequency: N/A
Date of Last EDR Contact: 03/05/2004
Date of Next Scheduled Update: 06/07/2004

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-564-2501
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 01/30/2004
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/22/2004
Date of Next Scheduled Update: 06/21/2004

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA
Telephone: 202-564-2501

Date of Government Version: 01/21/2004
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/22/2004
Date of Next Scheduled Update: 06/21/2004

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report
Source: EPA
Telephone: Not reported
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/08/2004
Database Release Frequency: Quarterly
Date of Last EDR Contact: 04/05/2004
Date of Next Scheduled Update: 07/05/2004

HI SPILLS: Release Notifications
Source: Department of Health
Telephone: 808-586-4249
Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 09/01/2000
Database Release Frequency: Varies
Date of Last EDR Contact: 03/25/2004
Date of Next Scheduled Update: 06/21/2004

HI BROWNFIELDS: Brownfields Sites
Source: Department of Health
Telephone: 808-586-4249

Date of Government Version: 10/10/2003
Database Release Frequency: Varies
Date of Last EDR Contact: 03/22/2004
Date of Next Scheduled Update: 06/21/2004

HI VCP: Voluntary Response Program Sites
Source: Department of Health
Telephone: 808-586-4249

Date of Government Version: 10/10/2003
Database Release Frequency: Varies
Date of Last EDR Contact: 03/22/2004
Date of Next Scheduled Update: 06/21/2004

GA SPILLS: Spills Information
Source: Department of Natural Resources
Telephone: 404-656-6905
Oil or Hazardous Material Spills or Releases.

Date of Government Version: 02/11/2004
Database Release Frequency: Quarterly
Date of Last EDR Contact: 04/26/2004
Date of Next Scheduled Update: 07/26/2004

GA HIST LF:

GA NON-HSI: Non-Hazardous Site Inventory
Source: Rindt-McDuff Associates, Inc.
Telephone: Not reported
This list was obtained by EDR in 1998 and contains property listings that have reported contamination of soil or groundwater under the Georgia Hazardous Site Response Act (HSRA). These sites were not placed on the Georgia Priority list (Hazardous Site Inventory or HSI) because their hazard evaluation scores did not exceed the threshold levels established for sites posing an imminent threat to health or the environment. Disclaimer provided by Rindt-McDuff Associates - the database information has been obtained from publicly available sources produced by other entities. While reasonable steps have been taken to insure the accuracy of the data, RMA does not guarantee the accuracy of the data. No claim is made for the actual existence of pollution at any site. This data does not constitute a legal opinion.

Date of Government Version: 01/20/2004
Database Release Frequency: Annually
Date of Last EDR Contact: 04/05/2004
Date of Next Scheduled Update: 07/05/2004

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. (C) Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

Disclaimer Provided by Real Property Scan, Inc.

The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

POTENTIAL SUPERFUND LIABILITY

PRP: Potentially Responsible Parties
Source: EPA
Telephone: 202-564-6064
A listing of verified Potentially Responsible Parties

Date of Government Version: 04/22/2004
Database Release Frequency: Quarterly

Date of Last EDR Contact: 02/23/2004
Date of Next Scheduled Update: 07/05/2004

CARLSMITH BALL LLP

A LIMITED LIABILITY LAW PARTNERSHIP

ONE MAIN PLAZA, SUITE 400
2200 MAIN STREET, P O BOX 1086
WAILUKU, MAUI, HAWAII 96793-1086
TELEPHONE 808 242.4535 FAX 808 244 4974
WWW CARLSMITH COM

FACSIMILE TRANSMISSION

DATE: April 20, 2004

TO: Name	Fax No.	Phone No.
Joe @Vuich	249-2778	

FROM: Tom C. Leuteneker

NUMBER OF PAGES INCLUDING THIS COVER SHEET: 2

CASE NAME: Emmanuel Lutheran Church
CASE NUMBER:

☐ ORIGINAL/COPY WILL BE MAILED ☐ ORIGINAL/COPY WILL NOT BE MAILED

MESSAGE: Attached is list showing chemicals and fertilizers that may have been used on TMK 3-5-02:01.

WAILUKU AGRIBUSINESS CO., INC.

April 15, 2004

To: Tom Leuteneker, via fax
From: Clayton Suzuki

Subject: Tax Map Key: 3-5-02:01

The following chemicals may have been used during the cultivation of sugarcane on Tax Map Key: 3-5-02:01 in Waikapu.

Active Ingredient:	Brand Name:
Atrazine	Aatrex Nine-O
Ametryn	Evik 80W
2, 4-D	Formula 40
Diuron	Karmex DF
Glyphosate	Roundup
Metribuzin	Sinbar
Hexazinone	Velpar
Glyphosate	Polado

The following fertilizers were used in the cultivation of sugarcane.

Nitrogen
Potassium
Phosphorus
Calcium carbonate

The following chemicals may have been used during the cultivation of pineapple in the Waikapu fields.

Aliette	Ethrel
Amdro	Evik
Diazinon	Hyvar X
Karmex (Diuron)	Velpar DF
Roundup (non crop area)	Atrazine
Fruitone	Nemcur 3

The following fertilizers were used in the cultivation of pineapple.

Nitrogen	Sulfate of Potash
Iron Sulfate	Magnesium Sulfate
Zinc Sulfate	Sulfate of Amonia

Appendix C:

Qualifications of Environmental Professionals

Vuich Environmental Consultants, Inc.

STATEMENT OF QUALIFICATIONS

for

Joseph W. Beaulieu, B.A.

Company Position Environmental Technician

Responsibilities and Duties:

- Phase I & II Environmental Site Assessments/Investigations
- Phase III Environmental Remediation Projects
- Underground Storage Tank (UST) Closures
- Erosion Control Management
- Indoor Air Quality Investigations
- Erosion Control Plan (BMP) Development
- Hazardous/Regulated Waste Management

Experience:

- Environmental Site Assessments
- Disaster Preparedness drills - GIS
- Cartographer – American Automobile Association
- 14 years with the State of New York Mapping and GIS program

Training & Education

- Bachelor of Arts, Environmental Science and Geography (double major), Planning (minor), Mapping Science (minor), Plattsburgh State University College, Plattsburgh, New York. 1986
- GIS Graduate course work, State University at Albany, New York
- GPS training

Rev. 7-03

Consultants, Inc.

STATEMENT OF QUALIFICATIONS

for

Jeffrey E. Kermode, B.A., B. Tech.

Company Position Vice President / Environmental Projects Manager

Responsibilities and Duties:

- Phase I & II Environmental Site Assessments/Investigations
- Phase III Remediation Projects
- Underground Storage Tank (UST) Closures
- Asbestos Inspections, Air Monitoring and Supervision of Removal
- Lead-Based Paint Inspections, Risk Assessments and Supervision of Removal
- Indoor Air Quality Investigations and Mold Remediation Project Management
- Erosion Control Plan (BMP) Development
- Site Safety Officer for Sampling/Remediation Projects

Experience:

- Soil and Groundwater Investigations/Remediation
- UST Removal and Closure
- Hazardous Materials Management
- Asbestos and Lead-Based Paint Projects (Inspections, Monitoring, Removal)
- Air Quality Sampling for Particulate and Microbiological Contaminants
- Wetland Delineation
- Erosion Control and Pollution Prevention Planning and Implementation for Large Scale Construction Projects
- Underground Injection Control (UIC) Permitting
- Environmental Report Writing and Compilation
- Conducted On-Site Oil Spill Response Training Courses, Assessed Clients' Response Preparedness, and Assisted in the Development of Oil Spill Contingency Plans
- Oil Spill Clean-Up Operations
- Pelagic and Coastal Fisheries Research as a Scientific Observer

Training & Education

- Bachelor of Technology, Environmental Engineering, B.C.I.T. Burnaby, B.C., 1999
- Bachelor of Arts, Geography, University of B.C., Vancouver, Canada, 1989
- AHERA (Asbestos Hazard Emergency Response Act) Inspector for Asbestos, US EPA Certified
- AHERA Asbestos Contractor Supervisor, US EPA Certified
- AHERA Project Monitor for Asbestos, US EPA Certified
- OSHA HAZWOPER Certification (40 Hr)
- On-Scene Incident Commander Certification (24 Hr), US EPA Certified
- Lead-Based Paint Inspector, US EPA Certified
- Lead-Based Paint Risk Assessor, US EPA Certified
- Lead-Based Paint Contractor Supervisor, US EPA Certified

Rev. 6-03

Vuich Environmental Consultants, Inc.

JOHN S. VUICH
President & CEO

STATEMENT OF QUALIFICATIONS:

M. S. Geological Engineering, University of Arizona
B. S. Geological Engineering, University of Arizona
Registered Geologist (California)
Registered Environmental Assessor (California)
Certified Environmental Manager (Nevada)

AREAS OF EXPERTISE

ENVIRONMENTAL

- Site Assessments, Phase I, II, III Investigations
- Underground Storage Tank Closure
- Asbestos Inspection and Monitoring, Management Planning, and Abatement Project Design and Removal
- Lead-Containing Paint Surveys and Inspections, and Disturbance Design and Removal
- Site Characterization for Remedial Investigations
- Facility Operation Compliance Audits-ISO 14000 Audits
- Soils/Groundwater Remediation
- Hazardous Waste Management
- Risk Assessment Investigations
- RCRA Compliance and Closure Projects
- Expert Witness/Litigation Support
- Industrial Hygiene Qualified/Competent Person
- Mold/Fungi Sampling, Remediation and Abatement Design and Removal

GEOLOGICAL

- Hydrogeology
- Geologic Hazards Analysis
- Landuse Planning
- Subsurface Excavations and Drilling Investigations and Sampling

MANAGEMENT

- Program Director - Project Management
- Client - Agency Liaison
- Field Supervision - Administrative Supervisor

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RELEVANT EXPERIENCE

Owner-President • Vuich Environmental Consultants, Inc.
Wailuku, Maui, and Honolulu, Oahu • (March, 1994 - Present)
Consulting services and project management for Abatement / Remediation Projects property transfers, sampling and site characterization plans, hazardous and toxic waste management, underground storage tanks, regulatory compliance, landfill sites, site remediation and closure plans, permit applications, litigation support, feasibility planning and contingency and emergency response plans.

Director • CEO Haztech Enviro-Systems
Tucson, AZ • July 1988 - February 1994)
Founder of professional environmental engineering and geological consulting firm. Services included site assessments, site contamination characterizations, facility audits, RCRA closure investigations and hazardous/regulated waste management, remediation projects, and asbestos surveys. Prepared regulatory documentation and permitting for Federal, State and local regulatory agencies on all projects. Supervised professional, technical, sales and administrative/clerical staff.

Project Engineer • Hazchem Environmental Services
Tucson, AZ • March 1987 - June 1988
Performed and supervised RCRA remedial projects and waste management projects.

Independent Consultant Geologist
Laguna Hills, CA and Tucson, AZ • 1982 - 1987
Conducted geological investigations in western United States and Mexico. Performed geochemical sampling and geologic mapping. Prepared technical reports for clients and regulatory agencies.

Environmental/Geotechnical Section Supervisor • TRW: Systems Engineering
Redondo Beach, CA • 1978 - 1981
Directed environmental project management for Department of Defense and Department of Energy related projects in Western U.S. Project, including site selection, planning and environmental impact statements. Supervised staff consisting of geologists and environmental scientists.

Assistant Geologist • Arizona Geological Survey
Tucson, AZ • 1972-1978
Participated in environmental impact studies, geologic hazards analysis, landuse planning. Author of several landuse planning technical publications.

Project Geologist and Staff Geologist • Various Geological Consulting & Mining Companies
Southwestern United States • 1968-1972
Performed geochemical sampling, subsurface investigations including drilling, mineral property valuation and geologic mapping. Prepared geologic reports and maps.

Maui (Main) Office: 1498 Lower Main Street, Suite C, Wailuku, Maui, Hawaii 96793 • (808) 249-2777 Phone (808) 249-2778 Fax
Oahu Office: Hanua Industrial Complex, 91-110 Hanua Street, Unit 317, Kapolei, Oahu, Hawaii 96707
(808) 682-1611 Phone • (808) 682-1616 Fax • Inter-Island: (800) 572-1165 • www.vuichenvironmental.com

OTHER CERTIFICATIONS, TRAINING AND SECURITY CLEARANCES

- Asbestos & Demolition Contractor (C-19, C-24) **HI LIC #21212**
- Certified Hazardous Materials First Responder, FEMA and Arizona Division of Emergency Services.
- OSHA Hazmat Worker and Supervisor
- Accredited Asbestos Building Inspector, Asbestos Contractor/Supervisor, Project Monitor, and Asbestos Abatement Project Designer.
- Accredited Lead Inspector and Lead Contractor Supervisor
- Continuing Education in Hazardous Materials Management, Environmental Studies and Environmental Regulations: 628 Classroom Hours since 1987 - Arizona State University, Tempe, AZ, Pima Community College, Tucson, AZ., & The Environmental Training Center Tucson, AZ.
- Security Clearance: Department of Defense, **TOP SECRET** (1980)
- Licensed Private Pilot - 1400 Hours, Single Engine, Land

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Appendix D:

Acronyms and Abbreviations

Abbreviation	Definition
AST	Aboveground Storage Tank
AHERA	(Federal) Asbestos Hazard Emergency Response Act
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
BLM	Bureau of Land Management
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CAA	Clean Air Act: Regulates Air Quality
CAMU	Corrective Action management Unit
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act: Federal Superfund for Cleanup of Environmental Contamination (1980, 1986)
CERCLIS	CERCLA Information System (data base)
CESQG	Conditionally Exempt SQG: Hazardous Waste Generator less than 100 kg/mo.
C.F.R.	Code of Federal Regulations: National Standard Regulations
COLIWASA	Composite Liquid Waste Sampler
CRC	Chlorofluorocarbon
CMU	Concrete Masonry Unit
CWA	Clean Water Act: Regulates Water Quality (1972, 1987)
CZMA	Coastal Zone Management Act
DLNR	Department of Land and Natural Resources
DOT	Department of Transportation: Administers hazardous Waste Containers-Marking-Labeling-Placarding and Transportation Procedures.
DOH	Department Of Health (State Of Hawaii)
DRASTIC	EPA Standardized System for Evaluating Groundwater Pollution Potential Using Hydrogeologic Settings.
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency: Administers CERCLA, RCRA and SARA
FID	Flame Ionization Detector
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act: Regulates Pesticides (1972, 1988)
FSP	Field Sampling Plan
FWPCA	Federal Water Pollution Control Act
HAP	Hazardous Air Pollutant
HCS	(OSHA) Hazard Communication Standard
HSWA	(Federal) Hazardous and Solid Waste Amendments of 1984
LEL	Lower Explosive Limit
LQG	Large Quantity Generators; Hazardous Waste Generator in Excess of 100 kg/mo.
LUST	Leaking Underground Storage Tank.
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MSDS	Material Safety Data Sheets: Hazard Information Required for Chemical Substances by OSHA
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants (Under CAA Regulations)
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operating and Maintenance
OCS	Outer Continental Shelf
OSHA	Occupational Safety and Health Act: Established Hazard Communication Program and Employee Right-to-Know Law (1970)
OVA	Organic Vapor Analyzer
PCB	Polychlorinated Biphenyls: Toxic Substance Used in Electric-Device Cooling.
PCi/l	Picocuries Per Liter
PEL	Permissible Airborne Exposure Level
PID	Photoionization Detector
POTW	Publicly Owned Treatment Works

ppb	parts per billion
ppm	parts per million
PWP	Project Work Plan
PRPs	Potentially Responsible Parties
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RBCA	Risk Based Corrective Action and Decision-Making at Sites with Contaminated Soil and Groundwater. (Hawaii DOH)
RCRA	Resource Conservation and Recovery Act: Federal Hazardous Waste Management Law. Regulates Waste Generation, Transportation, Treatment, Storage or Disposal Sites (1976, 1984)
RQ	Reportable Quantity
RUST	Registry of Underground Storage Tanks
SAP	Sampling & Analysis Plan
SARA	Superfund Amendments and Reauthorization Act: Amends CERCLA and includes Community Right to Know Law. Requires facilities report their chemical inventories and emissions (1986).
SDWA	Safe Drinking Water Act: Establishes maximum contaminant levels for drinking water (1974, 1986).
SHSP	Site Health & Safety Plan
SIC	Standard Industrial Classification
SIP	State implementation plan
SPCC	Spill Prevention Control and Countermeasure
SQG	Small Quantity Generator: Hazardous Waste Generator between 100-1000 kg/mo.
TCLP	Toxicity Characteristic Leaching Procedure: A toxicity test for certain substances declared hazardous by the EPA.
TMK	(Hawaii) Tax Map Key
TPH	Total Petroleum Hydrocarbons
TPQ	Threshold Planning Quantity
TSCA	Toxic Substances Control Act: Regulates PCBs in electrical devices and chromium in evaporative cooling towers, asbestos in schools. (1976)
TSD	Treatment, Storage, and Disposal
UEL	Upper Explosive Limit
UIC	Underground Injection Control
USGS	United States Geological Survey
UST	Underground Storage Tank
VOA	Volatile Organic Analyses
VOC	Volatile Organic Compound: EPA listed toxic or carcinogenic organic substances.
Minimal, Minor or Not Significant	1) An unlikely or remote event, i.e., possible, but not anticipated under current conditions and observed features. 2) Insignificant when compared to regulatory acceptance levels, guideline action levels or when compared to background and/or baseline conditions of the local environment. 3) Any potential effect or impact attributed to the subject factor may be considered as the least likely source among a number of potentially responsible factors. 4) Any potential effect may not be measurable or detected by current technology. 5) Education, experience, and background of the investigator were utilized to conclude the situation or condition as trifle.

Appendix D
Archaeological Field Report

ARCHAEOLOGICAL SERVICES HAWAII, LLC.,
16 S. Market St. Ste. G; Wailuku, HI; 96793
Ph.808-244-2012; Fx. 808-244-9592

11 May 04

Mr. Richard Sudheimer
Mr. Dick Drayson
Mr. Nathan Kwee
C/o Mr. Tom Leuteneker
Carlsmith Ball LLP
One Main Plaza Ste 400
Wailuku, Hi 96793

Subject: Post Field Summary Letter During Due Diligence at Wailuku Agribusiness, TMK 3-5-02: 01 pors.

Dear Sirs:

Per your request, Archaeological Services Hawaii, LLC., conducted a pedestrian survey with subsurface backhoe testing within 50 acres at the above referenced project area (Figure 1). The work was performed from 5-7 May 04 by Mr. Paul Titchenal (M.A.), and supervisor Ms. Diane Guerriero (B.A.), under the overall direction of Ms. Lisa Rotunno-Hazuka (B.A.) and Mr. Jeffrey Pantaleo (M.A.). A total of 25 backhoe trenches were selectively placed in areas that contained no active farming. No subsurface cultural remains were recovered in any of the trenches, however one surface site, the Kama Ditch, was identified. The ditch is from the historic period sugar cane era and consists of a concrete line ditch that is oriented north-south.

The project area is located between Honoapiilani Highway and Waiale Road within a highly sensitive area for traditional Native Hawaiian sites. The Wailale/Lower Main corridor from Kahului Harbor to Waiko Road, has contained numerous sand dune burials, habitation layers as well as some clay pit burials. Thus, the parcels within the project area had the potential to contain significant subsurface sites; unfortunately the project area has been heavily impacted by compounded surface disturbances from sugar cane, sand mining and farming tenements, and as such, contains little of its original landscape. Due to these compounded disturbances, the likelihood of recovering intact pre-Contact deposits was minimal.

Details of the parcels conditions, the findings of the archaeological investigation, and recommendations are presented below.

Project Area

The project area consists of two adjoining 25-acre parcels within a portion of Wailuku Agribusiness landholdings at TMK 3-5-02: 01 pors in Wailuku *ahupua'a* and District, in the isthmus of Maui. The parcels are bounded by Honoapiilani Highway to the northwest, Waiale Road to the southeast and the proposed retention basin along Kuikahi Avenue to the north. A sewer easement and the Kama ditch run north-south within the central portions of the project area (See Figure 1). The parcel closest to the northern boundary is owned by Emmanuel Lutheran Church and contains numerous individual farm plots with bananas, papayas and sweet potatoes. The southern parcel owned by Valley Isle Fellowship consists of bananas, sweet potatoes, and fallow sugar cane and a sod farm. Both parcels have undergone substantial surface disturbances, where most of the sand dune has been removed. An elongate portion (approximately one-third of the project area) between the sewer line easement and the Kama ditch consisted of a thick deposit of alluvial sand (highlighted in yellow). The remaining two-thirds of the parcel contained a cobbly, silt along Honoapiilani Highway, and a silty sand along Waiale Road. Again, all areas were tested by backhoe trenching, were no subsurface cultural deposits were identified.

Results

A total of 25 backhoe test trenches were executed within the two parcels in areas that would not disrupt active farming (See attached Table I). Trenches 1-6, 15,16 and 23-25 were excavated within the northern parcel, and trenches 7-14 and, 17 –22 were excavated within the southern parcel. Trenching was not conducted within the extreme central portion of the project area, due to dense active farming.

The trenches were oriented either north-south or east-west and averaged 6.0 meters in length by 2.0 meters in depth. No subsurface cultural deposits or features were identified within the trenches. In general, a three layer stratigraphic sequence was identified within the trenches, where Layer I was usually disturbed at least 2.0 ft. below the surface.

The pedestrian survey, coupled with the test excavations results, exemplified that the project area has been severely altered in historic times.

Discussion

The project area, located within the isthmus of Maui, would have contained high knolls and ridges and undulating inland sand dunes in the past. Traditionally, Native Hawaiian habitation sites and burial grounds have been documented within this type of landscape. The project area, though located within the isthmus, has undergone a substantial amount of clearing, grubbing and grading, resulting in the removal of the former sand dune ridge system (recall sand was present at the surface in the elongate portion and continues to a depth of 9.0 ft. below the surface). Due to these disturbances, the potential for identifying subsurface features consisting of burials has been reduced.

Recommendation

For the project area, no further archaeological testing is warranted, however archaeological monitoring is recommended during all construction related activities. Archaeological monitoring is the standard protocol in areas with the potential for subsurface sites (even though the probability of subsurface features has been reduced, the potential does exist). Monitoring is currently being conducted within adjoining parcels to the project area (Wailuku Agribusiness, Kehalani off sites, Hawaiian Cement, Waiko Baseyard LLC, Consolidated Baseyard LLC, Ameron and Maui Lani).

The testing conducted to date is intended to fulfill the requirements for an Inventory Survey under the guidelines set forth in Chapter 13-276, Hawaii Administrative Rules, Rules Governing Standards for Inventory Surveys and Reports. The testing and other pertinent data will be presented in an Inventory Survey report which will be submitted to the State Historic Preservation Division (SHPD) for their review.

Thank you very much for giving ASH the opportunity to conduct work in this area, if you should have any questions and or comments, please do not hesitate to call me. The Inventory Survey Report shall be submitted within 60 days to SHPD.

Respectfully,

Lisa Rotunno-Hazuka
Consulting Archaeologist

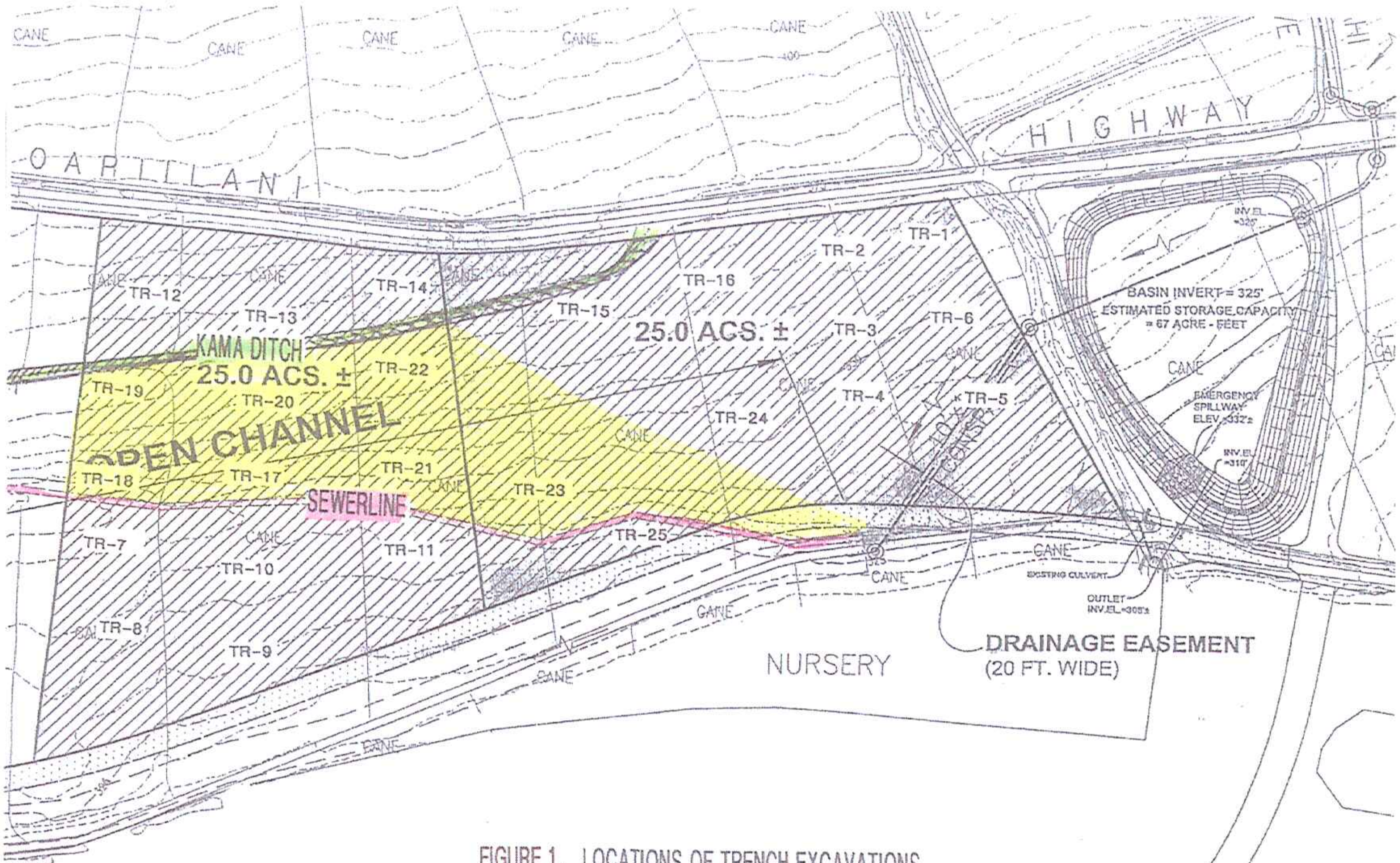

FIGURE 1. LOCATIONS OF TRENCH EXCAVATIONS

STRATIGRAPHIC SUMMARY TABLE

TRENCH (TR)	LOCATION	ORIENT.	DIMENSION	STRATIGRAPHY	COMMENTS
1	Located in the extreme northwest portion of project area East of Honoapiilani Highway	80 / 260 Az	6.6 m (L) x .80 cm (W) x 1 5 m (H)	Layer I - Fine, Silt, Dark Brown, (10YR3/3), agricultural layer. Layer II - Very Fine, Silt; Dark Grayish Brown (10YR 3/2); Layer III - Fine, Silt, Dark Grayish Brown (10YR 3/2), colluvial deposited with water affected pebbles, cobbles and small boulders	Previous surface disturbance with past and present agriculture farming Level surface area North Profile. No cultural remains identified
2	South of TR 1 East of Honoapiilani Highway	90 / 270 Az	7 m (L) x 80 m (W) x1 5 m (H)	Layer I - Fine, Silt; Dark Brown, (10YR3/3); agricultural layer Layer II - Very Fine, Silt; Dark Grayish Brown (10YR 3/2) with gravel inclusions; Layer III - Fine, Silt; Dark Grayish Brwn.(l0YR 3/2), colluvial deposit with water affected pebbles and cobbles.	Previous surface disturbance with past and present agriculture farming. On level surface area East Profile No cultural remains identified
3	Southeast of TR 2 and TR.1 East of Honapiilani Highway.	70 / 250 Az.	5 m (L) x .80m (W) x 1.4 m (H)	Layer I - Fine, Silt, Dark Brown, (10YR3/3), agricultural layer. Layer II - Very Fine. Silt; Dark Grayish Brown (10YR 3/2); Layer III - Fine, Silt; Dark Grayish Brown (l0YR 3/2); gravelly	Previous surface disturbance with past and present agriculture farming On slight slope towards east. North Profile No cultural remains identified.
4	East of TR. 3. East of Honapiilani Highway and west of exisiting sugar cane hauling road	80 / 260 Az	6 2 m (L) x 80 m (W) x 1.3 - 1 6 m (H)	Layer I - Fine. Silt; with sand inclusions, Dark Brown to Dark Yellowish Brown (10YR 3/3-3/4); agricultural layer. Layer II - Fine, Silt; Dark Brown (10YR 3/3).	Previous surface disturbance with past and present agriculture farming. On level surface area South Profile. No cultural remains identified
5	Located in the extreme northeast portion of the project area. North of TR. 4 and east of TR-6	70 / 250 Az	8 m (L) x .80 m (W) x 1.5 m (H)	Same as TR-4 without sand inclusions identified in TR 4 Layer I	Previous surface disturbance with past and present agriculture farming On level surface area. North Profile No cultural remains identified
6	Located along the northern project area boundary, west of TR-5 and east of TR-1	90 / 270 Az.	4 8 m (L) x .80 cm (W) x 1.6 (H)	Same as TR-3	Previous surface disturbance with past and present agriculture farming On slight slope towards east South Profile. No cultural remains identified. No cultural remains identified
7	Located in the extreme southern portion of project area. East of Honoapiilani Highwayand adjacent to' east of the exisiting sewerline easement	100 / 280 Az	5.5 m (L) x .80 cm (W) x 1.4 (H)	Layer I - Fine, Silt; with sand inclusions, Dark Brown to Dark Yellowish Brown (10YR 3/3-3/4); agricultural layer. Layer II - Fine, Silt, with sand and gravel inclusion, river bed inclusions noted in North and South Profiles, Dark Brown (10YR 3/3). Layer III - Fine. Silt, Dark Brown to Dark Yellowish Brown (10YR 3/3 - 3/4).	Previous surface disturbance with past sand mining activites and agriculture farming. Historic debris noted within area. Level surface area. South Profile No cultural remains identified
8	Located in the extreme southeastern portion of project area. East of Honoapiilani Highway and TR-7	80 / 240 ' AZ	5.5 m (L) x 80 cm m (W) x 1.5 m (H)	Layer I - Fine, Silt; with sand inclusions, Dark Brown to Dark Yellowish Brown (10YR 3/3-3/4), agricultural layer Layer II - Fine, Silt; Dark Brown (10YR 3/3). Layer II same as Layer II with many water affected and sub-angular cobbles and pebbles.	Level ground surface North Profile. No cultural remains identified.
9	North of TR 8 and west of sugar cane hauling road	90 / 270 Az.	6 m (L) x .80 cm (W) x 1.5 m (H)	Layer I - mottled Silt; with sand inclusions, Brown (7.5 3/2); agricultural layer. Layer II - remnant Aeolian Sand; (10YR 5/4), Yellowish Brown. Layer II / III - Transitional Layer, Sandy Silt; Brown (10YR 5/3), Layer III - Silt, Dark Brown (10YR 3/3.	Level ground surface in open fallow field of sweet potatoes. South Profile No cultural remains identified
10	West of TR. 9. Adjacent to, east of the existing sewerline easement	180 / 360 Az	6 m (L) x .80cm. (W) x 1 5 m (H)	Layer I - Mottled Silty Sand, Very Dark Grayish Brown; (10YR 3/2) with charcoal flecks. Layer II - Sand Silt, Brown to Dark Brown (10YR 5/3-4/3) ; Layer III - Aeolian SandSilt Vry Drk Graysh Brwn (10YR 3/2); Layer IV - Very Fine Grain Sand Pale Brwn (10YR 6/3), Layer V - BOE- Coarse Sand Light Brwn Gray(10YR 6/2).	Previous surface disturbance with past and present agriculture farming West Profile No cultural remains identified
11	East of TR. 10 Adjacent to , east of the existing sewerline easement	180 / 360 Az	6 m (L) x .80cm (W) x 1.5 (H)	Layer I - Silty Loam; Very Dark Grayish Brown (10YR 3/2), Layer II - Silt, Dark Brown, (10YR 3/3); Layer III - Silt; Dark Brown (10YR 3/3)	Previous surface disturbance with past and present agriculture farming Level ground surface area. South Profile. No cultural remains identified

STRATIGRAPHIC SUMMARY TABLE

TRENCH (TR)	LOCATION	ORIENT.	DIMENSION	STRATIGRAPHY	COMMENTS
12	Located in the extreme southeast portion of project area. Adjacent to east of, Honapiilani Highway	110 / 280 Az	6 m (L) x .80cm (W) x 1.8 (H)	Layer I - Silty Loam; Very Dark Grayish Brown (10YR 3/2); Layer II - Silt; Dark Brown, (10YR 3/3); Layer III - Silt; Dark Brown (10YR 3/3), with many water affected basalt cobbles and pebbles	Level ground surface area on upper slope. North Previous surface disturbance with past agricultural farming. North Profile. No cultural remains identified
13	North of TR 12. Adjacent to; east of Honoapiilani Highway	100 / 280 Az	5.5 m (L) x 80 cm (W) x 1.8 (H)	Same as TR - 12	Level ground surface area on upper slope. North Previous surface disturbance with past agricultural farming. East Profile. No cultural remains identified
14	North of TR 13. Adjacent to east of, Honoapiilani Highway	100 / 280 Az.	5 m (L) x .80 cm (W) x 1.7 m (H)	Same as TR - 12, and 13	Level ground surface area on upper slope. North Previous surface disturbance with past agricultural farming. North Profile. No cultural remains identified.
15	North of TR. 14. Adjacent to, east of, Honoapiilani Highway	100 / 280 Az	6 m (L) x .80cm (W) x 2 m (H)	Same as TR - 12, 13, 14	Level ground surface area on upper slope. North Previous surface disturbance with past agricultural farming. East Profile. No cultural remains identified
16	North of TR 15. Adjacent to, east of, Honoapiilani Highway	180 / 360 Az.	5 m (L) x 80cm (W) x 1.6 m (H)	Same as TR - 12, 13, 14 and 15	Level ground surface area on upper slope. North Previous surface disturbance with past agricultural farming. Profile. No cultural remains identified
17	West of TR 10. Adjacent to, west of, the sewerline easement and east Honoapiilani Highway.	170 / 350 Az	6 m (L) x .60 cm (W) x 1.7 m (H)	Layer I - Silty Sand, Grayish Brown (10YR 3/4); Layer II - Aeolian Sand, Yellowish Brown (10YR 5/6); Layer III - Silt, Very Dark Brown	On slope surface area, below a field of agricultural farming of sweet potatoes. East Profile.No cultural remains identified
18	South of TR 17 and east of TR 7. Adjacent to; east of, Honoapiilani Highway and the exsiting sewerline..	180 / 360 Az	5 m (L) x .80 m (W) x 1.6 m (H)	Same as TR - 17 with the exception of a disturbed sand layer below Layer I	On slope surface area. East Profile. No cultural remains identified
19	West of TR 18 and east of TR - 12. Adjacent to east of the Kama Ditch.	180 / 360 Az	5 m (L) x .80cm (W) x 2.2 m (H)	Same as TR - 18	Level ground surface on farm access road along upper slope. East Profile. No cultural remains identified
20	North of TR 19. Adjacent to; east of the Kama Ditch.	180 / 360 Az.	5.6 m (L) x.80 cm (W) x 2.8 m (H)	Same as TR - 18 and 19	On slope surface area along upper slope. West Profile. No cultural remains identified
21	East of 22. Adjacent to, West of the sewerline easement.	120 / 300 Az	5.5 m (L) x 1.6 m (W) x 2.5 m (H)	Same as TR - 18, 19 and 20	Level ground surface. West Profile. No cultural remains identified.
22	West of TR 21. Adjacent to, east of the Kama Ditch.	90 / 270 Az.	6 m (L) x .80 cm (W) x 2.5 m (H)	Same as TR - 18 thru 21	Level ground surface. East Profile. No cultural remains identified
23	North of TR. 21. Adjacent to; west of the sewerline easement	90 / 270 Az	6.5 m (L) x 80 cm (W) x 3.5 m (H)	Same as TR - 18 thru 22	Level ground surface. East Profile. No cultural remains identified.
24	Northwest of TR 23. Placed in an open unplanted agricultural field West of exsiting sewerline easement	180 / 360 Az	4 m (L) x 2 m (W) x 2 m (H)	Same as TR - 4 and 5	Level ground surface. West Profile. No cultural remains identified
25	East of TR 24. Adjacent to: east of exsiting sewerline easement. Placed in a fallow sweet potatoe field.	90 / 270 Az.	4.6 m (L) x 1.2 m (W) x 1.9 m (H)	Same as TR - 4 and 5	Level ground surface. North / northwest Profile. No cultural remains identified

Appendix E
Traffic Impact Analysis Report

TRAFFIC IMPACT ANALYSIS REPORT FOR

EMMANUEL LUTHERAN CHURCH AND SCHOOL

IN WAIKAPU, MAUI, HAWAII

FINAL REPORT

Prepared For

CHRIS HART & PARTNERS, INC.
1955 Main Street, Suite 200
Wailuku, Maui, Hawaii 96753

Prepared By

Phillip Rowell and Associates
47-273 ‘D’ Hui Iwa Street
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August 18, 2006

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1. INTRODUCTION

Phillip Rowell and Associates has been retained by Emmanuel Lutheran Church to prepare a traffic impact analysis for a proposed school and sanctuary in the Waikapu area of Maui. The approximate location of the project on the Island of Maui is shown in Figure 1.

This introductory chapter discusses the location of the project, the proposed development, and the study methodology.

Purpose and Objectives of Study

1. Determine and describe the traffic characteristics of the proposed project.

2. Quantify and document the traffic related impacts of the proposed project.

3. Identify and evaluate traffic related improvements required to provide adequate access to and egress from the proposed project and to mitigate the project's traffic impacts.

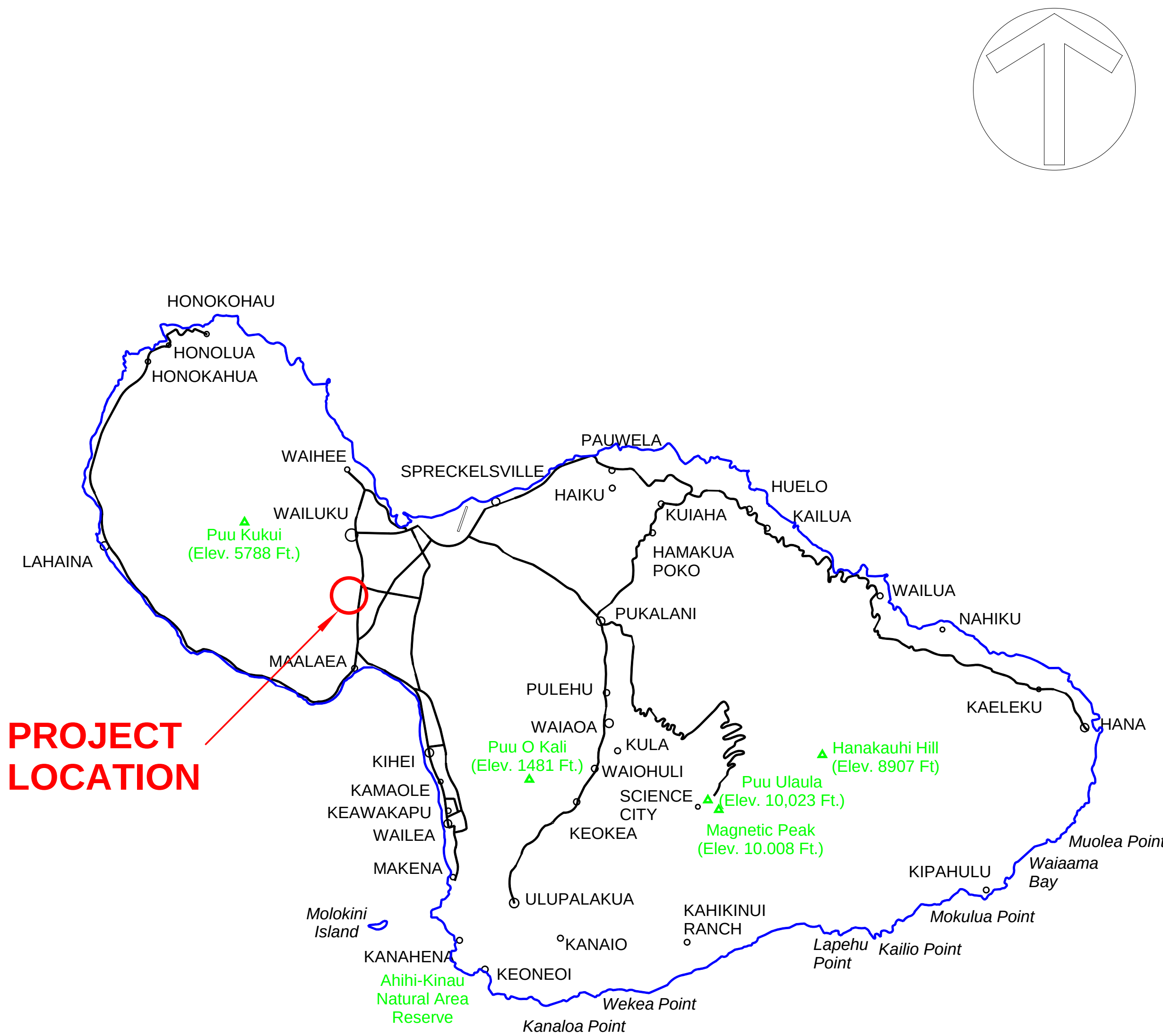

Figure 1
PROJECT LOCATION MAP

Project Location and Description

A preliminary site plan of the project is shown as Appendix A. The following is a summary of the project:

1. The project is located between Honoapiilani Highway and the extension of Waiale Road, south of Kuikahi Drive. The site is bounded by Honoapiilani Highway on the west, Kuikahi Drive on the north, Waiale Road on the east and the Waikapu Affordable Housing Project on the south.

2. The project will consist of a new K through 8 school and preschool. The students and staff will be relocated from the existing school located in Wailuku. Current enrollment of the preschool is 40. Maximum future enrollment is expected to be approximately 80. Current enrollment of the school is approximately 200. Enrollment is expected to increase to a maximum of 400 students.

3. The project will also consist of a new 4,000 square foot sanctuary.

4. Access will be via a new driveway along the west side of Waiale Road, approximately midway between Kuikahi Drive and the north boundary of the Waikapu Affordable Housing Project.

An activity matrix of the proposed uses at the project, the days and the approximate number of persons attending each use is shown as Table 1.

Table 1 Activity Matrix for Proposed Church and School [1]

Event	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Preschool		80 People 7 AM to 5 PM	80 People 7 AM to 5 PM	80 People 7 AM to 5 PM	80 People 7 AM to 5 PM	80 People 7 AM to 5 PM	
Day School		400 People 7:300 AM to 3:30 PM	400 People 7:300 AM to 3:30 PM	400 People 7:300 AM to 3:30 PM	400 People 7:300 AM to 3:30 PM	400 People 7:300 AM to 3:30 PM	
After School		120 People 3:30 PM to 5:30 PM	120 People 3:30 PM to 5:30 PM	120 People 3:30 PM to 5:30 PM	120 People 3:30 PM to 5:30 PM	120 People 3:30 PM to 5:30 PM	
Early Church Service	225 People 8 AM to 9:15 AM						
Sunday School	75 to 90 People 9:30 AM to 10:30 AM						
Church Service	110 People 10:45 AM to 11:45 AM						
Lenten Service (Feb., March, & April)				60 to 80 People 6 PM to 8 PM			
Advent Service (December)				60 to 80 People 6 PM to 8 PM			
Board Meetings					10 to 50 People 5 PM to 8 PM		
Maintenance							12 People 8 AM to 3 PM
Weddings (On Demand)							10 to 60 People 10 AM to 7 PM
Other Education		40 People 7:30 AM to 3:30 PM	40 People 7:30 AM to 3:30 PM	40 People 7:30 AM to 3 :30 PM	40 People 7:30 AM to 3:30 PM	40 People 7:30 AM to 3:30 PM	
Church Events		15 People 7 PM to 9 PM		15 People 7 PM to 9 PM		15 People 7 PM to 9 PM	

Notes:
1. Source: Emmanuel Lutheran Church

Horizon Year

The design horizon year represents a date for which future background traffic projections were estimated. These projections include traffic generated by other planned projects within and adjacent to the study area and background traffic growth.

