

KALAELOA MASTER PLAN –
INFRASTRUCTURE MASTER PLAN UPDATES

October 2010 Draft

Prepared for:
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1.0 OVERVIEW

1.1 INTRODUCTION – INFRASTRUCTURE MASTER PLAN UPDATES (IMPU)

The Kalaeloa Master Plan dated March 2006 (KMP) was prepared to assess the challenges facing the redevelopment of the Kalaeloa Community Development District (CDD) and to chart an economically feasible and sustainable course towards implementing the vision of Kalaeloa as a Wahi Ho'okela.

As noted in KMP Chapter 5.2 INFRASTRUCTURE, infrastructure master plans would need to be prepared and submitted to the City and County of Honolulu (City) or local utility service provider (utility provider) for approval. With an approved master plan, construction plans for the improvements could then be prepared, reviewed for compliance with the master plan and approved by the utility provider, and then constructed.

These IMPU are the draft master plans that the Hawaii Community Development Authority (HCDA) will submit to the City and utility providers for approval. When approved, these IMPU would replace KMP Chapter 5.2 and Appendix B.

1.2 PROCESS

Per Hawaii Administrative Rules Chapter 15-215 (HAR 15-215) lands within the Kalaeloa CDD are organized by "Transect Zones". Transect Zones and their related requirements (Density and Building Function and Use) define the developmental character allowed within the Kalaeloa CDD.

In the context of HAR 15-215, density means the maximum number of dwelling units and/or square footage of any non-residential use that would be allowed within a given Parcel based on its size (acreage) and allowable uses. Per discussion with HCDA, it was concluded that, using 100 percent of the maximum Density as allowed in HAR 15-215 to derive projected ultimate development buildout would result in significantly overstated development projections, which in turn would result in uneconomical over-sizing of the infrastructure that would be needed to service the projected development buildout of the district. As such, a Land Utilization Factor (Utilization Factor) was applied to each Parcel to derive a model that involved more realistic development projections involving less than 100-percent development. The Utilization Factor was intended to incorporate development limiting site factors such as topography, previously-

identified cultural and biological issues, etc. The Utilization Factor comprises either: a percentage based on the Parcel size, is consistent with the KMP Utilization Factor, or was determined by HCDA based on proximity to Parcels where KMP Utilization Factor was used. Because the number of residential dwellings and the amount of non-residential use is required in order to project infrastructure sizing, a percentage split between these two classes of uses (totaling 100-percent) was estimated by Parcel by HCDA.

Per HAR 15-215, by Transect Zone designation, specific Building Function and Uses are allowed. In addition to Residential, the use categories include: Office; Retail; Civil; Industrial, including Research and Development; and Transportation. Because the development by use category is also required in order to project infrastructure sizing, a percentage split between these use categories (totaling 100-percent of the non-residential use) was estimated by Parcel by HCDA.

Because development would not occur all at once, three development timeframes were designated: within 7 years, 7 to 20 years, and over 20 years. Development within these timeframes was also estimated by HCDA.

The Parcels designated as Special District Transect Zone were the exception to density, use and development timeframe process noted previously. The State Department of Transportation – Airports Division (DOT-A), Hawaii Army National Guard, and U.S. Coast Guard (all with property designated as Special District) were contacted to determine their existing property use, future property use, associated utility requirements, and development timeframe. Additionally, Ford Island Ventures, LLC (FIV), the Navy and the Department of Hawaiian Homelands (DHHL) were contacted to determine development timeframe.

The following table is a summation of the development (or projected buildout) for the Kalaeloa CDD that was used to generate the various infrastructure needs, which is the basis for the IMPU.

PROJECT: **Kalaeloa Master Plan**

CLIENT: Ford Island Ventures

SUBJECT: Kalaeloa Master Plan Development Buildout Projections for Infrastructure Sizing

REF: **HCDA Ch 15-215 Admin Rules - DRAFT XX**

FIV Pcl #	Parcel # (MP ref #)	Transect Designation & Land Use HCDA Ch 15-215 Admin Rules - DRAFT XX	Land Area Acres	Transect Parameters				Buildout Allocations by USE						PROJECTED BUILDOUT				Projected Development Timeframe, years			Development Criteria	Notes		
				100% Non-Residential		100% Residential		Non-Residential Buildout Allocation					Land Utilization & Residential vs Non-Residential Inputs			Residential Buildout	Non-Resid Buildout	Total Buildout, Sq Ft	Total Buildout as % of land area	Within 7 yrs			7 to 20 yrs	over 20 yrs
				Max Non-Resid Density, Sq Ft/Ac	Max Non-Resid Buildout in Sq Ft	Max Residential Density, Units/Acre	Max Resid Buildout, # Units	% Allocation Inputs					Land Utilization	% Non-Resid	% Resid									
						1,000 sf/unit		Civic	R&D	Light Ind	Office	Retail							# Units	Sq Ft				
	1	T2 Rural	275.470	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2006 Master Plan - NAVY Golf Course. Navy has no plans for new commercial development; no utility increase.	Parcel contains cultural sites and historical structures (ECP).		
	1A	T4 Urban Center	16.190	40,000	647,600	40	647	-	-	-	-	100%	60%	10%	90%	349	38,856	387,856	55%	-	100%	-		
	1B	T3 General Urban	56.975	20,000	1,139,500	20	1,139	-	-	-	50%	50%	60%	10%	90%	615	68,370	683,370	28%	-	100%	-		
	2	T3 General Urban	14.458	20,000	289,160	20	289	-	-	-	-	-	60%	-	100%	173	-	173,000	27%	-	100%	-	Per HCDA meeting with School Principal, there are no plans for expansion.	
	3	T3 General Urban	44.102	20,000	882,040	20	882	-	20%	80%	-	-	3.5%	100%	-	-	30,871	30,871	2%	-	100%	-	2006 Master Plan, Parcel 10. Net = 3.5% of gross. Net % calculation: 121968/43560/80. Site is populated with 'akoko (endangered plant - ECP Ref. 2). Site contains archaeological sites (SAP/NAVY 1999 FEIS). Almost entire site is designated as kiawe and lowland scrub (sensitive habitat - ECP Ref 2).	
	4 & 5	T3 General Urban	136.938	20,000	2,738,760	20	2,738	-	20%	80%	-	-	5.0%	100%	-	-	136,938	136,938	2%	-	100%	-	2006 Master Plan, composite of Parcels 1N & 1Q. Net = 5% of gross. Net % calculation for areas 1N (3.5%) & 1Q (7%): 22869/43560/15 and 106722/43560/35, respectively. Interim 0 to 7 year, 35-acre energy generation project is not included in the projected buildout. Site is populated with 'akoko (endangered plant - ECP Ref. 2). Site contains archaeological sites (SAP/NAVY 1999 FEIS). Majority of the site is designated as kiawe and lowland scrub (sensitive habitat - ECP Ref 2).	
	6	SD Special District	28.724	20,000	574,480	varies	-	-	-	100%	-	-	7.0%	100%	-	-	40,214	40,214	3%	-	100%	-	Land utilization = 7%. Site contains archaeological sites (SAP/NAVY 1999 FEIS). Portion of site is designated as kiawe and lowland scrub (sensitive habitat area - ECP Ref 2).	
	7	T3 General Urban	29.853	20,000	597,060	20	597	-	20%	80%	-	-	5.6%	100%	-	-	33,435	33,435	3%	100%	-	-	2006 Master Plan, Parcel 2J. Net = 5.6% of gross. Net % calculation: 73181/43560/30. Site contains archaeological sites (SAP/NAVY 1999 FEIS).	
	8	T3 General Urban	73.741	20,000	1,474,820	20	1,474	-	20%	80%	-	-	5.6%	100%	-	-	82,590	82,590	3%	-	-	100%	2006 Master Plan, Parcel 2K. Net = 5.6% of gross. Net % calculation: 253694/43560/104. Site contains archaeological sites (SAP/NAVY 1999 FEIS). Majority of the site is designated as kiawe and lowland scrub (sensitive habitat area - ECP Ref 2).	
	9	T3 General Urban	139.297	20,000	2,785,940	20	2,785	-	20%	80%	-	-	7.0%	100%	-	-	195,016	195,016	3%	-	100%	-	Land utilization = 7%. Site contains archaeological sites (SAP/NAVY 1999 FEIS). Portion of the site contains coastal salt flat and kiawe and lowland scrub, both are sensitive habitat areas (ECP Ref 2).	
	10	T3 General Urban	20.029	20,000	400,580	20	400	-	20%	80%	-	-	7.0%	100%	-	-	28,041	28,041	3%	-	100%	-	2006 Master Plan - BWS-1. Land utilization = 7%. Entire site is designated as kiawe and lowland scrub (sensitive habitat area - ECP Ref 2).	
	10A	T3 General Urban	10.569	20,000	211,380	20	211	-	20%	80%	-	-	7.0%	100%	-	-	14,797	14,797	3%	100%	-	-	Land utilization = 7%. Entire site is designated as coastal strand or kiawe and lowland scrub, both are sensitive habitat areas (ECP Ref 2).	
	11	T1 Natural	37.377	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T1: zero new development. Contains endangered plant (ECP Ref 2). Entire site is designated as coastal strand or kiawe and lowland scrub, both are sensitive habitat areas (ECP Ref 2).	
	12	SD Special District	752.216	20,000	15,044,320	20	15,044	-	-	-	-	-	1.0%	-	100%	150	-	150,000	0.5%	-	100%	-	2006 Master Plan - DOT-A. Develop to user plans. Land utilization = 1% for Hotel units; Landowner to petition for transect change. Site contains archaeological and historical sites (SAP/NAVY 1999 FEIS). Portion of the site contains coastal salt flat and kiawe and lowland scrub, both are sensitive habitat areas (ECP Ref 2). Per HCDA discussion with UH, there are no plans for expansion.	
	12A	SD Special District	4.520	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Develop to user plans.	
	13	T1 Natural	16.292	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T1: zero new development. No new development, no utility increase. Site contains archaeological sites (SAP/NAVY 1999 FEIS). Majority of site is designated as coastal strand and kiawe and lowland scrub (sensitive habitat area - ECP Ref. 2).	
	13A	T2 Rural	3.661	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Development/utility increase in support of required SPS expansion only. Otherwise, no new development, no utility increase. Site contains archaeological sites (SAP/NAVY 1999 FEIS). Portion of the site may contain kiawe and lowland scrub, both are sensitive habitat areas (ECP Ref 2).	
	14	SD Special District	42.964	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2006 Master Plan - USCG. Develop to user plans.	
	15	T1 Natural	21.308	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18 Existing units. Navy has no plans for new development; no utility increase. Site contains archaeological sites (SAP/NAVY 1999 FEIS). Portion of site is designated as coastal strand/sensitive habitat area (ECP Ref. 2).	
	16	T1 Natural	4.715	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T1: zero new development; except for new restroom facility. Park use (irrigate 0% of gross area).	
	17	T2 Rural	45.597	20,000	911,940	na	-	-	-	100%	-	-	3.5%	100%	-	-	31,918	31,918	2%	-	-	100%	Land utilization = 3.5%. Park use (0% irrigated area), no restroom. Site contains coastal salt flat (wetland - ECP Ref 2) which is habitat for the endangered Hawaiian black-necked stilt (ECP Ref 2). Parcel also contains archaeological sites (SAP/NAVY 1999 FEIS) and kiawe and lowland scrub (sensitive habitat areas - ECP Ref 2).	
	18	T2 Rural	65.356	20,000	1,307,120	na	-	50%	-	-	-	50%	3.5%	100%	-	-	45,749	45,749	2%	-	100%	-	Land utilization = 3.5%. Park use (0% irrigated area), no restroom. Parcel contains archaeological sites (SAP/NAVY 1999 FEIS). Majority of the site is designated as kiawe and lowland scrub (sensitive habitat area - ECP Ref 2).	
	18A	T2 Rural	19.361	20,000	387,220	na	-	50%	-	-	-	50%	3.5%	100%	-	-	13,553	13,553	2%	-	100%	-	Land utilization = 3.5%. Park use (irrigate 25% of gross area).	
	18B	T2 Rural	11.501	20,000	230,020	na	-	50%	-	-	-	50%	3.5%	100%	-	-	8,051	8,051	2%	-	100%	-	Land utilization = 3.5%. Same as Parcel 18 - two rows above.	
	19	T2 Rural	32.000	20,000	640,000	na	-	50%	-	-	-	50%	3.5%	100%	-	-	22,400	22,400	2%	-	-	100%	2006 Master Plan, Parcels 1G & 1H. Net = 3.5% of gross. Net % calculation: 128066/43560/84 and 48787/43560/32, respectively. Parcel contains archaeological and historic sites (SAP/NAVY 1999 FEIS) and kiawe and lowland scrub (sensitive habitat area - ECP - Ref 2).	
	19A	T3 General Urban	134.784	20,000	2,695,680	20	2,695	-	20%	50%	20%	10%	3.5%	100%	-	-	94,349	94,349	2%	-	-	100%	2006 Master Plan, Parcel 2A. Net = 5.6% of gross. Net % calculation: 160998/43560/66. Parcel contains archaeological sites (SAP/NAVY 1999 FEIS).	
	19A	T3 General Urban	22.997	20,000	459,940	20	459	-	20%	50%	20%	10%	5.6%	100%	-	-	25,757	25,757	3%	-	-	100%	2006 Master Plan, Parcel 2A. Net = 5.6% of gross. Net % calculation: 160998/43560/66. Parcel contains archaeological sites (SAP/NAVY 1999 FEIS).	