The year 2010 was used as the horizon year, even though scheduled completion is earlier. This year was selected to be consistent with the traffic studies for the related projects in the area.

Study Methodology

The following is a summary list of the tasks performed:

1. The study area and the scope of work were defined using criteria established by the Institute of Transportation Engineers[1] for small developments. Small developments are projects that generate between 100 and 500 peak hour trips. This was based on the results of a preliminary trip generation analysis that determined the proposed new office building would generate more than 100 trips during the peak hour. See Table 2.

2. A site reconnaissance was performed to identify existing roadway cross-sections, intersection lane configurations, traffic control devices, and surrounding land uses.

3. Existing peak-hour traffic volumes for the study intersections were obtained and summarized.

4. Existing levels-of-service of the study intersections was determined using the methodology described in the *Highway Capacity Manual*.

5. A list of related development projects within and adjacent to the study area that will impact traffic conditions at the study intersections was compiled. This list included both development projects and anticipated highway improvement projects.

6. Future background traffic volumes at the study intersections without traffic generated by the study project were estimated.

7. Peak hour traffic that the proposed project will generate was estimated using trip generation analysis procedures recommended by the Institute of Transportation Engineers.

8. A level-of-service analysis for future traffic conditions with traffic generated by the study project was performed.

9. The impacts of traffic generated by the proposed project at the study intersections was quantified and summarized.

10. Locations that project generated traffic significantly impacts traffic operating conditions were identified.

11. Recommendations, improvements or modifications necessary to mitigate the traffic impacts of the project and to provide adequate access to and egress from the site were formulated.

12. A report documenting the conclusions of the analyses performed and recommendations was prepared.

---

[1] Institute of Transportation Engineers, *Transportation and Land Development, Second Edition*, Washington, D.C., 2002, pages 3-1 thru 3-16.

Table 2 Suggested Requirements for Various Types of Traffic Impact Analyses[2]

	Trip Generation Threshold			
	Access Location & Design Review	Small Development: Traffic Impact Assessment	Medium Development: Traffic Impact Statement	Large Development: Regional Traffic Analysis
	T ≤ 100 Peak Hour Trips	100 < T ≤ 500 Peak Hour Trips	500 < T ≤ 1000 Peak Hour Trips	T > 1000 Peak Hour Trips
Pre-application meeting or discussion	✔	✔	✔	✔
Analysis of Roadway Issues				
Existing condition analysis within study area	✔	✔	✔	✔
Sight distance evaluation	✔	✔	✔	✔
Nearby driveway locations	**?**	✔	✔	✔
Existing traffic conditions at nearby intersections and driveways		✔	✔	✔
Future road improvements		**?**	✔	✔
Crash experience in proximity to site	**?**	✔	✔	✔
Trip generation of adjacent development		**?**	✔	✔
Trip distribution analysis		✔	✔	✔
Background traffic growth		**?**	✔	✔
Future conditions analysis at nearby intersections		**?**	✔	✔
Mitigation identification and evaluation		**?**	**?**	✔
Site Issues				
Traffic generation	✔	✔	✔	✔
Traffic distribution	**?**	✔	✔	✔
Evaluate number, location & spacing of access points	**?**	✔	✔	✔
Evaluate access design, queuing, etc.	✔	✔	✔	✔
Evaluate site circulation	✔	✔	✔	✔
Other Analyses				
Gap analysis for unsignalized locations		**?**	**?**	✔
TSM/TDM[2] Mitigation measures (car- or van-pooling, transit, etc.)- transit agency participation			**?**	✔
Effect on traffic signal progression, analysis of proposed signal locations			**?**	✔

Notes:
(1) Key: ✔ = required, **?** = may be appropriate on a case-by-case basis
(2) Source: Institute of Transportation Engineers, *Transportation and Land Development*, Washington, D.C., 2002, p.3-6
(3) TSM/TDM = Transportation System Management/Transportation Demand Management
(4) A traffic signal should not be permitted

Study Area

The study area for this study is consistent with the study area for other traffic impact studies in Wailea and recent direction from the County of Maui Department of Public Works. The study area is shown on Figure 2. The study intersections are listed in Table 2.

Table 3 Study Intersections and Right-of-Way Control

Number	Intersection	Right-of-Way Control	Jurisdiction
1	Honoapiilani Highway at East Waiko Road	Unsignalized (1)	State
2	Honoapiilani Highway at Waiolu Road	Unsignalized	State
3	Honoapiilani Highway at Pilikana Street	Unsignalized (1)	State
4	Honoapiilani Highway at Kuikahi Drive	Signalized	State
5	Waiale Road at Kuikahi Drive	Unsignalized	County
6	Waiale Road at Road A (2)	Unsignalized	County
7	Waiale Road at Road C (2)	Unsignalized	County
8	Waiale Road at East Waiko Road (2)	Unsignalized	County

Notes:
(1) This intersection is currently unsignalized. Signals are to be installed as a condition of other development projects in the area.
(2) This intersection is being constructed as part of the Waikapu Affordable Housing project that is under construction.

Order of Presentation

Chapter 2 describes existing traffic conditions, the Level-of-Service (LOS) concept and the results of the Level-of-Service analysis of existing conditions.

Chapter 3 describes the process used to estimate 2010 background traffic volumes and the resulting background traffic projections. Background conditions are defined as future background traffic conditions without traffic generation by the study project.

Chapter 4 describes the methodology used to estimate the traffic characteristics of the proposed project, including 2010 background plus project traffic projections.

Chapter 5 describes the traffic impacts of the proposed project, identifies potential mitigation measures and summarizes the traffic impact study.

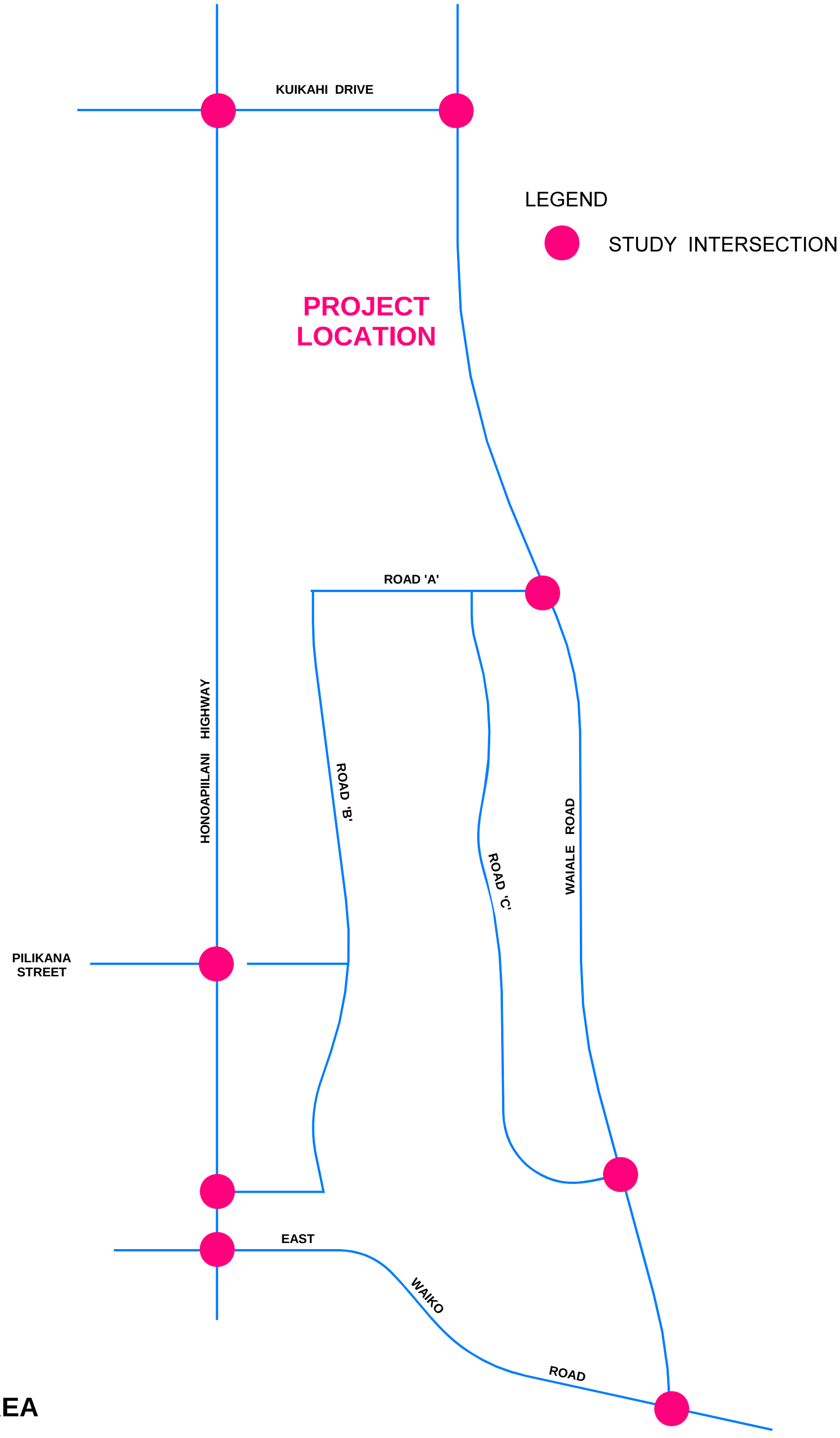

Figure 2
STUDY AREA

2. ANALYSIS OF EXISTING CONDITIONS

This chapter presents the existing traffic conditions on the roadways adjacent to the proposed project. The level-of-service (LOS) concept and the results of the Level-of-Service analysis for existing conditions are also presented. The purpose of this analysis is to establish the base conditions for the determination of the impacts of the project which are described in a subsequent chapter.

Description of Existing Streets and Intersection Controls

The following is a summary of the major roadways in the study area:

Honoapiilani Highway

Honoapiilani Highway is a major State highway connecting Wailuku and Maalaea. In the vicinity of the proposed project, the highway is a two-lane, two-way facility with separate left turn lanes. The posted speed limit is 45 miles per hour (mph).

East Waiko Road

East Waiko Road is a two-lane, two-way roadway intersecting Honoapiilani Highway approximately one quarter mile south of Pilikana Street. East Waiko Road serves residential development along both sides of Honoapiilani Highway. The intersection of Honoapiilani Highway at East Waiko Road is unsignalized.

Figure 3 is a schematic indicating the lane configurations and right-of-way controls of the study intersections.

Existing Peak Hour Traffic Volumes

The existing peak hour traffic volumes are shown in Figures 4, 5 and 6. The peak hour volumes were determined from traffic counts of the study intersections.

1. The traffic counts were performed during the first week of November and the first week of December, 2005.

2. The morning counts were performed between 6:30 AM and 9:00 AM. The afternoon counts were performed between 3:30 PM and 6:00 PM. Sunday counts were performed between 7:30 AM and 12:30 PM.

3. The traffic determined that the weekday morning peak hour is from 7:00 AM to 8:00 AM, the weekday afternoon peak hour is from 4:45 PM to 5:45 PM and the Sunday peak hour is from 11:45 AM to 12:45 PM.

4. The traffic counts include buses, trucks and other large vehicles. Mopeds and Bicycles were not counted.

5. The traffic volumes shown are the peak hourly volume of each movement rather than the peak sum of all approach volumes.

6. The traffic volumes of adjacent intersections may not match the volumes shown for an adjacent intersection because the peak hours of the adjacent intersections may not coincide and there may driveways between the intersections.

7. Pedestrian activity was negligible.

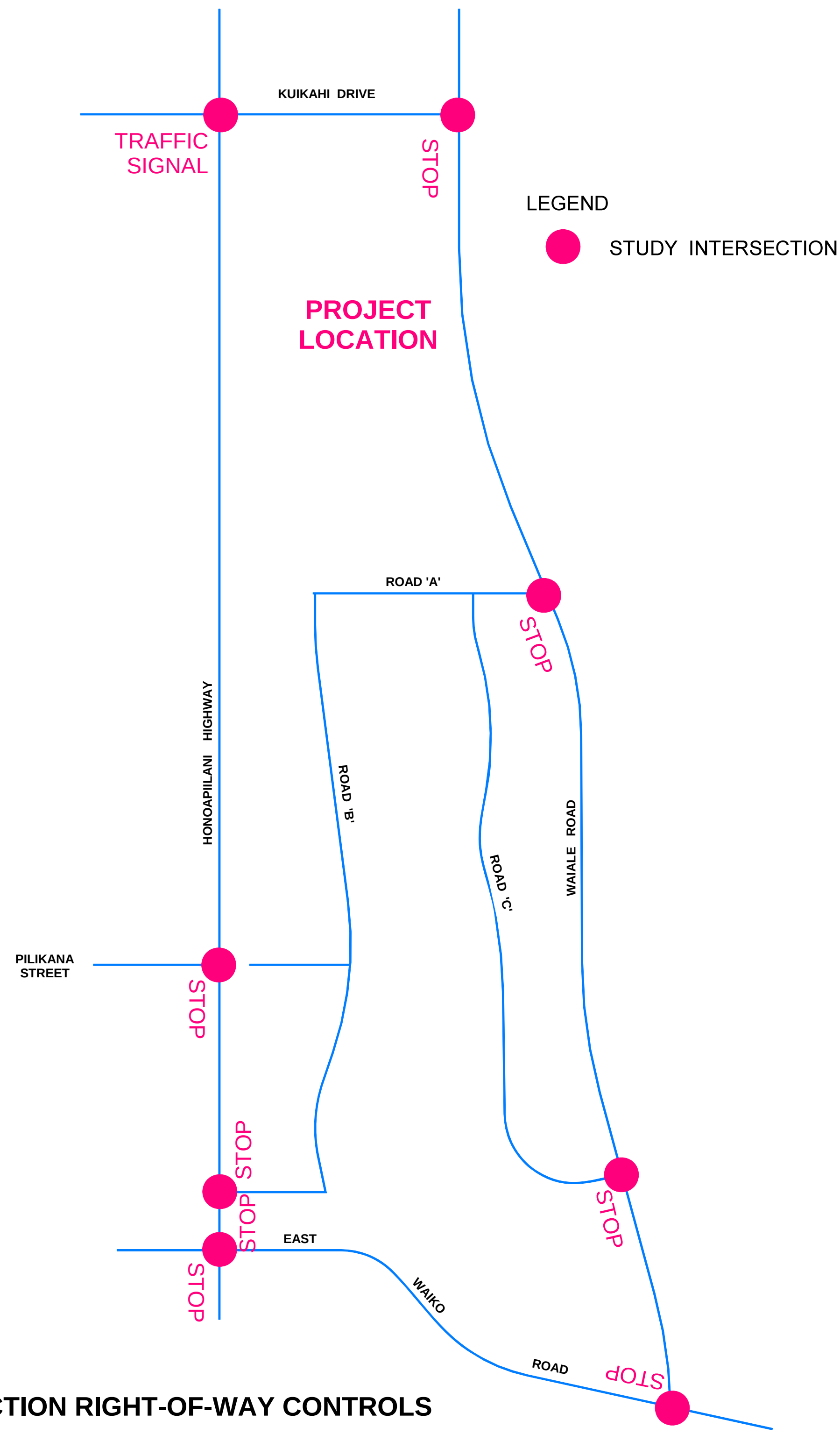

Figure 3
INTERSECTION RIGHT-OF-WAY CONTROLS

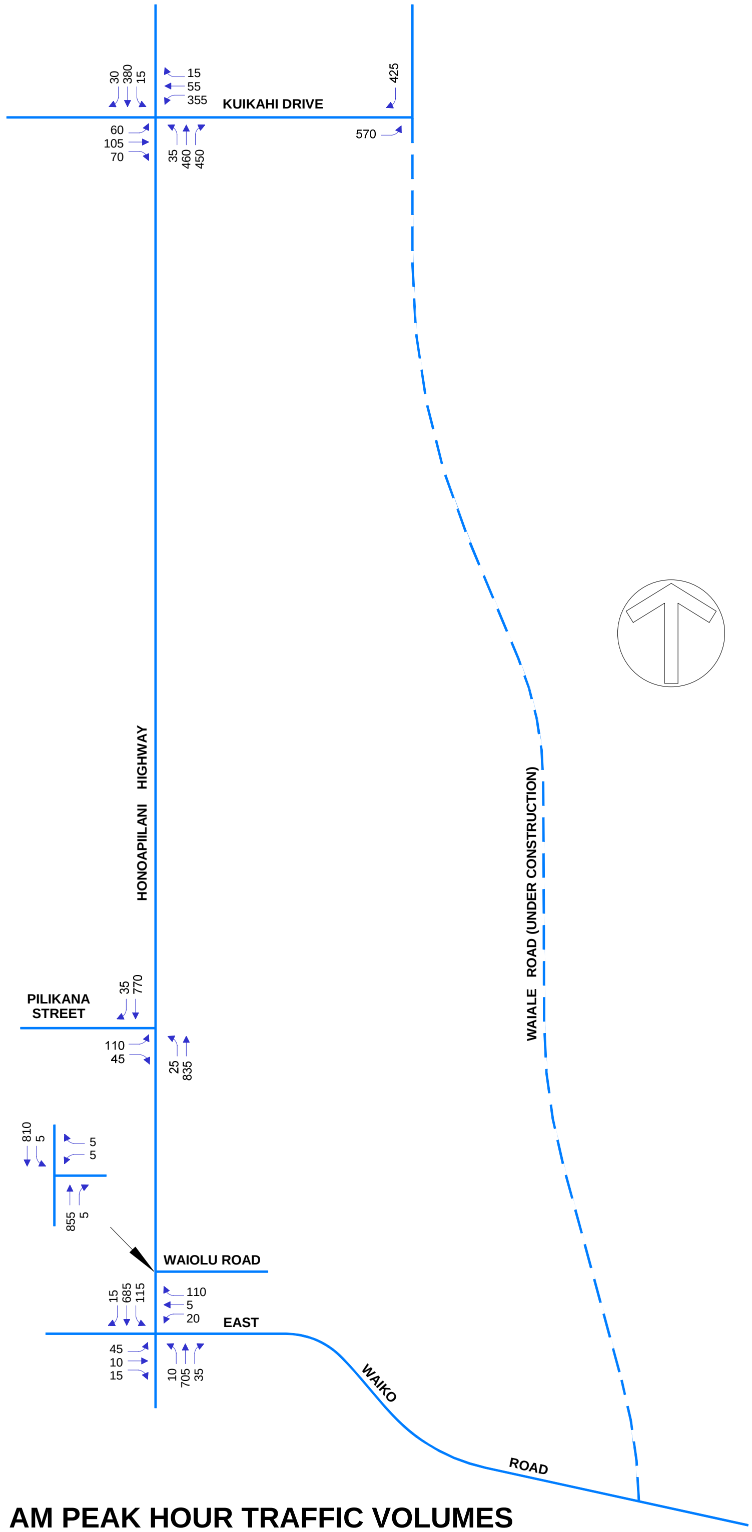

Figure 4
EXISTING (2005) AM PEAK HOUR TRAFFIC VOLUMES

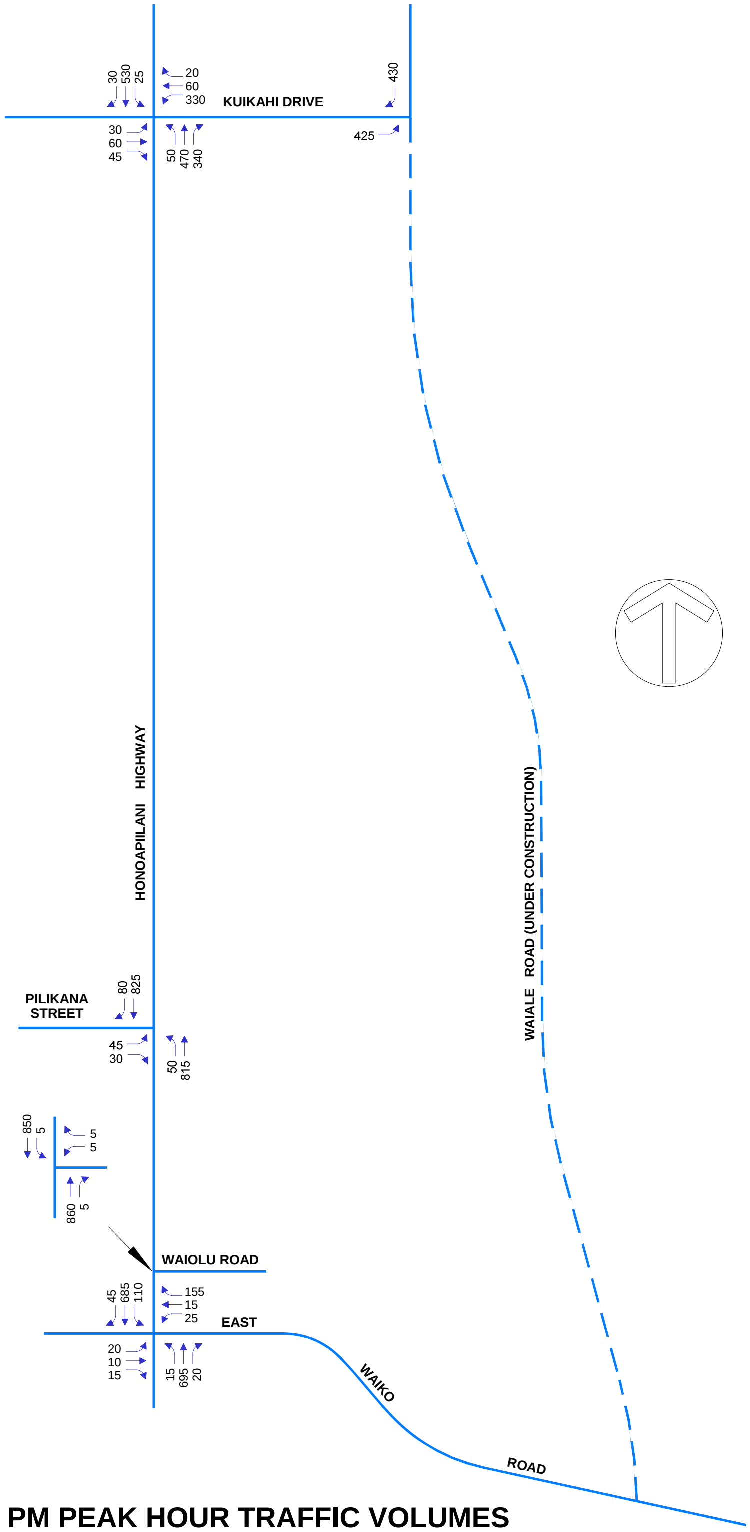

Figure 5
EXISTING (2005) PM PEAK HOUR TRAFFIC VOLUMES

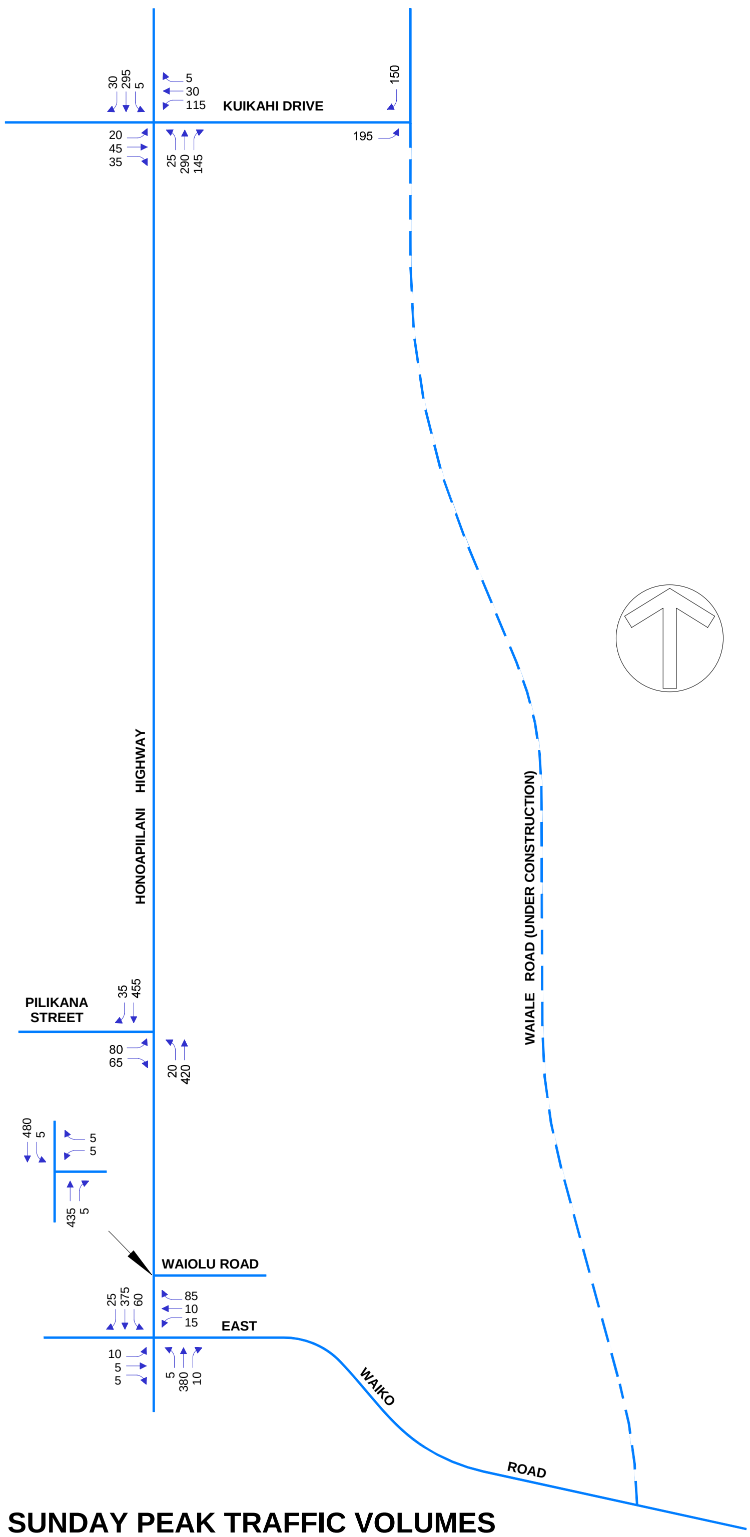

Figure 6
EXISTING (2005) SUNDAY PEAK TRAFFIC VOLUMES

Level-of-Service Concept

Signalized Intersections

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (Level-of-Service) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 4. In general, Level-of-Service A represents free-flow conditions with no congestion. Level-of-Service F, on the other hand, represents severe congestion with stop-and-go conditions. Level-of-service D is typically considered acceptable for peak hour conditions in urban areas.

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of traffic using the roadway (trucks, buses, etc.) and turning movements.

Table 4 Level-of-Service Definitions for Signalized Intersections[1]

Level of Service	Interpretation	Volume-to-Capacity Ratio[2]	Stopped Delay (Seconds)
A, B	Uncongested operations; all vehicles clear in a single cycle.	0.000-0.700	<20.0
C	Light congestion; occasional backups on critical approaches	0.701-0.800	20.1-35.0
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801-0.900	35.1-55.0
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901-1.000	55.1-80.0
F	Total breakdown with stop-and-go operation	>1.001	>80.0

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity.

Unsignalized Intersections

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from A to F. However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is therefore based on delay of each turning movement. Table 5 summarizes the definitions for level-of-service and the corresponding delay.

Table 5 Level-of-Service Definitions for Unsignalized Intersections[1]

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	See note (2) below	>50.1

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

Level-of-Service Analysis of Existing Conditions

Signalized Intersections

State Department of Transportation (Honolulu) requested the Synchro software package be used to performed level-of-service analyses. Accordingly, Synchro 6 was used to calculate the traffic signal timings. The timings were then downloaded into the Highway Capacity Software to calculate the levels-of-service of the signalized intersections. Both software packages are based on the *Highway Capacity Manual*.

The resulting levels-of-service of the signalized study intersection are summarized in Table 6. The results shown in the table are the volume-to-capacity ratios, delays and levels-of-service of all the controlled movements of the study intersection.

Table 6 Existing (2005) Levels-of-Service - Signalized Intersections

	AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
Intersection and Movement	V/C(1)	Delay(2)	LOS(3)	V/C(1)	Delay(2)	LOS(3)	V/C(1)	Delay(2)	LOS(3)
Honoapiilani Hwy at Kuikahi Dr	0.60	36.9	D	0.61	35.4	D	0.32	20.7	C
Eastbound Left	0.21	40.7	D	0.12	37.7	D	0.06	19.4	B
Eastbound Thru	0.26	40.9	D	0.16	38.0	D	0.09	19.6	B
Eastbound Right	0.21	40.3	D	0.15	37.9	D	0.08	19.6	B
Westbound Left	0.54	23.4	C	0.55	26.0	C	0.23	14.2	B
Westbound Thru & Right	0.08	16.9	B	0.11	19.3	B	0.05	12.6	B
Northbound Left	0.19	51.8	D	0.22	46.0	D	0.10	26.9	C
Northbound Thru	0.77	46.1	D	0.72	37.4	D	0.50	22.8	C
Northbound Right	0.40	34.1	C	0.16	25.0	C	0.16	18.3	B
Southbound Left	0.08	50.0	D	0.11	44.1	D	0.02	26.0	C
Southbound Thru	0.64	40.1	D	0.81	42.5	D	0.51	23.0	C
Southbound Right	0.06	28.6	C	0.06	23.6	C	0.06	17.3	B

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Unsignalized Intersections

The results of the Level-of-Service analysis of the unsignalized intersections are summarized in Table 7. Shown are the control delays and Levels-of-Service of each movement. Volume-to-capacity ratios are not calculated for unsignalized intersections.

Table 7 Existing (2005) Levels-of-Service Analysis for Unsignalized Intersections(1)

Intersection and Movement	AM Peak Hour		PM Peak Hour		Sunday Peak Hour	
	Delay [1]	LOS [2]	Delay [1]	LOS [2]	Delay [1]	LOS [2]
Honoapiilani Highway at East Waiko Road						
Northbound Left	9.1	A	9.3	A	8.1	A
Southbound Left	10.0-	A	9.8	A	8.3	A
Westbound Left, Thru & Right	70.9	F	173.5	F	15.4	C
Eastbound Left & Thru	478.6	F	315.6	F	24.7	C
Eastbound Right	13.7	B	13.7	B	10.5	B
Honoapiilani Highway at Waiolu Road						
Southbound Left	9.9	A	9.9	A	8.3	A
Westbound Left & Right	19.1	C	19.5	C	14.8	B
Honoapiilani Highway at Pilikana Road						
Northbound Left	9.5	A	9.9	A	8.4	A
Eastbound Left	268.6	F	104.6	F	23.4	C
Eastbound Right	15.7	C	16.1	C	11.9	B
Waiale Road at Kuikahi Drive						
Northbound Left	(4)	(4)	(4)	(4)	(4)	(4)
Eastbound Left	(4)	(4)	(4)	(4)	(4)	(4)
Eastbound Right	(4)	(4)	(4)	(4)	(4)	(4)

NOTES:
(1) Delay in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual. Level-of-Service is based on delay.
(3) The calculated delay exceeds 999.9 seconds, which is the maximum delay that the model will calculate.
(4) Delays and levels-of-service were not calculated as only two movements are allowed at the intersection.

Conclusions of the Level-of-Service Analysis

1. At the intersection of Honoapiilani Highway at Kuikahi Drive, all traffic movements operate at Level-of-Service D, or better, during both weekday peak periods and the Sunday peak period.

2. The eastbound and westbound approaches of Waiko Road to Honoapiilani Highway operate at Level-of-Service F during both weekday peak hour and Level-of-Service C during the Sunday peak hour. Traffic signals are to be installed at this intersection as a condition of the Waikapu Affordable Housing Project.

3. All controlled movements at the intersection of Honoapiilani Highway at Waiolu Road operate at Level-of-Service C, or better, during weekdays and Sundays.

4. The eastbound left turns at the intersection of Honoapiilani Highway at Pilikana Street operate at Level-of-Service F during the weekday peak hour and Level-of-Service C during the Sunday peak hour. Traffic signals are to be installed as a condition of the Waiolani Mauka subdivision project. These signals are currently being designed.

5. Delays and levels-of-service are not shown for the intersection of Waiale Road at Kuikahi Drive as only two movements, the southbound to westbound right turn and the eastbound to northbound left turn, are allowed. The south leg of the intersection is the entrance to a parking lot for construction workers.

3. PROJECTED BACKGROUND TRAFFIC CONDITIONS

The purpose of this chapter is to discuss the assumptions and data used to estimate 2010 background traffic conditions. Background traffic conditions are defined as future traffic volumes without the proposed project.

Future traffic growth consists of two components. The first is ambient background growth that is a result of regional growth and cannot be attributed to a specific project. This growth factor also accounts for smaller development projects in the area for which a traffic study is not available or are not identified as a related project during the data collection phase. The second component is estimated traffic that will be generated by other development projects in the vicinity of the proposed project.

Background Traffic Growth

Data provided in the *Maui Long Range Land Transportation Study* was used to estimated the background growth rate of traffic along Honoapiilani Highway. The AM and PM peak hour traffic estimates for 1990 and 2020 provided in the report were used to calculate separate growth rates for northbound and southbound peak hour traffic. This data and the calculations are shown in Table 8.

The higher growth rates for AM and PM peak hours were used to estimate the background growth of traffic along Honoapiilani Highway between 2005 and 2010. Therefore, 1.86% per year was used for the AM peak hour growth rate and 1.65% per year was used for the afternoon peak hour growth rate. As there were no Sunday peak hour projections provided in the *Maui Long Range Land Transportation Plan*, the growth rate calculated for the PM peak hour was used for the Sunday peak hour growth rate, 1.65% per year.

Table 8 Calculation of Background Growth Rate Along Honoapiilani Highway[1]

	AM Peak Hour		PM Peak Hour	
Year	Northbound	Southbound	Northbound	Southbound
1990	903	691	810	1,217
2020	1,401	1,201	1,324	1,845
Growth Rate [2]	1.47%	**1.86%**	**1.65%**	1.40%

Notes:
1. Source: Kaku & Associates, *Maui Long Range Land Transportation Study*, February 1997, p. 66
2. Compounded growth rate.

Related Projects

The second component in estimating future background traffic volumes is traffic resulting from other proposed projects in the vicinity. Related projects are defined as those projects that are likely to be constructed within or adjacent to the study project and would significantly impact traffic in the study area. Related projects may be development projects or roadway improvements.

The projects that were identified as related projects and the estimated number of peak hour trips generated by each are summarized in Table 9. The trip generation data was obtained from the traffic impact study for each project.

Table 9 Trip Generation Summary of Related Projects

		AM Peak Hour			PM Peak Hour			Sunday Peak Hour		
	Related Project	In	Out	Total	In	Out	Total	In	Out	Total
A	Waiolani Elua	5	15	20	20	10	30	15	10	25
B	Unnamed Project	10	20	30	25	15	40	20	15	35
C	Waikapu 28	30	85	115	90	55	145	65	55	120
D	Waikapu Affordable Housing Project	75	230	305	260	145	405	180	160	340
E	Kehalani (Remaining Development Approx 50%)	210	635	845	720	405	1,125	500	445	945
F	Pu'unani	105	265	370	290	165	455	200	180	380
F	Kehalani Retail	115	75	190	225 (2)	260 (2)	485 (2)	205	210	415
TOTALS		**550**	**1,325**	**1,875**	**1,630**	**1,055**	**2,685**	**1,185**	**1,075**	**2,260**

Notes:
(1) All numbers are rounded to nearest five (5).
(2) New trips only. Pass by trips are not shown.

There are three roadway projects.

1. The intersection of Honoapiilani Highway at Pilikana Street is to be signalized. The warrants for a traffic signals are satisfied for existing conditions[3]. The developer of Waiolani Elua and Waikapu 28 has agreed to coordinate installation of the traffic signals with adjacent developers.

2. Waiale Road is extended from Kuikahi Drive to East Waiko Road.

3. The intersection of Honoapiilani Highway at East Waiko Road is signalized.

The approximate locations of the development projects and the approximate alignment of Waiale Road is shown in Figure 7.

2010 Background Traffic Projections

2010 background traffic projections were calculated by expanding existing traffic volumes by the appropriate growth rates and then superimposing traffic generated by related projects. The resulting 2010 background peak hour traffic volumes are shown in Figures 8, 9 and 10.

[3] Philip Rowell and Associates, *Traffic Impact Study for Waikapu 28 Subdivision*, October 2003.