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CLIENT: Ford Island Ventures

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FIV Pcl #	Parcel # (MP ref #)	Transect Designation & Land Use HCDA Ch 15-215 Admin Rules - DRAFT XX	Land Area Acres	Transect Parameters				Buildout Allocations by USE						PROJECTED BUILDOUT				Projected Development Timeframe, years			Development Criteria	Notes				
				100% Non-Residential		100% Residential		Non-Residential Buildout Allocation					Land Utilization & Residential vs Non-Residential Inputs			Residential Buildout	Non-Residential Buildout	Total Buildout, Sq Ft	Total Buildout as % of land area	Within 7 yrs			7 to 20 yrs	over 20 yrs		
				Max Non-Resid Density, Sq Ft/Ac	Max Non-Resid Buildout in Sq Ft	Max Residential Density, Units/Acre	Max Residential Buildout, # Units	% Allocation Inputs					Land Utilization	% Non-Resid	% Resid											
						1,000 sf/unit		Civic	R&D	Light Ind	Office	Retail				Non-Res vs Res	# Units	Sq Ft								
	20	SD Special District	18.030	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2006 Master Plan - FAA. No new development, no utility increase.	Parcel may contain archaeological sites (SAP/NAVY 1999 FEIS).	
	21	T2 Rural	50.482	20,000	1,009,644	na	-	50%	-	-	-	50%	5.0%	100%	-	-	50,482	50,482	2%	-	-	100%	Land utilization = 5%.	Majority of the site is designated as kiawe and lowland scrub (sensitive habitat area - ECP Ref 2).		
		T3 General Urban	47.056	20,000	941,116	20	941	50%	-	-	-	50%	5.0%	100%	-	-	47,056	47,056	2%	-	-	100%				
	21A	T2 Rural	5.634	20,000	112,680	na	-	50%	-	-	-	50%	5.0%	100%	-	-	5,634	5,634	2%	-	-	100%	Land utilization = 5%.			
	22	T2 Rural	29.960	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No development allowed. Site is, and may also in the future, used for area (or regional) drainage use.	Parcel contains archaeological sites (SAP/NAVY 1999 FEIS). Majority of the site is designated as kiawe and lowland scrub (sensitive habitat area - ECP Ref 2).	
	23	T2 Rural	131.035	20,000	2,620,698	na	-	50%	-	-	-	50%	1.0%	100%	-	-	26,207	26,207	0%	-	100%	-	Reduced land utilization - archaeological constraints. Interim 0 to 7 year, 60-acre energy generation project is not included in the projected buildout.	Remainder of T2 zone - Park use (0% irrigated area). All of T4 zone covered in 'akoko. Majority of site is populated with 'akoko (endangered plant - ECP Ref. 2) and is designated as kiawe and lowland scrub (sensitive habitat area - ECP Ref. 2). Site also contains archaeological sites (SAP/NAVY 1999 FEIS).		
		T3 General Urban	14.750	20,000	295,002	20	295	-	-	-	-	-	60%	-	100%	177	-	177,000	177,000	28%	-	100%	-			
	24	T2 Rural	49.177	20,000	983,540	na	-	50%	-	-	-	50%	7.0%	100%	-	-	68,848	68,848	3%	-	100%	-	Land utilization = 7%.	Site may be habitat for the endangered Hawaiian black-necked stilt (ECP Ref 2). Site contains archaeological sites (SAP/NAVY 1999 FEIS) and is designated as kiawe and lowland scrub (sensitive habitat area - ECS Ref 2).		
	25	T1 Natural	9.303	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No development allowed.	Site contains Ordy Pond/mangrove swamp (wetland - ECP Ref 2), which is the habitat for the endangered Hawaiian black-necked stilt (ECP Ref 2). Site contains archaeological sites (SAP/NAVY 1999 FEIS) and is designated as kiawe and lowland scrub (sensitive habitat area - ECS Ref 2).	
	26	T2 Rural	47.556	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No development allowed; except for new restroom facility.	Park use (0% irrigated area). Entire T4 zone covered in 'akoko or within archaeological preserve area. Site may be habitat for the endangered Hawaiian black-necked stilt (ECP Ref 2) and is populated with 'akoko (endangered plant - ECP Ref. 2). Site contains archaeological sites (SAP/NAVY 1999 FEIS) and the majority of site is designated as kiawe and lowland scrub (ECP Ref 2).	
		T3 General Urban	6.421	20,000	128,411	20	128	-	-	-	-	-	50%	-	100%	64	-	64,000	64,000	23%	-	100%	-	Reduced land utilization - archaeological constraints.		
		T3 General Urban	3.961	20,000	79,213	20	79	-	-	-	-	-	50%	-	100%	39	-	39,000	39,000	23%	-	100%	-	Reduced land utilization - archaeological constraints.		
	27	T1 Natural	27.792	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T1: zero new development.	Park use (0% irrigated area). Site contains archaeological sites (SAP/NAVY 1999 FEIS). Entire site is designated as coastal strand or kiawe and lowland scrub, both are sensitive habitat areas (ECP Ref. 2).	
		T2 Rural	155.678	20,000	3,113,563	na	-	30%	50%	-	-	20%	3.5%	100%	-	-	108,975	108,975	2%	-	-	100%	Land utilization = 3.5%.			
		T3 General Urban	28.485	20,000	569,703	20	569	-	-	-	-	-	50%	-	100%	284	-	284,000	284,000	23%	-	-	100%	Reduced land utilization - archaeological constraints.		
	28	T1 Natural	11.149	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T1: zero new development. Navy has no plans for new development; no utility increase.	Site contains archaeological sites (SAP/NAVY 1999 FEIS). Entire site is designated as marine wetland or coastal strand, both are sensitive habitat areas (ECP Ref. 2).	
		T3 General Urban	4.254	20,000	85,088	20	85	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	12 Existing units. Navy has no plans for new development; no utility increase.		
10	29	T3 General Urban	3.809	20,000	76,180	20	76	-	-	50%	30%	20%	28%	100%	-	-	21,330	21,330	13%	-	100%	-	2006 Master Plan, Parcel 3F. Net = 28% of gross. Net % calculation: 8659734/43560/71.	2006 Master Plan, Parcel 3F. Net = 28% of gross. Net % calculation: 8659734/43560/71.		
	30	T3 General Urban	31.746	20,000	634,920	20	634	-	-	50%	30%	20%	28%	100%	-	-	177,778	177,778	13%	-	100%	-	2006 Master Plan, Parcel 3F. Net = 28% of gross. Net % calculation: 8659734/43560/71.	Site contains historical structures (ECP).		
	31	T3 General Urban	10.890	20,000	217,800	20	217	-	-	50%	30%	20%	28%	100%	-	-	60,984	60,984	13%	100%	-	-	2006 Master Plan, Parcel 3F. Net = 28% of gross. Net % calculation: 8659734/43560/71.	Site contains historical structures (ECP).		
	32	SD Special District	138.164	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
		32A SD Special District	5.931	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Develop to user plans.	
		32B SD Special District	3.730	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		32C SD Special District	7.316	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
14	33	T3 General Urban	2.039	20,000	40,780	20	40	-	-	100%	-	-	80%	100%	-	-	32,624	32,624	37%	-	100%	-				
	34	T3 General Urban	9.722	20,000	194,440	20	194	-	-	50%	30%	20%	28%	100%	-	-	54,443	54,443	13%	100%	-	-	2006 Master Plan, Parcel 3F. Net = 28% of gross. Net % calculation: 8659734/43560/71.			
	35	T4 Urban Center	7.550	40,000	302,000	40	302	-	-	-	-	-	70%	-	100%	211	-	211,000	211,000	64%	-	-	100%			
9	36	T5 Urban Core	13.532	60,000	811,920	60	811	-	-	-	60%	40%	60%	10%	90%	437	48,715	485,715	82%	-	100%	-				
	37	T4 Urban Center	5.162	40,000	206,480	40	206	-	-	-	-	-	70%	-	100%	144	-	144,000	144,000	64%	-	100%	-			
		37A T4 Urban Center	1.680	40,000	67,200	40	67	-	-	-	-	-	80%	-	100%	53	-	53,000	53,000	72%	-	100%	-			
	38	T4 Urban Center	4.742	40,000	189,680	40	189	-	-	-	-	-	70%	-	100%	132	-	132,000	132,000	64%	-	-	100%			
8	39	T4 Urban Center	1.208	40,000	48,320	40	48	-	-	-	-	-	80%	-	100%	38	-	38,000	38,000	72%	-	-	100%			
7	40	T4 Urban Center	9.454	40,000	378,160	40	378	-	-	-	30%	70%	60%	10%	90%	204	22,690	226,690	55%	100%	-	-				
	41	T4 Urban Center	1.354	40,000	54,160	40	54	-	-	-	-	100%	80%	100%	-	-	43,328	43,328	73%	-	-	100%				