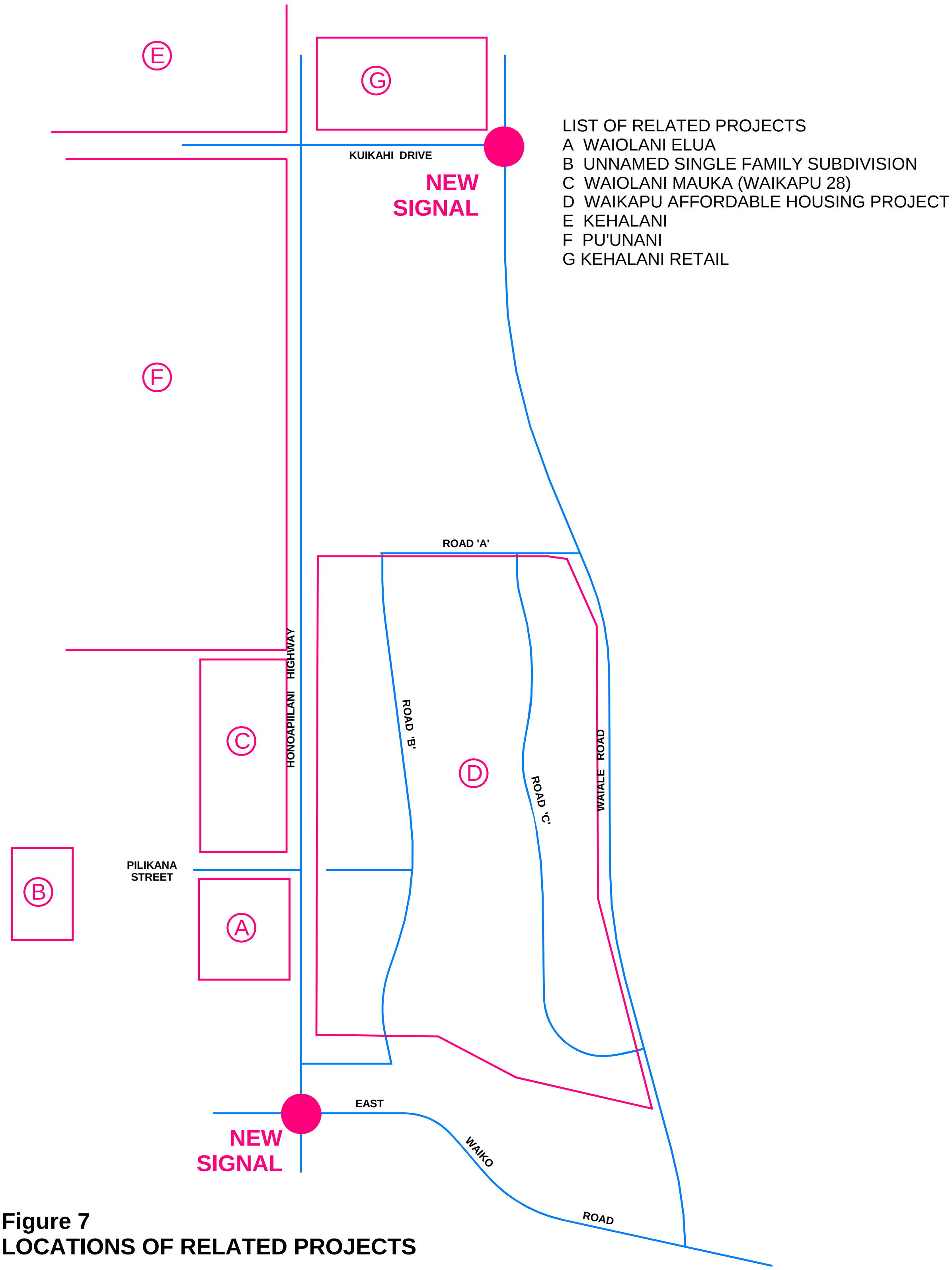

Figure 7
LOCATIONS OF RELATED PROJECTS

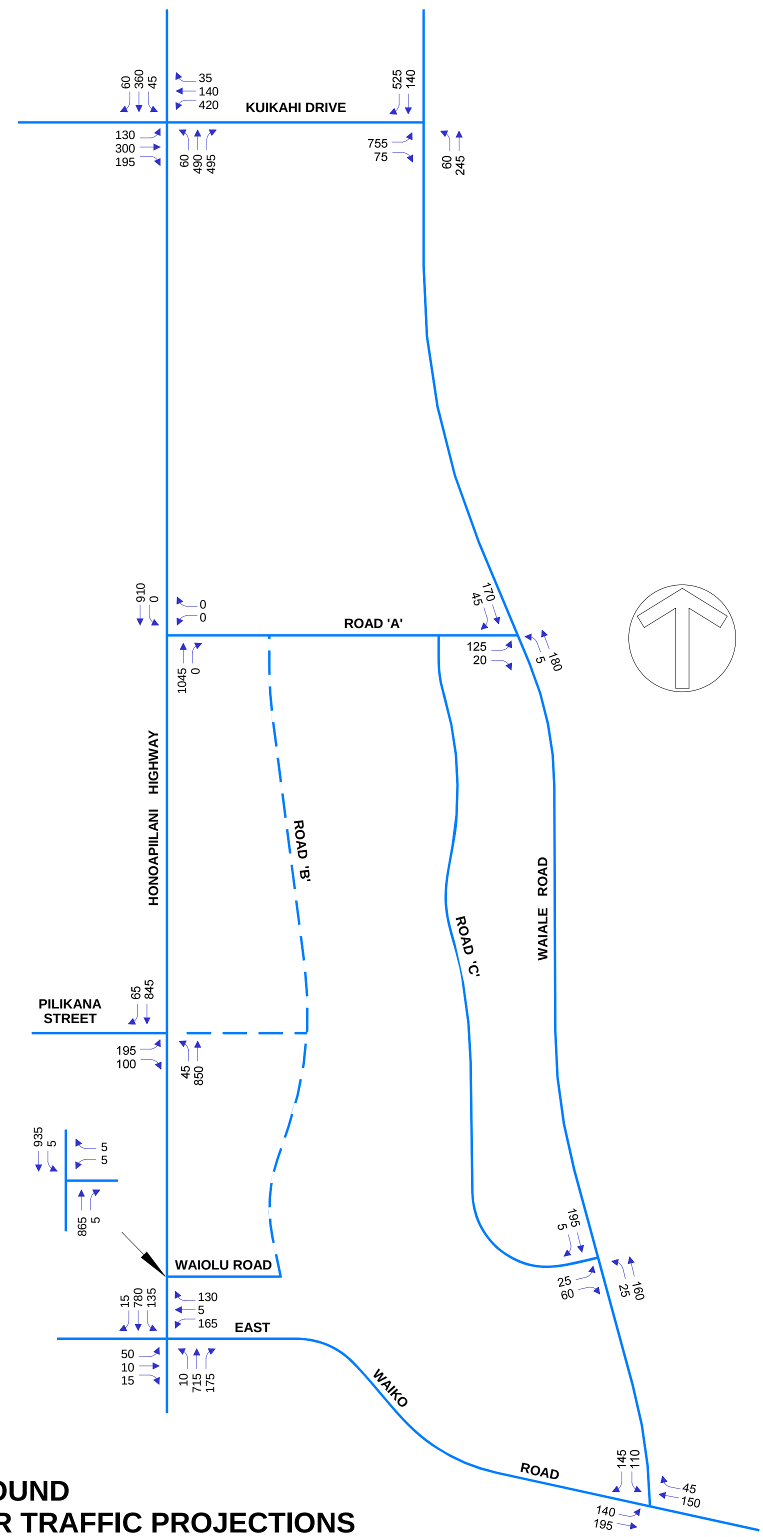

Figure 8
2010 BACKGROUND
AM PEAK HOUR TRAFFIC PROJECTIONS

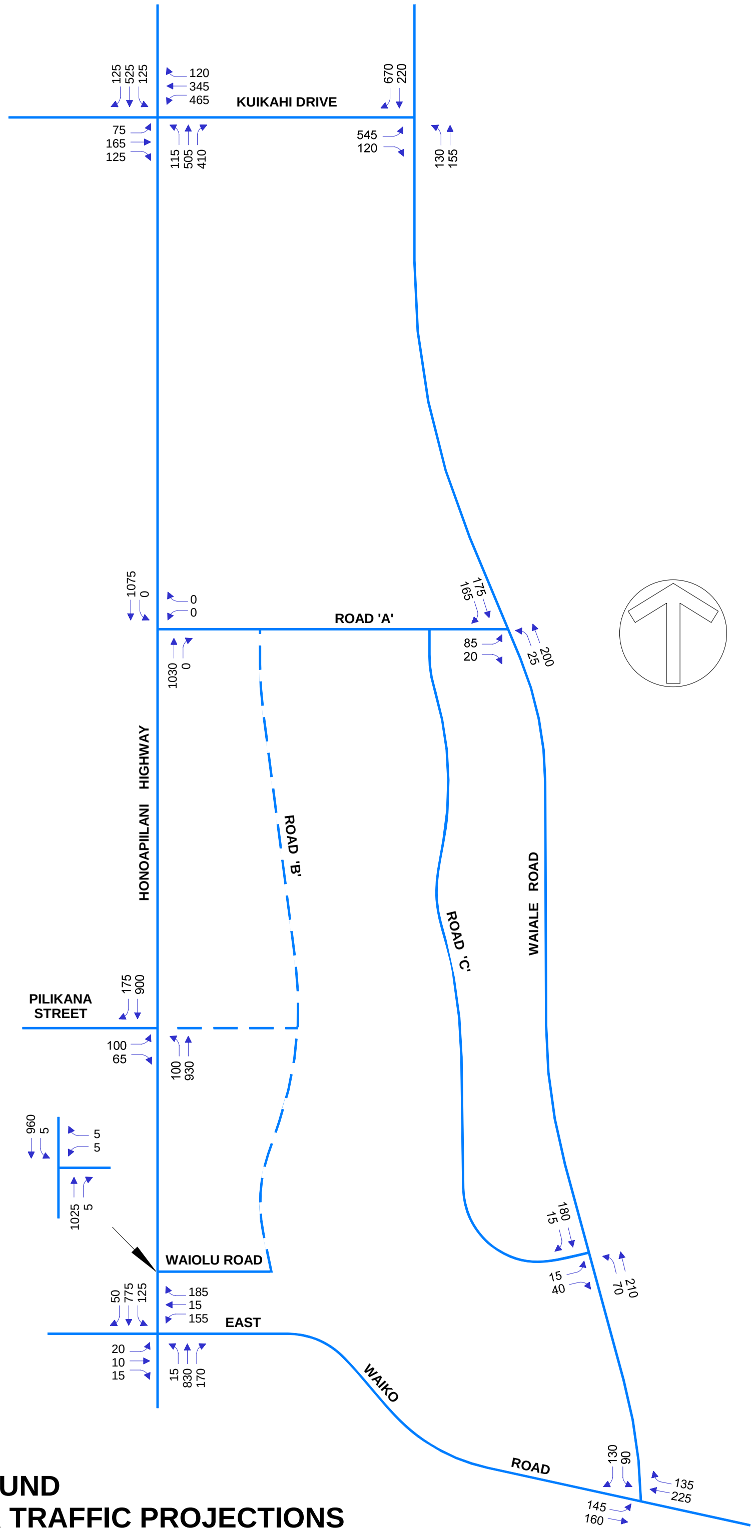

Figure 9
2010 BACKGROUND
PM PEAK HOUR TRAFFIC PROJECTIONS

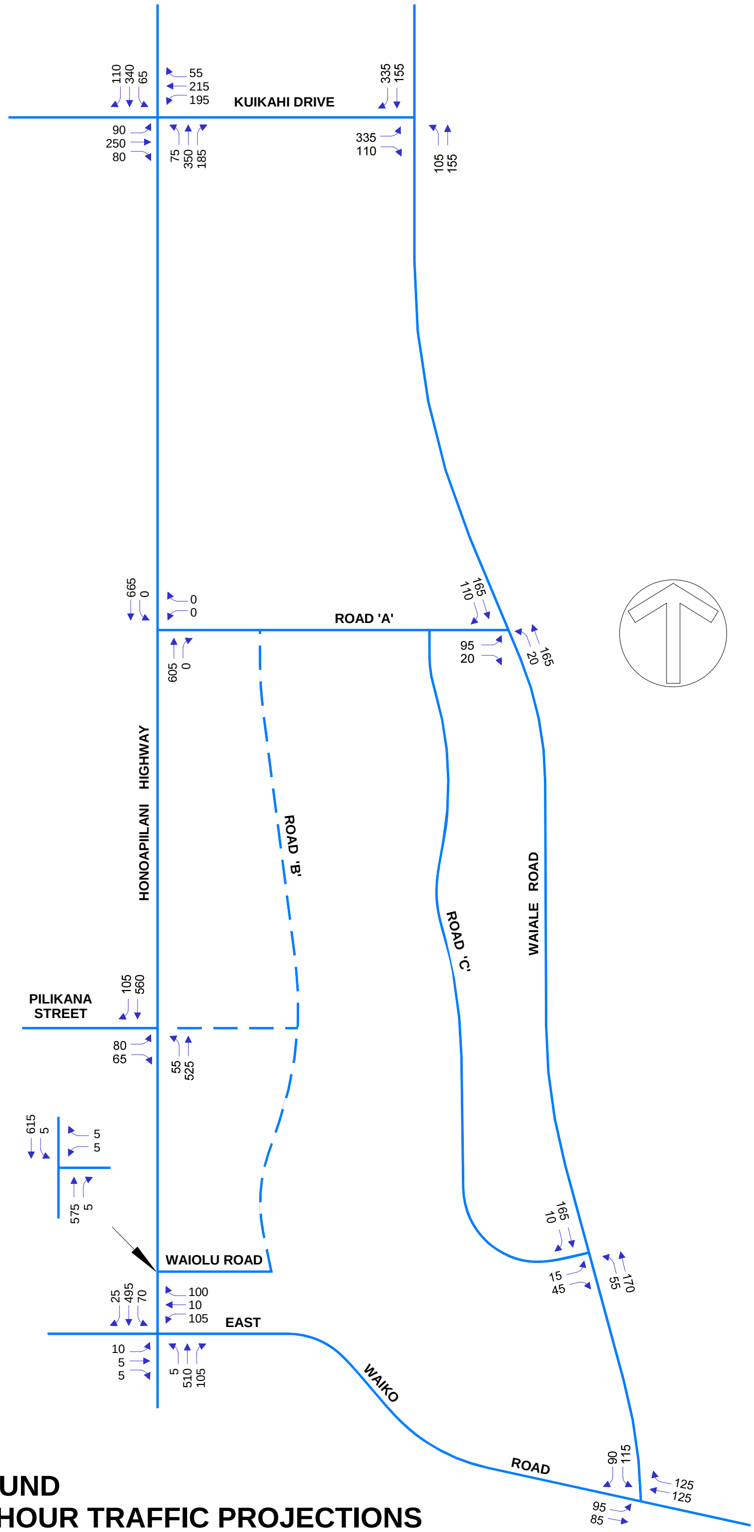

Figure 10
2010 BACKGROUND
SUNDAY PEAK HOUR TRAFFIC PROJECTIONS

4. PROJECT-RELATED TRAFFIC CONDITIONS

This chapter presents the generation, distribution and assignment of project generated traffic and the background plus project traffic projections. The result of the level-of-service analysis of background plus project conditions is presented in the following chapter.

Project Trip Generation Calculations

Future traffic volumes generated by a project were estimated using the procedures described in the *Trip Generation Handbook,*[4] published by the Institute of Transportation Engineers. This method uses trip generation rates to estimate the number of trips that a proposed project will generate during peak hours. The standard reference for trip generation data is *Trip Generation.*[5]

The proposed project consists of three components, the pre-school, the day-school and the church. Each component is discussed separately.

[4] Institute of Transportation Engineers, *Trip Generation Handbook*, Washington, D.C., 1998, p. 7-12

[5] Institute of Transportation Engineers, *Trip Generation, 7th Edition*, Washington, D.C., 2003

Pre-School

Trip Generation does not contain trip generation data for pre-schools. In order to determine the number of peak hour trips per student, a trip generation survey was performed for the existing pre-school is Wailuku. The number of vehicles dropping off and picking up pre-school students was counted and related to the number of pre-school students enrolled. This count was performed in May 2005. During the survey, there were 24 inbound and 24 outbound vehicle trips during the morning peak hour. There were 38 pre-school students enrolled at the time of the survey. Therefore, the morning peak hour trip generation rate is 1.26 trips per student and the directional distribution is 50/50.

During the afternoon peak hour, there were 15 inbound and 15 outbound trips. The afternoon peak hour trip generation rate is 0.78 and the directional distribution is 50/50.

The trip generation data is summarized in Table 10, along with the calculations for 80 pre-school students.

Day School

Trip Generation contains peak hour trip generation data for K through 8 private schools. The rates are based of the number of students enrolled. These rates were used to estimate the number of trips that the day school will generate.

Church

Trip Generation contains peak hour trip generation data for churches. The Institute of Transportation Engineers defines a church as follows:

> *A church is a building in which public worship services are held. A church houses an assembly hall or sanctuary; it may also house meeting rooms, classrooms and occasionally dining, catering, or party facilities.* [6]

Rates are provided for weekday morning, weekday afternoon and Sunday peak hours. The rates are based on the gross square footage of the building. These rates were used to estimate the trip generated by the church building.

The trip generation analysis for the total project is summarized in Table 10. The trips shown are the peak hourly trips generated by the project, which typically coincide with the peak hour of the adjacent street.

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[6] Institute of Transportation Engineers, *Trip Generation, 7th Edition*, Washington, D.C., 2003, page 1002

Table 10 Trip Generation Analysis

Period & Direction		Pre-School			K-8 Day-School			Church			Totals
		Trips per Student or Percent		Trips	Trips per Student or Percent		Trips	Trips per TGSF or Percent		Trips	
AM Peak Hour	Total	1.26	80	100	0.90	400	360	1.28	5,000	10	470
	Inbound	50%		50	55%		200	50%		5	255
	Outbound	50%		50	45%		160	50%		5	215
PM Peak Hour	Total	0.78		60	0.61		245	1.41		10	315
	Inbound	50%		30	47%		115	59%		5	150
	Outbound	50%		30	53%		130	41%		5	165
Sunday Peak Hour	Total	(2)			(2)			11.76		60	60
	Inbound							50%		30	30
	Outbound							50%		30	30

Notes:
(1) All number are rounded to five (5).
(2) Pre-school and day-school are closed on Sunday.
(3) TGSF = Thousand Gross Square Feet

Trip Distribution and Assignments

The project-related trips were distributed along the anticipated approach routes to the project site based on the directional distribution of existing peak hour traffic along Honoapiilani Highway and Waiale Road.

The project morning and afternoon peak hour trip assignments are shown in Figures 11, 12 and 13.

2010 Background Plus Project Projections

Background plus project traffic conditions are defined as 2010 background traffic conditions plus project related traffic. These conditions are also sometimes referred to as "cumulative" conditions since it represents to total traffic projections upon build out of all known projects in the study area. These projections were estimated by superimposing the peak hourly traffic generated by the proposed project on the 2010 background peak hour traffic volumes presented in Chapter 3.

The incremental difference between background and background plus project is the traffic impact of the project under study.

The traffic projections for 2010 background plus project conditions are shown on Figures 14, 15 and 16. The traffic projection worksheets are presented as Appendix B.

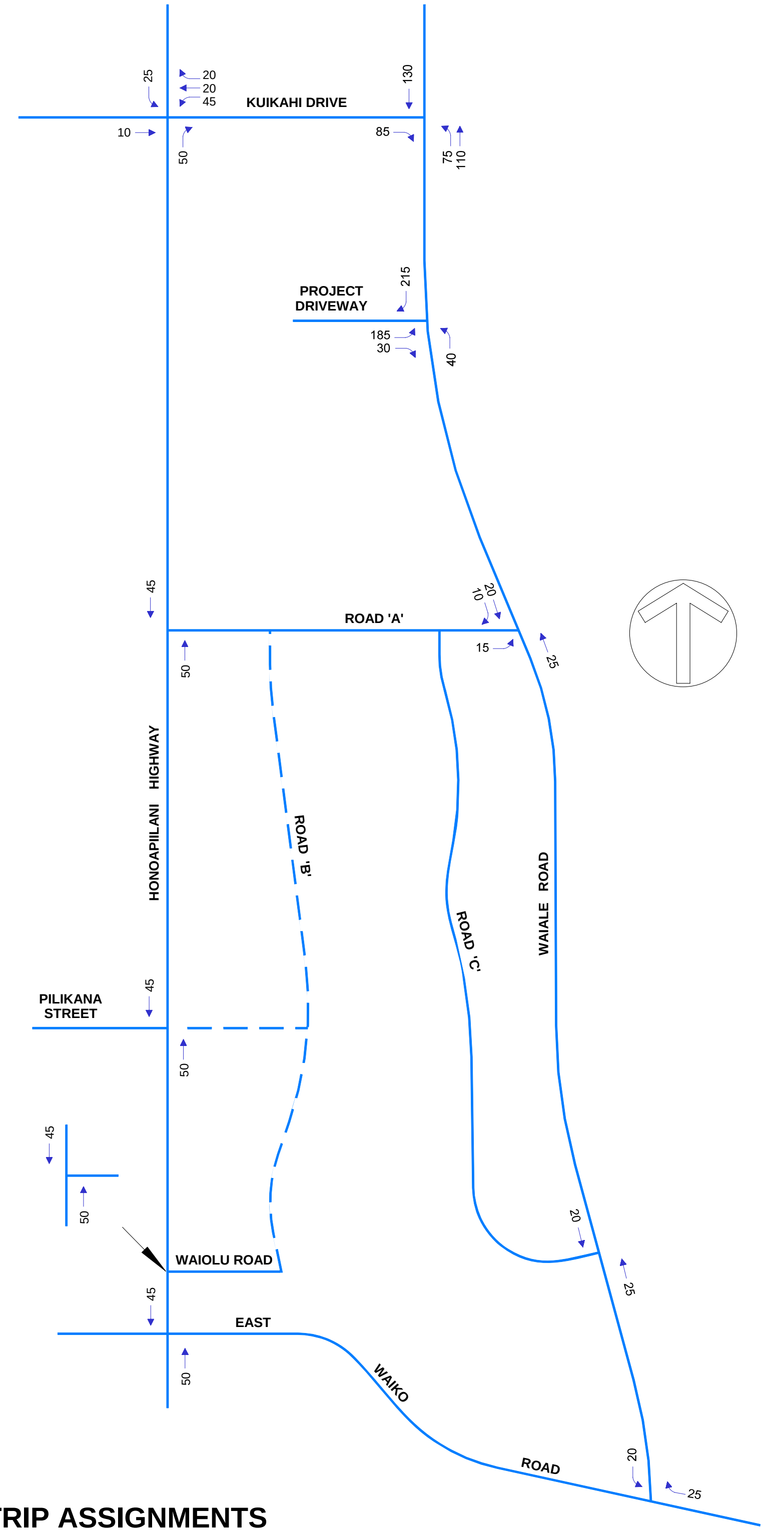


Figure 11
AM PROJECT TRIP ASSIGNMENTS

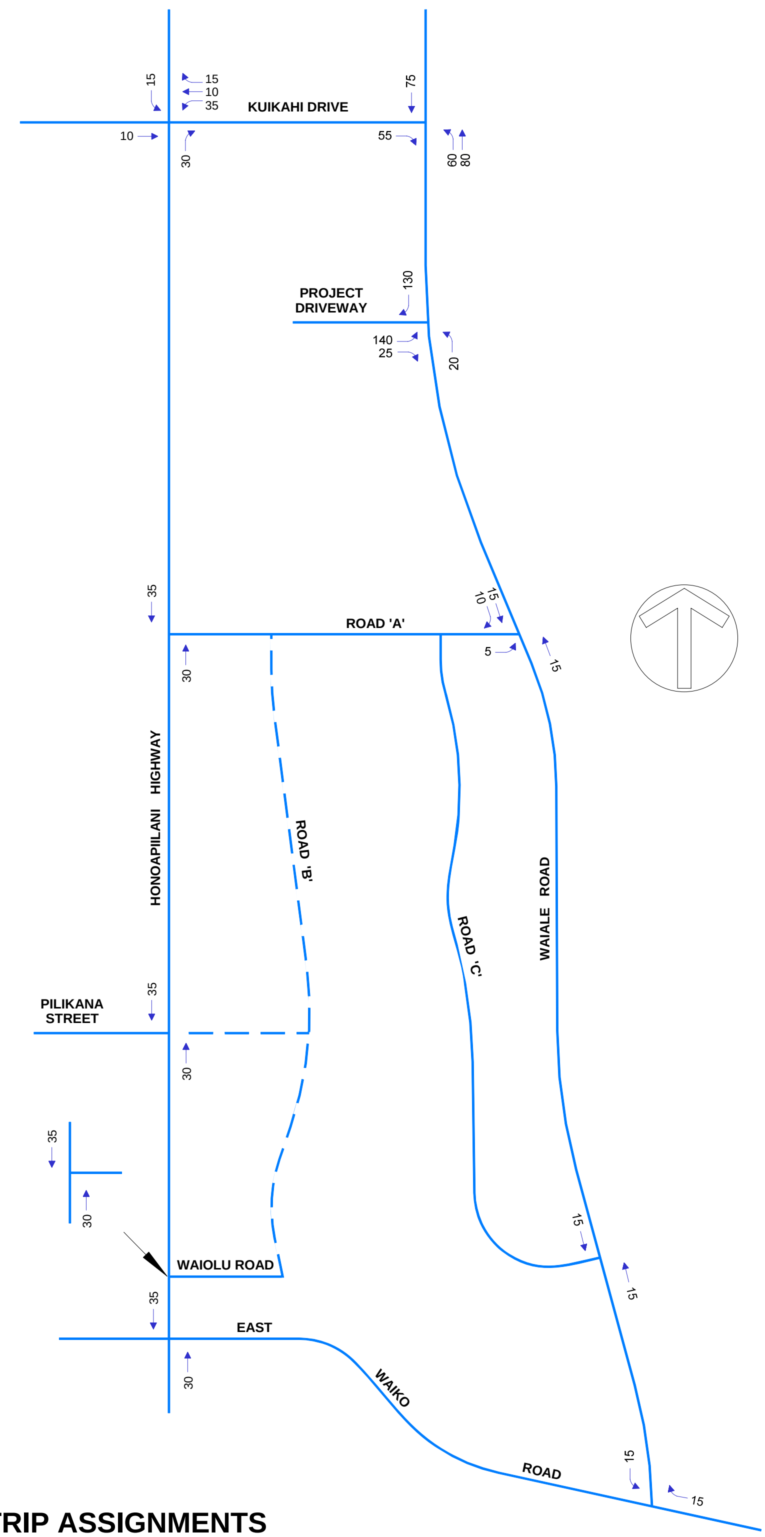


Figure 12
PM PROJECT TRIP ASSIGNMENTS

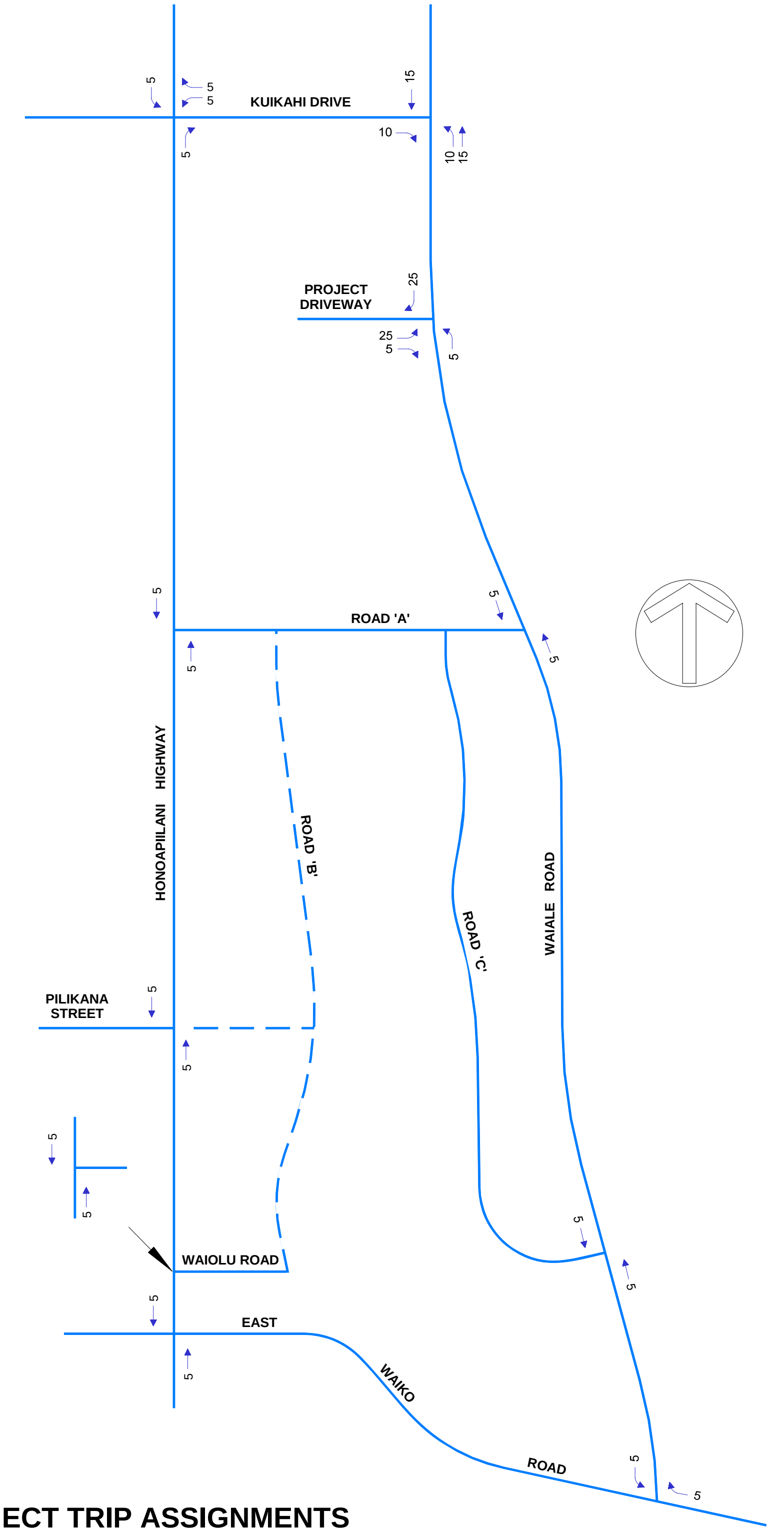


Figure 13
SUNDAY PROJECT TRIP ASSIGNMENTS

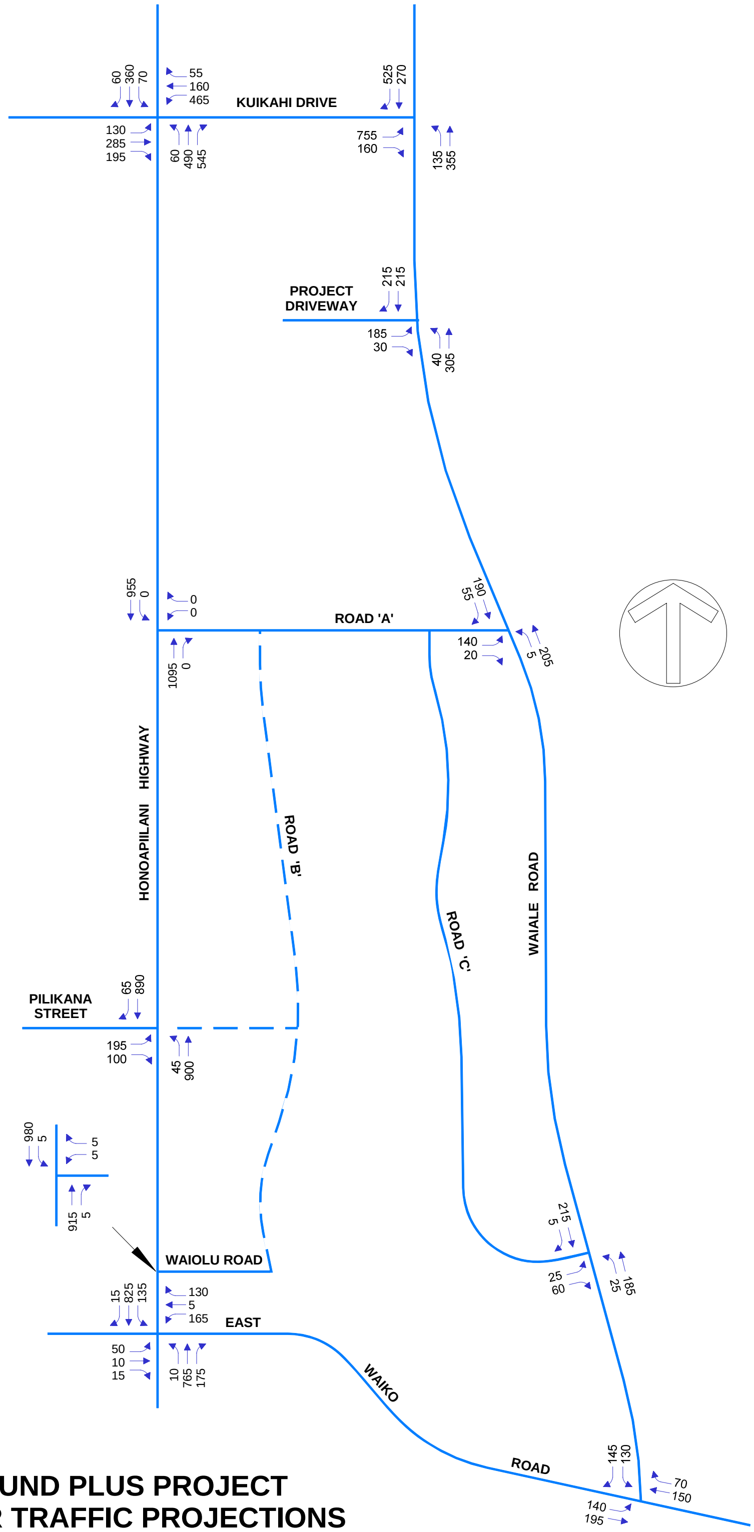


Figure 14
2010 BACKGROUND PLUS PROJECT
AM PEAK HOUR TRAFFIC PROJECTIONS

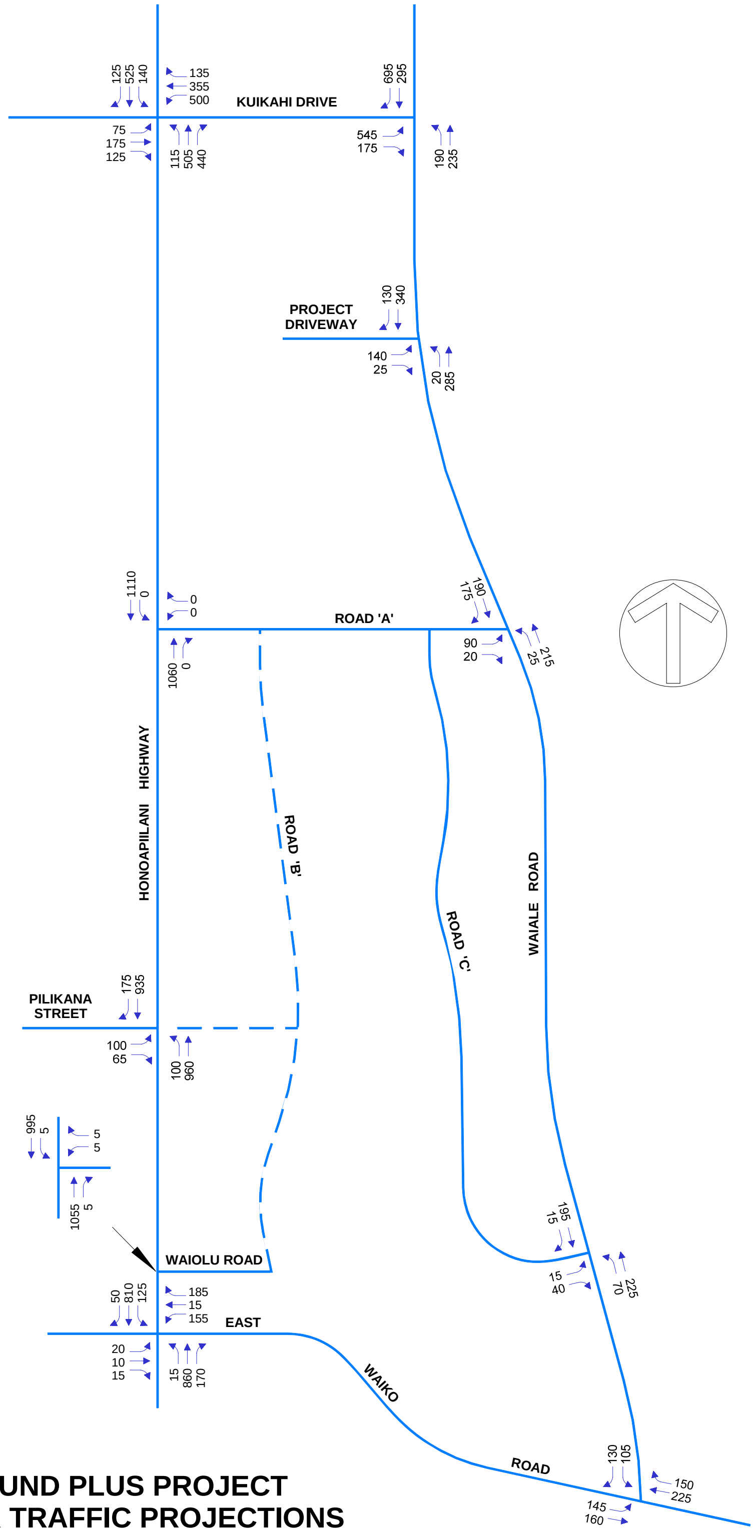


Figure 15
2010 BACKGROUND PLUS PROJECT
PM PEAK HOUR TRAFFIC PROJECTIONS

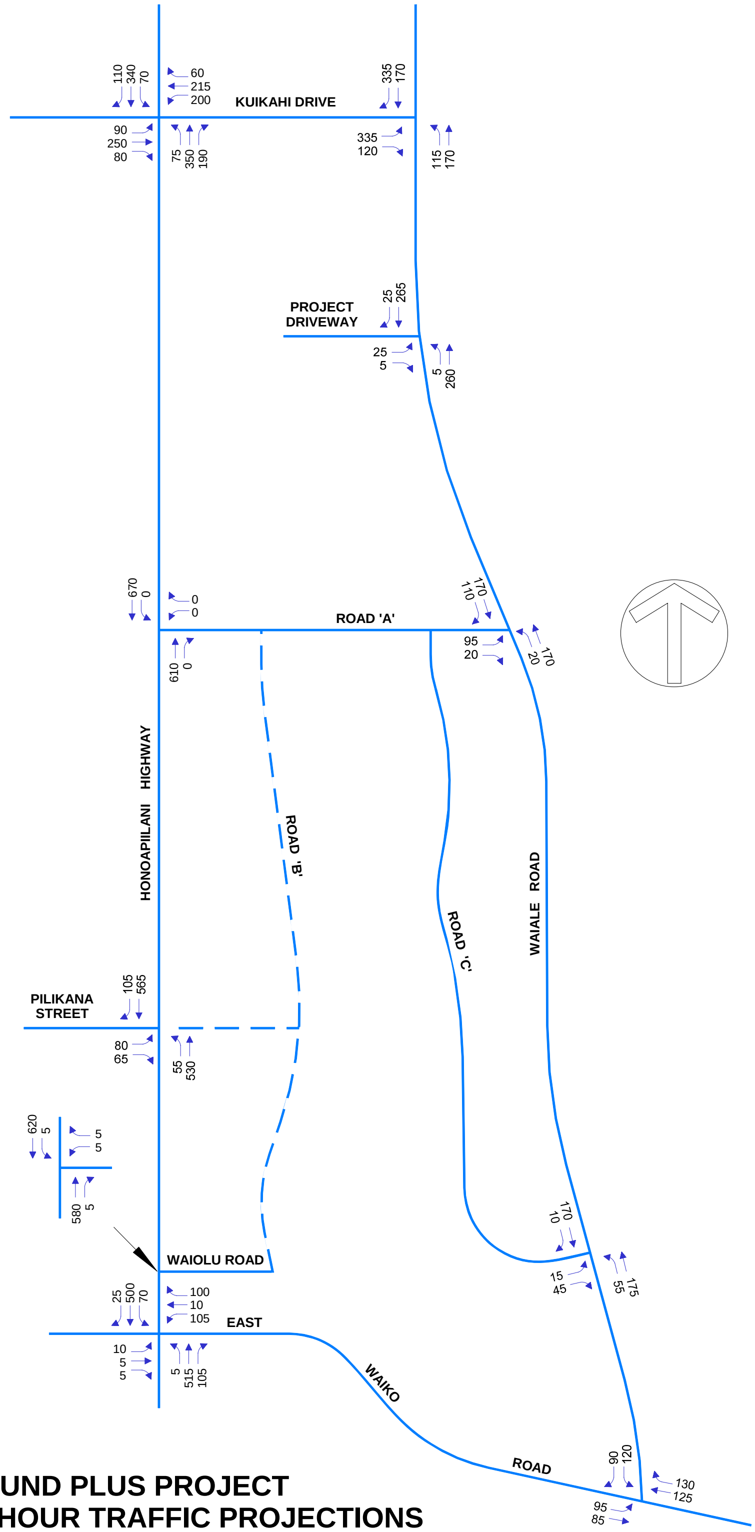


Figure 16
2010 BACKGROUND PLUS PROJECT
SUNDAY PEAK HOUR TRAFFIC PROJECTIONS

5. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to summarize the results of the level-of-service analysis, which identifies the project-related impacts. In addition, any mitigation measures necessary and feasible are identified and other access, egress and circulation issues are discussed.

The impact of the project was assessed by analyzing the changes in traffic volumes and levels-of-service at the study intersections.

Changes in Total Intersection Volumes

An analysis of the total approach volumes at the study intersections is summarized in Table 11. Shown are the percentages of total intersection traffic that is generated by the study project. Also shown are the percentages that are the result of background growth and related projects. The largest percentage is at the intersection of Waiale Road at Kuikahi Drive. The weekday morning and afternoon percentages are 18.2% and 12.6%, respectively. All remaining percentages are 5.9%, or less. The average percentage of project traffic at all the study intersections is 7.3% during the morning peak hour, 4.7% during the afternoon peak hour and 1.7% during the Sunday peak hour.

An analysis of the project's pro rata share of traffic growth between 2005 and 2010 is summarized in Table 12 .

Table 11 Percentage of Total Intersection Approach Volumes from Project [1]

Intersection	Period	Existing	2010 Background	2010 Background Plus Project	Percent of Total Traffic from Background Growth [2]	Percent of Total Traffic from Project [3]
Honoapiilani Highway at East Waiko Road	AM	1770	2205	2300	18.9%	4.1%
	PM	1810	2365	2430	22.8%	2.7%
	Sunday	985	1445	1455	31.6%	0.7%
Honoapiilani Highway at Waiolu Road	AM	1685	1845	1940	8.2%	4.9%
	PM	1730	2005	2070	13.3%	3.1%
	Sunday	935	1210	1220	22.5%	0.8%
Honoapiilani Highway at Pilikana Street	AM	1820	2100	2195	12.8%	4.3%
	PM	1845	2270	2335	18.2%	2.8%
	Sunday	990	1390	1400	28.6%	0.7%
Honoapiilani Highway at Kuikahi Drive	AM	2030	2730	2900	24.1%	5.9%
	PM	1990	3145	3260	35.4%	3.5%
	Sunday	1040	2050	2070	48.8%	1.0%
Waiale Road at East Waiko Road	AM	290	785	830	59.6%	5.4%
	PM	335	885	915	60.1%	3.3%
	Sunday	185	635	645	69.8%	1.6%
Waiale Road at Kuikahi Drive	AM	995	1800	2200	36.6%	18.2%
	PM	855	1865	2135	47.3%	12.6%
	Sunday	345	1165	1245	65.9%	6.4%
Averages	AM	1432	1911	2061	23.2%	7.3%
	PM	1428	2089	2191	30.2%	4.7%
	Sunday	747	1316	1339	42.5%	1.7%

Notes:
(1) Volumes shown are total intersection approach volumes or projections.
(2) Background growth compared to existing volumes.
(3) Growth from project traffic compared to background plus project traffic projections.

Table 12 Analysis of Project's Pro Rata Share of Traffic Growth [1]

Intersection	Period	Existing	2010 Background	Background Plus Project	Background Growth [2]		Project Trips [3]	
					Volume	% of 2005 to 2010 Growth	Volume [4]	% of 2005 to 2010 Growth
Honoapiilani Highway at East Waiko Road	AM	1770	2205	2300	435	82.1%	95	17.9%
	PM	1810	2365	2430	555	89.5%	65	10.5%
	Sunday	985	1445	1455	460	97.9%	10	2.1%
Honoapiilani Highway at Waiolu Road	AM	1685	1845	1940	160	62.7%	95	37.3%
	PM	1730	2005	2070	275	80.9%	65	19.1%
	Sunday	935	1210	1220	275	96.5%	10	3.5%
Honoapiilani Highway at Pilikana Street	AM	1820	2100	2195	280	74.7%	95	25.3%
	PM	1845	2270	2335	425	86.7%	65	13.3%
	Sunday	990	1390	1400	400	97.6%	10	2.4%
Honoapiilani Highway at Kuikahi Drive	AM	2030	2730	2900	700	80.5%	170	19.5%
	PM	1990	3145	3260	1155	90.9%	115	9.1%
	Sunday	1040	2050	2070	1010	98.1%	20	1.9%
Waiale Road at East Waiko Road	AM	290	785	830	495	91.7%	45	8.3%
	PM	335	885	915	550	94.8%	30	5.2%
	Sunday	185	635	645	450	97.8%	10	2.2%
Waiale Road at Kuikahi Drive	AM	995	1800	2200	805	66.8%	400	33.2%
	PM	855	1865	2135	1010	78.9%	270	21.1%
	Sunday	345	1165	1245	820	91.1%	80	8.9%

Notes:
(1) Volumes shown are total intersection approach volumes or projections.
(2) Background versus existing.
(3) Background plus project versus background.
(4) Project generated traffic

Methodology for Level-of-Service Analysis

1. As previously noted, State Department of Transportation (Honolulu) has requested the Synchro software package be used to performed level-of-service analyses. Accordingly, Synchro 6 was used to calculate the traffic signal timings. The timings were then downloaded into the Highway Capacity Software to calculate the levels-of-service of the signalized intersections. Both software packages are based on the methodology described in the *Highway Capacity Manual*.

2. In the past, the LA Department of Transportation standard was used to determine the significance of the impacts of project generated traffic. SDOT has consistently responded that they prefer to use engineering judgement to assess the traffic impacts of a project and the effectiveness of possible mitigation measures, along with the standards of the Institute of Transportation Engineers. Accordingly, we have used the Institute of Transportation Engineers standard that a Level-of-Service D is the minimum acceptable level-of-service and that the criteria is applicable to the overall intersection. Side street approaches and minor movements may operate at Level-of-Service E or F in order for the overall intersection and the major roadway to operate at Level-of-Service D, or better. If project generated traffic causes the level-of-service to drop below Level-of-Service D (Levels-of-Service E or F), then mitigation should be provided to improve the level-of-service to Level-of-Service D or better.

3. As the *Highway Capacity Manual* defines level-of-service by delay, we have used the same definition.

Level-of-Service Analysis for Signalized Intersections

The level-of-service analysis of the signalized intersections was performed for background and background plus project conditions and then compared. The incremental difference of the volume-to-capacity ratios between the two conditions is the impact of the project. The assumptions used for the level-of-service analysis are:

1. The existing intersection configurations will be maintained.

2. The intersections of Honoapiilani Highway at East Waiko Road and Honoapiilani Highway at Pilikana Street are signalized.

3. Waiale Road is completed between Kuikahi Drive and East Waiko Road. There are two three new intersections along this section of Waiale Road (at East Waiko Road, at Road A and at Road C). All these intersections are unsignalized.

Signalized Intersections

The results of the level-of-service analysis of the signalized intersections are summarized in Table 13. The results for three signalized intersections are shown. Shown are the volume-to-capacity ratios, average vehicle delays and levels-of-service. As previously noted, the intersections of Honoapiilani Highway at East Waiko Road and Honoapiilani Highway at Pilikana Street are signalized for 2010 background conditions. The intersection of Honoapiilani Highway at Kuikahi Drive is already signalized.

For all the signalized study intersections, all movements will operate at Level-of-Service D, or better. As Level-of-Service D is the minimum acceptable level-of-service, no additional mitigation of the signalized intersections is recommended.

Unsignalized Intersections

The results of the level-of-service analysis of the unsignalized intersections are summarized in Table 14. Shown are the average vehicle delays and levels-of-service of the controlled lane groups. Delays and levels-of-service are not calculated for the overall intersection of the uncontrolled movements of an unsignalized intersection.

With the exception of the intersection of Waiale Road at Kuikahi Drive, all controlled lane groups will operate a Level-of-Service C, or better, during all peak periods. At the intersection of Waiale Road at Kuikahi Drive, the eastbound to northbound left turn will operate at Level-of-Service E or F during all weekday peak periods, without and with the project. Mitigation will be required for this intersection to operate at an acceptable level-of-service.