PROJECT: **Kalaeloa Master Plan**

CLIENT: Ford Island Ventures

SUBJECT: Kalaeloa Master Plan Development Buildout Projections for Infrastructure Sizing

REF: **HCDA Ch 15-215 Admin Rules - DRAFT XX**

FIV Pcl #	Parcel # (MP ref #)	Transect Designation & Land Use HCDA Ch 15-215 Admin Rules - DRAFT XX	Land Area Acres	Transect Parameters				Buildout Allocations by USE						PROJECTED BUILDOUT				Projected Development Timeframe, years			Development Criteria	Notes				
				100% Non-Residential		100% Residential		Non-Residential Buildout Allocation					Land Utilization & Residential vs Non-Residential Inputs			Residential Buildout # Units	Non-Residential Buildout Sq Ft	Total Buildout, Sq Ft	Total Buildout as % of land area	Within 7 yrs			7 to 20 yrs	over 20 yrs		
				Max Non-Resid Density, Sq Ft/Ac	Max Non-Resid Buildout in Sq Ft	Max Residential Density, Units/Acre	Max Resid Buildout, # Units	Civic	R&D	Light Ind	Office	Retail	Land Utilization	% Non-Resid	% Resid											
								1,000 sf/unit			% Allocation Inputs						Non-Res vs Res									
	42	T3 General Urban	19.952	20,000	399,040	20	399	-	-	-	-	-	60%	-	100%	239	-	239,000	27%	100%	-	-		Site contains historical sites (SAP/NAVY 1999 FEIS).		
	43	T4 Urban Center	1.527	40,000	61,080	40	61	-	-	-	80%	20%	80%	100%	-	-	48,864	48,864	73%	-	100%	-				
	44	T2 Rural	6.969	20,000	139,380	na	-	50%	-	-	-	50%	70%	100%	-	-	97,566	97,566	32%	-	100%	-				
1	45	T3 General Urban	49.679	20,000	993,580	20	993	-	20%	50%	10%	20%	60%	100%	-	-	596,148	596,148	28%	100%	-	-				
2	46	T3 General Urban	30.941	20,000	618,820	20	618	-	20%	50%	20%	10%	60%	100%	-	-	371,292	371,292	28%	100%	-	-				
3	47	T4 Urban Center	25.053	40,000	1,002,120	40	1,002	-	-	-	80%	20%	60%	10%	90%	541	60,127	601,127	55%	-	100%	-				
4	48	T4 Urban Center	3.384	40,000	135,360	40	135	-	-	-	-	-	70%	-	100%	94	-	94,000	64%	100%	-	-				
5	49	T5 Urban Core	3.950	60,000	237,000	60	237	-	-	-	-	-	70%	-	100%	165	-	165,000	96%	-	100%	-				
6b	50	T3 General Urban	3.170	20,000	63,400	20	63	-	-	-	80%	20%	70%	10%	90%	39	4,438	43,438	31%	-	100%	-				
6a	51	T3 General Urban	50.780	20,000	1,015,600	20	1,015	-	-	-	80%	20%	60%	10%	90%	548	60,936	608,936	28%	-	100%	-				
11	52	T4 Urban Center	26.270	40,000	1,050,800	40	1,050	-	-	-	30%	70%	60%	20%	80%	504	126,096	630,096	55%	-	100%	-				
12	53	T5 Urban Core	20.000	60,000	1,200,000	60	1,200	-	-	-	50%	50%	60%	60%	40%	288	432,000	720,000	83%	42%	58%	-		150K sf FBI bldg on 10 ac. Remaining buildout on balance of T5 area.		
		T3 General Urban	25.000	20,000	500,000	20	500	-	-	-	50%	50%	60%	10%	90%	270	30,000	300,000	28%	-	100%	-				
		T2 Rural	13.808	20,000	276,160	20	276	-	-	-	50%	50%	60%	10%	90%	149	16,570	165,570	28%	-	100%	-		Landowner to petition for transect change for development of residential and office uses.		
13	54	T2 Rural	21.417	20,000	428,340	20	428	-	-	-	50%	50%	60%	30%	70%	179	77,101	256,101	27%	-	100%	-		Landowner to petition for transect change for development of residential and office uses.		
		T4 Urban Center	13.000	40,000	520,000	40	520	-	-	-	50%	50%	60%	20%	80%	249	62,400	311,400	55%	-	100%	-				
15	55	T3 General Urban	22.068	20,000	441,360	20	441	-	50%	-	40%	10%	60%	20%	80%	211	52,963	263,963	27%	100%	-	-				
16	56	T3 General Urban	0.936	20,000	18,720	20	18	-	50%	-	50%	-	80%	100%	-	-	14,976	14,976	37%	-	100%	-				
17	57	T3 General Urban	68.632	20,000	1,372,640	20	1,372	-	20%	50%	20%	10%	60%	100%	-	-	823,584	823,584	28%	-	100%	-				
18	58	T3 General Urban	69.568	20,000	1,391,360	20	1,391	-	20%	50%	20%	10%	40%	100%	-	-	556,544	556,544	18%	-	100%	-		Land utilization = 40%. Parcel contains historical structures (ECP).		
19	59	T2 Rural	70.726	20,000	1,414,520	na	-	-	20%	50%	20%	10%	20%	100%	-	-	282,904	282,904	9%	100%	-	-		Land utilization = 20%. Interim 0 to 7 year, 16.5-acre energy generation project is not included in the projected buildout. Landowner to petition for transect change for development of office use. Parcel contains cultural site (ECP).		
Totals, Avgs:				3,506.58	17,070 sf/ac	59,857,539	13.2 /ac	46,392							6,546	5,394,508	11,940,508	8%								
				Land Area	Max Non-Resid Density, Sq Ft/Ac	Max Non-Resid Buildout in Sq Ft	Max Residential Density, Units/Acre	Max Resid Buildout, # Units							Land Utilization	% Non-Resid	% Resid	Residential Buildout	Non-Residential Buildout	Total Buildout, Sq Ft	Total Buildout as % of land area					
				% Allocation Inputs																						