Table 13 2012 Levels-of-Service - Signalized Intersections

	AM Peak Hour						PM Peak Hour						SUNDAY Peak Hour					
	Without Project			With Project			Without Project			With Project			Without Project			With Project		
Intersection, Approach and Movement	V/C(1)	Delay(2)	LOS(3)	V/C	Delay	LOS	V/C(1)	Delay(2)	LOS(3)	V/C	Delay	LOS	V/C(1)	Delay(2)	LOS(3)	V/C	Delay	LOS
Honoapiilani Hwy at E. Waiko Rd	0.92	31.0	C	0.96	35.9	D	0.95	38.0	D	0.96	41.5	D	0.66	19.3	B	0.66	19.4	B
Eastbound Left & Thru	0.18	25.8	C	0.18	25.8	C	0.22	46.4	D	0.22	46.4	D	0.04	18.2	B	0.04	18.2	B
Eastbound Right	0.04	23.9	C	0.04	23.9	C	0.10	43.7	D	0.10	43.7	D	0.01	18.0	B	0.01	18.0	B
Westbound Let, Thru & Right	0.84	49.8	D	0.84	49.8	D	0.83	51.2	D	0.83	51.2	D	0.54	25.9	C	0.54	25.9	C
Northbound Left	0.04	10.4	B	0.05	10.5	B	0.06	12.7	B	0.06	13.9	B	0.01	7.3	A	0.01	7.3	A
Northbound Thru & Right	0.95	39.3	D	1.00	50.7	D	0.99	46.4	D	1.02	53.7	D	0.75	20.9	C	0.75	21.1	C
Southbound Left	0.73	40.6	D	0.73	41.2	D	0.75	49.0	D	0.75	49.0	D	0.24	11.0	B	0.24	11.2	B
Southbound Thru	0.68	13.8	B	0.72	14.9	B	0.75	21.3	C	0.78	22.7	C	0.58	16.2	B	0.59	16.3	B
Southbound Right	0.02	6.1	A	0.02	6.1	A	0.06	10.0+	B	0.06	10.0+	B	0.04	10.0+	B	0.04	10.0+	B
Honoapiilani Hwy at Pilikana Rd	0.68	21.9	C	0.71	24.9	C	0.69	21.0	C	0.71	23.5	C	0.44	14.0	B	0.45	14.0	B
Eastbound Left	0.51	31.8	C	0.51	31.8	C	0.30	28.8	C	0.30	28.8	C	0.20	21.4	C	0.20	21.4	C
Eastbound Right	0.22	26.8	C	0.22	26.8	C	0.13	26.6	C	0.13	26.6	C	0.11	20.5	C	0.11	20.5	C
Northbound Left	0.19	32.3	C	0.19	32.3	C	0.40	34.5	C	0.40	34.5	C	0.19	24.6	C	0.19	24.6	C
Northbound Thru	0.70	11.7	B	0.74	12.8	B	0.74	11.3	B	0.76	12.0	B	0.45	7.3	A	0.46	7.3	A
Southbound Thru	0.89	29.5	C	0.94	35.7	D	0.92	30.2	C	0.95	35.5	D	0.67	18.1	B	0.68	18.3	B
Southbound Right	0.05	9.6	A	0.05	9.6	A	0.19	9.6	A	0.19	9.6	A	0.12	10.5	B	0.12	10.5	B
Honoapiilani Hwy at Kuikahi Dr	0.76	43.4	D	0.78	46.4	D	0.83	38.9	D	0.84	41.0	D	0.59	23.0	C	0.59	23.1	C
Eastbound Left	0.47	47.5	D	0.49	48.3	D	0.46	51.8	D	0.47	52.5	D	0.32	23.4	C	0.32	23.4	C
Eastbound Thru	0.69	53.5	D	0.72	54.7	D	0.63	53.1	D	0.67	54.6	D	0.58	26.9	C	0.58	26.9	C
Eastbound Right	0.53	48.1	D	0.53	48.1	D	0.44	47.7	D	0.44	47.7	D	0.19	20.8	C	0.19	20.8	C
Westbound Left	0.82	38.0	D	0.92	53.7	D	0.86	41.2	D	0.94	52.6	D	0.57	21.2	C	0.59	21.7	C
Westbound Thru & Right	0.20	18.8	B	0.25	19.4	B	0.58	26.7	C	0.61	27.6	C	0.38	16.0	B	0.39	16.1	B
Northbound Left	0.27	53.7	D	0.27	53.7	D	0.45	27.7	C	0.45	27.7	C	0.30	29.8	C	0.30	29.8	C
Northbound Thru	0.83	52.6	D	0.83	52.6	D	0.78	42.9	D	0.78	42.9	D	0.61	25.1	C	0.61	25.1	C
Northbound Right	0.49	38.4	D	0.59	41.3	D	0.29	28.8	C	0.35	29.8	C	0.24	19.2	B	0.26	19.4	B
Southbound Left	0.20	52.3	D	0.32	54.7	D	0.46	27.3	C	0.51	28.8	C	0.26	29.1	C	0.28	29.4	C
Southbound Thru	0.61	41.2	D	0.61	41.2	D	0.81	44.9	D	0.81	44.9	D	0.59	24.7	C	0.59	24.7	C
Southbound Right	0.09	20.7	C	0.09	20.7	C	0.23	27.8	C	0.23	27.8	C	0.23	19.1	B	0.23	19.1	B

NOTES:
1. V/C denotes ratio of volume to capacity.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.

Table 14 2010 Levels-of-Service - Unsignalized Intersections(1)

	AM Peak Hour				PM Peak Hour				Sunday Peak Hour			
	Without Project		With Project		Without Project		With Project		Without Project		With Project	
Intersection and Movement	Delay [1]	LOS [2]	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Honoapiilani Highway at Waiolu Road												
Southbound Left	9.9	A	10.2	B	10.7	B	10.7	B	8.8	A	8.8	A
Westbound Left & Right	20.1	C	21.2	C	23.2	C	23.4	C	19.1	C	19.3	C
Waiale Road at East Waiko Rd												
Eastbound Left & Thru	78.0	A	8.0	A	8.5	A	8.6	A	8.0	A	8.0	A
Southbound Left & Right	18.4	C	21.4	C	20.4	C	23.2	C	14.4	B	14.7	B
Waiale Road at Kuikahi Drive												
Northbound Left	9.4	A	10.6	B	11.2	B	13.0	B	8.9	A	9.0	A
Eastbound Left	375.0	F		F	386.6	F		F	42.7	E	56.7	F
Eastbound Right	9.4	A	11.3	B	10.3	B	11.7	B	9.7	A	9.9	A
Waiale Road at Road A												
Northbound Left & Thru	7.7	A	7.8	A	8.1	A	8.1	A	7.9	A	7.9	A
Eastbound Left & Right	12.7	B	13.9	B	13.8	B	14.5	B	12.8	B	12.9	B
Waiale Road at Road C												
Northbound Left & Thru	7.7	A	7.7	A	7.8	A	7.8	A	7.7	A	7.7	A
Eastbound Left & Right	10.6	B	10.9	B	10.8	B	11.0	B	10.3	B	10.4	B

NOTES:
(1) Delay in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual. Level-of-Service is based on delay.

Mitigation

As noted in the previous section, mitigation is required at the intersection of Waiale Road at Kuikahi Drive to mitigate an expected Level-of-Service F. It should be noted that this intersection will operate at Level-of-Service F without and with the project. This implies that background growth and traffic from the related projects increases the traffic volumes and delays such that Level-of-Service F is the result. The proposed project contributes additional traffic that further aggravates the long delays.

There are three potential mitigation measures, each of which is discussed in the following paragraphs.

Intersection Widening

Widening of the intersection to provide a second lane for the eastbound to northbound left turn would require widening of Waiale Road northbound in order to accommodate the second left turn lane. This does not appear to be a viable option because of right-of-way constraints. It is also understood that the community has expressed its desire that Waiale Road be only two lanes wide.

Signalization

The peak hour warrants for a traffic signal are satisfied for both morning and afternoon peak hour conditions without the project. The warrants will also be satisfied for peak hour conditions with the project. As a signalized intersection, all movements will operate at Level-of-Service C, or better, during morning and afternoon peak hours.

Roundabout

An analysis of the intersection as a roundabout was performed. This analysis concluded that the intersection would have a volume-to-capacity ratio of 1.08 during the morning weekday peak hour. This implies that the intersection would operate a Level-of-Service F if converted to a roundabout. The conclusion is that a roundabout at the intersection is not a viable mitigation measure.

Driveway Analysis

An analysis of anticipated traffic conditions at the project's driveway along Waiale Road was performed to determine the required lane configuration. The assumptions used in the analysis were that the driveway would have two exit lanes, one left turn lane and one right turn lane, and the intersection would be unsignalized. The results of this analysis is summarized in Table15. As shown, all movements will operate at Level-of-Service D, or better. Level-of-Service D is the minimum acceptable level-of-service.

Table 15 2010 Levels-of-Service at Project Driveway along Waiale Road

	AM Peak Hour		PM Peak Hour		Sunday Peak Hour	
Intersection and Movement	Delay	LOS	Delay	LOS	Delay	LOS
Waiale Road at Project Driveway						
Northbound Left & Thru	8.4	A	8.4	A	7.9	A
Eastbound Left	27.2	D	22.6	C	13.1	B
Eastbound Right	10.4	B	11.1	B	9.9	A

NOTES:
(1) Delay in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual. Level-of-Service is based on delay.

An assessment of the need for a separate left turn lane for traffic turning into the project was performed using guidelines published by the Transportation Resource Board[7]. The assessment determined that a separate left turn lane is warranted at the driveway during the morning peak period. Accordingly, based on the findings of an accepted standard, a separate left turn lane along northbound Waiale Road at the project driveway is recommended.

The widening required for the left turn lane will also provide widening for a left turn refuge lane. This will improve the level-of-service and safety of traffic exiting the project onto Waiale Road.

Figure 17 is a schematic drawing of the recommended configuration of the project's driveway along Waiale Road.

[7] Transportation Resource Board, NCHRP Report 457, *Evaluating Intersection Improvements: An Engineering Study Guide*, 2001, Washington, D.C. p21-22

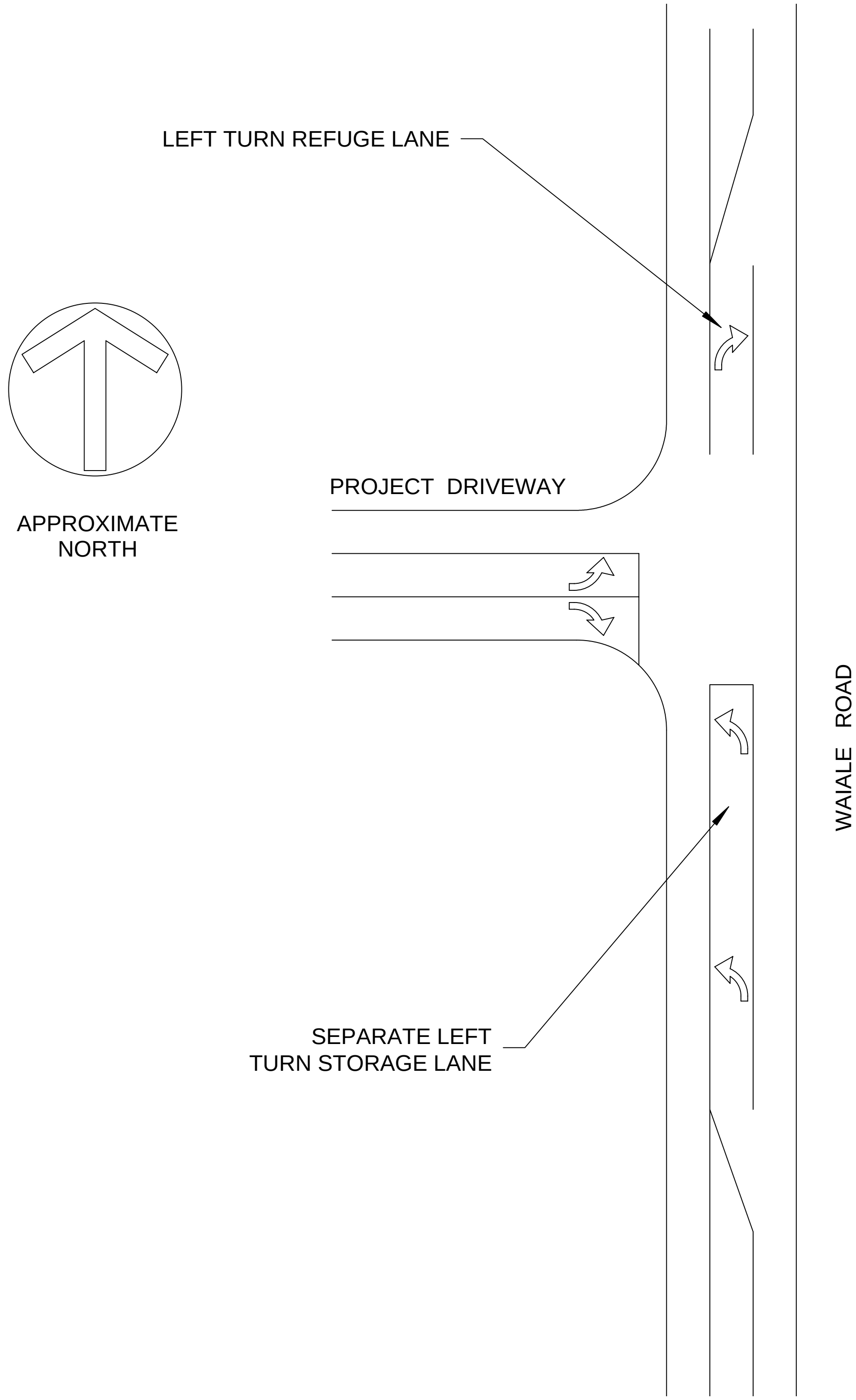


Figure 17
SCHEMATIC DRAWING OF PROJECT DRIVEWAY ALONG WAIALE ROAD

Other Traffic Issues

Secondary Access Along Honoapiilani Highway

The preceding traffic analysis is based on the assumption that there will be only one access and egress point to the project and that this would be the driveway along Waiale Road. This assumption is based on preliminary discusses with SDOT. SDOT indicated that it would not allow a secondary access along Honoapiilani Highway.

However, it is recommended that a secondary access along Honoapiilani Highway be pursued. A secondary access and egress should be provided for emergency services, construction activities and for use during special events. A traffic control officer should be provided during construction and special events. The County has tentatively indicated it would support this second entrance for emergency services.

A secondary entrance along Honoapiilani Highway would divert traffic from Kuikahi Drive and therefore improve the levels-of-service at the intersections with Honoapiilani Highway and Waiale Road. The entrance should be restricted to right turns in and right turns out only.

Extension of Waiale Road to Maui Tropical Plantation

Long range plans for the area included extension of Waiale Road from East Waiko Road to Honoapiilani Highway in the vicinity of Maui Tropical Plantation. A preliminary assessment of the impact of this extension to traffic volumes along Honoapiilani Highway was performed in order to address comments received from the County and during various public meetings in the area. The preliminary assessment concluded:

1. Approximately one-third of the weekday peak hour traffic along Honoapiilani Highway will be diverted to Waiale Road.

2. Approximately 50% of the peak hour through traffic along East Waiko Road between Honoapiilani Highway and Waiale Road will be diverted to Waiale Road.

3. The reduced traffic volumes along Honoapiilani Highway will have a significant positive impact of the levels-of-service of the intersections along this roadway. However, these volumes will result in lower levels-of-service of the intersections along Waiale Road.

Speeding Along Honoapiilani Highway

During the public meetings in the area for this and other project, concern was expressed regarding speeding along Honoapiilani Highway. As already noted in this report, the intersections of Honoapiilani Highway at East Waiko Road and Pilikana Street will be implemented as conditions for other development projects in the area. These signals should be coordinated so the vehicles traveling at the posted speed limit will not be stopped. Vehicles traveling faster than the posted speed limit will be stopped by the red signal. This should result in safer speeds along this section of highway.

APPENDIX A

SITE PLAN

FIGURE 3 Not to Scale

Conceptual Master Plan

Emmanuel Lutheran Church and School Campus

CHRIS HART & PARTNERS, INC.

APPENDIX B

TRAFFIC PROJECTION WORKSHEETS

Part 2.1

Traffic Projection Worksheets

Emmanuel Lutheran Church & School Project
January 2006

INTERSECTION NO 1
INTERSECTION OF Honoapiilani Highway at East Waiko Road

No	Approach & Mvt		Existing			Background Growth			Related Projects			2010 Background			Project Trips			2010 Background Plus Project		
			AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun
1	N-	RT	15	45	25	1	4	2	0	0	0	15	50	25				15	50	25
2		TH	685	685	375	66	58	32	29	30	89	780	775	495	45	35	5	825	810	500
3		LT	115	110	60	11	9	5	10	7	6	135	125	70				135	125	70
4	E-	RT	110	155	85	11	13	7	10	15	7	130	185	100				130	185	100
5		TH	5	15	10	0	1	1	0	0	0	5	15	10				5	15	10
6		LT	20	25	15	2	2	1	144	128	90	165	155	105				165	155	105
7	S-	RT	35	22	10	3	2	1	139	147	96	175	170	105				175	170	105
8		TH	705	695	380	68	59	32	-58	77	98	715	830	510	50	30	5	765	860	515
9		LT	10	15	5	1	1	0	0	0	0	10	15	5				10	15	5
10	W-	RT	15	15	5	1	1	0	0	0	0	15	15	5				15	15	5
11		TH	10	10	5	1	1	0	0	0	0	10	10	5				10	10	5
12		LT	45	20	10	4	2	1	0	0	0	50	20	10				50	20	10
TOTAL			1770	1812	985	169	153	82	274	404	386	2205	2365	1445	95	65	10	2300	2430	1455

Approach Totals

	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun
From North	815	840	460	78	71	39	39	37	95	930	950	590	45	35	5	975	985	595
From East	135	195	110	13	16	9	154	143	97	300	355	215	0	0	0	300	355	215
From South	750	732	395	72	62	33	81	224	194	900	1015	620	50	30	5	950	1045	625
From West	70	45	20	6	4	1	0	0	0	75	45	20	0	0	0	75	45	20
Total	1770	1812	985	169	153	82	274	404	386	2205	2365	1445	95	65	10	2300	2430	1455

Departure Totals

	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun
To North	860	870	475	83	74	40	-48	92	105	895	1035	620	50	30	5	945	1065	625
To East	160	142	75	15	12	6	149	154	102	320	305	180	0	0	0	320	305	180
To South	720	725	395	69	61	33	173	158	179	960	945	605	45	35	5	1005	980	610
To West	30	75	40	2	6	3	0	0	0	30	80	40	0	0	0	30	80	40
Total	1770	1812	985	169	153	82	274	404	386	2205	2365	1445	95	65	10	2300	2430	1455

Leg Totals

	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun
North	1675	1710	935	161	145	79	-9	129	200	1825	1985	1210	95	65	10	1920	2050	1220
East	295	337	185	28	28	15	303	297	199	620	660	395	0	0	0	620	660	395
South	1470	1457	790	141	123	66	254	382	373	1860	1960	1225	95	65	10	1955	2025	1235
West	100	120	60	8	10	4	0	0	0	105	125	60	0	0	0	105	125	60
Total	3540	3624	1970	338	306	164	548	808	772	4410	4730	2890	190	130	20	4600	4860	2910

Part 2.3

Traffic Projection Worksheets

Emmanuel Lutheran Church & School Project
January 2006

INTERSECTION NO 2
INTERSECTION OF Honoapiilani Highway at Waiolu Road

No	Approach & Mvt	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
1 N-	RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
2	TH	810	850	480	78	73	41	49	37	95	935	960	615	45	35	5	980	995	620
3	LT	5	5	5	0	0	0	0	0	0	5	5	5				5	5	5
4 E-	RT	5	5	5	0	0	0	0	0	0	5	5	5				5	5	5
5	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
6	LT	5	5	5	0	0	0	0	0	0	5	5	5				5	5	5
7 S-	RT	5	5	5	0	0	0	0	0	0	5	5	5				5	5	5
8	TH	855	860	435	83	73	37	-48	92	105	890	1025	575	50	30	5	940	1055	580
9	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
10 W-	RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
11	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
12	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
TOTAL		1685	1730	935	161	146	78	1	129	200	1845	2005	1210	95	65	10	1940	2070	1220

	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
Approach Totals																		
From North	815	855	485	78	73	41	49	37	95	940	965	620	45	35	5	985	1000	625
From East	10	10	10	0	0	0	0	0	0	10	10	10	0	0	0	10	10	10
From South	860	865	440	83	73	37	-48	92	105	895	1030	580	50	30	5	945	1060	585
From West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1685	1730	935	161	146	78	1	129	200	1845	2005	1210	95	65	10	1940	2070	1220
Departure Totals																		
To North	860	865	440	83	73	37	-48	92	105	895	1030	580	50	30	5	945	1060	585
To East	10	10	10	0	0	0	0	0	0	10	10	10	0	0	0	10	10	10
To South	815	855	485	78	73	41	49	37	95	940	965	620	45	35	5	985	1000	625
To West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1685	1730	935	161	146	78	1	129	200	1845	2005	1210	95	65	10	1940	2070	1220
Leg Totals																		
North	1675	1720	925	161	146	78	1	129	200	1835	1995	1200	95	65	10	1930	2060	1210
East	20	20	20	0	0	0	0	0	0	20	20	20	0	0	0	20	20	20
South	1675	1720	925	161	146	78	1	129	200	1835	1995	1200	95	65	10	1930	2060	1210
West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3370	3460	1870	322	292	156	2	258	400	3690	4010	2420	190	130	20	3880	4140	2440

Part 2.2

Traffic Projection Worksheets

Emmanuel Lutheran Church & School Project
January 2006

INTERSECTION NO 3
INTERSECTION OF Honoapiilani Highway at Pilikana Road

No	Approach & Mvt		Existing			Background Growth			Related Projects			2010 Background			Project Trips			2010 Background Plus Project		
			AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun
1	N-	RT	35	80	35	3	7	3	29	87	65	65	175	105				65	175	105
2		TH	770	825	455	74	70	39	0	5	65	845	900	560	45	35	5	890	935	565
3		LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
4	E-	RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
5		TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
6		LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
7	S-	RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
8		TH	835	815	420	81	70	36	-64	44	70	850	930	525	50	30	5	900	960	530
9		LT	25	50	20	2	4	2	16	48	35	45	100	55				45	100	55
10	W-	RT	45	30	30	4	3	3	49	32	30	100	65	65				100	65	65
11		TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
12		LT	110	45	30	11	4	3	73	49	45	195	100	80				195	100	80
TOTAL			1820	1845	990	175	158	86	103	265	310	2100	2270	1390	95	65	10	2195	2335	1400
Approach Totals																				
From North			805	905	490	77	77	42	29	92	130	910	1075	665	45	35	5	955	1110	670
From East			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From South			860	865	440	83	74	38	-48	92	105	895	1030	580	50	30	5	945	1060	585
From West			155	75	60	15	7	6	122	81	75	295	165	145	0	0	0	295	165	145
Total			1820	1845	990	175	158	86	103	265	310	2100	2270	1390	95	65	10	2195	2335	1400
Departure Totals																				
To North			945	860	450	92	74	39	9	93	115	1045	1030	605	50	30	5	1095	1060	610
To East			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South			815	855	485	78	73	42	49	37	95	945	965	625	45	35	5	990	1000	630
To West			60	130	55	5	11	5	45	135	100	110	275	160	0	0	0	110	275	160
Total			1820	1845	990	175	158	86	103	265	310	2100	2270	1390	95	65	10	2195	2335	1400
Leg Totals																				
North			1750	1765	940	169	151	81	38	185	245	1955	2105	1270	95	65	10	2050	2170	1280
East			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South			1675	1720	925	161	147	80	1	129	200	1840	1995	1205	95	65	10	1935	2060	1215
West			215	205	115	20	18	11	167	216	175	405	440	305	0	0	0	405	440	305
Total			3640	3690	1980	350	316	172	206	530	620	4200	4540	2780	190	130	20	4390	4670	2800

Part 2.4

Traffic Projection Worksheets

Emmanuel Lutheran Church & School Project

INTERSECTION NO 4
INTERSECTION OF Honoapiilani Highway at Kuikahi Drive

No	Approach & Mvt	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
1	N- RT	30	30	30	3	3	3	25	90	75	60	125	110				60	125	110
2	TH	380	530	295	37	45	25	-55	-52	20	360	525	340				360	525	340
3	LT	15	25	5	1	2	0	30	96	58	45	125	65	25	15	5	70	140	70
4	E- RT	15	20	5	1	2	0	18	96	50	35	120	55	20	15	5	55	135	60
5	TH	55	60	30	5	5	3	80	280	180	140	345	215	20	10		160	355	215
6	LT	355	330	115	34	28	10	29	109	70	420	465	195	45	35	5	465	500	200
7	S- RT	450	340	145	43	29	12	1	40	28	495	410	185	50	30	5	545	440	190
8	TH	460	470	290	44	40	25	-12	-7	37	490	505	350				490	505	350
9	LT	35	50	25	3	4	2	20	60	50	60	115	75				60	115	75
10	W- RT	70	45	35	7	4	3	120	75	40	195	125	80				195	125	80
11	TH	105	60	45	10	5	4	185	145	240	300	210	290	10	10		310	220	290
12	LT	60	30	20	6	3	2	65	40	70	130	75	90				130	75	90
TOTAL		2030	1990	1040	194	170	89	506	972	918	2730	3145	2050	170	115	20	2900	3260	2070

	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
Approach Totals																		
From North	425	585	330	41	50	28	0	134	153	465	775	515	25	15	5	490	790	520
From East	425	410	150	40	35	13	127	485	300	595	930	465	85	60	10	680	990	475
From South	945	860	460	90	73	39	9	93	115	1045	1030	610	50	30	5	1095	1060	615
From West	235	135	100	23	12	9	370	260	350	625	410	460	10	10	0	635	420	460
Total	2030	1990	1040	194	170	89	506	972	918	2730	3145	2050	170	115	20	2900	3260	2070
Departure Totals																		
To North	535	520	315	51	45	27	71	129	157	655	700	495	20	15	5	675	715	500
To East	570	425	195	54	36	16	216	281	326	840	745	540	85	55	10	925	800	550
To South	805	905	445	78	77	38	94	132	130	975	1115	615	45	35	5	1020	1150	620
To West	120	140	85	11	12	8	125	430	305	260	585	400	20	10	0	280	595	400
Total	2030	1990	1040	194	170	89	506	972	918	2730	3145	2050	170	115	20	2900	3260	2070
Leg Totals																		
North	960	1105	645	92	95	55	71	263	310	1120	1475	1010	45	30	10	1165	1505	1020
East	995	835	345	94	71	29	343	766	626	1435	1675	1005	170	115	20	1605	1790	1025
South	1750	1765	905	168	150	77	103	225	245	2020	2145	1225	95	65	10	2115	2210	1235
West	355	275	185	34	24	17	495	690	655	885	995	860	30	20	0	915	1015	860
Total	4060	3980	2080	388	340	178	1012	1944	1836	5460	6290	4100	340	230	40	5800	6520	4140

Part 2.5

Traffic Projection Worksheets

Emmanuel Lutheran Church & School Project
January 2006

INTERSECTION NO 5
INTERSECTION OF Waiale Road at East Waiko Road

No	Approach & Mvt		Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
1	N-	RT	0	0	0	0	0	0	144	128	90	145	130	90				145	130	90
2		TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
3		LT	0	0	0	0	0	0	109	88	115	110	90	115	20	15	5	130	105	120
4	E-	RT	0	0	0	0	0	0	46	133	126	45	135	125	25	15	5	70	150	130
5		TH	135	195	110	13	17	9	4	11	7	150	225	125				150	225	125
6		LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
7	S-	RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
8		TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
9		LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
10	W-	RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
11		TH	155	140	75	15	12	6	27	7	6	195	160	85				195	160	85
12		LT	0	0	0	0	0	0	141	147	96	140	145	95				140	145	95
TOTAL			290	335	185	28	29	15	471	514	440	785	885	635	45	30	10	830	915	645

Approach Totals	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
From North	0	0	0	0	0	0	253	216	205	255	220	205	20	15	5	275	235	210
From East	135	195	110	13	17	9	50	144	133	195	360	250	25	15	5	220	375	255
From South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From West	155	140	75	15	12	6	168	154	102	335	305	180	0	0	0	335	305	180
Total	290	335	185	28	29	15	471	514	440	785	885	635	45	30	10	830	915	645

Departure Totals	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
To North	0	0	0	0	0	0	187	280	222	185	280	220	25	15	5	210	295	225
To East	155	140	75	15	12	6	136	95	121	305	250	200	20	15	5	325	265	205
To South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To West	135	195	110	13	17	9	148	139	97	295	355	215	0	0	0	295	355	215
Total	290	335	185	28	29	15	471	514	440	785	885	635	45	30	10	830	915	645

Leg Totals	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
North	0	0	0	0	0	0	440	496	427	440	500	425	45	30	10	485	530	435
East	290	335	185	28	29	15	186	239	254	500	610	450	45	30	10	545	640	460
South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West	290	335	185	28	29	15	316	293	199	630	660	395	0	0	0	630	660	395
Total	580	670	370	56	58	30	942	1028	880	1570	1770	1270	90	60	20	1660	1830	1290

Part 2.6

Traffic Projection Worksheets

Emmanuel Lutheran Church & School Project
January 2006

INTERSECTION NO 6
INTERSECTION OF Waiale Road at Kuikahi Drive

No	Approach & Mvt	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
1	N- RT	425	430	150	41	37	13	59	229	170	525	695	335				525	695	335
2	TH	0	0	0	0	0	0	141	219	155	140	220	155	130	75	15	270	295	170
3	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
4	E- RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
5	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
6	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
7	S- RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
8	TH	0	0	0	0	0	0	245	156	155	245	155	155	110	80	15	355	235	170
9	LT	0	0	0	0	0	0	59	131	105	60	130	105	75	60	10	135	190	115
10	W- RT	0	0	0	0	0	0	75	121	108	75	120	110	85	55	10	160	175	120
11	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
12	LT	570	425	195	55	36	17	131	85	123	755	545	335				755	545	335
TOTAL		995	855	345	96	73	30	710	941	816	1800	1865	1195	400	270	50	2200	2135	1245

Approach Totals

	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
From North	425	430	150	41	37	13	200	448	325	665	915	490	130	75	15	795	990	505
From East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From South	0	0	0	0	0	0	304	287	260	305	285	260	185	140	25	490	425	285
From West	570	425	195	55	36	17	206	206	231	830	665	445	85	55	10	915	720	455
Total	995	855	345	96	73	30	710	941	816	1800	1865	1195	400	270	50	2200	2135	1245
Departure Totals																		
To North	570	425	195	55	36	17	376	241	278	1000	700	490	110	80	15	1110	780	505
To East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South	0	0	0	0	0	0	216	340	263	215	340	265	215	130	25	430	470	290
To West	425	430	150	41	37	13	118	360	275	585	825	440	75	60	10	660	885	450
Total	995	855	345	96	73	30	710	941	816	1800	1865	1195	400	270	50	2200	2135	1245
Leg Totals																		
North	995	855	345	96	73	30	576	689	603	1665	1615	980	240	155	30	1905	1770	1010
East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South	0	0	0	0	0	0	520	627	523	520	625	525	400	270	50	920	895	575
West	995	855	345	96	73	30	324	566	506	1415	1490	885	160	115	20	1575	1605	905
Total	1990	1710	690	192	146	60	1420	1882	1632	3600	3730	2390	800	540	100	4400	4270	2490

Part 2.7

Traffic Projection Worksheets

Emmanuel Lutheran Church & School Project
January 2006

INTERSECTION NO 7
INTERSECTION OF Waiale Road at Project Driveway

No	Approach & Mvt	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
1	N- RT	0	0	0	0	0	0	0	0	0	0	0	0	215	130	25	215	130	25
2	TH	0	0	0	0	0	0	216	340	263	215	340	265				215	340	265
3	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
4	E- RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
5	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
6	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
7	S- RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
8	TH	0	0	0	0	0	0	304	287	260	305	285	260				305	285	260
9	LT	0	0	0	0	0	0	0	0	0	0	0	0	40	20	5	40	20	5
10	W- RT	0	0	0	0	0	0	0	0	0	0	0	0	30	25	5	30	25	5
11	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
12	LT	0	0	0	0	0	0	0	0	0	0	0	0	185	140	25	185	140	25
TOTAL		0	0	0	0	0	0	520	627	523	520	625	525	470	315	60	990	940	585
Approach Totals																			
From North		0	0	0	0	0	0	216	340	263	215	340	265	215	130	25	430	470	290
From East		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From South		0	0	0	0	0	0	304	287	260	305	285	260	40	20	5	345	305	265
From West		0	0	0	0	0	0	0	0	0	0	0	0	215	165	30	215	165	30
Total		0	0	0	0	0	0	520	627	523	520	625	525	470	315	60	990	940	585
Departure Totals																			
To North		0	0	0	0	0	0	304	287	260	305	285	260	185	140	25	490	425	285
To East		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South		0	0	0	0	0	0	216	340	263	215	340	265	30	25	5	245	365	270
To West		0	0	0	0	0	0	0	0	0	0	0	0	255	150	30	255	150	30
Total		0	0	0	0	0	0	520	627	523	520	625	525	470	315	60	990	940	585
Leg Totals																			
North		0	0	0	0	0	0	520	627	523	520	625	525	400	270	50	920	895	575
East		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South		0	0	0	0	0	0	520	627	523	520	625	525	70	45	10	590	670	535
West		0	0	0	0	0	0	0	0	0	0	0	0	470	315	60	470	315	60
Total		0	0	0	0	0	0	1040	1254	1046	1040	1250	1050	940	630	120	1980	1880	1170

Part 2.8

Traffic Projection Worksheets

Emmanuel Lutheran Church & School Project
January 2006

INTERSECTION NO 8
INTERSECTION OF Waiale Road at Road A

		Existing			Background Growth			Related Projects			2010 Background			Project Trips			2010 Background Plus Project		
No	Approach & Mvt	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun
1	N- RT	0	0	0	0	0	0	47	167	109	45	165	110	10	10		55	175	110
2	TH	0	0	0	0	0	0	169	173	163	170	175	165	20	15	5	190	190	170
3	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
4	E- RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
5	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
6	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
7	S- RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
8	TH	0	0	0	0	0	0	178	200	166	180	200	165	25	15	5	205	215	170
9	LT	0	0	0	0	0	0	7	26	18	5	25	20				5	25	20
10	W- RT	0	0	0	0	0	0	21	18	20	20	20	20				20	20	20
11	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
12	LT	0	0	0	0	0	0	126	87	94	125	85	95	15	5		140	90	95
TOTAL		0	0	0	0	0	0	548	671	570	545	670	575	70	45	10	615	715	585

Approach Totals

From North	0	0	0	0	0	0	216	340	272	215	340	275	30	25	5	245	365	280
From East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From South	0	0	0	0	0	0	185	226	184	185	225	185	25	15	5	210	240	190
From West	0	0	0	0	0	0	147	105	114	145	105	115	15	5	0	160	110	115
Total	0	0	0	0	0	0	548	671	570	545	670	575	70	45	10	615	715	585

Departure Totals

To North	0	0	0	0	0	0	304	287	260	305	285	260	40	20	5	345	305	265
To East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South	0	0	0	0	0	0	190	191	183	190	195	185	20	15	5	210	210	190
To West	0	0	0	0	0	0	54	193	127	50	190	130	10	10	0	60	200	130
Total	0	0	0	0	0	0	548	671	570	545	670	575	70	45	10	615	715	585

Leg Totals

North	0	0	0	0	0	0	520	627	532	520	625	535	70	45	10	590	670	545
East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South	0	0	0	0	0	0	375	417	367	375	420	370	45	30	10	420	450	380
West	0	0	0	0	0	0	201	298	241	195	295	245	25	15	0	220	310	245
Total	0	0	0	0	0	0	1096	1342	1140	1090	1340	1150	140	90	20	1230	1430	1170

Part 2.9

Traffic Projection Worksheets

Emmanuel Lutheran Church & School Project
January 2006

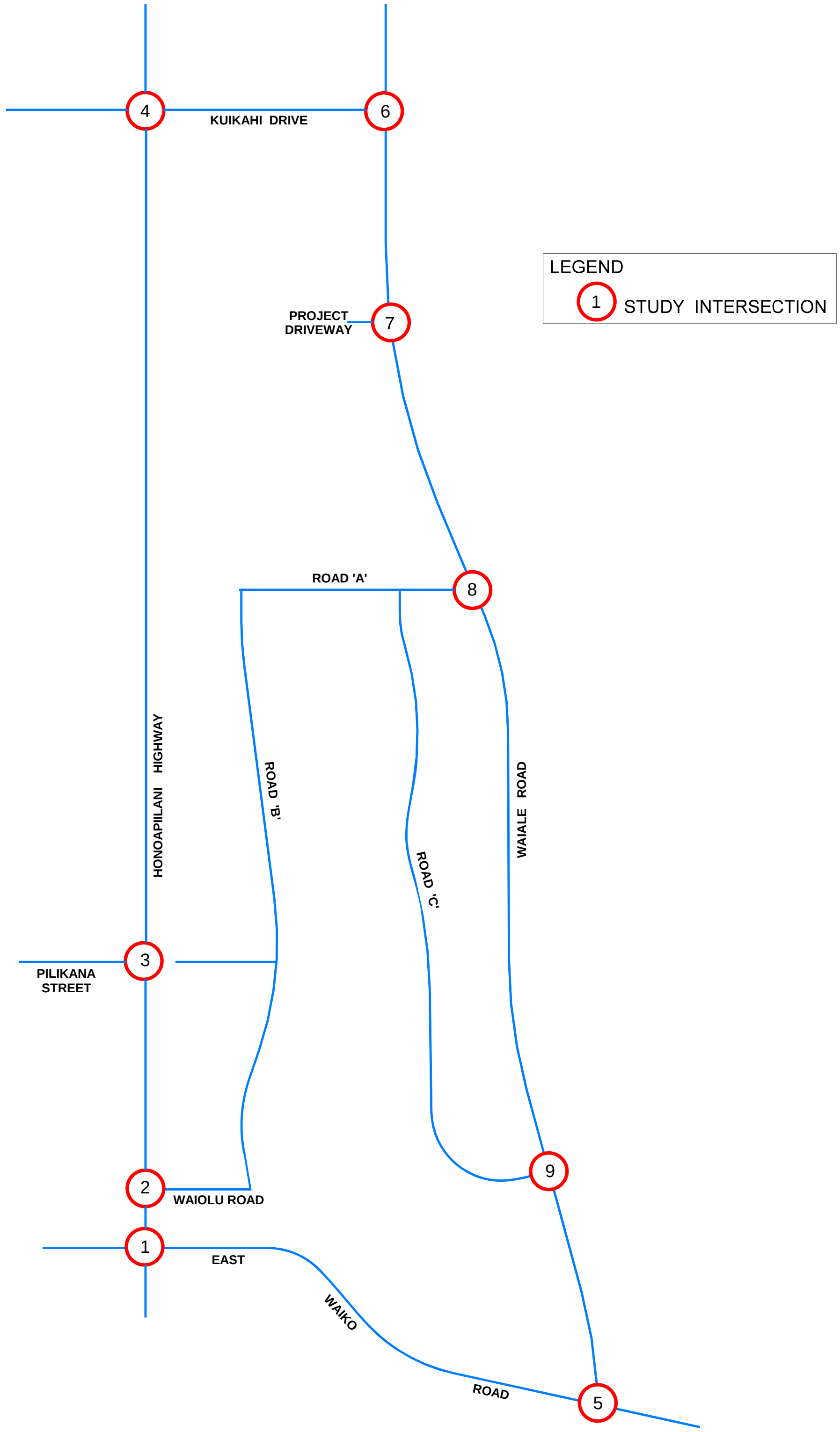
INTERSECTION NO 9
INTERSECTION OF Waiale Road at Road C

No	Approach & Mvt	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
1	N- RT	0	0	0	0	0	0	4	13	9	5	15	10				5	15	10
2	TH	0	0	0	0	0	0	194	178	165	195	180	165	20	15	5	215	195	170
3	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
4	E- RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
5	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
6	LT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
7	S- RT	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
8	TH	0	0	0	0	0	0	162	211	168	160	210	170	25	15	5	185	225	175
9	LT	0	0	0	0	0	0	23	69	54	25	70	55				25	70	55
10	W- RT	0	0	0	0	0	0	59	38	44	60	40	45				60	40	45
11	TH	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0
12	LT	0	0	0	0	0	0	23	15	16	25	15	15				25	15	15
TOTAL		0	0	0	0	0	0	465	524	456	470	530	460	45	30	10	515	560	470

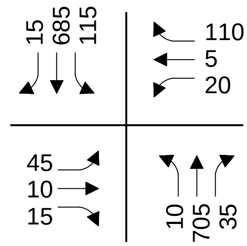
	Existing AM	Existing PM	Existing Sun	Background Growth AM	Background Growth PM	Background Growth Sun	Related Projects AM	Related Projects PM	Related Projects Sun	2010 Background AM	2010 Background PM	2010 Background Sun	Project Trips AM	Project Trips PM	Project Trips Sun	2010 Background Plus Project AM	2010 Background Plus Project PM	2010 Background Plus Project Sun
Approach Totals																		
From North	0	0	0	0	0	0	198	191	174	200	195	175	20	15	5	220	210	180
From East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From South	0	0	0	0	0	0	185	280	222	185	280	225	25	15	5	210	295	230
From West	0	0	0	0	0	0	82	53	60	85	55	60	0	0	0	85	55	60
Total	0	0	0	0	0	0	465	524	456	470	530	460	45	30	10	515	560	470
Departure Totals																		
To North	0	0	0	0	0	0	185	226	184	185	225	185	25	15	5	210	240	190
To East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South	0	0	0	0	0	0	253	216	209	255	220	210	20	15	5	275	235	215
To West	0	0	0	0	0	0	27	82	63	30	85	65	0	0	0	30	85	65
Total	0	0	0	0	0	0	465	524	456	470	530	460	45	30	10	515	560	470
Leg Totals																		
North	0	0	0	0	0	0	383	417	358	385	420	360	45	30	10	430	450	370
East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South	0	0	0	0	0	0	438	496	431	440	500	435	45	30	10	485	530	445
West	0	0	0	0	0	0	109	135	123	115	140	125	0	0	0	115	140	125
Total	0	0	0	0	0	0	930	1048	912	940	1060	920	90	60	20	1030	1120	940

APPENDIX C

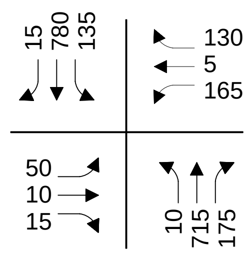
LEVEL-OF-SERVICE CALCULATIONS


LEGEND
1 STUDY INTERSECTION
KUIKAHI DRIVE
PROJECT DRIVEWAY
ROAD 'A'
HONOAPIILANI HIGHWAY
ROAD 'B'
ROAD 'C'
WAIALE ROAD
PILIKANA STREET
WAIOLU ROAD
EAST WAIKO ROAD
1
2
3
4
5
6
7
8
9

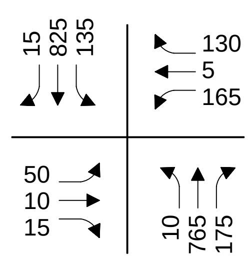
INTERSECTION 1
HONOAPIILANI HIGHWAY AT EAST WAIKO ROAD



CASE 1.1 AM



CASE 2.1 AM



CASE 3.1 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case1.1am*
Agency/Co.		Jurisdiction	
Date Performed	*1/18/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmauel Lutheran Church*		
East/West Street:	*East Waiko Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*10*	*705*	*35*	*115*	*685*	*15*
Peak-Hour Factor, PHF	*0.92*	*0.95*	*0.92*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*10*	*742*	*38*	*124*	*721*	*16*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*1*
Configuration	*L*		*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*20*	*5*	*110*	*45*	*10*	*15*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*21*	*5*	*119*	*48*	*10*	*16*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration		*LTR*		*LT*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*		*LT*		*R*
v (vph)	*10*	*124*		*145*		*58*		*16*
C (m) (vph)	*878*	*846*		*186*		*39*		*431*
v/c	*0.01*	*0.15*		*0.78*		*1.49*		*0.04*
95% queue length	*0.03*	*0.51*		*5.24*		*6.00*		*0.12*
Control Delay	*9.1*	*10.0-*		*70.9*		*478.6*		*13.7*
LOS	*A*	*A*		*F*		*F*		*B*
Approach Delay	--	--	*70.9*			*378.1*		
Approach LOS	--	--	*F*			*F*		

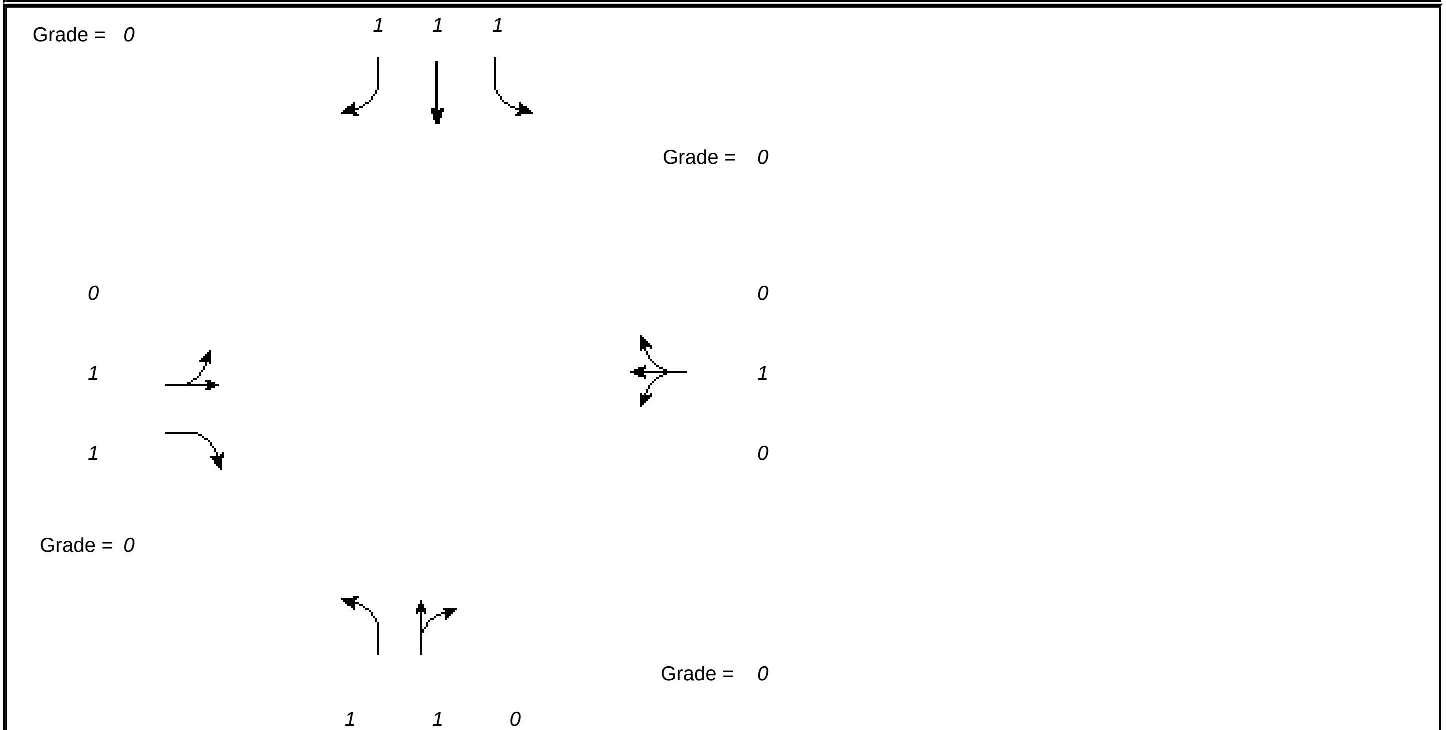
>

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case2.1am*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Church Case2.1am*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*50*	*10*	*15*	*165*	*5*	*130*	*10*	*715*	*175*	*135*	*780*	*15*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Ext. eff. green		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Arrival type		*3*	*3*		*3*		*3*	*3*		*3*	*3*	*3*
Unit Extension		*3.0*	*3.0*		*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width		*12.0*	*12.0*		*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr		*0*	*0*		*0*		*0*	*0*		*0*	*0*	*0*

	EW Perm	02	03	04	SB Only	NS Perm	07	08
Timing	G = *25.0*	G =	G =	G =	G = *9.0*	G = *48.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *90.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Church Case2.1am*

Capacity Analysis

	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*64*	*16*		*316*		*11*	*937*		*142*	*821*	*16*
Satflow rate		*1275*	*1615*		*1362*		*470*	*1844*		*1805*	*1900*	*1615*
Lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Green ratio		*0.28*	*0.28*		*0.28*		*0.53*	*0.53*		*0.63*	*0.63*	*0.63*
Lane group cap.		*354*	*449*		*378*		*251*	*983*		*195*	*1203*	*1023*
v/c ratio		*0.18*	*0.04*		*0.84*		*0.04*	*0.95*		*0.73*	*0.68*	*0.02*
Flow ratio		*0.05*	*0.01*		*0.23*		*0.02*	*0.51*			*0.43*	*0.01*
Crit. lane group		*N*	*N*		*Y*		*N*	*Y*		*N*	*N*	*N*
Sum flow ratios	*0.80*											
Lost time/cycle	*12.00*											
Critical v/c ratio	*0.92*											

Lane Group Capacity, Control Delay, and LOS Determination

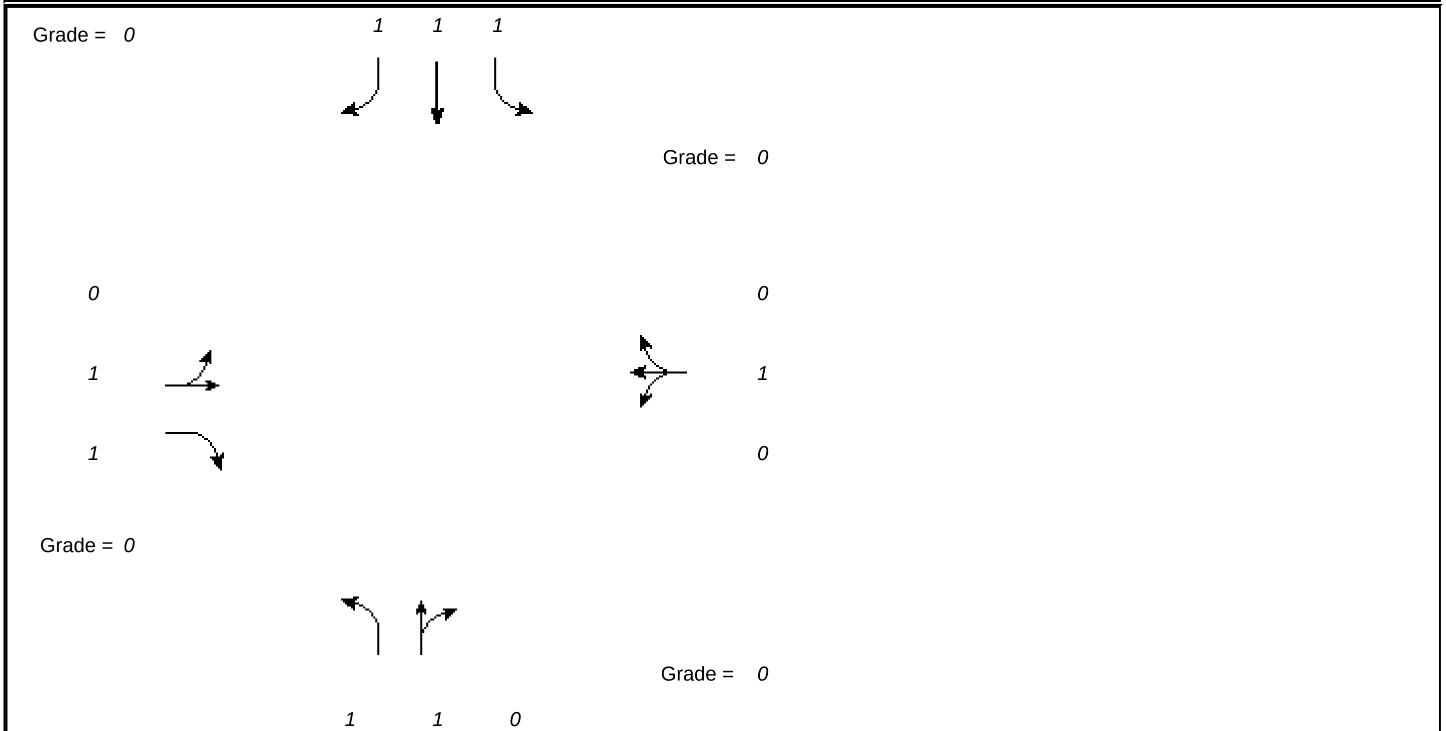
	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*64*	*16*		*316*		*11*	*937*		*142*	*821*	*16*
Lane group cap.		*354*	*449*		*378*		*251*	*983*		*195*	*1203*	*1023*
v/c ratio		*0.18*	*0.04*		*0.84*		*0.04*	*0.95*		*0.73*	*0.68*	*0.02*
Green ratio		*0.28*	*0.28*		*0.28*		*0.53*	*0.53*		*0.63*	*0.63*	*0.63*
Unif. delay d1		*24.7*	*23.7*		*30.6*		*10.0*	*19.9*		*19.5*	*10.7*	*6.1*
Delay factor k		*0.50*	*0.50*		*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	*0.50*
Increm. delay d2		*1.1*	*0.1*		*19.2*		*0.3*	*19.4*		*21.1*	*3.1*	*0.0*
PF factor		*1.000*	*1.000*		*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	*1.000*
Control delay		*25.8*	*23.9*		*49.8*		*10.4*	*39.3*		*40.6*	*13.8*	*6.1*
Lane group LOS		*C*	*C*		*D*		*B*	*D*		*D*	*B*	*A*
Apprch. delay	*25.4*			*49.8*			*39.0*			*17.6*		
Approach LOS	*C*			*D*			*D*			*B*		
Intersec. delay	*31.0*			Intersection LOS						*C*		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case3.1am*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Church Case3.1am*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*50*	*10*	*15*	*165*	*5*	*130*	*10*	*765*	*175*	*135*	*825*	*15*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Ext. eff. green		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Arrival type		*3*	*3*		*3*		*3*	*3*		*3*	*3*	*3*
Unit Extension		*3.0*	*3.0*		*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width		*12.0*	*12.0*		*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr		*0*	*0*		*0*		*0*	*0*		*0*	*0*	*0*

	EW Perm	02	03	04	SB Only	NS Perm	07	08
Timing	G = *25.0*	G =	G =	G =	G = *9.0*	G = *48.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *90.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Church Case3.1am*

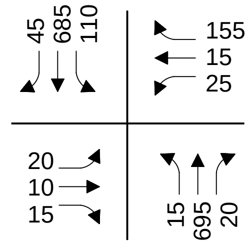
Capacity Analysis

	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*64*	*16*		*316*		*11*	*989*		*142*	*868*	*16*
Satflow rate		*1275*	*1615*		*1362*		*409*	*1847*		*1805*	*1900*	*1615*
Lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Green ratio		*0.28*	*0.28*		*0.28*		*0.53*	*0.53*		*0.63*	*0.63*	*0.63*
Lane group cap.		*354*	*449*		*378*		*218*	*985*		*195*	*1203*	*1023*
v/c ratio		*0.18*	*0.04*		*0.84*		*0.05*	*1.00*		*0.73*	*0.72*	*0.02*
Flow ratio		*0.05*	*0.01*		*0.23*		*0.03*	*0.54*			*0.46*	*0.01*
Crit. lane group		*N*	*N*		*Y*		*N*	*Y*		*N*	*N*	*N*
Sum flow ratios	*0.83*											
Lost time/cycle	*12.00*											
Critical v/c ratio	*0.96*											

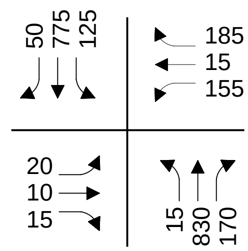
Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*64*	*16*		*316*		*11*	*989*		*142*	*868*	*16*
Lane group cap.		*354*	*449*		*378*		*218*	*985*		*195*	*1203*	*1023*
v/c ratio		*0.18*	*0.04*		*0.84*		*0.05*	*1.00*		*0.73*	*0.72*	*0.02*
Green ratio		*0.28*	*0.28*		*0.28*		*0.53*	*0.53*		*0.63*	*0.63*	*0.63*
Unif. delay d1		*24.7*	*23.7*		*30.6*		*10.1*	*21.0*		*20.1*	*11.1*	*6.1*
Delay factor k		*0.50*	*0.50*		*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	*0.50*
Increm. delay d2		*1.1*	*0.1*		*19.2*		*0.4*	*29.7*		*21.1*	*3.8*	*0.0*
PF factor		*1.000*	*1.000*		*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	*1.000*
Control delay		*25.8*	*23.9*		*49.8*		*10.5*	*50.7*		*41.2*	*14.9*	*6.1*
Lane group LOS		*C*	*C*		*D*		*B*	*D*		*D*	*B*	*A*
Apprch. delay	*25.4*			*49.8*			*50.2*			*18.4*		
Approach LOS	*C*			*D*			*D*			*B*		
Intersec. delay	*35.9*			Intersection LOS						*D*		

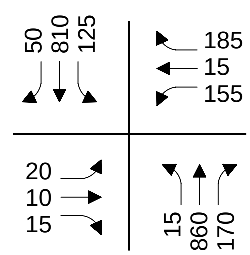
INTERSECTION 1
HONOAPIILANI HIGHWAY AT EAST WAIKO ROAD



CASE 1.1 PM



CASE 2.1 PM



CASE 3.1 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case1.1pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/18/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmauel Lutheran Church*		
East/West Street:	*East Waiko Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*15*	*695*	*20*	*110*	*685*	*45*
Peak-Hour Factor, PHF	*0.92*	*0.95*	*0.92*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*16*	*731*	*21*	*119*	*721*	*48*
Percent Heavy Vehicles	*0*	*--*	*--*	*0*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*1*
Configuration	*L*		*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*25*	*15*	*155*	*20*	*10*	*15*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*27*	*16*	*168*	*21*	*10*	*16*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration		*LTR*		*LT*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*		*LT*		*R*
v (vph)	*16*	*119*		*211*		*31*		*16*
C (m) (vph)	*854*	*867*		*180*		*33*		*431*
v/c	*0.02*	*0.14*		*1.17*		*0.94*		*0.04*
95% queue length	*0.06*	*0.47*		*11.04*		*3.29*		*0.12*
Control Delay	*9.3*	*9.8*		*173.5*		*315.6*		*13.7*
LOS	*A*	*A*		*F*		*F*		*B*
Approach Delay	--	--	*173.5*			*212.8*		
Approach LOS	--	--	*F*			*F*		

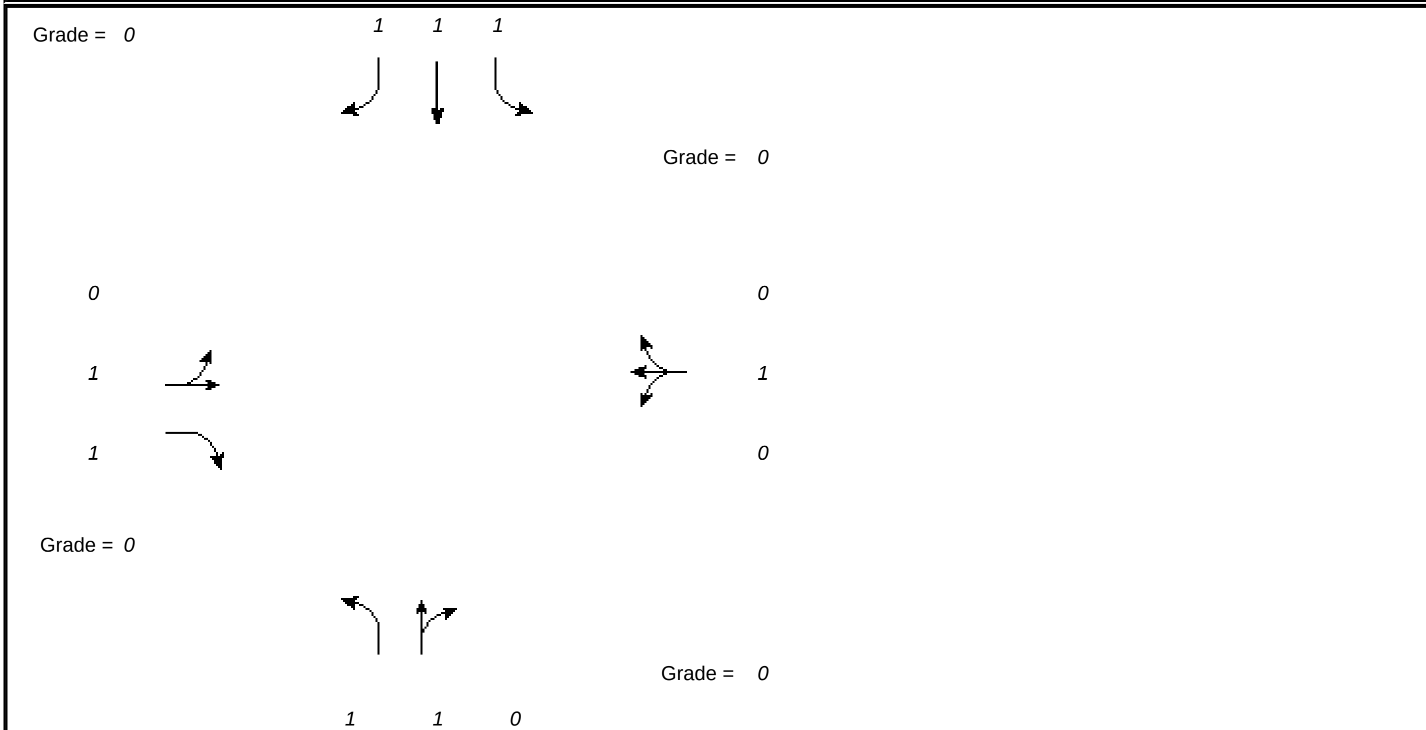
>

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case2.1pm*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Church Case2.1pm*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*20*	*10*	*15*	*155*	*15*	*185*	*15*	*830*	*170*	*125*	*775*	*50*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Ext. eff. green		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Arrival type		*3*	*3*		*3*		*3*	*3*		*3*	*3*	*3*
Unit Extension		*3.0*	*3.0*		*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width		*12.0*	*12.0*		*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr		*0*	*0*		*0*		*0*	*0*		*0*	*0*	*0*

	EW Perm	WB Only	03	04	Excl. Left	NS Perm	07	08
Timing	G = *9.0*	G = *18.0*	G =	G =	G = *9.0*	G = *57.0*	G =	G =
	Y = *0*	Y = *4*	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *101.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Church Case2.1pm*

Capacity Analysis

	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*31*	*15*		*366*		*15*	*1031*		*129*	*799*	*52*
Satflow rate		*1557*	*1615*		*1728*		*1805*	*1852*		*1805*	*1900*	*1615*
Lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Green ratio		*0.09*	*0.09*		*0.27*		*0.65*	*0.56*		*0.65*	*0.56*	*0.56*
Lane group cap.		*139*	*144*		*441*		*272*	*1045*		*173*	*1072*	*911*
v/c ratio		*0.22*	*0.10*		*0.83*		*0.06*	*0.99*		*0.75*	*0.75*	*0.06*
Flow ratio		*0.02*	*0.01*					*0.56*			*0.42*	*0.03*
Crit. lane group		*N*	*N*		*N*		*N*	*Y*		*N*	*N*	*N*
Sum flow ratios	*0.84*											
Lost time/cycle	*12.00*											
Critical v/c ratio	*0.95*											

Lane Group Capacity, Control Delay, and LOS Determination

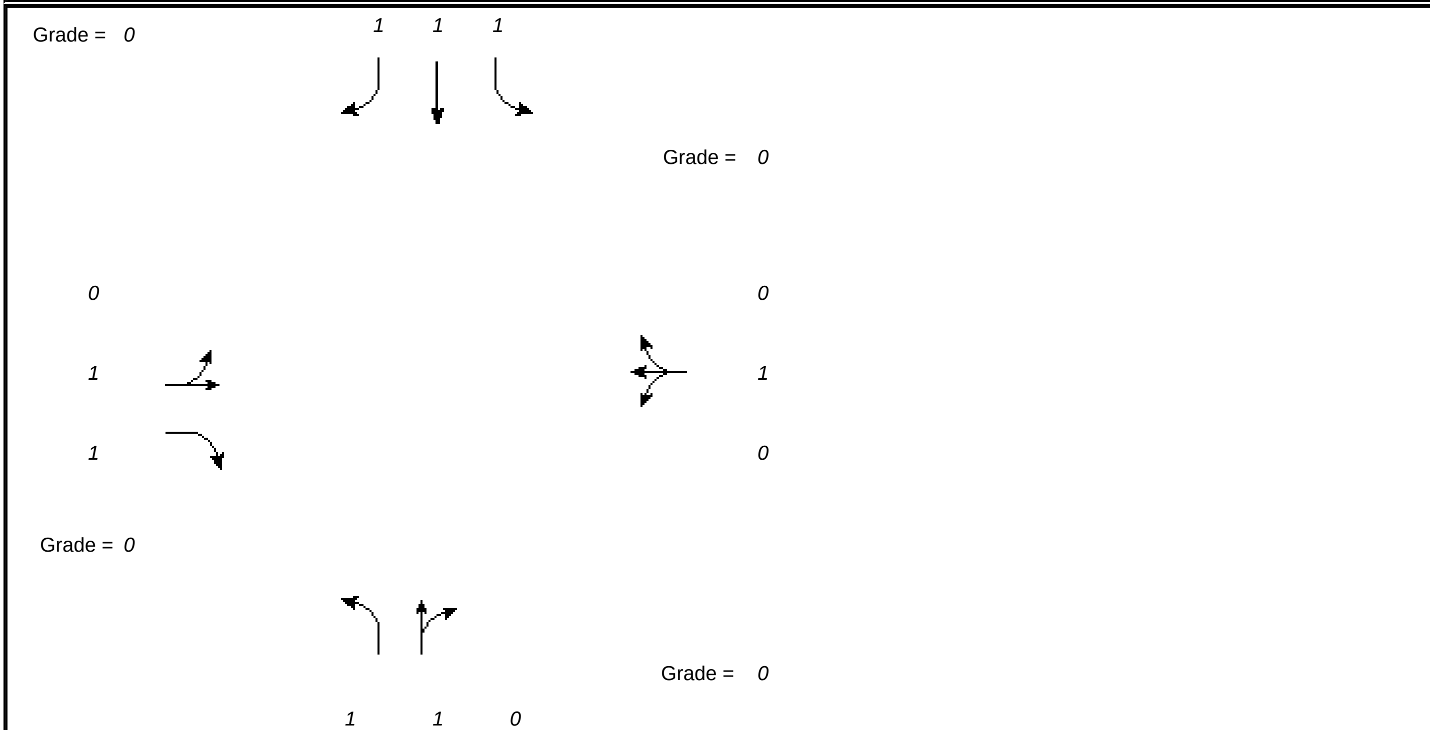
	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*31*	*15*		*366*		*15*	*1031*		*129*	*799*	*52*
Lane group cap.		*139*	*144*		*441*		*272*	*1045*		*173*	*1072*	*911*
v/c ratio		*0.22*	*0.10*		*0.83*		*0.06*	*0.99*		*0.75*	*0.75*	*0.06*
Green ratio		*0.09*	*0.09*		*0.27*		*0.65*	*0.56*		*0.65*	*0.56*	*0.56*
Unif. delay d1		*42.8*	*42.3*		*34.8*		*12.4*	*21.6*		*24.0*	*16.5*	*9.9*
Delay factor k		*0.50*	*0.50*		*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	*0.50*
Increm. delay d2		*3.7*	*1.4*		*16.4*		*0.4*	*24.8*		*25.0*	*4.7*	*0.1*
PF factor		*1.000*	*1.000*		*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	*1.000*
Control delay		*46.4*	*43.7*		*51.2*		*12.7*	*46.4*		*49.0*	*21.3*	*10.0+*
Lane group LOS		*D*	*D*		*D*		*B*	*D*		*D*	*C*	*B*
Apprch. delay	*45.6*			*51.2*			*45.9*			*24.3*		
Approach LOS	*D*			*D*			*D*			*C*		
Intersec. delay	*38.0*			Intersection LOS						*D*		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case3.1pm*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Church Case3.1pm*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*20*	*10*	*15*	*155*	*15*	*185*	*15*	*860*	*170*	*125*	*810*	*50*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Ext. eff. green		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Arrival type		*3*	*3*		*3*		*3*	*3*		*3*	*3*	*3*
Unit Extension		*3.0*	*3.0*		*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width		*12.0*	*12.0*		*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr		*0*	*0*		*0*		*0*	*0*		*0*	*0*	*0*

	EW Perm	WB Only	03	04	Excl. Left	NS Perm	07	08
Timing	G = *9.0*	G = *18.0*	G =	G =	G = *9.0*	G = *57.0*	G =	G =
	Y = *0*	Y = *4*	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *101.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Church Case3.1pm*

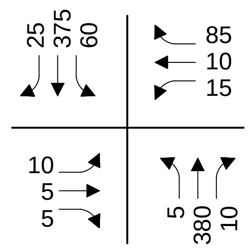
Capacity Analysis

	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*31*	*15*		*366*		*15*	*1062*		*129*	*835*	*52*
Satflow rate		*1557*	*1615*		*1728*		*1805*	*1853*		*1805*	*1900*	*1615*
Lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Green ratio		*0.09*	*0.09*		*0.27*		*0.65*	*0.56*		*0.65*	*0.56*	*0.56*
Lane group cap.		*139*	*144*		*441*		*247*	*1046*		*173*	*1072*	*911*
v/c ratio		*0.22*	*0.10*		*0.83*		*0.06*	*1.02*		*0.75*	*0.78*	*0.06*
Flow ratio		*0.02*	*0.01*					*0.56*			*0.44*	*0.03*
Crit. lane group		*N*	*N*		*N*		*N*	*Y*		*N*	*N*	*N*
Sum flow ratios	*0.84*											
Lost time/cycle	*12.00*											
Critical v/c ratio	*0.96*											

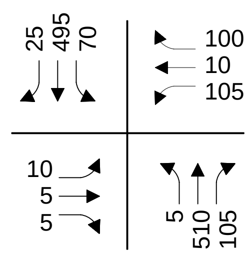
Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*31*	*15*		*366*		*15*	*1062*		*129*	*835*	*52*
Lane group cap.		*139*	*144*		*441*		*247*	*1046*		*173*	*1072*	*911*
v/c ratio		*0.22*	*0.10*		*0.83*		*0.06*	*1.02*		*0.75*	*0.78*	*0.06*
Green ratio		*0.09*	*0.09*		*0.27*		*0.65*	*0.56*		*0.65*	*0.56*	*0.56*
Unif. delay d1		*42.8*	*42.3*		*34.8*		*13.5*	*22.0*		*24.0*	*17.1*	*9.9*
Delay factor k		*0.50*	*0.50*		*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	*0.50*
Increm. delay d2		*3.7*	*1.4*		*16.4*		*0.5*	*31.7*		*25.0*	*5.6*	*0.1*
PF factor		*1.000*	*1.000*		*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	*1.000*
Control delay		*46.4*	*43.7*		*51.2*		*13.9*	*53.7*		*49.0*	*22.7*	*10.0+*
Lane group LOS		*D*	*D*		*D*		*B*	*D*		*D*	*C*	*B*
Apprch. delay	*45.6*			*51.2*			*53.1*			*25.4*		
Approach LOS	*D*			*D*			*D*			*C*		
Intersec. delay	*41.5*			Intersection LOS						*D*		

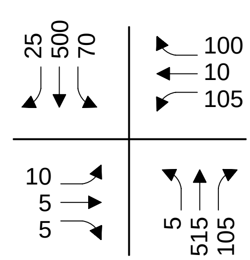
INTERSECTION 1
HONOAPIILANI HIGHWAY AT EAST WAIKO ROAD



CASE 1.1 SUNDAY



CASE 2.1 SUNDAY



CASE 3.1 SUNDAY

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case1.1sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/18/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmauel Lutheran Church*		
East/West Street:	*East Waiko Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*5*	*380*	*10*	*60*	*375*	*25*
Peak-Hour Factor, PHF	*0.92*	*0.95*	*0.92*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*5*	*400*	*10*	*65*	*394*	*27*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*1*
Configuration	*L*		*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*15*	*10*	*85*	*10*	*5*	*5*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*16*	*10*	*92*	*10*	*5*	*5*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration		*LTR*		*LT*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*		*LT*		*R*
v (vph)	*5*	*65*		*118*		*15*		*5*
C (m) (vph)	*1149*	*1160*		*463*		*198*		*659*
v/c	*0.00*	*0.06*		*0.25*		*0.08*		*0.01*
95% queue length	*0.01*	*0.18*		*1.00*		*0.24*		*0.02*
Control Delay	*8.1*	*8.3*		*15.4*		*24.7*		*10.5*
LOS	*A*	*A*		*C*		*C*		*B*
Approach Delay	--	--		*15.4*			*21.1*	
Approach LOS	--	--		*C*			*C*	

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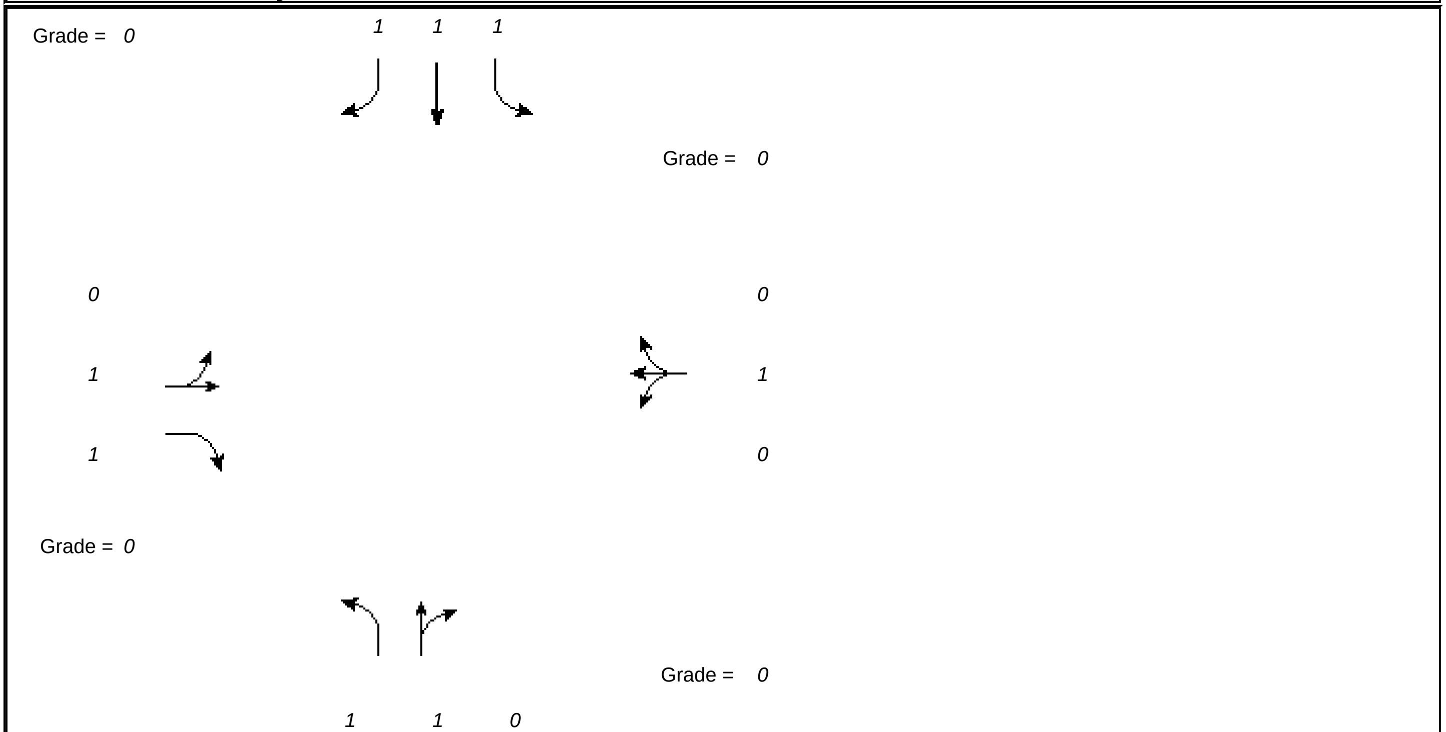
*HCS2000*TM Version 4.1c

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case2.1sunday*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Church Case2.1sunday*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*10*	*5*	*5*	*105*	*10*	*100*	*5*	*510*	*105*	*70*	*495*	*25*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.92*	*0.92*	*0.92*	*0.93*	*0.93*	*0.93*	*0.92*	*0.95*	*0.92*	*0.93*	*0.95*	*0.92*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Ext. eff. green		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Arrival type		*3*	*3*		*3*		*3*	*3*		*3*	*3*	*3*
Unit Extension		*3.0*	*3.0*		*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width		*12.0*	*12.0*		*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr		*0*	*0*		*0*		*0*	*0*		*0*	*0*	*0*

	EW Perm	02	03	04	Excl. Left	NS Perm	07	08
Timing	G = *20.0*	G =	G =	G =	G = *9.0*	G = *33.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =

Duration of Analysis (hrs) = *0.25*		Cycle Length C = *70.0*

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Church Case2.1sunday*

Capacity Analysis

	EB			WB			NB			SB		
Lane group		LT	R		LTR		L	TR		L	T	R
Adj. flow rate		16	5		232		5	651		75	521	27
Satflow rate		1589	1615		1504		1805	1850		1805	1900	1615
Lost time		2.0	2.0		2.0		2.0	2.0		2.0	2.0	2.0
Green ratio		0.29	0.29		0.29		0.60	0.47		0.60	0.47	0.47
Lane group cap.		454	461		430		416	872		318	896	761
v/c ratio		0.04	0.01		0.54		0.01	0.75		0.24	0.58	0.04
Flow ratio		0.01	0.00		0.15			0.35			0.27	0.02
Crit. lane group		N	N		Y		N	Y		N	N	N
Sum flow ratios	0.55											
Lost time/cycle	12.00											
Critical v/c ratio	0.66											

Lane Group Capacity, Control Delay, and LOS Determination

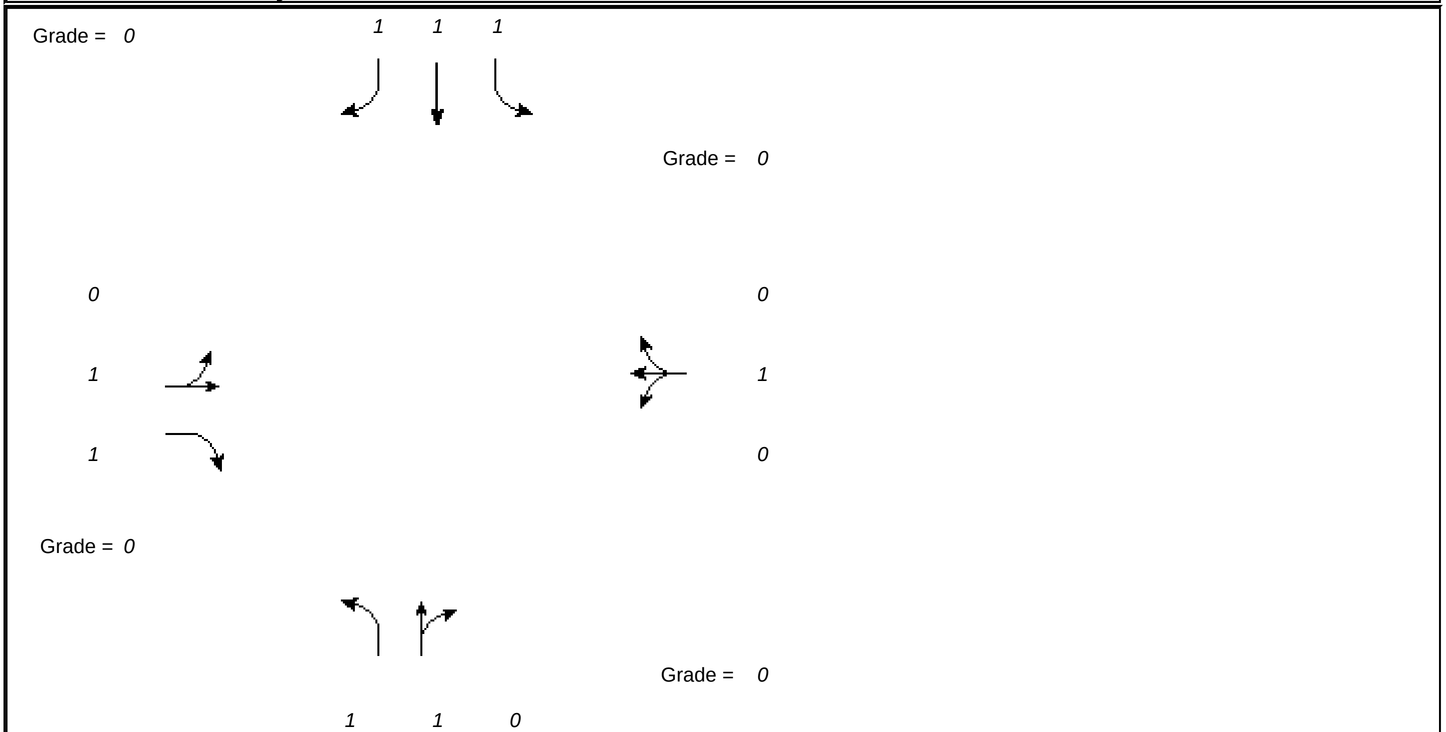
	EB			WB			NB			SB		
Lane group		LT	R		LTR		L	TR		L	T	R
Adj. flow rate		16	5		232		5	651		75	521	27
Lane group cap.		454	461		430		416	872		318	896	761
v/c ratio		0.04	0.01		0.54		0.01	0.75		0.24	0.58	0.04
Green ratio		0.29	0.29		0.29		0.60	0.47		0.60	0.47	0.47
Unif. delay d1		18.0	17.9		21.1		7.2	15.1		9.3	13.5	9.9
Delay factor k		0.50	0.50		0.50		0.50	0.50		0.50	0.50	0.50
Increm. delay d2		0.1	0.0		4.8		0.1	5.8		1.7	2.8	0.1
PF factor		1.000	1.000		1.000		1.000	1.000		1.000	1.000	1.000
Control delay		18.2	18.0		25.9		7.3	20.9		11.0	16.2	10.0+
Lane group LOS		B	B		C		A	C		B	B	B
Apprch. delay	18.1			25.9			20.8			15.3		
Approach LOS	B			C			C			B		
Intersec. delay	19.3			Intersection LOS						B		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case3.1sunday*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Church Case3.1sunday*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*10*	*5*	*5*	*105*	*10*	*100*	*5*	*515*	*105*	*70*	*500*	*25*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.92*	*0.92*	*0.92*	*0.93*	*0.93*	*0.93*	*0.92*	*0.95*	*0.92*	*0.93*	*0.95*	*0.92*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Ext. eff. green		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Arrival type		*3*	*3*		*3*		*3*	*3*		*3*	*3*	*3*
Unit Extension		*3.0*	*3.0*		*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width		*12.0*	*12.0*		*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr		*0*	*0*		*0*		*0*	*0*		*0*	*0*	*0*

	EW Perm	02	03	04	Excl. Left	NS Perm	07	08
Timing	G = *20.0*	G =	G =	G =	G = *9.0*	G = *33.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *70.0*			

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Church Case3.1sunday*

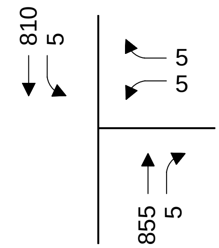
Capacity Analysis

	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*16*	*5*		*232*		*5*	*656*		*75*	*526*	*27*
Satflow rate		*1589*	*1615*		*1504*		*1805*	*1850*		*1805*	*1900*	*1615*
Lost time		*2.0*	*2.0*		*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	*2.0*
Green ratio		*0.29*	*0.29*		*0.29*		*0.60*	*0.47*		*0.60*	*0.47*	*0.47*
Lane group cap.		*454*	*461*		*430*		*412*	*872*		*315*	*896*	*761*
v/c ratio		*0.04*	*0.01*		*0.54*		*0.01*	*0.75*		*0.24*	*0.59*	*0.04*
Flow ratio		*0.01*	*0.00*		*0.15*			*0.35*			*0.28*	*0.02*
Crit. lane group		*N*	*N*		*Y*		*N*	*Y*		*N*	*N*	*N*
Sum flow ratios	*0.55*											
Lost time/cycle	*12.00*											
Critical v/c ratio	*0.66*											

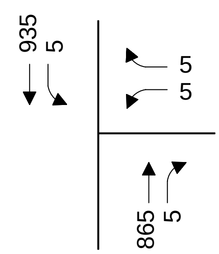
Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group		*LT*	*R*		*LTR*		*L*	*TR*		*L*	*T*	*R*
Adj. flow rate		*16*	*5*		*232*		*5*	*656*		*75*	*526*	*27*
Lane group cap.		*454*	*461*		*430*		*412*	*872*		*315*	*896*	*761*
v/c ratio		*0.04*	*0.01*		*0.54*		*0.01*	*0.75*		*0.24*	*0.59*	*0.04*
Green ratio		*0.29*	*0.29*		*0.29*		*0.60*	*0.47*		*0.60*	*0.47*	*0.47*
Unif. delay d1		*18.0*	*17.9*		*21.1*		*7.3*	*15.2*		*9.4*	*13.5*	*9.9*
Delay factor k		*0.50*	*0.50*		*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	*0.50*
Increm. delay d2		*0.1*	*0.0*		*4.8*		*0.1*	*6.0*		*1.8*	*2.8*	*0.1*
PF factor		*1.000*	*1.000*		*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	*1.000*
Control delay		*18.2*	*18.0*		*25.9*		*7.3*	*21.1*		*11.2*	*16.3*	*10.0+*
Lane group LOS		*B*	*B*		*C*		*A*	*C*		*B*	*B*	*B*
Apprch. delay	*18.1*			*25.9*			*21.0*			*15.4*		
Approach LOS	*B*			*C*			*C*			*B*		
Intersec. delay	*19.4*			Intersection LOS						*B*		

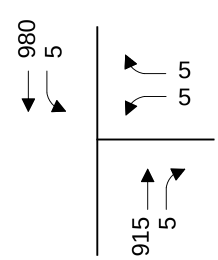
INTERSECTION 2
HONOAPIILANI HIGHWAY AT WAIOLU ROAD



CASE 1.2 AM



CASE 2.2 AM



CASE 3.2 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case1.2am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Churc*		
East/West Street:	*Waiolu Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*855*	*5*	*5*	*810*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*0*	*929*	*5*	*5*	*852*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*5*	*0*	*5*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (vph)		*5*		*10*				
C (m) (vph)		*741*		*265*				
v/c		*0.01*		*0.04*				
95% queue length		*0.02*		*0.12*				
Control Delay		*9.9*		*19.1*				
LOS		*A*		*C*				
Approach Delay	--	--		*19.1*				
Approach LOS	--	--		*C*				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.2am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Churc*		
East/West Street:	*Waiolu Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*865*	*5*	*5*	*935*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*0*	*940*	*5*	*5*	*984*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*5*	*0*	*5*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (vph)		*5*		*10*				
C (m) (vph)		*734*		*248*				
v/c		*0.01*		*0.04*				
95% queue length		*0.02*		*0.13*				
Control Delay		*9.9*		*20.1*				
LOS		*A*		*C*				
Approach Delay	--	--	*20.1*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.2am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Churc*		
East/West Street:	*Waiolu Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*915*	*5*	*5*	*980*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*0*	*994*	*5*	*5*	*1031*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*5*	*0*	*5*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (vph)		*5*		*10*				
C (m) (vph)		*701*		*232*				
v/c		*0.01*		*0.04*				
95% queue length		*0.02*		*0.13*				
Control Delay		*10.2*		*21.2*				
LOS		*B*		*C*				
Approach Delay	--	--	*21.2*					
Approach LOS	--	--	*C*					

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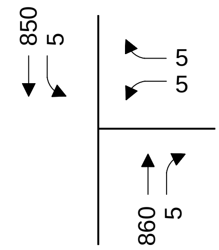
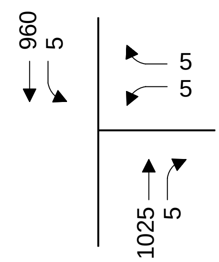
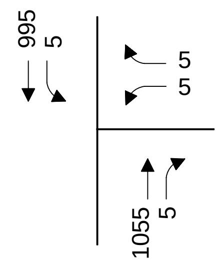


CASE 1.2 PM



CASE 2.2 PM



CASE 3.2 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case1.2pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Churc*		
East/West Street:	*Waiolu Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*860*	*5*	*5*	*850*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*0*	*934*	*5*	*5*	*894*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*5*	*0*	*5*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (vph)		*5*		*10*				
C (m) (vph)		*738*		*259*				
v/c		*0.01*		*0.04*				
95% queue length		*0.02*		*0.12*				
Control Delay		*9.9*		*19.5*				
LOS		*A*		*C*				
Approach Delay	--	--	*19.5*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.2pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description	*Emmanuel Lutheran Churc*		
East/West Street:	*Waiolu Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*1025*	*5*	*5*	*960*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*0*	*1114*	*5*	*5*	*1010*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*5*	*0*	*5*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (vph)		*5*		*10*				
C (m) (vph)		*632*		*208*				
v/c		*0.01*		*0.05*				
95% queue length		*0.02*		*0.15*				
Control Delay		*10.7*		*23.2*				
LOS		*B*		*C*				
Approach Delay	--	--	*23.2*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.2pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Churc*		
East/West Street:	*Waiolu Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*1055*	*5*	*5*	*995*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.95*	*0.92*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*0*	*1110*	*5*	*5*	*1047*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

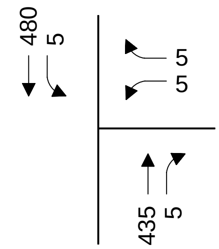
Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*5*	*0*	*5*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

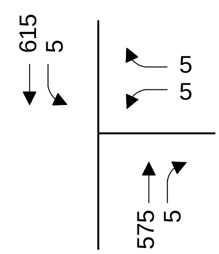
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (vph)		*5*		*10*				
C (m) (vph)		*634*		*206*				
v/c		*0.01*		*0.05*				
95% queue length		*0.02*		*0.15*				
Control Delay		*10.7*		*23.4*				
LOS		*B*		*C*				
Approach Delay	--	--	*23.4*					
Approach LOS	--	--	*C*					