To model potential likely development intensity (v.s. theoretical maximum allowable). Includes allowance for land-development overhead for bulk lots, e.g. roads, utilities, open space, sensitive areas, etc.

Land Utilization Factor:

Parcel Size Ranges	Land Utilization %
0 ac to 3 ac	80%
3 ac to 8 ac	70%
8 ac to over	60%

Non-typical Land Utilization assumptions to account for special undevelopable areas (eg. sensitive areas) are entered manually.

R&D	Light Ind	Office	Retail	Res Units	Non-Res
111,068	173,370	103,416	266,166		
631,842	1,841,079	658,438	460,373	868	1,669,656
0	0	163,029	239,332	5,013	3,212,363
0	0	245,229	235,486	665	512,489
0	40,214	0	0		
742,910	2,054,663	1,170,112	1,201,358	6,546	5,394,508
13.8%	38.1%	21.7%	22.3%		

- Notes:
- 1 Projected Buildouts are based on projections of likely development activity within the given time frames.
 - 2 Projected Buildouts do not represent the extremes of theoretical maximum or minimum densities defined by the Rules.
 - 3 Projected Buildouts do not include density transfers where allowable by the Rules.

2.0 INFRASTRUCTURE MASTER PLAN UPDATES (IMPU)

2.1 PUBLIC DEDICATION

The KMP anticipates that eventually the future utility systems within Kalaeloa would be managed and operated by local utility providers such as City Department of Facilities Maintenance (DFM, for roads and regional drainage), City Board of Water Supply (BWS, for potable water and non-potable irrigation), City Department of Environmental Services (ENV, for sewer), Hawaiian Electric Company (HECO, for electrical) and others for telephone and data communication. The City Department of Planning and Permitting (DPP) would also be involved in review and approval for construction of infrastructure to be dedicated to the City, as well as the Department of Design and Construction (DDC) for street light systems and the Department of Transportation Services (DTS) for roadway improvements and traffic signals; or in default, a private utility provider. The various infrastructure improvements would need to be designed to the appropriate system standards established by the utility provider to which they would ultimately be dedicated.