>

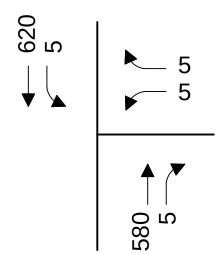
INTERSECTION 2
HONOAPIILANI HIGHWAY AT WAIOLU ROAD



CASE 1.2 SUNDAY



CASE 2.2 SUNDAY



CASE 3.2 SUNDAY

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case1.2sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Churc*		
East/West Street:	*Waiolu Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*435*	*5*	*5*	*480*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*0*	*472*	*5*	*5*	*505*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*5*	*0*	*5*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (vph)		*5*		*10*				
C (m) (vph)		*1096*		*376*				
v/c		*0.00*		*0.03*				
95% queue length		*0.01*		*0.08*				
Control Delay		*8.3*		*14.8*				
LOS		*A*		*B*				
Approach Delay	--	--	*14.8*					
Approach LOS	--	--	*B*					

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.2sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Churc*		
East/West Street:	*Waiolu Road*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*575*	*5*	*5*	*615*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*0*	*624*	*5*	*5*	*647*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*5*	*0*	*5*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (vph)		*5*		*10*				
C (m) (vph)		*963*		*266*				
v/c		*0.01*		*0.04*				
95% queue length		*0.02*		*0.12*				
Control Delay		*8.8*		*19.1*				
LOS		*A*		*C*				
Approach Delay	--	--	*19.1*					
Approach LOS	--	--	*C*					

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.2sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description	*Emmanuel Lutheran Churc*
East/West Street: *Waiolu Road*	North/South Street: *Honoapiilani Highway*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*580*	*5*	*5*	*620*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*0*	*630*	*5*	*5*	*652*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

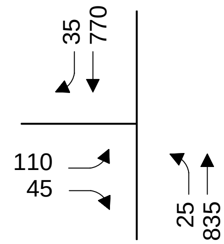
Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*5*	*0*	*5*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

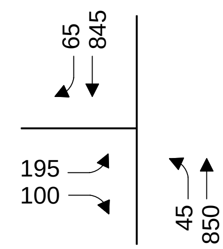
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (vph)		*5*		*10*				
C (m) (vph)		*958*		*262*				
v/c		*0.01*		*0.04*				
95% queue length		*0.02*		*0.12*				
Control Delay		*8.8*		*19.3*				
LOS		*A*		*C*				
Approach Delay	--	--	*19.3*					
Approach LOS	--	--	*C*					

>

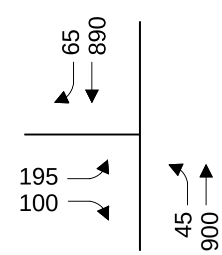
INTERSECTION 3
HONOAPIILANI HIGHWAY AT PILIKANA STREET



CASE 1.3 AM



CASE 2.3 AM



CASE 3.3 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case1.3am*
Agency/Co.		Jurisdiction	
Date Performed	*1/18/2006*	Analysis Year	
Analysis Time Period			

Project Description *Emmanuel Lutheran Church*

East/West Street: *Pilikana Street*	North/South Street: *Honoapiilani Highway*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*25*	*835*	*0*	*0*	*770*	*35*
Peak-Hour Factor, PHF	*0.92*	*0.95*	*0.92*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*27*	*878*	*0*	*0*	*810*	*38*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*110*	*0*	*45*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*119*	*0*	*48*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*1*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*27*					*119*		*48*
C (m) (vph)	*825*					*93*		*383*
v/c	*0.03*					*1.28*		*0.13*
95% queue length	*0.10*					*8.50*		*0.43*
Control Delay	*9.5*					*268.6*		*15.7*
LOS	*A*					*F*		*C*
Approach Delay	--	--				*195.9*		
Approach LOS	--	--				*F*		

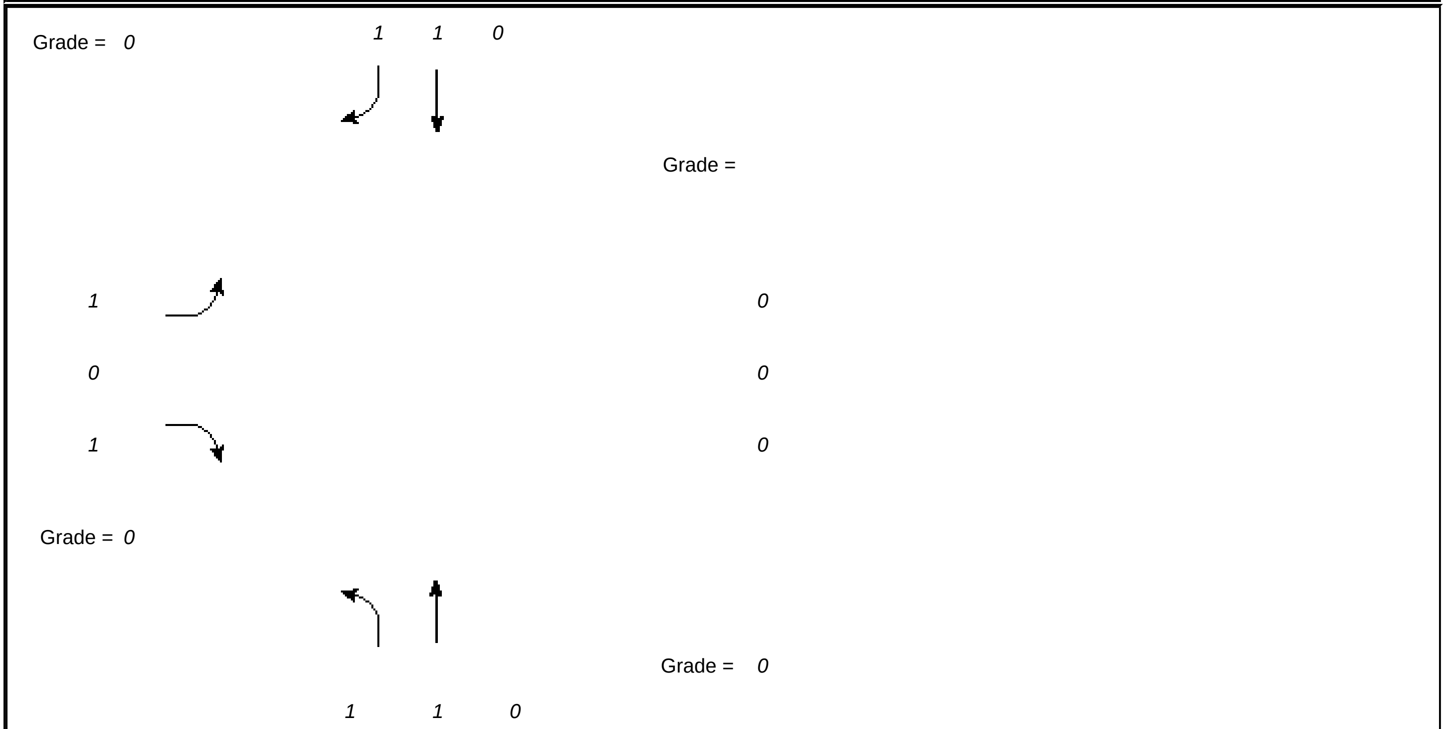
>

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case2.3am*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case2.3am*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*195*		*100*				*45*	*850*			*845*	*65*
% Heavy veh	*0*		*0*				*0*	*0*			*0*	*0*
PHF	*0.92*		*0.92*				*0.92*	*0.95*			*0.95*	*0.92*
Actuated (P/A)	*P*		*P*				*P*	*P*			*P*	*P*
Startup lost time	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Ext. eff. green	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Arrival type	*3*		*3*				*3*	*3*			*3*	*3*
Unit Extension	*3.0*		*3.0*				*3.0*	*3.0*			*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*25*	*0*						*0*		*25*
Lane Width	*12.0*		*12.0*				*12.0*	*12.0*			*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*		*0*				*0*	*0*			*0*	*0*

	EB Only	02	03	04	NB Only	Thru & RT	07	08
Timing	G = *19.0*	G =	G =	G =	G = *12.0*	G = *43.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *82.0*			

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case2.3am*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	L		R				L	T			T	R
Adj. flow rate	212		82				49	895			889	43
Satflow rate	1805		1615				1805	1900			1900	1615
Lost time	2.0		2.0				2.0	2.0			2.0	2.0
Green ratio	0.23		0.23				0.15	0.67			0.52	0.52
Lane group cap.	418		374				264	1274			996	847
v/c ratio	0.51		0.22				0.19	0.70			0.89	0.05
Flow ratio	0.12		0.05				0.03	0.47			0.47	0.03
Crit. lane group	Y	N	N		N		Y	N			Y	N
Sum flow ratios	0.61											
Lost time/cycle	8.00											
Critical v/c ratio	0.68											

Lane Group Capacity, Control Delay, and LOS Determination

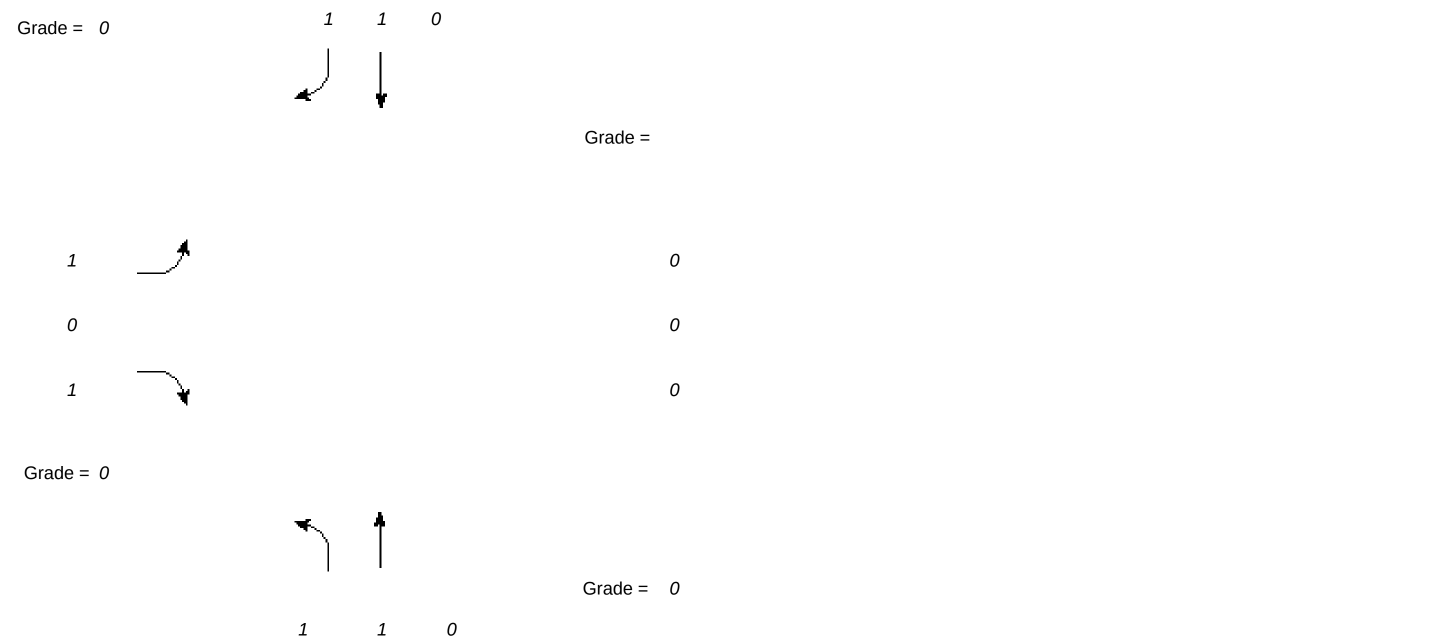
	EB			WB			NB			SB		
Lane group	L		R				L	T			T	R
Adj. flow rate	212		82				49	895			889	43
Lane group cap.	418		374				264	1274			996	847
v/c ratio	0.51		0.22				0.19	0.70			0.89	0.05
Green ratio	0.23		0.23				0.15	0.67			0.52	0.52
Unif. delay d1	27.4		25.5				30.7	8.4			17.4	9.5
Delay factor k	0.50		0.50				0.50	0.50			0.50	0.50
Increm. delay d2	4.3		1.3				1.5	3.3			12.0	0.1
PF factor	1.000		1.000				1.000	1.000			1.000	1.000
Control delay	31.8		26.8				32.3	11.7			29.5	9.6
Lane group LOS	C		C				C	B			C	A
Apprch. delay	30.4						12.7			28.5		
Approach LOS	C						B			C		
Intersec. delay	21.9			Intersection LOS						C		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case3.3am*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case3.3am*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*195*		*100*				*45*	*900*			*890*	*65*
% Heavy veh	*0*		*0*				*0*	*0*			*0*	*0*
PHF	*0.92*		*0.92*				*0.92*	*0.95*			*0.95*	*0.92*
Actuated (P/A)	*P*		*P*				*P*	*P*			*P*	*P*
Startup lost time	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Ext. eff. green	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Arrival type	*3*		*3*				*3*	*3*			*3*	*3*
Unit Extension	*3.0*		*3.0*				*3.0*	*3.0*			*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*25*	*0*						*0*		*25*
Lane Width	*12.0*		*12.0*				*12.0*	*12.0*			*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*		*0*				*0*	*0*			*0*	*0*

	EB Only	02	03	04	NB Only	Thru & RT	07	08
Timing	G = *19.0*	G =	G =	G =	G = *12.0*	G = *43.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *82.0*

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case3.3am*

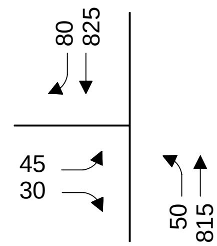
Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*		*R*				*L*	*T*			*T*	*R*
Adj. flow rate	*212*		*82*				*49*	*947*			*937*	*43*
Satflow rate	*1805*		*1615*				*1805*	*1900*			*1900*	*1615*
Lost time	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Green ratio	*0.23*		*0.23*				*0.15*	*0.67*			*0.52*	*0.52*
Lane group cap.	*418*		*374*				*264*	*1274*			*996*	*847*
v/c ratio	*0.51*		*0.22*				*0.19*	*0.74*			*0.94*	*0.05*
Flow ratio	*0.12*		*0.05*				*0.03*	*0.50*			*0.49*	*0.03*
Crit. lane group	*Y*	*N*	*N*		*N*		*Y*	*N*			*Y*	*N*
Sum flow ratios	*0.64*											
Lost time/cycle	*8.00*											
Critical v/c ratio	*0.71*											

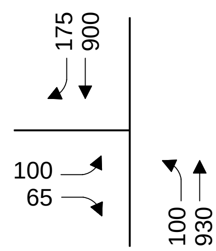
Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	*L*		*R*				*L*	*T*			*T*	*R*
Adj. flow rate	*212*		*82*				*49*	*947*			*937*	*43*
Lane group cap.	*418*		*374*				*264*	*1274*			*996*	*847*
v/c ratio	*0.51*		*0.22*				*0.19*	*0.74*			*0.94*	*0.05*
Green ratio	*0.23*		*0.23*				*0.15*	*0.67*			*0.52*	*0.52*
Unif. delay d1	*27.4*		*25.5*				*30.7*	*8.9*			*18.3*	*9.5*
Delay factor k	*0.50*		*0.50*				*0.50*	*0.50*			*0.50*	*0.50*
Increm. delay d2	*4.3*		*1.3*				*1.5*	*4.0*			*17.4*	*0.1*
PF factor	*1.000*		*1.000*				*1.000*	*1.000*			*1.000*	*1.000*
Control delay	*31.8*		*26.8*				*32.3*	*12.8*			*35.7*	*9.6*
Lane group LOS	*C*		*C*				*C*	*B*			*D*	*A*
Apprch. delay	*30.4*						*13.8*			*34.5*		
Approach LOS	*C*						*B*			*C*		
Intersec. delay	*24.9*			Intersection LOS						*C*		

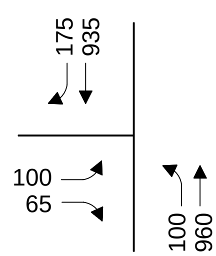
INTERSECTION 3
HONOAPIILANI HIGHWAY AT PILIKANA STREET



CASE 1.3 PM



CASE 2.3 PM



CASE 3.3 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case1.3pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/18/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Pilikana Street*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*50*	*815*	*0*	*0*	*825*	*80*
Peak-Hour Factor, PHF	*0.92*	*0.95*	*0.92*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*54*	*857*	*0*	*0*	*868*	*86*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*45*	*0*	*30*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*48*	*0*	*32*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*1*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*54*					*48*		*32*
C (m) (vph)	*785*					*79*		*355*
v/c	*0.07*					*0.61*		*0.09*
95% queue length	*0.22*					*2.73*		*0.30*
Control Delay	*9.9*					*104.6*		*16.1*
LOS	*A*					*F*		*C*
Approach Delay	--	--				*69.2*		
Approach LOS	--	--				*F*		

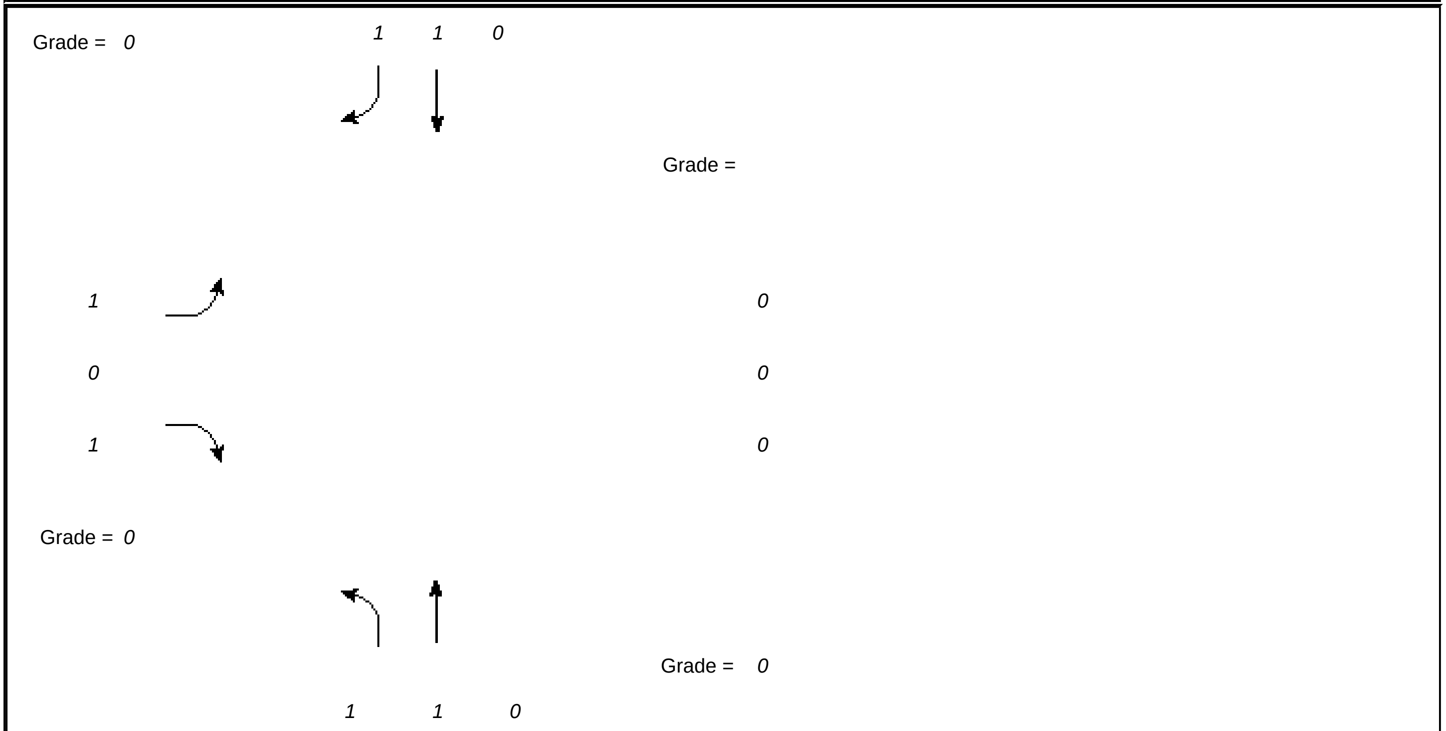
>

INPUT WORKSHEET

General Information		**Site Information**	
Analyst		Intersection	*Case2.3pm*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case2.3pm*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*100*		*65*				*100*	*930*			*900*	*175*
% Heavy veh	*0*		*0*				*0*	*0*			*0*	*0*
PHF	*0.92*		*0.92*				*0.92*	*0.95*			*0.95*	*0.92*
Actuated (P/A)	*P*		*P*				*P*	*P*			*P*	*P*
Startup lost time	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Ext. eff. green	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Arrival type	*3*		*3*				*3*	*3*			*3*	*3*
Unit Extension	*3.0*		*3.0*				*3.0*	*3.0*			*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*25*	*0*						*0*		*25*
Lane Width	*12.0*		*12.0*				*12.0*	*12.0*			*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*		*0*				*0*	*0*			*0*	*0*

	EB Only	02	03	04	NB Only	Thru & RT	07	08
Timing	G = *16.0*	G =	G =	G =	G = *12.0*	G = *43.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =

Duration of Analysis (hrs) = *0.25*		Cycle Length C = *79.0*

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case2.3pm*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	L		R				L	T			T	R
Adj. flow rate	109		43				109	979			947	163
Satflow rate	1805		1615				1805	1900			1900	1615
Lost time	2.0		2.0				2.0	2.0			2.0	2.0
Green ratio	0.20		0.20				0.15	0.70			0.54	0.54
Lane group cap.	366		327				274	1323			1034	879
v/c ratio	0.30		0.13				0.40	0.74			0.92	0.19
Flow ratio	0.06		0.03				0.06	0.52			0.50	0.10
Crit. lane group	Y	N	N		N		Y	N			Y	N
Sum flow ratios	0.62											
Lost time/cycle	8.00											
Critical v/c ratio	0.69											

Lane Group Capacity, Control Delay, and LOS Determination

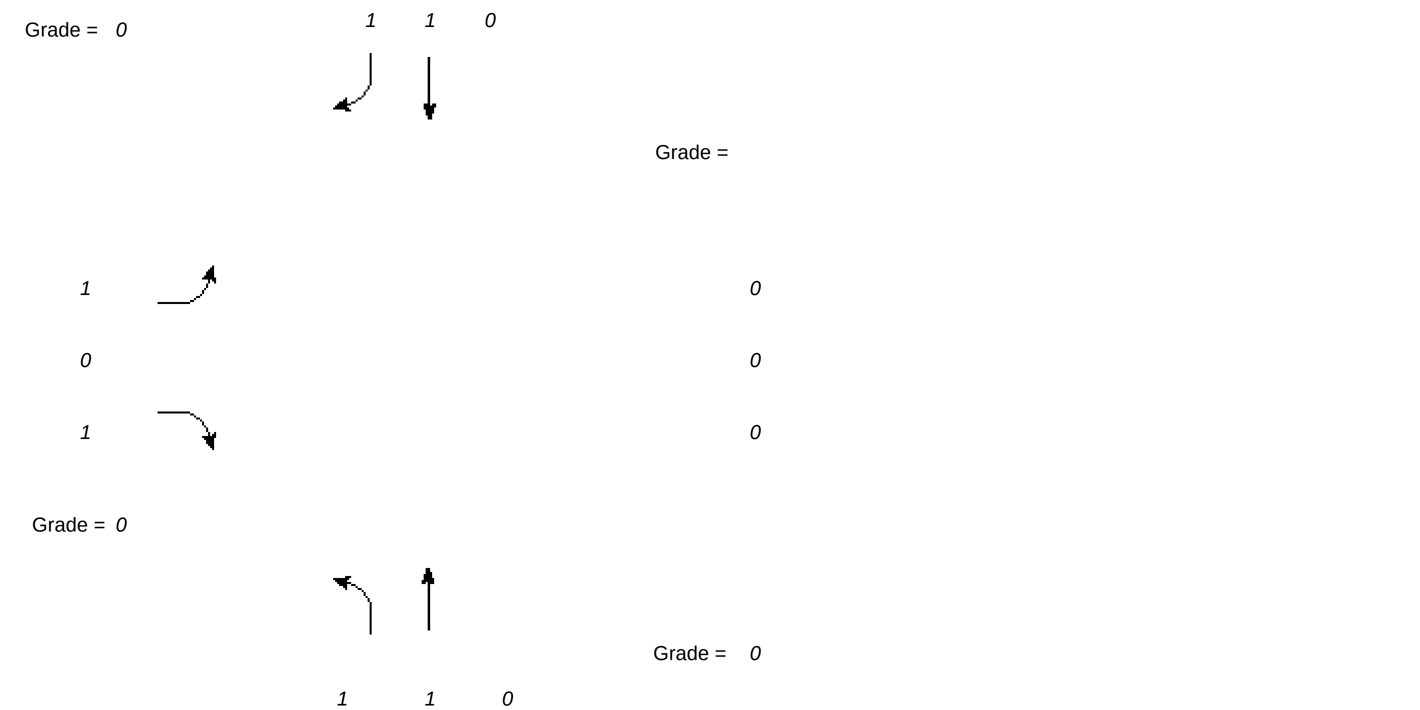
	EB			WB			NB			SB		
Lane group	L		R				L	T			T	R
Adj. flow rate	109		43				109	979			947	163
Lane group cap.	366		327				274	1323			1034	879
v/c ratio	0.30		0.13				0.40	0.74			0.92	0.19
Green ratio	0.20		0.20				0.15	0.70			0.54	0.54
Unif. delay d1	26.7		25.8				30.2	7.5			16.4	9.1
Delay factor k	0.50		0.50				0.50	0.50			0.50	0.50
Increm. delay d2	2.1		0.8				4.3	3.8			13.9	0.5
PF factor	1.000		1.000				1.000	1.000			1.000	1.000
Control delay	28.8		26.6				34.5	11.3			30.2	9.6
Lane group LOS	C		C				C	B			C	A
Apprch. delay	28.2						13.6			27.2		
Approach LOS	C						B			C		
Intersec. delay	21.0			Intersection LOS						C		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case3.3pm*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case3.3pm*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*100*		*65*				*100*	*960*			*935*	*175*
% Heavy veh	*0*		*0*				*0*	*0*			*0*	*0*
PHF	*0.92*		*0.92*				*0.92*	*0.95*			*0.95*	*0.92*
Actuated (P/A)	*P*		*P*				*P*	*P*			*P*	*P*
Startup lost time	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Ext. eff. green	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Arrival type	*3*		*3*				*3*	*3*			*3*	*3*
Unit Extension	*3.0*		*3.0*				*3.0*	*3.0*			*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*25*	*0*						*0*		*25*
Lane Width	*12.0*		*12.0*				*12.0*	*12.0*			*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*		*0*				*0*	*0*			*0*	*0*

	EB Only	02	03	04	NB Only	Thru & RT	07	08
Timing	G = *16.0*	G =	G =	G =	G = *12.0*	G = *43.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *79.0*			

CAPACITY AND LOS WORKSHEET

General Information

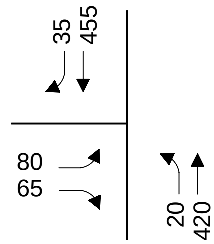
Project Description *Emmanuel Lutheran Case3.3pm*

Capacity Analysis

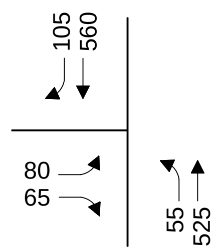
	EB			WB			NB			SB		
Lane group	*L*		*R*				*L*	*T*			*T*	*R*
Adj. flow rate	*109*		*43*				*109*	*1011*			*984*	*163*
Satflow rate	*1805*		*1615*				*1805*	*1900*			*1900*	*1615*
Lost time	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Green ratio	*0.20*		*0.20*				*0.15*	*0.70*			*0.54*	*0.54*
Lane group cap.	*366*		*327*				*274*	*1323*			*1034*	*879*
v/c ratio	*0.30*		*0.13*				*0.40*	*0.76*			*0.95*	*0.19*
Flow ratio	*0.06*		*0.03*				*0.06*	*0.53*			*0.52*	*0.10*
Crit. lane group	*Y*	*N*	*N*		*N*		*Y*	*N*			*Y*	*N*
Sum flow ratios	*0.64*											
Lost time/cycle	*8.00*											
Critical v/c ratio	*0.71*											

Lane Group Capacity, Control Delay, and LOS Determination

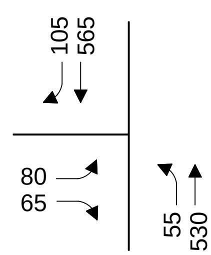
	EB			WB			NB			SB		
Lane group	*L*		*R*				*L*	*T*			*T*	*R*
Adj. flow rate	*109*		*43*				*109*	*1011*			*984*	*163*
Lane group cap.	*366*		*327*				*274*	*1323*			*1034*	*879*
v/c ratio	*0.30*		*0.13*				*0.40*	*0.76*			*0.95*	*0.19*
Green ratio	*0.20*		*0.20*				*0.15*	*0.70*			*0.54*	*0.54*
Unif. delay d1	*26.7*		*25.8*				*30.2*	*7.8*			*17.0*	*9.1*
Delay factor k	*0.50*		*0.50*				*0.50*	*0.50*			*0.50*	*0.50*
Increm. delay d2	*2.1*		*0.8*				*4.3*	*4.2*			*18.5*	*0.5*
PF factor	*1.000*		*1.000*				*1.000*	*1.000*			*1.000*	*1.000*
Control delay	*28.8*		*26.6*				*34.5*	*12.0*			*35.5*	*9.6*
Lane group LOS	*C*		*C*				*C*	*B*			*D*	*A*
Apprch. delay	*28.2*						*14.2*			*31.8*		
Approach LOS	*C*						*B*			*C*		
Intersec. delay	*23.5*			Intersection LOS						*C*		



CASE 1.3 SUNDAY



CASE 2.3 SUNDAY



CASE 3.3 SUNDAY

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case1.3sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/18/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Pilikana Street*	North/South Street:	*Honoapiilani Highway*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*20*	*420*	*0*	*0*	*455*	*35*
Peak-Hour Factor, PHF	*0.92*	*0.95*	*0.92*	*0.92*	*0.95*	*0.92*
Hourly Flow Rate, HFR	*21*	*442*	*0*	*0*	*478*	*38*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*80*	*0*	*65*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*86*	*0*	*70*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*1*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*21*					*86*		*70*
C (m) (vph)	*1095*					*281*		*591*
v/c	*0.02*					*0.31*		*0.12*
95% queue length	*0.06*					*1.26*		*0.40*
Control Delay	*8.4*					*23.4*		*11.9*
LOS	*A*					*C*		*B*
Approach Delay	--	--				*18.2*		
Approach LOS	--	--				*C*		

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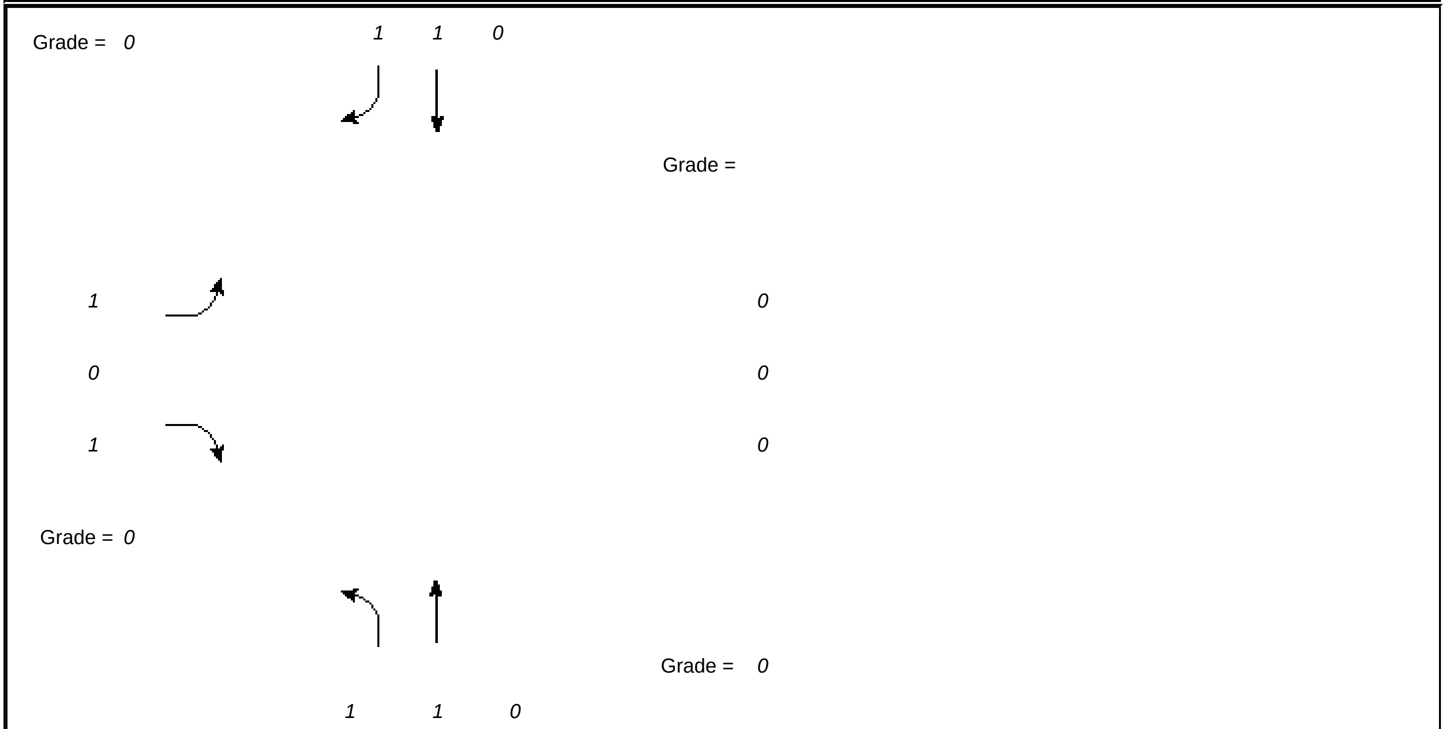
INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case2.3sunday*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case2.3sunday*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*80*		*65*				*55*	*525*			*560*	*105*
% Heavy veh	*0*		*0*				*0*	*0*			*0*	*0*
PHF	*0.92*		*0.92*				*0.92*	*0.95*			*0.95*	*0.92*
Actuated (P/A)	*P*		*P*				*P*	*P*			*P*	*P*
Startup lost time	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Ext. eff. green	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Arrival type	*3*		*3*				*3*	*3*			*3*	*3*
Unit Extension	*3.0*		*3.0*				*3.0*	*3.0*			*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*25*	*0*						*0*		*25*
Lane Width	*12.0*		*12.0*				*12.0*	*12.0*			*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*		*0*				*0*	*0*			*0*	*0*

	EB Only	02	03	04	NB Only	Thru & RT	07	08
Timing	G = *16.0*	G =	G =	G =	G = *12.0*	G = *31.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *67.0*

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case2.3sunday*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*		*R*				*L*	*T*			*T*	*R*
Adj. flow rate	*87*		*43*				*60*	*553*			*589*	*87*
Satflow rate	*1805*		*1615*				*1805*	*1900*			*1900*	*1615*
Lost time	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Green ratio	*0.24*		*0.24*				*0.18*	*0.64*			*0.46*	*0.46*
Lane group cap.	*431*		*386*				*323*	*1219*			*879*	*747*
v/c ratio	*0.20*		*0.11*				*0.19*	*0.45*			*0.67*	*0.12*
Flow ratio	*0.05*		*0.03*				*0.03*	*0.29*			*0.31*	*0.05*
Crit. lane group	*Y*	*N*	*N*		*N*		*Y*	*N*			*Y*	*N*
Sum flow ratios	*0.39*											
Lost time/cycle	*8.00*											
Critical v/c ratio	*0.44*											

Lane Group Capacity, Control Delay, and LOS Determination

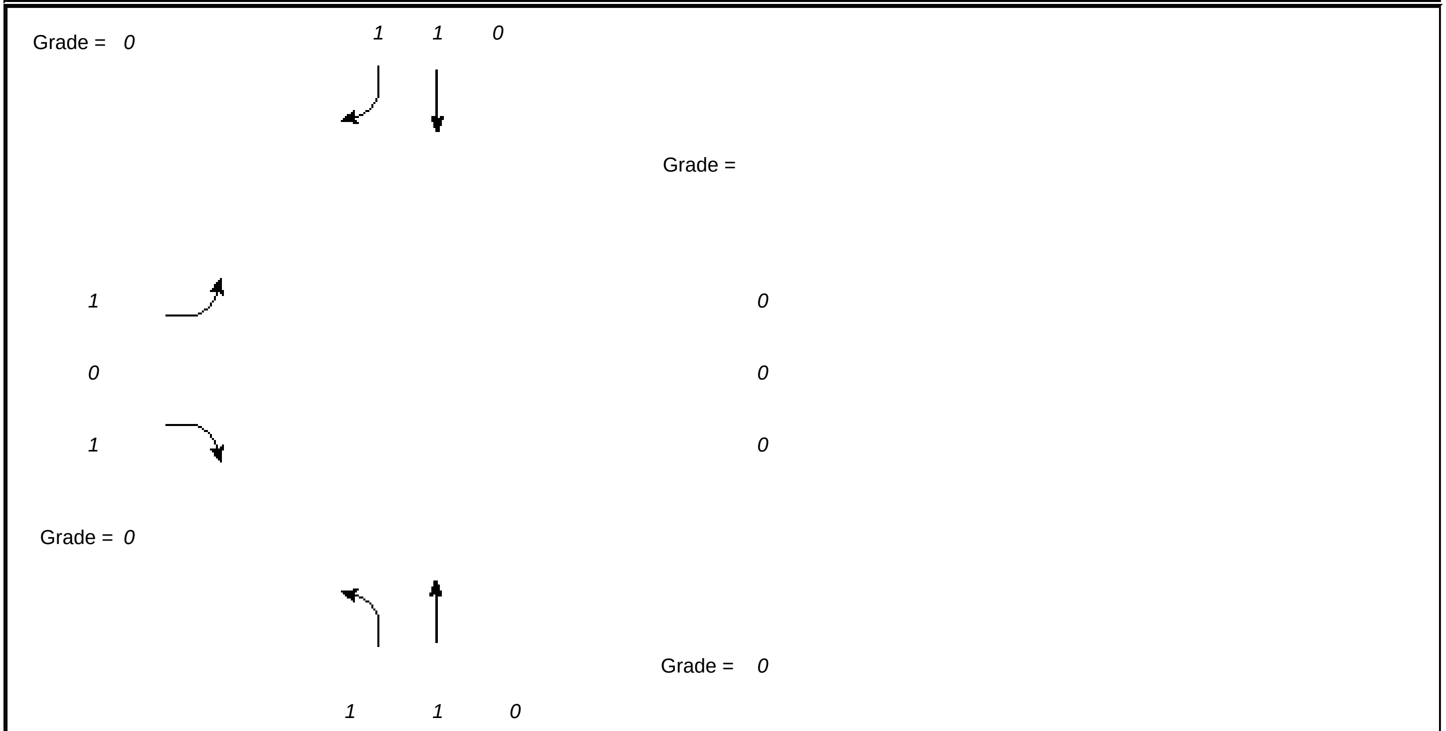
	EB			WB			NB			SB		
Lane group	*L*		*R*				*L*	*T*			*T*	*R*
Adj. flow rate	*87*		*43*				*60*	*553*			*589*	*87*
Lane group cap.	*431*		*386*				*323*	*1219*			*879*	*747*
v/c ratio	*0.20*		*0.11*				*0.19*	*0.45*			*0.67*	*0.12*
Green ratio	*0.24*		*0.24*				*0.18*	*0.64*			*0.46*	*0.46*
Unif. delay d1	*20.4*		*19.9*				*23.4*	*6.1*			*14.0*	*10.2*
Delay factor k	*0.50*		*0.50*				*0.50*	*0.50*			*0.50*	*0.50*
Increm. delay d2	*1.1*		*0.6*				*1.3*	*1.2*			*4.0*	*0.3*
PF factor	*1.000*		*1.000*				*1.000*	*1.000*			*1.000*	*1.000*
Control delay	*21.4*		*20.5*				*24.6*	*7.3*			*18.1*	*10.5*
Lane group LOS	*C*		*C*				*C*	*A*			*B*	*B*
Apprch. delay	*21.1*						*9.0*			*17.1*		
Approach LOS	*C*						*A*			*B*		
Intersec. delay	*14.0*			Intersection LOS						*B*		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case3.3sunday*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case3.3sunday*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*80*		*65*				*55*	*530*			*565*	*105*
% Heavy veh	*0*		*0*				*0*	*0*			*0*	*0*
PHF	*0.92*		*0.92*				*0.92*	*0.95*			*0.95*	*0.92*
Actuated (P/A)	*P*		*P*				*P*	*P*			*P*	*P*
Startup lost time	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Ext. eff. green	*2.0*		*2.0*				*2.0*	*2.0*			*2.0*	*2.0*
Arrival type	*3*		*3*				*3*	*3*			*3*	*3*
Unit Extension	*3.0*		*3.0*				*3.0*	*3.0*			*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*25*	*0*						*0*		*25*
Lane Width	*12.0*		*12.0*				*12.0*	*12.0*			*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*		*0*				*0*	*0*			*0*	*0*

	EB Only	02	03	04	NB Only	Thru & RT	07	08
Timing	G = *16.0*	G =	G =	G =	G = *12.0*	G = *31.0*	G =	G =
	Y = *4*	Y =	Y =	Y =	Y =	Y = *4*	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *67.0*

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case3.3sunday*

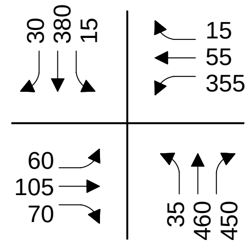
Capacity Analysis

	EB			WB			NB			SB		
Lane group	L		R				L	T			T	R
Adj. flow rate	87		43				60	558			595	87
Satflow rate	1805		1615				1805	1900			1900	1615
Lost time	2.0		2.0				2.0	2.0			2.0	2.0
Green ratio	0.24		0.24				0.18	0.64			0.46	0.46
Lane group cap.	431		386				323	1219			879	747
v/c ratio	0.20		0.11				0.19	0.46			0.68	0.12
Flow ratio	0.05		0.03				0.03	0.29			0.31	0.05
Crit. lane group	Y	N	N		N		Y	N			Y	N
Sum flow ratios	0.39											
Lost time/cycle	8.00											
Critical v/c ratio	0.45											

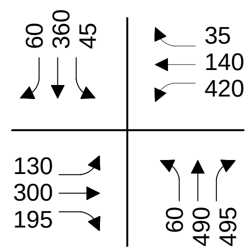
Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	L		R				L	T			T	R
Adj. flow rate	87		43				60	558			595	87
Lane group cap.	431		386				323	1219			879	747
v/c ratio	0.20		0.11				0.19	0.46			0.68	0.12
Green ratio	0.24		0.24				0.18	0.64			0.46	0.46
Unif. delay d1	20.4		19.9				23.4	6.1			14.1	10.2
Delay factor k	0.50		0.50				0.50	0.50			0.50	0.50
Increm. delay d2	1.1		0.6				1.3	1.2			4.2	0.3
PF factor	1.000		1.000				1.000	1.000			1.000	1.000
Control delay	21.4		20.5				24.6	7.3			18.3	10.5
Lane group LOS	C		C				C	A			B	B
Apprch. delay	21.1						9.0			17.3		
Approach LOS	C						A			B		
Intersec. delay	14.0			Intersection LOS						B		

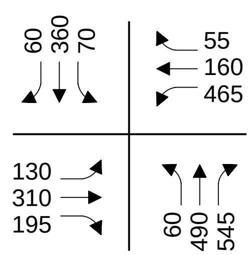
INTERSECTION 4
HONOAPIILANI HIGHWAY AT KUIKAHI DRIVE



CASE 1.4 AM



CASE 2.4 AM



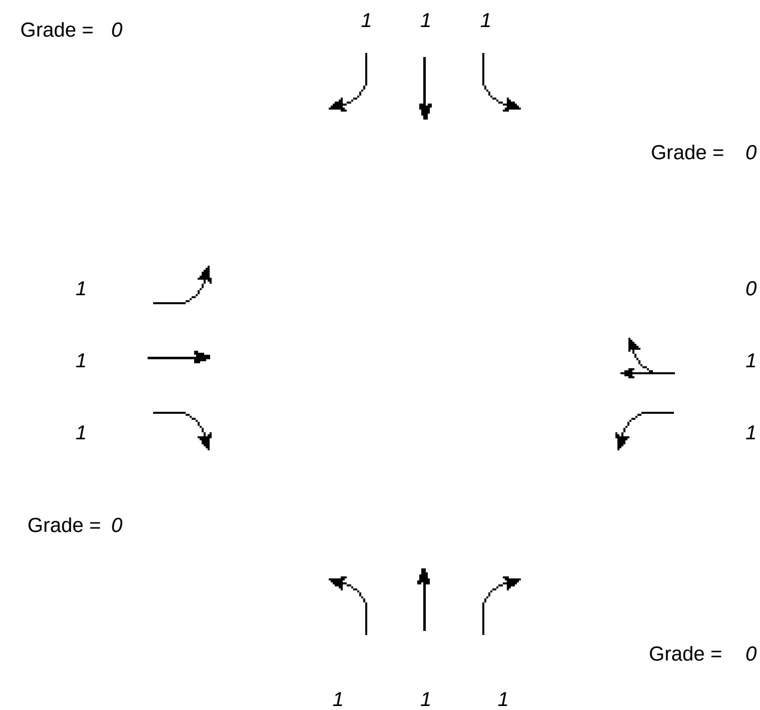
CASE 3.4 AM

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case1.4am*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case1.4am*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*60*	*105*	*70*	*355*	*55*	*15*	*35*	*460*	*450*	*15*	*380*	*30*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*	*0.92*	*0.92*	*0.95*	*0.95*	*0.92*	*0.95*	*0.92*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Ext. eff. green	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*	*3*	*3*	*3*	*3*
Unit Extension	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*250*	*0*		*0*
Lane Width	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*

	WB Only	EW Perm	03	04	Excl. Left	Thru & RT	07	08
Timing	G = *33.0*	G = *28.0*	G =	G =	G = *14.0*	G = *41.0*	G =	G =
	Y =	Y = *4*	Y =	Y =	Y =	Y = *4*	Y =	Y =

Duration of Analysis (hrs) = *0.25*		Cycle Length C = *124.0*

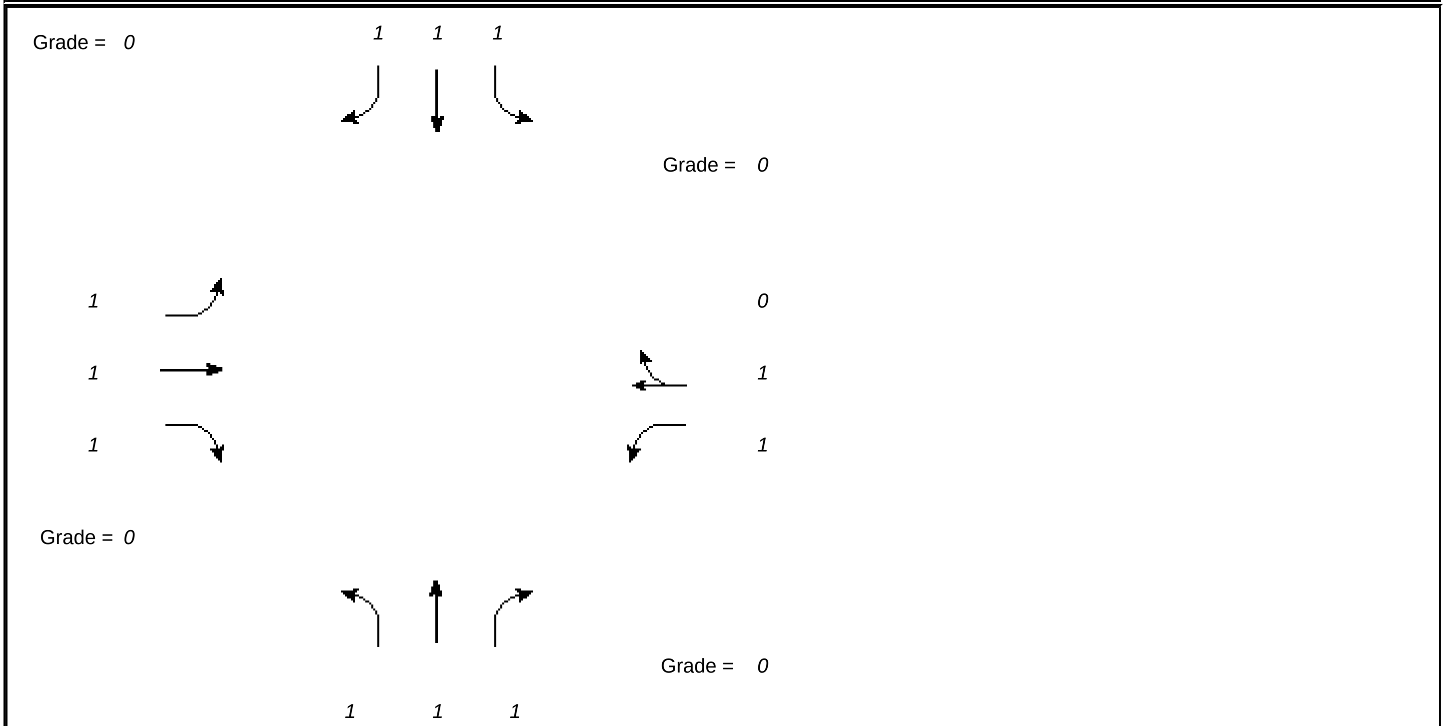
CAPACITY AND LOS WORKSHEET												
General Information												
Project Description	*Emmanuel Lutheran Case1.4am*											
Capacity Analysis												
	EB			WB			NB			SB		
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*T*	*R*	*L*	*T*	*R*
Adj. flow rate	*65*	*111*	*76*	*374*	*76*		*38*	*484*	*211*	*16*	*400*	*33*
Satflow rate	*1344*	*1900*	*1615*	*1805*	*1840*		*1805*	*1900*	*1615*	*1805*	*1900*	*1615*
Lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Green ratio	*0.23*	*0.23*	*0.23*	*0.49*	*0.49*		*0.11*	*0.33*	*0.33*	*0.11*	*0.33*	*0.33*
Lane group cap.	*303*	*429*	*365*	*694*	*905*		*204*	*628*	*534*	*204*	*628*	*534*
v/c ratio	*0.21*	*0.26*	*0.21*	*0.54*	*0.08*		*0.19*	*0.77*	*0.40*	*0.08*	*0.64*	*0.06*
Flow ratio	*0.05*	*0.06*	*0.05*		*0.04*		*0.02*	*0.25*	*0.13*	*0.01*	*0.21*	*0.02*
Crit. lane group	*N*	*Y*	*N*	*N*	*N*		*Y*	*Y*	*N*	*N*	*N*	*N*
Sum flow ratios	*0.54*											
Lost time/cycle	*12.00*											
Critical v/c ratio	*0.60*											
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*T*	*R*	*L*	*T*	*R*
Adj. flow rate	*65*	*111*	*76*	*374*	*76*		*38*	*484*	*211*	*16*	*400*	*33*
Lane group cap.	*303*	*429*	*365*	*694*	*905*		*204*	*628*	*534*	*204*	*628*	*534*
v/c ratio	*0.21*	*0.26*	*0.21*	*0.54*	*0.08*		*0.19*	*0.77*	*0.40*	*0.08*	*0.64*	*0.06*
Green ratio	*0.23*	*0.23*	*0.23*	*0.49*	*0.49*		*0.11*	*0.33*	*0.33*	*0.11*	*0.33*	*0.33*
Unif. delay d1	*39.1*	*39.5*	*39.0*	*20.4*	*16.7*		*49.8*	*37.3*	*32.0*	*49.2*	*35.2*	*28.4*
Delay factor k	*0.50*	*0.50*	*0.50*	*0.50*	*0.50*		*0.50*	*0.50*	*0.50*	*0.50*	*0.50*	*0.50*
Increm. delay d2	*1.6*	*1.5*	*1.3*	*3.0*	*0.2*		*2.0*	*8.9*	*2.2*	*0.7*	*4.9*	*0.2*
PF factor	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
Control delay	*40.7*	*40.9*	*40.3*	*23.4*	*16.9*		*51.8*	*46.1*	*34.1*	*50.0*	*40.1*	*28.6*
Lane group LOS	*D*	*D*	*D*	*C*	*B*		*D*	*D*	*C*	*D*	*D*	*C*
Apprch. delay	*40.7*			*22.3*			*43.0*			*39.6*		
Approach LOS	*D*			*C*			*D*			*D*		
Intersec. delay	*36.9*			Intersection LOS						*D*		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case2.4am*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case2.4am*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*130*	*300*	*195*	*420*	*140*	*35*	*60*	*490*	*495*	*45*	*360*	*60*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Ext. eff. green	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*	*3*	*3*	*3*	*3*
Unit Extension	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*250*	*0*		*0*
Lane Width	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*

	WB Only	EW Perm	03	04	NS Perm	Thru & RT	07	08
Timing	G = *33.0*	G = *30.0*	G =	G =	G = *16.0*	G = *41.0*	G =	G =
	Y =	Y = *4*	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *128.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case2.4am*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	134	309	201	433	180		62	505	253	46	371	62
Satflow rate	1223	1900	1615	1805	1843		1805	1900	1615	1805	1900	1615
Lost time	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Green ratio	0.23	0.23	0.23	0.49	0.49		0.13	0.32	0.32	0.13	0.32	0.45
Lane group cap.	287	445	379	528	907		226	609	517	226	609	719
v/c ratio	0.47	0.69	0.53	0.82	0.20		0.27	0.83	0.49	0.20	0.61	0.09
Flow ratio	0.11	0.16	0.12		0.10		0.03	0.27	0.16	0.03	0.20	0.04
Crit. lane group	N	Y	N	N	N		Y	Y	N	N	N	N
Sum flow ratios	0.69											
Lost time/cycle	12.00											
Critical v/c ratio	0.76											

Lane Group Capacity, Control Delay, and LOS Determination

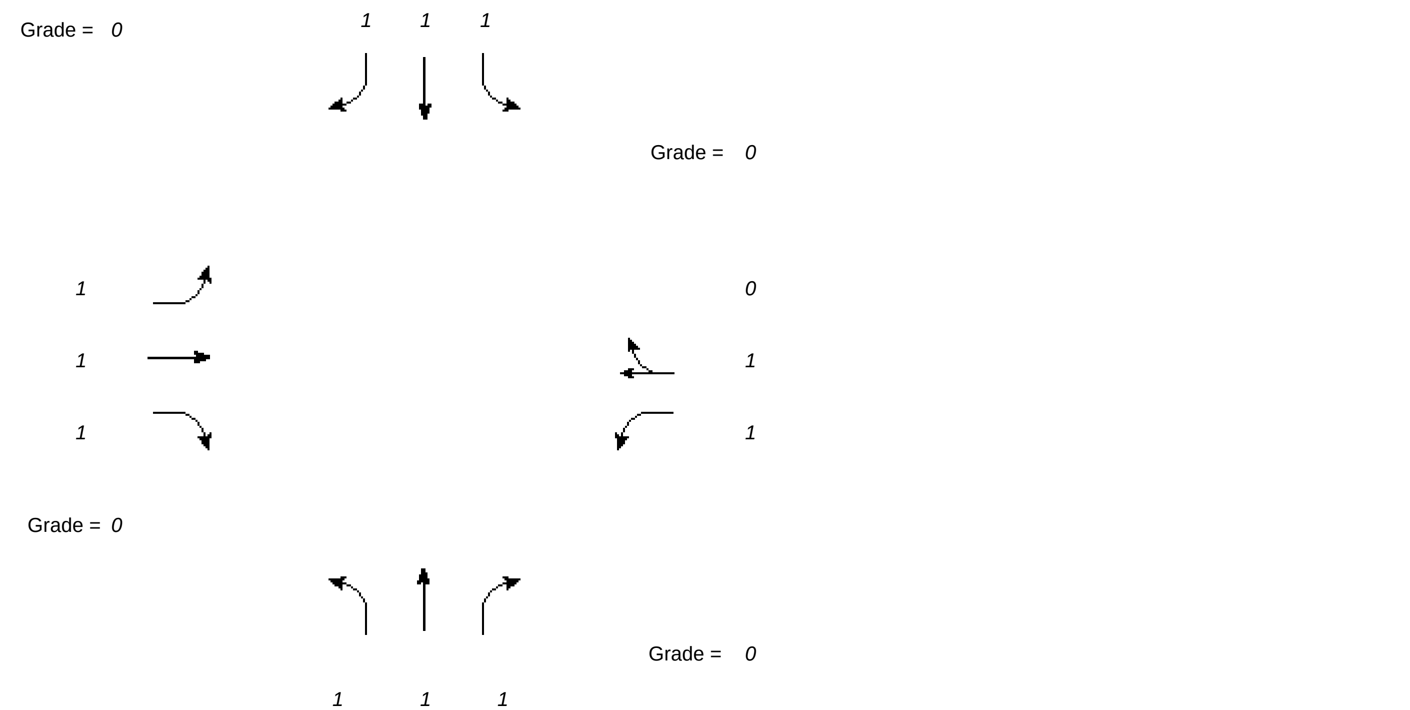
	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	134	309	201	433	180		62	505	253	46	371	62
Lane group cap.	287	445	379	528	907		226	609	517	226	609	719
v/c ratio	0.47	0.69	0.53	0.82	0.20		0.27	0.83	0.49	0.20	0.61	0.09
Green ratio	0.23	0.23	0.23	0.49	0.49		0.13	0.32	0.32	0.13	0.32	0.45
Unif. delay d1	42.1	44.8	42.8	24.6	18.3		50.7	40.3	35.1	50.3	36.7	20.5
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	5.4	8.6	5.2	13.3	0.5		3.0	12.4	3.3	2.0	4.5	0.2
PF factor	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Control delay	47.5	53.5	48.1	38.0	18.8		53.7	52.6	38.4	52.3	41.2	20.7
Lane group LOS	D	D	D	D	B		D	D	D	D	D	C
Apprch. delay	50.5			32.3			48.3			39.6		
Approach LOS	D			C			D			D		
Intersec. delay	43.4			Intersection LOS						D		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case3.4am*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case3.4am*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*130*	*310*	*195*	*465*	*160*	*55*	*60*	*490*	*545*	*70*	*360*	*60*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Ext. eff. green	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*	*3*	*3*	*3*	*3*
Unit Extension	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*250*	*0*		*0*
Lane Width	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*

	WB Only	EW Perm	03	04	NS Perm	Thru & RT	07	08
Timing	G = *33.0*	G = *30.0*	G =	G =	G = *16.0*	G = *41.0*	G =	G =
	Y =	Y = *4*	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *128.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case3.4am*

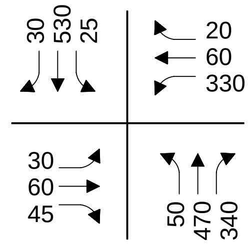
Capacity Analysis

	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	134	320	201	479	222		62	505	304	72	371	62
Satflow rate	1177	1900	1615	1805	1827		1805	1900	1615	1805	1900	1615
Lost time	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Green ratio	0.23	0.23	0.23	0.49	0.49		0.13	0.32	0.32	0.13	0.32	0.45
Lane group cap.	276	445	379	520	899		226	609	517	226	609	719
v/c ratio	0.49	0.72	0.53	0.92	0.25		0.27	0.83	0.59	0.32	0.61	0.09
Flow ratio	0.11	0.17	0.12		0.12		0.03	0.27	0.19	0.04	0.20	0.04
Crit. lane group	N	Y	N	N	N		N	Y	N	Y	N	N
Sum flow ratios	0.70											
Lost time/cycle	12.00											
Critical v/c ratio	0.78											

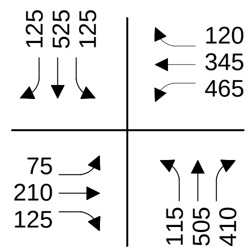
Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	134	320	201	479	222		62	505	304	72	371	62
Lane group cap.	276	445	379	520	899		226	609	517	226	609	719
v/c ratio	0.49	0.72	0.53	0.92	0.25		0.27	0.83	0.59	0.32	0.61	0.09
Green ratio	0.23	0.23	0.23	0.49	0.49		0.13	0.32	0.32	0.13	0.32	0.45
Unif. delay d1	42.3	45.1	42.8	29.6	18.8		50.7	40.3	36.4	51.0	36.7	20.5
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	6.0	9.6	5.2	24.1	0.7		3.0	12.4	4.8	3.7	4.5	0.2
PF factor	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Control delay	48.3	54.7	48.1	53.7	19.4		53.7	52.6	41.3	54.7	41.2	20.7
Lane group LOS	D	D	D	D	B		D	D	D	D	D	C
Apprch. delay	51.4			42.8			48.7			40.6		
Approach LOS	D			D			D			D		
Intersec. delay	46.4			Intersection LOS						D		

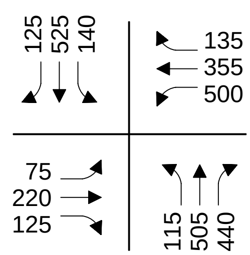
INTERSECTION 4
HONOAPIILANI HIGHWAY AT KUIKAHI DRIVE



CASE 1.4 PM



CASE 2.4 PM



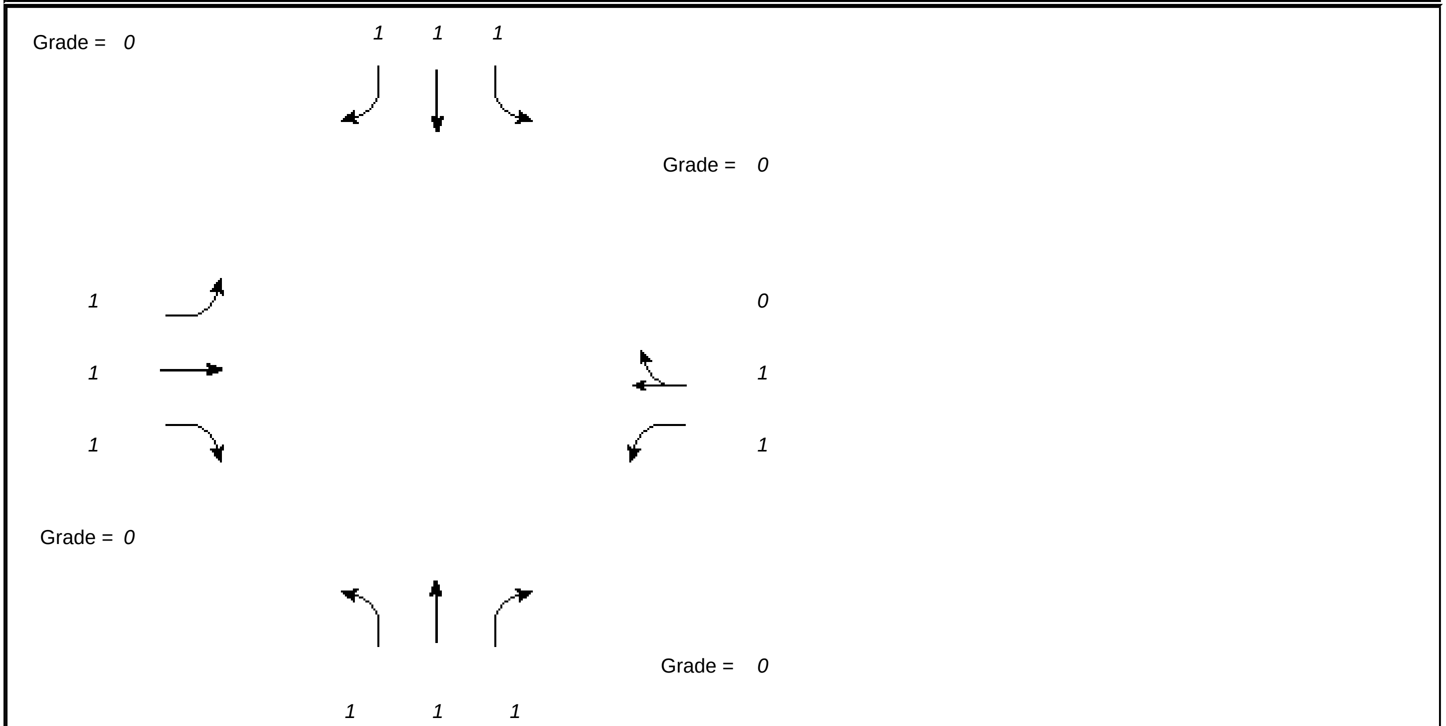
CASE 3.4 PM

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case1.4pm*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case1.4pm*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	30	60	45	330	60	20	50	470	340	25	530	30
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
PHF	0.92	0.95	0.92	0.95	0.92	0.92	0.92	0.95	0.95	0.92	0.95	0.92
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival type	3	3	3	3	3		3	3	3	3	3	3
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		250	0		0
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking (Y or N)	N		N	N		N	N		N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0	0	0	0	0	0

	WB Only	EW Perm	03	04	Excl. Left	Thru & RT	07	08
Timing	G = 26.0	G = 23.0	G =	G =	G = 15.0	G = 41.0	G =	G =
	Y =	Y = 4	Y =	Y =	Y =	Y = 4	Y =	Y =
Duration of Analysis (hrs) = 0.25					Cycle Length C = 113.0			

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case1.4pm*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	33	63	49	347	87		54	495	95	27	558	33
Satflow rate	1331	1900	1615	1805	1828		1805	1900	1615	1805	1900	1615
Lost time	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Green ratio	0.20	0.20	0.20	0.43	0.43		0.13	0.36	0.36	0.13	0.36	0.36
Lane group cap.	271	387	329	630	793		240	689	586	240	689	586
v/c ratio	0.12	0.16	0.15	0.55	0.11		0.22	0.72	0.16	0.11	0.81	0.06
Flow ratio	0.02	0.03	0.03		0.05		0.03	0.26	0.06	0.01	0.29	0.02
Crit. lane group	N	Y	N	N	N		Y	N	N	N	Y	N
Sum flow ratios	0.55											
Lost time/cycle	12.00											
Critical v/c ratio	0.61											

Lane Group Capacity, Control Delay, and LOS Determination

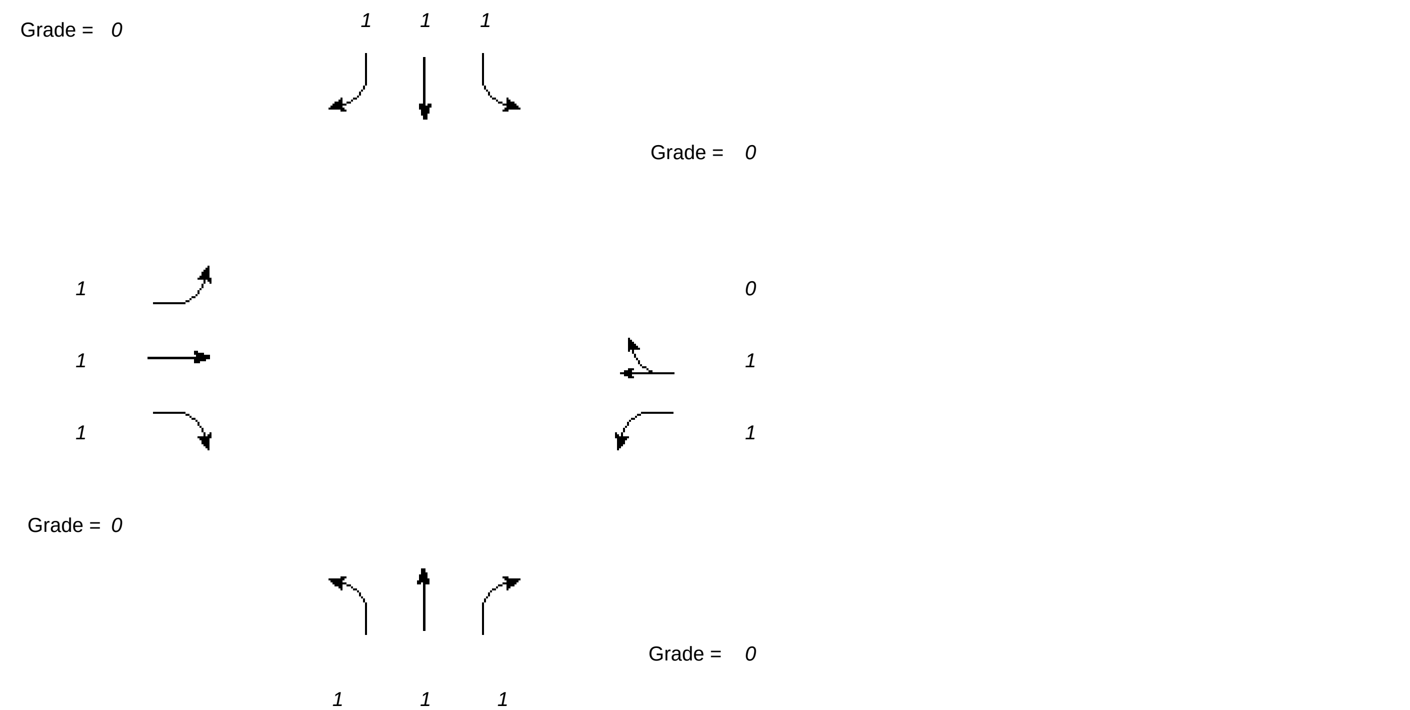
	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	33	63	49	347	87		54	495	95	27	558	33
Lane group cap.	271	387	329	630	793		240	689	586	240	689	586
v/c ratio	0.12	0.16	0.15	0.55	0.11		0.22	0.72	0.16	0.11	0.81	0.06
Green ratio	0.20	0.20	0.20	0.43	0.43		0.13	0.36	0.36	0.13	0.36	0.36
Unif. delay d1	36.8	37.1	37.0	22.5	19.0		43.8	31.0	24.4	43.1	32.5	23.4
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	0.9	0.9	1.0	3.4	0.3		2.2	6.3	0.6	0.9	10.0	0.2
PF factor	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Control delay	37.7	38.0	37.9	26.0	19.3		46.0	37.4	25.0	44.1	42.5	23.6
Lane group LOS	D	D	D	C	B		D	D	C	D	D	C
Apprch. delay	37.9			24.6			36.3			41.5		
Approach LOS	D			C			D			D		
Intersec. delay	35.4			Intersection LOS						D		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case2.4pm*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case2.4pm*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*75*	*210*	*125*	*465*	*345*	*120*	*115*	*505*	*410*	*125*	*525*	*125*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Ext. eff. green	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*	*3*	*3*	*3*	*3*
Unit Extension	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*250*	*0*		*0*
Lane Width	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*

	WB Only	EW Perm	03	04	Excl. Left	NS Perm	07	08
Timing	G = *32.0*	G = *21.0*	G =	G =	G = *15.0*	G = *41.0*	G =	G =
	Y =	Y = *4*	Y =	Y =	Y =	Y = *4*	Y =	Y =

Duration of Analysis (hrs) = *0.25*		Cycle Length C = *117.0*

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case2.4pm*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	77	216	129	479	480		119	521	165	129	541	129
Satflow rate	929	1900	1615	1805	1826		1805	1900	1615	1805	1900	1615
Lost time	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Green ratio	0.18	0.18	0.18	0.45	0.45		0.48	0.35	0.35	0.48	0.35	0.35
Lane group cap.	167	341	290	555	827		266	666	566	280	666	566
v/c ratio	0.46	0.63	0.44	0.86	0.58		0.45	0.78	0.29	0.46	0.81	0.23
Flow ratio	0.08	0.11	0.08		0.26			0.27	0.10		0.28	0.08
Crit. lane group	N	Y	N	N	N		N	N	N	N	Y	N
Sum flow ratios	0.71											
Lost time/cycle	16.00											
Critical v/c ratio	0.83											

Lane Group Capacity, Control Delay, and LOS Determination

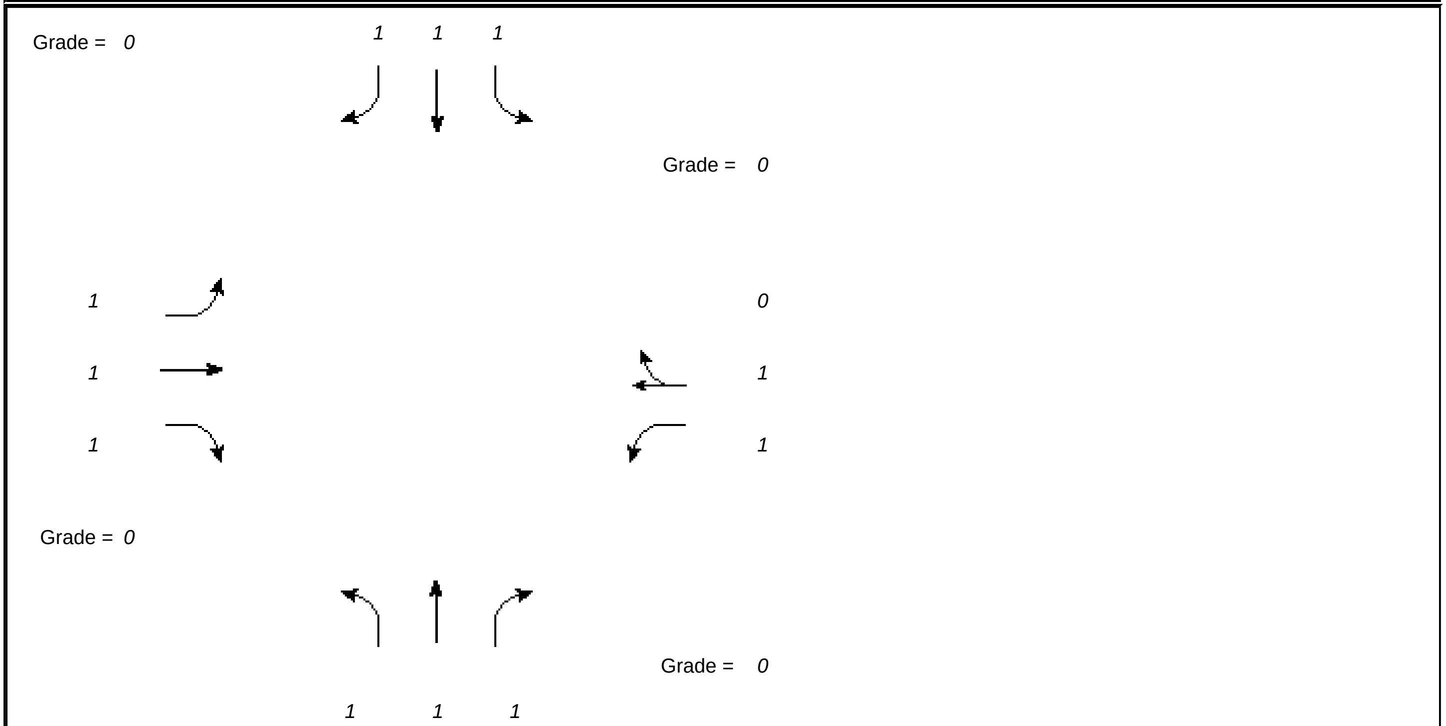
	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	77	216	129	479	480		119	521	165	129	541	129
Lane group cap.	167	341	290	555	827		266	666	566	280	666	566
v/c ratio	0.46	0.63	0.44	0.86	0.58		0.45	0.78	0.29	0.46	0.81	0.23
Green ratio	0.18	0.18	0.18	0.45	0.45		0.48	0.35	0.35	0.48	0.35	0.35
Unif. delay d1	42.9	44.4	42.8	25.1	23.7		22.3	34.0	27.5	21.9	34.5	26.8
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	8.9	8.7	4.9	16.2	3.0		5.4	8.9	1.3	5.4	10.4	0.9
PF factor	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Control delay	51.8	53.1	47.7	41.2	26.7		27.7	42.9	28.8	27.3	44.9	27.8
Lane group LOS	D	D	D	D	C		C	D	C	C	D	C
Apprch. delay	51.2			34.0			37.8			39.3		
Approach LOS	D			C			D			D		
Intersec. delay	38.9			Intersection LOS						D		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case3.4pm*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case3.4pm*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*75*	*220*	*125*	*500*	*355*	*135*	*115*	*505*	*440*	*140*	*525*	*125*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*	*0.97*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Ext. eff. green	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*	*3*	*3*	*3*	*3*
Unit Extension	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*250*	*0*		*0*
Lane Width	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*

	WB Only	EW Perm	03	04	Excl. Left	NS Perm	07	08
Timing	G = *32.0*	G = *21.0*	G =	G =	G = *15.0*	G = *41.0*	G =	G =
	Y =	Y = *4*	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *117.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case3.4pm*

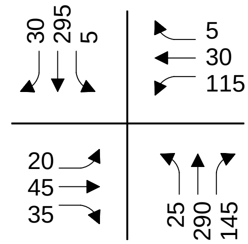
Capacity Analysis

	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	77	227	129	515	505		119	521	196	144	541	129
Satflow rate	908	1900	1615	1805	1822		1805	1900	1615	1805	1900	1615
Lost time	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Green ratio	0.18	0.18	0.18	0.45	0.45		0.48	0.35	0.35	0.48	0.35	0.35
Lane group cap.	163	341	290	547	825		266	666	566	280	666	566
v/c ratio	0.47	0.67	0.44	0.94	0.61		0.45	0.78	0.35	0.51	0.81	0.23
Flow ratio	0.08	0.12	0.08		0.28			0.27	0.12		0.28	0.08
Crit. lane group	N	N	N	N	N		N	N	N	N	Y	N
Sum flow ratios	0.76											
Lost time/cycle	12.00											
Critical v/c ratio	0.84											

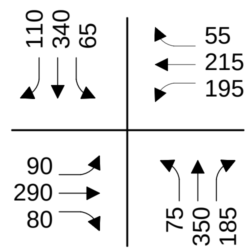
Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	77	227	129	515	505		119	521	196	144	541	129
Lane group cap.	163	341	290	547	825		266	666	566	280	666	566
v/c ratio	0.47	0.67	0.44	0.94	0.61		0.45	0.78	0.35	0.51	0.81	0.23
Green ratio	0.18	0.18	0.18	0.45	0.45		0.48	0.35	0.35	0.48	0.35	0.35
Unif. delay d1	43.0	44.7	42.8	26.2	24.2		22.3	34.0	28.1	22.2	34.5	26.8
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	9.5	9.9	4.9	26.4	3.4		5.4	8.9	1.7	6.6	10.4	0.9
PF factor	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Control delay	52.5	54.6	47.7	52.6	27.6		27.7	42.9	29.8	28.8	44.9	27.8
Lane group LOS	D	D	D	D	C		C	D	C	C	D	C
Apprch. delay	52.2			40.2			37.7			39.3		
Approach LOS	D			D			D			D		
Intersec. delay	41.0			Intersection LOS						D		

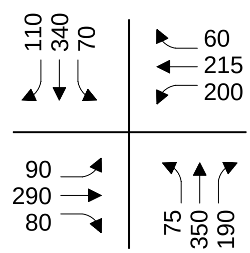
INTERSECTION 4
HONOAPIILANI HIGHWAY AT KUIKAHI DRIVE



CASE 1.4 SUNDAY



CASE 2.4 SUNDAY



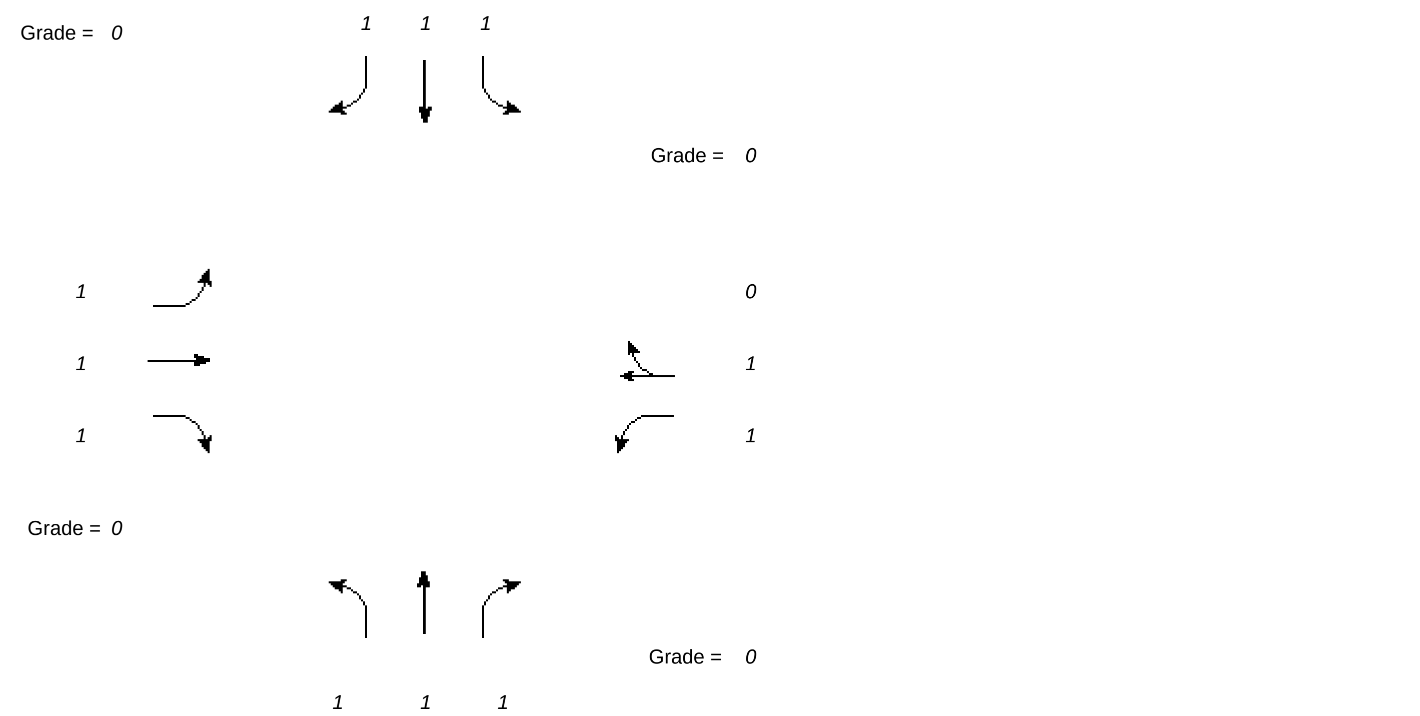
CASE 3.4 SUNDAY

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case1.4sunday*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case1.4sunday*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*20*	*45*	*35*	*115*	*30*	*5*	*25*	*290*	*145*	*5*	*295*	*30*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*	*0.92*	*0.92*	*0.95*	*0.95*	*0.92*	*0.95*	*0.92*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Ext. eff. green	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*	*3*	*3*	*3*	*3*
Unit Extension	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*65*	*0*		*0*
Lane Width	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*

	WB Only	EW Perm	03	04	Excl. Left	Thru & RT	07	08
Timing	G = *10.0*	G = *20.0*	G =	G =	G = *11.0*	G = *23.0*	G =	G =
	Y =	Y = *4*	Y =	Y =	Y =	Y = *4*	Y =	Y =

Duration of Analysis (hrs) = *0.25*		Cycle Length C = *72.0*

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case1.4sunday*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	22	47	38	121	38		27	305	84	5	311	33
Satflow rate	1391	1900	1615	1805	1863		1805	1900	1615	1805	1900	1615
Lost time	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Green ratio	0.28	0.28	0.28	0.42	0.42		0.15	0.32	0.32	0.15	0.32	0.32
Lane group cap.	386	528	449	537	776		276	607	516	276	607	516
v/c ratio	0.06	0.09	0.08	0.23	0.05		0.10	0.50	0.16	0.02	0.51	0.06
Flow ratio	0.02	0.02	0.02		0.02		0.01	0.16	0.05	0.00	0.16	0.02
Crit. lane group	N	Y	N	N	N		Y	N	N	N	Y	N
Sum flow ratios	0.27											
Lost time/cycle	12.00											
Critical v/c ratio	0.32											

Lane Group Capacity, Control Delay, and LOS Determination

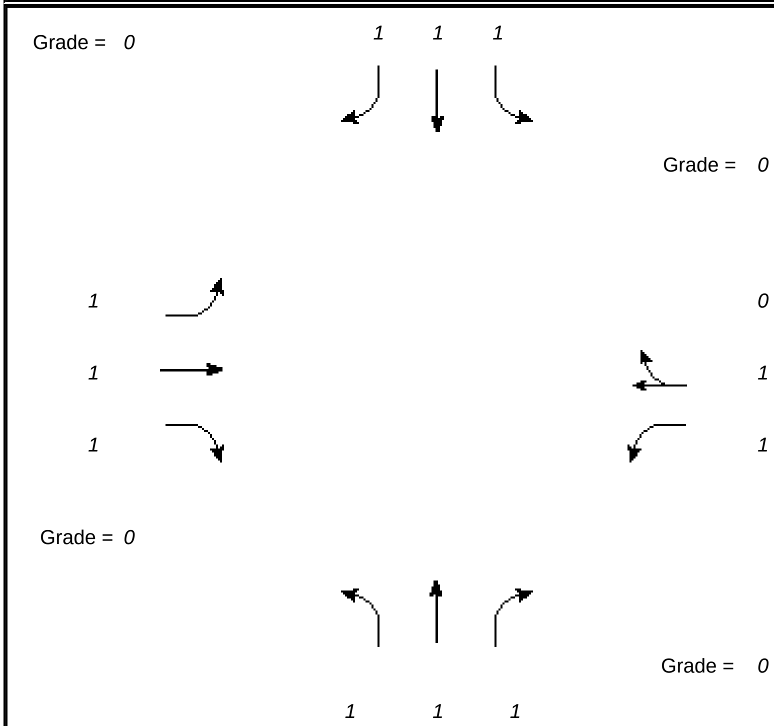
	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	22	47	38	121	38		27	305	84	5	311	33
Lane group cap.	386	528	449	537	776		276	607	516	276	607	516
v/c ratio	0.06	0.09	0.08	0.23	0.05		0.10	0.50	0.16	0.02	0.51	0.06
Green ratio	0.28	0.28	0.28	0.42	0.42		0.15	0.32	0.32	0.15	0.32	0.32
Unif. delay d1	19.1	19.3	19.2	13.3	12.5		26.2	19.9	17.6	25.9	19.9	17.0
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	0.3	0.3	0.4	1.0	0.1		0.7	3.0	0.7	0.1	3.1	0.2
PF factor	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Control delay	19.4	19.6	19.6	14.2	12.6		26.9	22.8	18.3	26.0	23.0	17.3
Lane group LOS	B	B	B	B	B		C	C	B	C	C	B
Apprch. delay	19.5			13.8			22.2			22.5		
Approach LOS	B			B			C			C		
Intersec. delay	20.7			Intersection LOS						C		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case2.4sunday*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case2.4sunday*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	90	290	80	195	215	55	75	350	185	65	340	110
% Heavy veh	0	0	0	0	0	0	0	0	0	0	0	0
PHF	0.92	0.95	0.92	0.95	0.92	0.92	0.92	0.95	0.95	0.92	0.95	0.92
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Ext. eff. green	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival type	3	3	3	3	3		3	3	3	3	3	3
Unit Extension	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		0	0		0	0		65	0		0
Lane Width	12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking (Y or N)	N		N	N		N	N		N	N		N
Parking/hr												
Bus stops/hr	0	0	0	0	0		0	0	0	0	0	0

	WB Only	EW Perm	03	04	Excl. Left	Thru & RT	07	08
Timing	G = 10.0	G = 20.0	G =	G =	G = 11.0	G = 23.0	G =	G =
	Y =	Y = 4	Y =	Y =	Y =	Y = 4	Y =	Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 72.0		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case2.4sunday*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	98	305	87	205	294		82	368	126	71	358	120
Satflow rate	1102	1900	1615	1805	1842		1805	1900	1615	1805	1900	1615
Lost time	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Green ratio	0.28	0.28	0.28	0.42	0.42		0.15	0.32	0.32	0.15	0.32	0.32
Lane group cap.	306	528	449	359	767		276	607	516	276	607	516
v/c ratio	0.32	0.58	0.19	0.57	0.38		0.30	0.61	0.24	0.26	0.59	0.23
Flow ratio	0.09	0.16	0.05		0.16		0.05	0.19	0.08	0.04	0.19	0.07
Crit. lane group	N	Y	N	N	N		Y	Y	N	N	N	N
Sum flow ratios	0.49											
Lost time/cycle	12.00											
Critical v/c ratio	0.59											