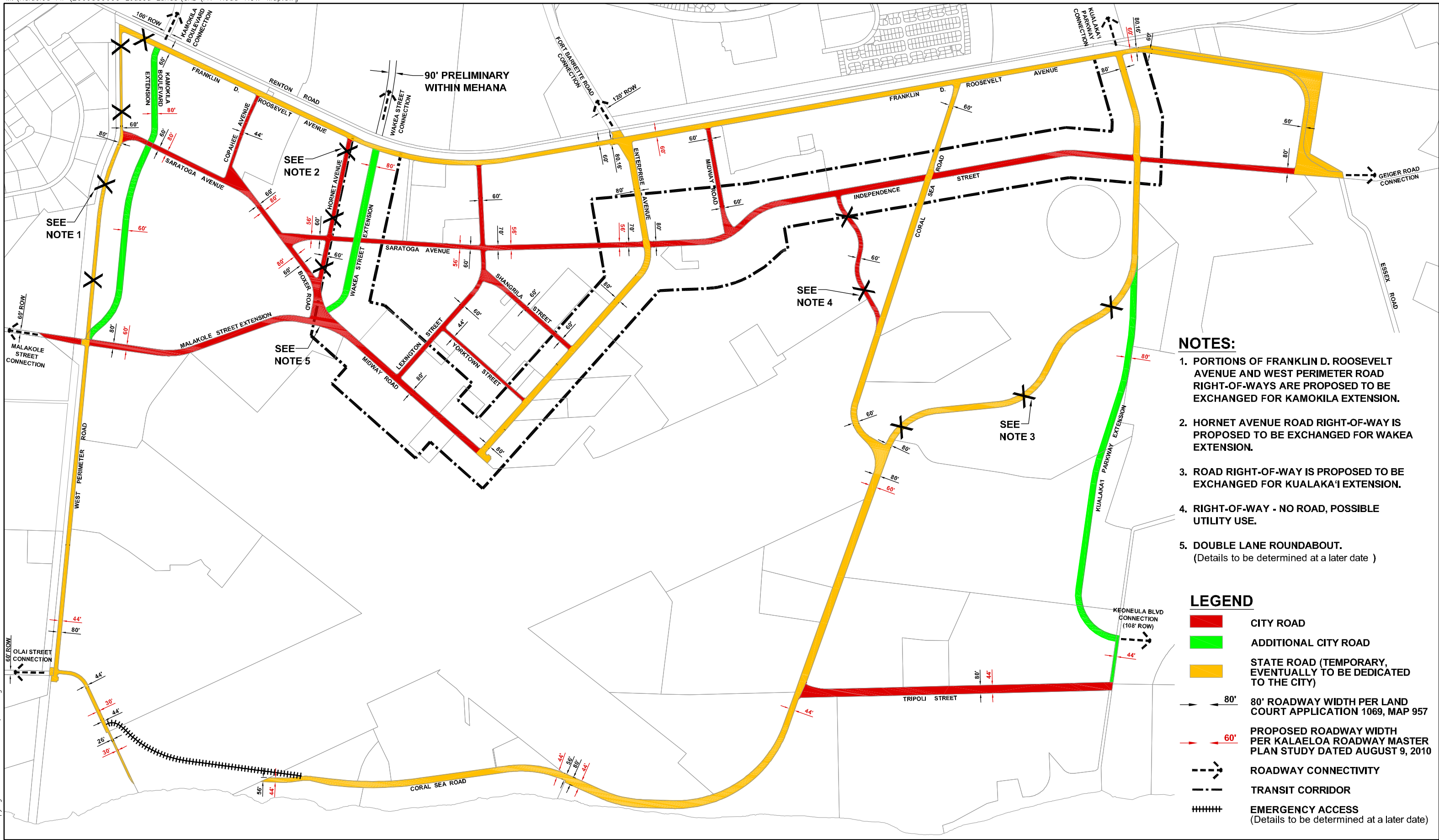
2.2 ROADWAYS

2.2.1 Background

Existing roadways within the Kalaeloa CDD generally do not conform to City standards; as such, all existing City/State owned roads and new roads to be dedicated to the City would need to be reconstructed to a City approved road standard (or section) because it is expected that the City would ultimately assume ownership of all roads within Kalaeloa.

2.2.2 Improvements

Roads within the Kalaeloa CDD that were conveyed at the time of transfer from the Navy to either the City or State or were identified by HCDA were evaluated as part of the IMPU. (Refer to Figure 2.2-1). Fehr & Peers conducted traffic counts, determined road type and recommended roadway sections for these roads. Fehr & Peers summarized their findings in a memorandum, provided in Appendix B – Roadways.



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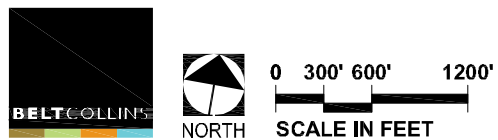


FIGURE 2.2-1: DRAFT - KALAELOA ROADWAY CONCEPT

Table 2.2-1 provides a Road ROW comparison. The table provides: the road name, type, special feature, existing right-of-way (ROW) width, City Standard ROW width, KMP (2006) planned ROW width, and proposed ROW width and cross section designation. Existing ROW widths may not match with the proposed widths; therefore, either of the following may be necessary:

- Transfer of additional land to the City for new roads or expanded ROW widths.
- Transfer of existing ROW land from the State/City to adjacent land owners for reduced ROW width or for road ROW exchanges.

Transfer of additional land to the City to accommodate auxiliary lanes, crosswalk/pedestrian islands, etc. at intersections may also be necessary.

The main thoroughfares roads (arterials) provide access into, through and out of the Kalaeloa CDD. Arterial roads include: Kamokila Boulevard extension from Franklin D Roosevelt Avenue (FDR) to Saratoga Avenue, continuing to Boxer Road, to Midway Road, to Enterprise Avenue and to Fort Barrette Road; Wakea Street extension from FDR to Midway Road; Kualaka'i Parkway extension from FDR to Independence Street; and Independence Street from Enterprise Avenue to Geiger Road at Kalaeloa CDD's eastern boundary. Arterial roads have 80-foot ROW widths, with two travel lanes in each direction, a center median or turn-lane, and a bike lane and sidewalk in each direction.

Collector streets provide access and circulation within residential, commercial and industrial areas; and connect sub-collector streets to arterial roads. Collector streets include: Kamokila Boulevard from Saratoga Avenue to Malakole Street; Lexington Street; Midway Road from FDR to Independence Street; Coral Sea Road from FDR to Tripoli Street; Kualaka'i Parkway from Independence Street to Keoneula Boulevard at Kalaeloa CDD's eastern boundary; FDR; Saratoga Ave from Boxer Road to Enterprise Avenue; Malakole Street; and Shangrila Street. Collector streets typically have 60-foot ROW widths; with a travel lane in each direction, a center median or turn-lane, a bike lane or parallel parking and sidewalk in each direction. The exceptions are Kualaka'i Parkway, Saratoga Avenue and FDR. Kualaka'i Parkway from Independence Street to the Kalaeloa CDD's eastern boundary has an 80-foot ROW width; in the unlikely event that another travel lane in each direction is warranted, it can be accommodated with the 80-foot ROW width. Saratoga Avenue is intended to have a "downtown neighborhood", pedestrian friendly character and scale; as such, the ROW width was held to 56-feet but includes adjacent 5-foot sidewalk within an easement in the adjacent private property on both

Table 2.2-1: ROAD ROW COMPARISON

Road Name ¹	Road Type ²	Special Feature	Existing ROW Width (ft) ³	City Standard ROW Width (ft) ⁴	KMP Planned ROW Width (ft) ⁵	Proposed ROW width (ft)/Cross Section Designation ²
Kamokila Boulevard (por)	Arterial	Bicycle Lanes	NA ^{3a}	102-108	58	80/4a
Wakea Street	Arterial	Bicycle Lanes	NA ^{3b}	102-108	78	80/4a
Enterprise Avenue	Arterial	Bicycle Lanes	80	102-108	100	80/4a
Kualaka'i Parkway ^{1a} (por)	Arterial	Bicycle Lanes	80	102-108	199	80/4a
Saratoga Avenue (por)	Arterial	Bicycle Lanes	60	102-108	138	80/4a
Boxer Road	Arterial	Bicycle Lanes	60	102-108		80/4a
Malakole Street (por)	Arterial	Bicycle Lanes	80	102-108	58	80/4a
Midway Road (E-W)	Arterial	Bicycle Lanes	80	102-108		80/4a
Independence Street ^{1a}	Arterial	Bicycle Lanes	80	102-108	138	80/4a
Kamokila Boulevard (por)	Collector	Bicycle Lanes	NA ^{3a}	66-70-78	58	60/2g
Lexington Street	Collector	Parking Lanes	60	66-70-78	58	60/2e
Midway Road (N-S)	Collector	Parking Lanes	60	66-70-78	58	60/2e
Coral Sea Road	Collector	Bicycle Lanes	60	66-70-78	58	60/2g
Kualaka'i Parkway ^{1a} (por)	Collector	Bicycle Lanes	NA ^{3c}	102-108	199	80/2g
Franklin D. Roosevelt Avenue	Collector		60-80	66-70-78	58	60/2c or 2d
Saratoga Avenue (por-downtown)	Collector	Street Parking	60-70	66-70-78	138	56/2f
Malakole Street (por)	Collector	Bicycle Lanes	80	66-70-78	58	60/2g
Shangrila Street	Collector	Parking Lanes	60	66-70-78		60/2e
West Perimeter Road ^{1a}	Sub-Collector	Bicycle Lanes	80	40-44-48-50		44/2b
Copahee Avenue	Sub-Collector	Parking Lanes	44	40-44-48-50		44/2a
Coral Sea Road	Sub-Collector	Bicycle Lanes	56-80	40-44-48-50	58	44/2b
Essex Road	Sub-Collector	Bicycle Lanes	NA ^{3c}	40-44-48-50	58	44/2b
Yorktown Street	Sub-Collector	Parking Lanes	44	40-44-48-50		44/2a
Tripoli Street	Sub-Collector	Bicycle Lanes	80	40-44-48-50		44/2b
Un-named (adjacent to Parcel 11)	Sub-Collector		26-44	40-44-48-50		30/2h