Lane Group Capacity, Control Delay, and LOS Determination

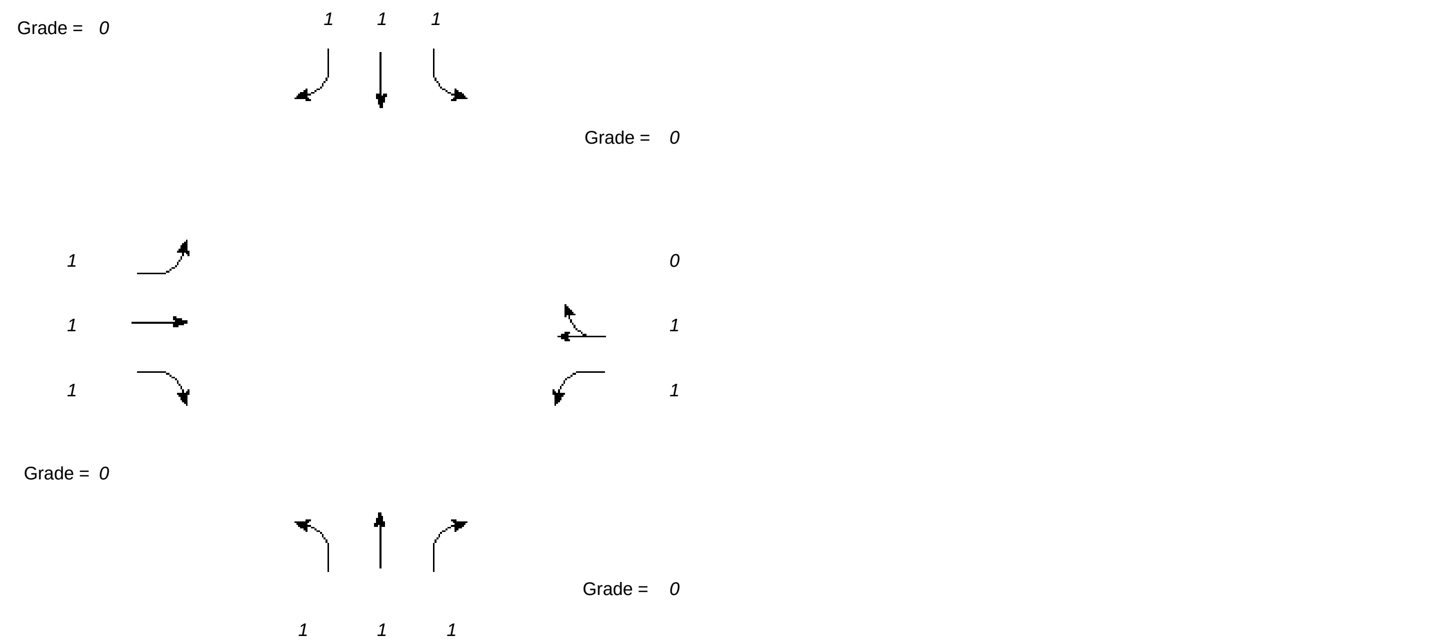
	EB			WB			NB			SB		
Lane group	L	T	R	L	TR		L	T	R	L	T	R
Adj. flow rate	98	305	87	205	294		82	368	126	71	358	120
Lane group cap.	306	528	449	359	767		276	607	516	276	607	516
v/c ratio	0.32	0.58	0.19	0.57	0.38		0.30	0.61	0.24	0.26	0.59	0.23
Green ratio	0.28	0.28	0.28	0.42	0.42		0.15	0.32	0.32	0.15	0.32	0.32
Unif. delay d1	20.6	22.4	19.8	14.8	14.6		27.1	20.7	18.1	26.9	20.5	18.0
Delay factor k	0.50	0.50	0.50	0.50	0.50		0.50	0.50	0.50	0.50	0.50	0.50
Increm. delay d2	2.7	4.6	1.0	6.5	1.5		2.7	4.5	1.1	2.2	4.2	1.1
PF factor	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Control delay	23.4	26.9	20.8	21.2	16.0		29.8	25.1	19.2	29.1	24.7	19.1
Lane group LOS	C	C	C	C	B		C	C	B	C	C	B
Apprch. delay	25.1			18.2			24.5			24.1		
Approach LOS	C			B			C			C		
Intersec. delay	23.0			Intersection LOS						C		

INPUT WORKSHEET

General Information		Site Information	
Analyst		Intersection	*Case3.4sunday*
Agency or Co.		Area Type	*All other areas*
Date Performed	*1/17/2006*	Jurisdiction	
Time Period		Analysis Year	

Project Description *Emmanuel Lutheran Case3.4sunday*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*90*	*290*	*80*	*200*	*215*	*60*	*75*	*350*	*190*	*70*	*340*	*110*
% Heavy veh	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.92*	*0.95*	*0.92*	*0.95*	*0.92*	*0.92*	*0.92*	*0.95*	*0.95*	*0.92*	*0.95*	*0.92*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Ext. eff. green	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*	*3*	*3*	*3*	*3*
Unit Extension	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*65*	*0*		*0*
Lane Width	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*

	WB Only	EW Perm	03	04	Excl. Left	Thru & RT	07	08
Timing	G = *10.0*	G = *20.0*	G =	G =	G = *11.0*	G = *23.0*	G =	G =
	Y =	Y = *4*	Y =	Y =	Y =	Y = *4*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *72.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Emmanuel Lutheran Case3.4sunday*

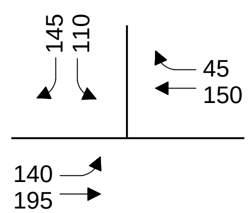
Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*T*	*R*	*L*	*T*	*R*
Adj. flow rate	*98*	*305*	*87*	*211*	*299*		*82*	*368*	*132*	*76*	*358*	*120*
Satflow rate	*1097*	*1900*	*1615*	*1805*	*1838*		*1805*	*1900*	*1615*	*1805*	*1900*	*1615*
Lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*
Green ratio	*0.28*	*0.28*	*0.28*	*0.42*	*0.42*		*0.15*	*0.32*	*0.32*	*0.15*	*0.32*	*0.32*
Lane group cap.	*305*	*528*	*449*	*359*	*766*		*276*	*607*	*516*	*276*	*607*	*516*
v/c ratio	*0.32*	*0.58*	*0.19*	*0.59*	*0.39*		*0.30*	*0.61*	*0.26*	*0.28*	*0.59*	*0.23*
Flow ratio	*0.09*	*0.16*	*0.05*		*0.16*		*0.05*	*0.19*	*0.08*	*0.04*	*0.19*	*0.07*
Crit. lane group	*N*	*Y*	*N*	*N*	*N*		*Y*	*Y*	*N*	*N*	*N*	*N*
Sum flow ratios	*0.49*											
Lost time/cycle	*12.00*											
Critical v/c ratio	*0.59*											

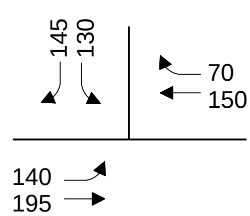
Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*T*	*R*	*L*	*T*	*R*
Adj. flow rate	*98*	*305*	*87*	*211*	*299*		*82*	*368*	*132*	*76*	*358*	*120*
Lane group cap.	*305*	*528*	*449*	*359*	*766*		*276*	*607*	*516*	*276*	*607*	*516*
v/c ratio	*0.32*	*0.58*	*0.19*	*0.59*	*0.39*		*0.30*	*0.61*	*0.26*	*0.28*	*0.59*	*0.23*
Green ratio	*0.28*	*0.28*	*0.28*	*0.42*	*0.42*		*0.15*	*0.32*	*0.32*	*0.15*	*0.32*	*0.32*
Unif. delay d1	*20.6*	*22.4*	*19.8*	*14.8*	*14.6*		*27.1*	*20.7*	*18.2*	*27.0*	*20.5*	*18.0*
Delay factor k	*0.50*	*0.50*	*0.50*	*0.50*	*0.50*		*0.50*	*0.50*	*0.50*	*0.50*	*0.50*	*0.50*
Increm. delay d2	*2.8*	*4.6*	*1.0*	*6.9*	*1.5*		*2.7*	*4.5*	*1.2*	*2.5*	*4.2*	*1.1*
PF factor	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
Control delay	*23.4*	*26.9*	*20.8*	*21.7*	*16.1*		*29.8*	*25.1*	*19.4*	*29.4*	*24.7*	*19.1*
Lane group LOS	*C*	*C*	*C*	*C*	*B*		*C*	*C*	*B*	*C*	*C*	*B*
Apprch. delay	*25.1*			*18.4*			*24.5*			*24.1*		
Approach LOS	*C*			*B*			*C*			*C*		
Intersec. delay	*23.1*			Intersection LOS						*C*		

INTERSECTION 5
WAIALE ROAD AT EAST WAIKO ROAD



CASE 2.5 AM



CASE 3.5 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.5am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description *Emmanuel Lutheran Church*	
East/West Street: *East Waiko Road*	North/South Street: *Waiale Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*140*	*195*	*0*	*0*	*150*	*45*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*152*	*211*	*0*	*0*	*163*	*48*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*110*	*0*	*145*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*119*	*0*	*157*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*152*						*276*	
C (m) (vph)	*1372*						*540*	
v/c	*0.11*						*0.51*	
95% queue length	*0.37*						*2.88*	
Control Delay	*8.0*						*18.4*	
LOS	*A*						*C*	
Approach Delay	--	--				*18.4*		
Approach LOS	--	--				*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	*1/17/2006*
Analysis Time Period	

Site Information

Intersection	*Case3.5am*
Jurisdiction	
Analysis Year	

Project Description *Emmanuel Lutheran Church*

East/West Street: *East Waiko Road* | North/South Street: *Waiale Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

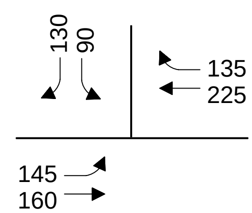
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*140*	*195*	*0*	*0*	*150*	*70*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*152*	*211*	*0*	*0*	*163*	*76*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*130*	*0*	*145*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*141*	*0*	*157*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

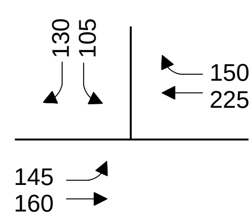
Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*152*						*298*	
C (m) (vph)	*1340*						*511*	
v/c	*0.11*						*0.58*	
95% queue length	*0.38*						*3.69*	
Control Delay	*8.0*						*21.4*	
LOS	*A*						*C*	
Approach Delay	--	--				*21.4*		
Approach LOS	--	--				*C*		

INTERSECTION 5
WAIALE ROAD AT EAST WAIKO ROAD



CASE 2.5 PM



CASE 3.5 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.5pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description *Emmanuel Lutheran Church*	
East/West Street: *East Waiko Road*	North/South Street: *Waiale Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*145*	*160*	*0*	*0*	*225*	*135*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*157*	*173*	*0*	*0*	*244*	*146*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*90*	*0*	*130*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*97*	*0*	*141*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*157*						*238*	
C (m) (vph)	*1180*						*468*	
v/c	*0.13*						*0.51*	
95% queue length	*0.46*						*2.83*	
Control Delay	*8.5*						*20.4*	
LOS	*A*						*C*	
Approach Delay	--	--				*20.4*		
Approach LOS	--	--				*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	
Agency/Co.	
Date Performed	*1/17/2006*
Analysis Time Period	

Site Information

Intersection	*Case3.5pm*
Jurisdiction	
Analysis Year	

Project Description *Emmanuel Lutheran Church*

East/West Street: *East Waiko Road*	North/South Street: *Waiale Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

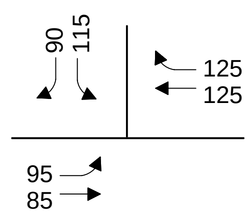
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*145*	*160*	*0*	*0*	*225*	*150*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*157*	*173*	*0*	*0*	*244*	*163*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*105*	*0*	*130*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*114*	*0*	*141*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

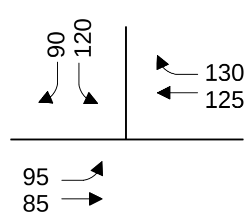
Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*157*						*255*	
C (m) (vph)	*1163*						*447*	
v/c	*0.13*						*0.57*	
95% queue length	*0.47*						*3.48*	
Control Delay	*8.6*						*23.2*	
LOS	*A*						*C*	
Approach Delay	--	--				*23.2*		
Approach LOS	--	--				*C*		

INTERSECTION 5
WAIALE ROAD AT EAST WAIKO ROAD



CASE 2.5 SUNDAY



CASE 3.5 SUNDAY

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.5sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description *Emmanuel Lutheran Church*	
East/West Street: *East Waiko Road*	North/South Street: *Waiale Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*95*	*85*	*0*	*0*	*125*	*125*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*103*	*92*	*0*	*0*	*135*	*135*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*115*	*0*	*90*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*124*	*0*	*97*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*103*						*221*	
C (m) (vph)	*1305*						*602*	
v/c	*0.08*						*0.37*	
95% queue length	*0.26*						*1.68*	
Control Delay	*8.0*						*14.4*	
LOS	*A*						*B*	
Approach Delay	--	--				*14.4*		
Approach LOS	--	--				*B*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.5sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description *Emmanuel Lutheran Church*

East/West Street: *East Waiko Road*	North/South Street: *Waiale Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

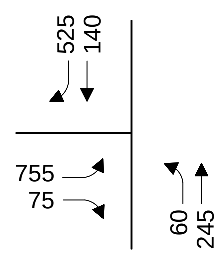
Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*95*	*85*	*0*	*0*	*125*	*130*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*103*	*92*	*0*	*0*	*135*	*141*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*120*	*0*	*90*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*130*	*0*	*97*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

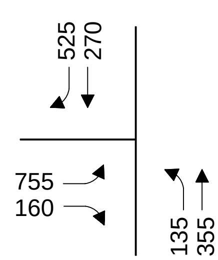
Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*103*						*227*	
C (m) (vph)	*1299*						*595*	
v/c	*0.08*						*0.38*	
95% queue length	*0.26*						*1.78*	
Control Delay	*8.0*						*14.7*	
LOS	*A*						*B*	
Approach Delay	--	--				*14.7*		
Approach LOS	--	--				*B*		

INTERSECTION 6
WAIALE ROAD AT KUIKAHI DRIVE



CASE 2.6 AM



CASE 3.6 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.6am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*emmanuel Lutheran Church*		
East/West Street:	*Kuikahi Drive*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*60*	*245*	*0*	*0*	*140*	*525*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*65*	*266*	*0*	*0*	*152*	*570*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*755*	*0*	*75*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*820*	*0*	*81*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*65*					*820*		*81*
C (m) (vph)	*889*					*464*		*900*
v/c	*0.07*					*1.77*		*0.09*
95% queue length	*0.24*					*50.58*		*0.30*
Control Delay	*9.4*					*375.0*		*9.4*
LOS	*A*					*F*		*A*
Approach Delay	--	--				*342.2*		
Approach LOS	--	--				*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.6am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description *emmanuel Lutheran Church*

East/West Street: *Kuikahi Drive*	North/South Street: *Waiale Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*135*	*355*	*0*	*0*	*270*	*525*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*146*	*385*	*0*	*0*	*293*	*570*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*755*	*0*	*165*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*820*	*0*	*179*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*146*					*820*		*179*
C (m) (vph)	*788*					*231*		*751*
v/c	*0.19*					*3.55*		*0.24*
95% queue length	*0.68*					*77.59*		*0.93*
Control Delay	*10.6*							*11.3*
LOS	*B*					*F*		*B*
Approach Delay	--	--				*978.2*		
Approach LOS	--	--				*F*		

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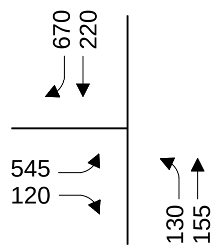
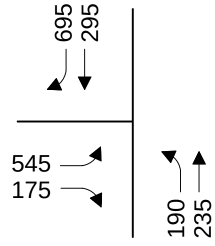
INTERSECTION 6
WAIALE ROAD AT KUIKAHI DRIVE



CASE 2.6 PM



CASE 3.6 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.6pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description	*emmanuel Lutheran Church*
East/West Street: *Kuikahi Drive*	North/South Street: *Waiale Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*130*	*155*	*0*	*0*	*220*	*670*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*141*	*168*	*0*	*0*	*239*	*728*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*545*	*0*	*120*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*592*	*0*	*130*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*141*					*592*		*130*
C (m) (vph)	*720*					*334*		*805*
v/c	*0.20*					*1.77*		*0.16*
95% queue length	*0.72*					*38.08*		*0.57*
Control Delay	*11.2*					*386.6*		*10.3*
LOS	*B*					*F*		*B*
Approach Delay	--	--				*318.8*		
Approach LOS	--	--				*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.6pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description	*emmanuel Lutheran Church*		
East/West Street:	*Kuikahi Drive*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*190*	*235*	*0*	*0*	*295*	*695*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*206*	*255*	*0*	*0*	*320*	*755*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*545*	*0*	*175*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*592*	*0*	*190*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*206*					*592*		*190*
C (m) (vph)	*656*					*190*		*725*
v/c	*0.31*					*3.12*		*0.26*
95% queue length	*1.34*					*54.34*		*1.05*
Control Delay	*13.0*							*11.7*
LOS	*B*					*F*		*B*
Approach Delay	--	--				*762.3*		
Approach LOS	--	--				*F*		

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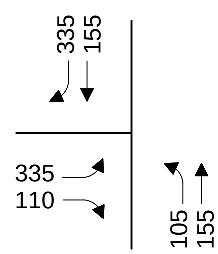
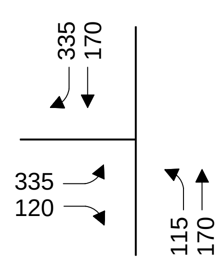
INTERSECTION 6
WAIALE ROAD AT KUIKAHI DRIVE



CASE 2.6 SUNDAY



CASE 3.6 SUNDAY

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.6sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description	*emmanuel Lutheran Church*
East/West Street: *Kuikahi Drive*	North/South Street: *Waiale Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*105*	*155*	*0*	*0*	*155*	*335*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*114*	*168*	*0*	*0*	*168*	*364*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*335*	*0*	*110*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*364*	*0*	*119*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*114*					*364*		*119*
C (m) (vph)	*1046*					*437*		*881*
v/c	*0.11*					*0.83*		*0.14*
95% queue length	*0.37*					*7.98*		*0.47*
Control Delay	*8.9*					*42.7*		*9.7*
LOS	*A*					*E*		*A*
Approach Delay	--	--				*34.6*		
Approach LOS	--	--				*D*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.6sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description *emmanuel Lutheran Church*

East/West Street: *Kuikahi Drive*	North/South Street: *Waiale Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*115*	*170*	*0*	*0*	*170*	*335*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*124*	*184*	*0*	*0*	*184*	*364*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*335*	*0*	*120*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*364*	*0*	*130*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (vph)	*124*					*364*		*130*
C (m) (vph)	*1032*					*402*		*864*
v/c	*0.12*					*0.91*		*0.15*
95% queue length	*0.41*					*9.55*		*0.53*
Control Delay	*9.0*					*56.7*		*9.9*
LOS	*A*					*F*		*A*
Approach Delay	--	--				*44.4*		
Approach LOS	--	--				*E*		

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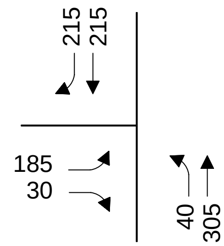
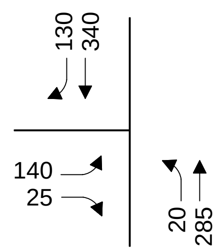
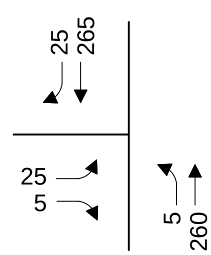
INTERSECTION 7
WAIALE ROAD AT PROJECT DRIVEWAY



CASE 3.7 AM



CASE 3.7 PM



CASE 3.7 SUNDAY

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.7am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description *Emmanuel Lutheran Church*

East/West Street: *Project Driveway*	North/South Street: *Waiale Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*40*	*305*	*0*	*0*	*215*	*215*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*43*	*331*	*0*	*0*	*233*	*233*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*185*	*0*	*30*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*201*	*0*	*32*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (vph)	*43*					*201*		*32*
C (m) (vph)	*1106*					*358*		*698*
v/c	*0.04*					*0.56*		*0.05*
95% queue length	*0.12*					*3.29*		*0.14*
Control Delay	*8.4*					*27.2*		*10.4*
LOS	*A*					*D*		*B*
Approach Delay	--	--				*24.9*		
Approach LOS	--	--				*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.7pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Project Driveway*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*20*	*285*	*0*	*0*	*340*	*130*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*21*	*309*	*0*	*0*	*369*	*141*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*140*	*0*	*25*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*152*	*0*	*27*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (vph)	*21*					*152*		*27*
C (m) (vph)	*1065*					*354*		*621*
v/c	*0.02*					*0.43*		*0.04*
95% queue length	*0.06*					*2.09*		*0.14*
Control Delay	*8.4*					*22.6*		*11.1*
LOS	*A*					*C*		*B*
Approach Delay	--	--				*20.9*		
Approach LOS	--	--				*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.7sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Project Driveway*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*5*	*260*	*0*	*0*	*265*	*25*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*282*	*0*	*0*	*288*	*27*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*25*	*0*	*5*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*27*	*0*	*5*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (vph)	*5*					*27*		*5*
C (m) (vph)	*1257*					*469*		*742*
v/c	*0.00*					*0.06*		*0.01*
95% queue length	*0.01*					*0.18*		*0.02*
Control Delay	*7.9*					*13.1*		*9.9*
LOS	*A*					*B*		*A*
Approach Delay	--	--				*12.6*		
Approach LOS	--	--				*B*		

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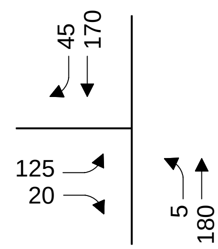
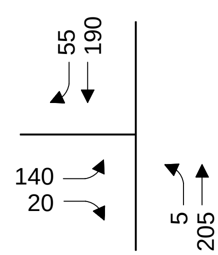
INTERSECTION 8
WAIALE ROAD AT ROAD 'A'



CASE 2.8 AM



CASE 3.8 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.8am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description *Emmanuel Lutheran Church*

East/West Street: *Road A*	North/South Street: *Waiale Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*5*	*180*	*0*	*0*	*170*	*45*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*195*	*0*	*0*	*184*	*48*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*125*	*0*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*135*	*0*	*21*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*5*						*156*	
C (m) (vph)	*1348*						*621*	
v/c	*0.00*						*0.25*	
95% queue length	*0.01*						*0.99*	
Control Delay	*7.7*						*12.7*	
LOS	*A*						*B*	
Approach Delay	--	--				*12.7*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.8am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description	*Emmanuel Lutheran Church*
East/West Street: *Road A*	North/South Street: *Waiale Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*5*	*205*	*0*	*0*	*190*	*55*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*5*	*222*	*0*	*0*	*206*	*59*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*140*	*0*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*152*	*0*	*21*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*5*						*173*	
C (m) (vph)	*1311*						*577*	
v/c	*0.00*						*0.30*	
95% queue length	*0.01*						*1.25*	
Control Delay	*7.8*						*13.9*	
LOS	*A*						*B*	
Approach Delay	--	--				*13.9*		
Approach LOS	--	--				*B*		

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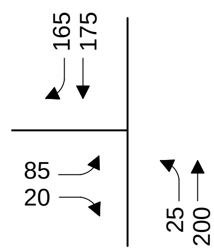
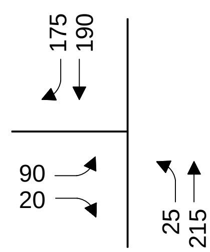
INTERSECTION 8
WAIALE ROAD AT ROAD 'A'



CASE 2.8 PM



CASE 3.8 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.8pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Road A*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*25*	*200*	*0*	*0*	*175*	*165*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*27*	*217*	*0*	*0*	*190*	*179*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*85*	*0*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*92*	*0*	*21*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*27*						*113*	
C (m) (vph)	*1201*						*523*	
v/c	*0.02*						*0.22*	
95% queue length	*0.07*						*0.81*	
Control Delay	*8.1*						*13.8*	
LOS	*A*						*B*	
Approach Delay	--	--				*13.8*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.8pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Road A*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*25*	*215*	*0*	*0*	*190*	*175*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*27*	*233*	*0*	*0*	*206*	*190*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*90*	*0*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*97*	*0*	*21*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*27*						*118*	
C (m) (vph)	*1174*						*497*	
v/c	*0.02*						*0.24*	
95% queue length	*0.07*						*0.92*	
Control Delay	*8.1*						*14.5*	
LOS	*A*						*B*	
Approach Delay	--	--				*14.5*		
Approach LOS	--	--				*B*		

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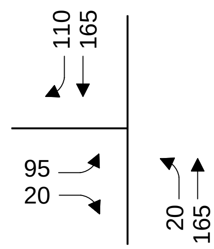
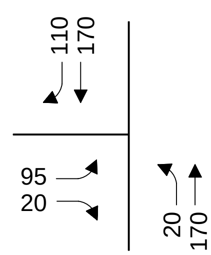
INTERSECTION 8
WAIALE ROAD AT ROAD 'A'



CASE 2.8 SUNDAY



CASE 3.8 SUNDAY

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.8sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description	*Emmanuel Lutheran Church*
East/West Street: *Road A*	North/South Street: *Waiale Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*20*	*165*	*0*	*0*	*165*	*110*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*21*	*179*	*0*	*0*	*179*	*119*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*95*	*0*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*103*	*0*	*21*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*21*						*124*	
C (m) (vph)	*1275*						*586*	
v/c	*0.02*						*0.21*	
95% queue length	*0.05*						*0.79*	
Control Delay	*7.9*						*12.8*	
LOS	*A*						*B*	
Approach Delay	--	--				*12.8*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.8sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Road A*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*20*	*170*	*0*	*0*	*170*	*110*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*21*	*184*	*0*	*0*	*184*	*119*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*95*	*0*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*103*	*0*	*21*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*21*						*124*	
C (m) (vph)	*1269*						*578*	
v/c	*0.02*						*0.21*	
95% queue length	*0.05*						*0.81*	
Control Delay	*7.9*						*12.9*	
LOS	*A*						*B*	
Approach Delay	--	--				*12.9*		
Approach LOS	--	--				*B*		

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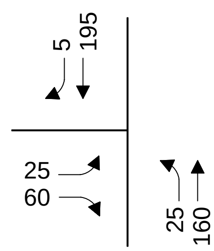
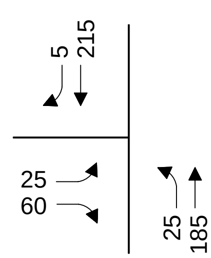
INTERSECTION 9
WAIALE ROAD AT ROAD 'C'



CASE 2.9 AM



CASE 3.9 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		**Site Information**	
Analyst		Intersection	*Case2.9am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Road C*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*25*	*160*	*0*	*0*	*195*	*5*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*27*	*173*	*0*	*0*	*211*	*5*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*25*	*0*	*60*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*27*	*0*	*65*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*27*						*92*	
C (m) (vph)	*1366*						*731*	
v/c	*0.02*						*0.13*	
95% queue length	*0.06*						*0.43*	
Control Delay	*7.7*						*10.6*	
LOS	*A*						*B*	
Approach Delay	--	--				*10.6*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY			
General Information		**Site Information**	
Analyst		Intersection	*Case3.9am*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Road C*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*25*	*185*	*0*	*0*	*215*	*5*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*27*	*201*	*0*	*0*	*233*	*5*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*25*	*0*	*60*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*27*	*0*	*65*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*27*						*92*	
C (m) (vph)	*1341*						*700*	
v/c	*0.02*						*0.13*	
95% queue length	*0.06*						*0.45*	
Control Delay	*7.7*						*10.9*	
LOS	*A*						*B*	
Approach Delay	--	--				*10.9*		
Approach LOS	--	--				*B*		

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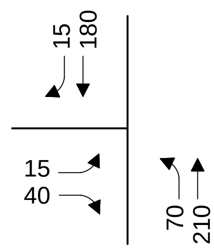
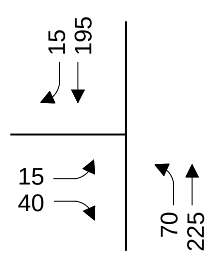
INTERSECTION 9
WAIALE ROAD AT ROAD 'C'



CASE 2.9 PM



CASE 3.9 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.9pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			

Project Description *Emmanuel Lutheran Church*

East/West Street: *Road C*	North/South Street: *Waiale Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*70*	*210*	*0*	*0*	*180*	*15*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*76*	*228*	*0*	*0*	*195*	*16*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*15*	*0*	*40*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*16*	*0*	*43*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*76*						*59*	
C (m) (vph)	*1372*						*683*	
v/c	*0.06*						*0.09*	
95% queue length	*0.18*						*0.28*	
Control Delay	*7.8*						*10.8*	
LOS	*A*						*B*	
Approach Delay	--	--				*10.8*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case3.9pm*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Road C*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*70*	*225*	*0*	*0*	*195*	*15*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*76*	*244*	*0*	*0*	*211*	*16*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*15*	*0*	*40*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*16*	*0*	*43*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*76*						*59*	
C (m) (vph)	*1353*						*662*	
v/c	*0.06*						*0.09*	
95% queue length	*0.18*						*0.29*	
Control Delay	*7.8*						*11.0*	
LOS	*A*						*B*	
Approach Delay	--	--				*11.0*		
Approach LOS	--	--				*B*		

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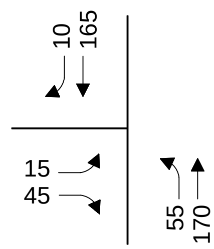
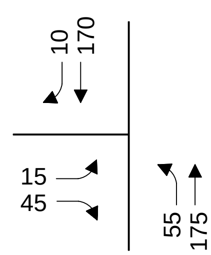


CASE 2.9 SUNDAY



CASE 3.9 SUNDAY

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Case2.9sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Road C*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*55*	*170*	*0*	*0*	*165*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*59*	*184*	*0*	*0*	*179*	*10*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*15*	*0*	*45*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*16*	*0*	*48*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*59*						*64*	
C (m) (vph)	*1397*						*742*	
v/c	*0.04*						*0.09*	
95% queue length	*0.13*						*0.28*	
Control Delay	*7.7*						*10.3*	
LOS	*A*						*B*	
Approach Delay	--	--				*10.3*		
Approach LOS	--	--				*B*		

>

TWO-WAY STOP CONTROL SUMMARY			
General Information		**Site Information**	
Analyst		Intersection	*Case2.9sunday*
Agency/Co.		Jurisdiction	
Date Performed	*1/17/2006*	Analysis Year	
Analysis Time Period			
Project Description	*Emmanuel Lutheran Church*		
East/West Street:	*Road C*	North/South Street:	*Waiale Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*55*	*175*	*0*	*0*	*170*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*59*	*190*	*0*	*0*	*184*	*10*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*15*	*0*	*45*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR	*0*	*0*	*0*	*16*	*0*	*48*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (vph)	*59*						*64*	
C (m) (vph)	*1391*						*735*	
v/c	*0.04*						*0.09*	
95% queue length	*0.13*						*0.29*	
Control Delay	*7.7*						*10.4*	
LOS	*A*						*B*	
Approach Delay	--	--				*10.4*		
Approach LOS	--	--				*B*		

>

PEDESTRIAN CROSSINGS

- Prohibit left turns from northbound Kinau Avenue to westbound Kaahumanu Avenue to improve pedestrian and vehicular safety.
- Widen Puunene Avenue at Kaahumanu Avenue to increase capacity and to allow more time for pedestrian crossing phases and to provide median islands that provide refuge areas for pedestrians crossing Puunene Avenue at mid-block driveways.
- Establish an all-way STOP along Lono Street at Town Center Drive to improve pedestrian crossings of Lono Street to Vevau Street.
- Raised crosswalks within project slow traffic down and enhance pedestrian safety.

INTERNAL CIRCULATION

- Roundabout and raised pedestrian crosswalks slow traffic down and discourage through traffic.
- Roundabout in center of project allow closure of street sections for public and special events.

Appendix F
Preliminary Engineering Report

PRELIMINARY ENGINEERING REPORT

FOR

EMMANUEL LUTHERAN CHURCH & SCHOOL

Waikapu, Wailuku, Maui, Hawaii

T.M.K.: (2) 3-5-002: Por. 001

Prepared for:

Emmanuel Lutheran Church.
c/o Chris Hart & Partners, Inc.
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Wailuku, Maui, Hawaii 96793

STACY A. OTOMO
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April 2006

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PRELIMINARY ENGINEERING REPORT
FOR
EMMANUEL LUTHERAN CHURCH & SCHOOL
T.M.K.: (2) 3-5-002: Por. 001

1.0 INTRODUCTION

The purpose of this report is to provide information on the existing infrastructure which will be servicing the proposed project. It will also evaluate the adequacy of the existing infrastructure and anticipated improvements which may be required for the proposed project.

The subject parcel is identified as T.M.K.: (2) 3-5-002: portion of Parcel 001. It is also known as Lot A of the Waikapu East (Large Lot) Subdivision No. 3, encompassing an area of 25.263 acres. It is bordered by Lot J of the Waikapu East (Large Lot) Subdivision No. 3 to the north, the Waiale Road Extension to the east; Lot B of the Waikapu East (Large Lot) Subdivision No. 3 to the south; and Honoapiilani Highway to the west. Lot J is currently being used as a field office by Stanford Carr Development and Goodfellow Brothers, Inc.

The proposed project consists of two phases which will create approximately 56,000 gross square feet. The total facility will include a new sanctuary building and educational space for pre-school to 8th grade which will accommodate approximately 490 students. Associated improvements include paved roadways and parking areas, landscaping, and underground water, sewer, drainage, electrical, and telephone systems.

2.0 EXISTING INFRASTRUCTURE

2.1 ROADWAYS

Honoapiilani Highway is located immediately west of the project site. It is a two lane undivided State Highway which runs in the north-south direction into Wailuku town. The speed limit ranges between 30 and 55 miles per hour (mph) in the vicinity of Waikapu. There is an existing left turn pocket into Kuikahi Drive.

Kuihelani Highway is located approximately a mile east of the project site. It is a two way, four-lane State arterial highway which also runs in the north-south direction. The posted speed limit on Kuihelani Highway varies between 30 and 55 mph. There is a traffic signal at the Kuihelani Highway-Waiko Road intersection. The southern terminus of Kuihelani Highway is its intersection with Honoapiilani Highway.

Waiko Road is a two-lane collector roadway that connects Honoapiilani Highway and Kuihelani Highway. A portion of Waiko Road, from Honoapiilani Highway to the area east of Makai Waikapu Village is privately owned and the remainder of Waiko Road to Kuihelani Highway is owned by the County. The posted speed limit on Waiko Road is 20 mph. Immediately east of Honoapiilani Highway, Waiko Road provides access to a residential community. Further east, Waiko Road provides access to industrial and livestock land uses. There is a weight limit of 10,000 pounds from vehicles entering and exiting Waiko Road near Honoapiilani Highway.

Waiale Road is a two-lane, cane haul road running north from Waiko Road to Kuikahi Drive, which is gated at its intersection with Kuikahi Drive. The segment from Kuikahi Drive to Lower Main Street is paved and used as a collector road. It turns into Lower Main Street near Kaahumanu Avenue.

As part of the Waikapu Gardens Subdivision, Spencer Homes, Inc. purchased the right-of-way of Waiale Road from Wailuku Agribusiness for the segment from Kuikahi Drive to Waiko Road. Waiale Road will be improved to the same standards as Kuikahi Drive.

2.2 DRAINAGE

The existing ground slopes in a west to east direction from elevation 384 feet above mean sea level at Honoapiilani Highway (southwesterly corner of the property) to elevation 323 feet at the Waiale Road Extension (northeasterly corner of the property), with an average slope of approximately 6.2%. The project site is currently vacant and was previously used for farming of bananas and other types of vegetables by private farmers.

According to the "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (August, 1972)," prepared by the United States Department of Agriculture Soil Conservation Service, the soils within the project site are classified as Iao clay (IaA and IcB). Iao clay is characterized as having slow runoff and no more than slight erosion hazard for 0 to 3 percent slopes; moderately slow permeability, medium runoff, and a slight to moderate erosion hazard 3 to 7 percent slopes; and medium runoff and moderate erosion hazard for 7 to 15 percent slopes.

As part of the Kehalani Offsite Drainage System project, an open-channel was constructed within the subject property, It traverses diagonally through the northeastern corner of the project site. The channel created a separation of the parcel where approximately 1.5 acres of the project site is separated at the northeast corner. Approximately 1.88 cfs of onsite runoff sheet flows from this area onto the Waiale Road Extension.

A Wailuku Agribusiness irrigation ditch known as the Kama Ditch traverses across the southwesterly corner of the project site. The ditch is overgrown and covered with soil within the site.

Presently, runoff from approximately 9.35 acres of the project site (11.30 cfs) sheet flows into the open-channel. The remainder of the runoff from the southern portion of the site (17.42 cfs) sheet flows onto the Waiale Road Extension. The total onsite runoff which sheet flows onto the Waiale Road Extension is 19.30 cfs. Runoff from the makai half of Honoapiilani Highway sheet flows across the project site.

It is estimated that the present onsite runoff for a 50-year, 1-hour storm from the entire project site is 30.60 cfs.

2.3 SEWER

There is an existing 12-inch sewerline traversing through the southeastern corner of the project site. Said sewerline is part of a system which services the Waikapu area. The system consists 8-inch sewerline which begins on Waiko Road and heads in a northerly direction immediately east of the existing Wailuku Agribusiness irrigation reservoir. It continues in a northerly direction approximately midway through the Waikapu Gardens Subdivision project site and continues along Waiale Road. The sewerline size increases to a 12-inch line before it reaches Waiale Road.

As part of the Kehalani Offsite Drainage System project, the section of Waiale Road fronting the project site was realigned. In addition, the existing 12-inch sewerline was also realigned to conform to the new alignment of Waiale Road.

Wastewater collected from the Waikapu area is transported to the Kahului-Wailuku Wastewater Reclamation Facility in Naska. According to the Wastewater Reclamation Division, County of Maui, as of June 30, 2005, the cumulative flow allocated for the facility is 6.3 million gallons per day (mgd) and the average daily flow is 4.64 mgd. The design capacity of the facility is 7.9 mgd.

2.4 WATER

There are no existing waterlines in the immediate vicinity of the project area. There are 12-inch waterlines along Honoapiilani Highway and Waiale Road to the north of the project site. The existing 12-inch waterline along Honoapiilani Highway terminates at Kehalani Makai Parkway and the existing 12-inch waterline along Waiale Road terminates at the intersection of Kuikahi Drive. Both 12-inch waterlines are interconnected between Kehalani Makai Parkway and Kaupo Street and Olomea Street.

Storage in this area is from an existing 3.0 million gallon reservoir located at the intersection of West Alu Road, Iao Valley Road and Main Street.

The sources for this water system are from Iao Valley and the Mokuhau wells located in Happy Valley. According to the Department of Water Supply, there is some storage available in the 3.0 million gallon reservoir for new projects.

2.5 ELECTRIC, TELEPHONE & CABLE TV

There are existing power, telephone and cable TV facilities along Honoapiilani Highway. An existing 25-foot wide electrical easement is designated along the western boundary of the property. There is an electrical easement within the adjacent boundary at the northern end of the property. The existing overhead electrical lines traverse within said easement from Honoapiilani Highway.

3.0 ANTICIPATED INFRASTRUCTURE IMPROVEMENTS

3.1 ROADWAYS

There will be no access onto Honoapiilani Highway directly from the project site. Access to the project site will be from the Waiale Road Extension. As part of the Waikapu Gardens Subdivision project, the Waiale Road Extension will be improved to a similar standard used for Kuikahi Drive. The improvements to Waiale Road will extend from Kuikahi Drive to Waiko Road.

Once on Waiale Road, vehicles can head north then west on Kuikahi Drive to access Honoapiilani Highway. Vehicles which continue north on Waiale Road will eventually exit onto Lower Main Street.

Vehicles exiting the project site can also head south until it reaches Waiko Road. Waiale Road will remain a two-lane roadway along its entire length. At the intersection of Waiko Road and Waiale Road, vehicles can head east to Kuihelani Highway or west to Honoapiilani Highway.

The interior driveways will consist of 24-feet wide paved roadways. All designated parking areas will be paved and meet the minimum dimensions set forth in the County's parking ordinance.

A Traffic Impact Analysis Report was prepared for the project on by Phillip Rowell & Associates, which stated the following:

> "As noted in the previous section, mitigation is required at the intersection of Waiale Road at Kuikahi Drive to mitigate an expected Level-of-Service F. It should be noted that this intersection will operate at Level-of-Service F without and with this project. This implies that the background growth and traffic from the related projects increases the traffic volumes and delays such that Level-of-Service F is the result. The proposed project contributes additional traffic that further aggravates the long delays.
>
> There are three potential mitigation measures, each of which is discussed in the following paragraphs.
>
> *Intersection Widening*
>
> Widening of the intersection to provide a second lane for the eastbound to northbound left turn would require widening of Waiale Road northbound in order to accommodate the second left turn lane. This does not appear to be a viable option because of right-of-way constraints. It is also understood that the community has expressed its desire that Waiale Road be only two lanes wide.

Signalization

The peak hour warrants for a traffic signal are satisfied for both morning and afternoon peak hour conditions without the project. The warrants will also be satisfied for peak hour conditions with the project. As a signalized intersection, all movements will operate at Level-of-Service C, or better, during morning and afternoon peak hours.

Roundabout

An analysis of the intersection as a roundabout was performed. This analysis concluded that the intersection would have a volume-to-capacity ratio of 1.08 during the morning weekday peak hour. This implies that the intersection would operate at a Level-of-Service F if converted to a roundabout. The conclusion is that a roundabout at the intersection is not a viable measure."

3.2 DRAINAGE

Onsite runoff from the project site will be collected by grated catch basins located at appropriate intervals along the driveways and landscaped areas. The runoff will then be conveyed to onsite retention basins which will be located within the play fields and landscaped areas.

Offsite runoff from the makai half of Honoapiilani Highway will be intercepted by the project's drainage system and conveyed to the onsite retention basins. The retention basins will be sized to accommodate the increase in runoff from a 50-year,1-hour storm. As a result, no additional runoff will sheet flow into the existing open-channel or onto the Waiale Road Extension. This is in accordance with Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui.

It is estimated that the post development runoff from the project site will be 45.15 cfs, with a net increase of 14.55 cfs.

3.3 SEWER

The full build out of the proposed project is expected to generate a wastewater flow of 10,050 gallons per day.

Wastewater from the project will be collected by an onsite gravity sewer system. The onsite system will connect to the sewerline will connect to the existing 12-inch sewerline traversing through the southeastern corner of the project site.

The Kehalani project recently upgraded the existing sewerage system on Lower Main Street adjacent to St. Anthony School. The upgrade included the installation of a new 15-inch sewerline, which has the capacity to accommodate the sewerage generated by this project.

There is sufficient capacity at the Kahului-Wailuku Wastewater Reclamation Facility to accommodate wastewater from the proposed project.

3.4 WATER

The Department of Water Supply has indicated that their 3.0 million gallon tank has some storage capacity remaining. Hawaii Land & Farming, Inc. (HLFI) is currently constructing a 1.5 million gallon mid-level tank on Kuikahi Drive. HLFI is required to install a 1.0 million gallon water tank for the mid-level service area for the Kehalani development. Spencer Homes, Inc. is participating to enlarge the tank which will provide them with 400,000 gallons to meet the storage needs of their Waikapu Affordable Housing project.

The domestic water demand for the project is anticipated to be approximately 42,947 gallons per day as determined by the land area and 29,400 as determined by the total number of students. The realistic domestic water demand for the project is 29,400 gallons per day since the irrigation source for the project will be provided by Wailuku Agribusiness from their non-potable source.

In accordance with DWS standards, the fire flow demand for schools is 2,000 gallons per minute for a 2-hour duration. Fire hydrants will be installed with a maximum spacing of 250 feet.

3.5 ELECTRIC, TELEPHONE & CABLE TV

The proposed electrical, telephone, and cable TV distribution systems will be serviced from the existing facilities along Honoapiilani Highway. Within the project site, all distribution systems will be installed underground. Street lights will be installed along the subdivision streets at intervals to be determined by the electrical engineer.