NOTES:

1. Reference: <http://gis.hicentral.com/Pubwebsite/>. Unless otherwise noted.
- 1a. Road Name: not shown on City's GIS website.
2. Reference: Fehr & Peers - August 9, 2010 Draft Memorandum.
3. Reference: Land Court Application 1069, Map 957.
- 3a. Not a subdivided road. Propose exchanging portions of West Perimeter Road ROW to create Kamokila Blvd.
- 3b. Not a subdivided road. Propose exchanging portions of Hornet Avenue ROW to create Wakea St.
- 3c. Not a subdivided road.
4. Reference: Subdivision Street Standards, Dept. of Planning & Permitting dated Dec. 2000.
5. Reference: HAR Chapter 15-215 Draft #7, Table 5.

Figure 2.2-1 - "Draft - Kalaeloa Roadway Concept" dated August 10, 2010 provides a graphic for the existing and proposed road ROW.

sides of the ROW. FDR is an exception for two reasons. The first is that FDR provides a “bypass” of the “downtown” area; as such the road section is limited to a travel lane in each direction, a center median or turn-lane, and a sidewalk in each direction. The second is that FDR has large trees along the makai ROW; roadway sections were developed to retain as many of these trees as possible to preserve the character of this road.

Sub-collector streets provide access and circulation to less-developed/more remote parcels within the Kalaeloa CDD. Sub-collector streets include: West Perimeter Road; Copahee Avenue; Coral Sea Road from Tripoli Street to the beach park; Essex Road between Kualaka'i Parkway and Tripoli Street; Yorktown Street; Tripoli Street; and the un-named street adjacent to Parcel 11. Sub-collector streets typically have 44-foot ROW widths; with a travel lane, a bike lane or parallel parking, and a sidewalk in each direction. The exception is an un-named street, which has a 30-foot ROW and with a travel lane and a sidewalk in each direction.

A single-lane roundabout at the Fort Barrette Road/Franklin D Roosevelt Avenue/Enterprise Avenue intersection is being considered by DOT-Highways Division. It is noted that, sometime before full buildout the single-lane roundabout would not work acceptably; a conventional signalized intersection is being proposed at this intersection.

As of the writing of this report, the City's high-capacity transit (Rail) project has not been conceptually design within the Kalaeloa CDD. Nevertheless, the IMPU has provided for a conceptual transit corridor within the Kalaeloa CDD. The Rail corridor alignment follows Wakea Street to Midway Road, to Enterprise Avenue, to Independence Street, and to Kualaka'i Parkway and is graphically shown on Figure 2.2-1. Should an above-ground rail project occur within the corridor, the median could be used to accommodate the Rail's support structure(s).

Emergency responders have often commented that access from Kalaeloa CDD's western edge to the beach/U.S. Coast Guard is needed. A suggested emergency access connection, which is not part of this IMPU, is graphically shown on Figure 2.2-1 and needs to be coordinated with DOT-A.

2.2.3 Impact fees, assessment, and monthly fees

In accordance with the Revised Ordinances of Honolulu Chapter 33A, traffic impact fees would be assessed on developers within the Kalaeloa CDD to provide for Ewa regional transportation improvements.

Additionally, upon acceptance of Section 2.2 by the DOT-Highways and DTS, an order of magnitude opinion of probable construction costs (OMOPCC) for the roadways as shown on Figure 2.2-1 will be provided. HCDA would use the OMOPCC to prorate an assessment for onsite roadway improvements that developers within the Kalaeloa CDD would be required to pay prior to connecting to the roadways.

Landowners would be required to pay certain roadway maintenance fees. Rates would be based upon operations and maintenance costs.

2.3 DRAINAGE - Section 2.3 will not be provided at this time.

2.3.1 Background

2.3.2 Improvements

2.3.3 Assessment, facilities charge and monthly fees

2.4 POTABLE WATER - Section 2.4 will not be provided at this time

2.4.1 Background

2.4.2 Improvements

2.4.3 Assessment, facilities charge and monthly fees

2.5 NON-POTABLE IRRIGATION (R1)

2.5.1 Background

Per discussion with BWS, a dual water system (i.e., separate potable and non-potable irrigation systems) within the Kalaeloa CDD is required.

R1 water is produced at the Honouliuli WWTP and is distributed via a pipe line: towards the west, parallel to and north of the Kalaeloa CDD; towards the south, parallel to and west of the Kalaeloa CDD; and then towards the west along Olai Street. Since BWS's R1 distribution pipe line is in the vicinity of the Kalaeloa CDD northern and western boundaries, multiple connections to BWS's R1 system are proposed in the following Improvements Section.

Only Parcel 1, the Navy's golf course, currently receives BWS R1 service. Therefore, within the Kalaeloa CDD, a new R1 system would need to be designed to BWS standards, constructed, and then dedicated to the BWS.

2.5.2 Improvements

Per discussion with BWS, water use criteria and system design standards are to follow the "Ewa Non-Potable Water Master Plan", dated January 2007. Based on HAR 15-214, Draft #8, Subsection 47 (8): "The portion of each individual lot that may be landscaped with lawns or landscaping requiring watering or irrigation shall be limited to:

- (A) No more than twenty percent of the area not occupied by buildings in the T2 and T3 zones, and
- (B) No more than ten percent of the area not occupied by buildings in the T4 and T5 zones.

Where irrigation is required for any area other than a lawn, subsurface or drip irrigation systems (rather than above-ground spray systems) shall be installed ..." To be conservative, the landscaped area is calculated as the (10 or 20) percent times the entire Parcel area. The calculations for landscaped area, R1 demands by parcel and R1 demands by point-of-connection to BWS's transmission main are provided in Appendix B – R1.

To promote development momentum within the Kalaeloa CDD, connections to the existing BWS system were maximized. The IMPU indicates four initial connections to BWS's existing transmission main and an eventual connection to BWS's future 24-inch transmission main at the

eastern end of Independence Street. (Refer to Figure 2.5-1). The Navy's Golf Course connection to the existing BWS 16" diameter R1 main near Honouliuli WWTP is to remain solely for the Navy's Golf Course use.

The following describes the proposed R1 improvements.

- Parcels 9, 10, and 10A would be serviced by the Olai Street Connection.
- Parcels 3, portions of 4 and 5, 7 and 8 would be serviced by the Malakole Street Connection.
- Parcels 45 and 46 would be serviced by the existing 12" diameter main west of Parcel 45 during the 0 to 7 year development schedule.
- Parcels 12, 31, 32, 32A, 32B, 32C, 34, 40, 42, 53 and 55 would be serviced by the Fort Barrette connection during the 0 to 7 year development schedule.

During the 7 to 20 year development schedule it is anticipated that the Parcel 45 and Fort Barrette systems would be interconnected with the future BWS 24" diameter R1 transmission main at the eastern end of Independence Street.

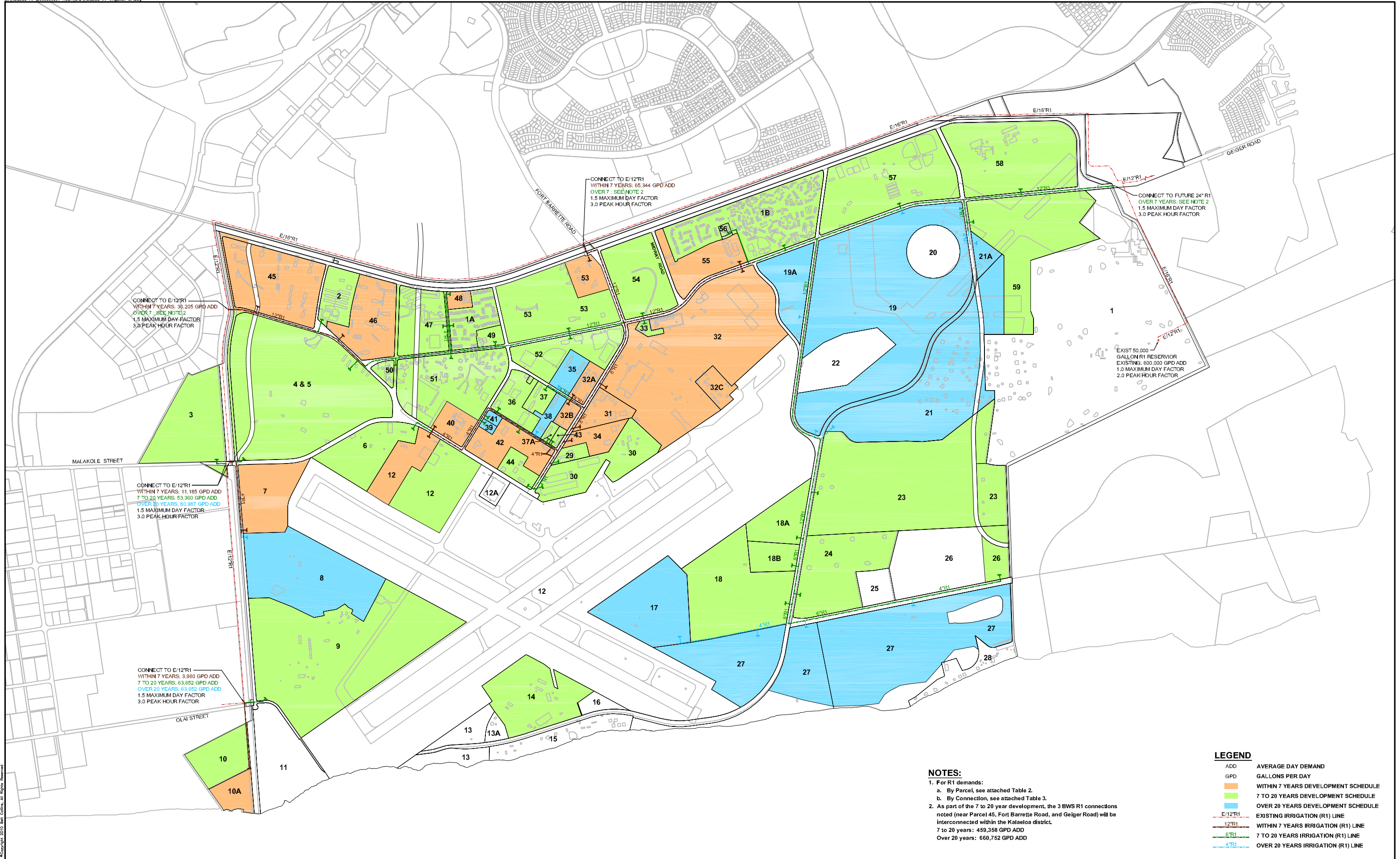
Figure 2.5-1 shows the minimum distribution network based on preliminary modeling. Upon receipt of BWS water pressure information for the five points of connection for the three development schedules, the R1 system sizing and layout will be verified, and Figure 2-5 updated. This revised R1 system layout and R1 system modeling data would then be re-submitted to BWS for review and approval.

2.5.3 Assessment, facilities charge and monthly fees

Upon acceptance of Section 2.5 by BWS, an OMOPCC for the R1 system as shown on Figure 2.5-1 will be provided. HCDA would use the OMOPCC as a basis to prorate assessments for onsite R1 system improvements that developers within the Kalaeloa CDD would be required to pay prior to connecting to it.

BWS currently does not charge R1 users a facilities charge for: offsite resource development, transmission or storage as these costs are built into the prevailing R1 rate. However, R1 users pay a facilities charge for the installation of service and/or meter connections prior to connecting to BWS's R1 system; the charges are similar to connecting to BWS's potable water system.

Tenants would need to pay monthly metered R1 fees at the prevailing R1 rate, which may be adjusted annually by BWS.



CONNECT TO E/12"R1
 WITHIN 7 YEARS: 30,205 GPD ADD
 OVER 7 : SEE NOTE 2
 1.5 MAXIMUM DAY FACTOR
 3.0 PEAK HOUR FACTOR

CONNECT TO E/12"R1
 WITHIN 7 YEARS: 65,344 GPD ADD
 OVER 7 : SEE NOTE 2
 1.5 MAXIMUM DAY FACTOR
 3.0 PEAK HOUR FACTOR

CONNECT TO FUTURE 24" R1
 OVER 7 YEARS: SEE NOTE 2
 1.5 MAXIMUM DAY FACTOR
 3.0 PEAK HOUR FACTOR

CONNECT TO E/12"R1
 WITHIN 7 YEARS: 11,185 GPD ADD
 7 TO 20 YEARS: 53,360 GPD ADD
 OVER 30 YEARS: 80,987 GPD ADD
 1.5 MAXIMUM DAY FACTOR
 3.0 PEAK HOUR FACTOR

CONNECT TO E/12"R1
 WITHIN 7 YEARS: 3,960 GPD ADD
 7 TO 20 YEARS: 63,652 GPD ADD
 OVER 30 YEARS: 83,652 GPD ADD
 1.5 MAXIMUM DAY FACTOR
 3.0 PEAK HOUR FACTOR

EXIST 50,000
 GALLON R1 RESERVOIR
 EXISTING: 600,000 GPD ADD
 1.0 MAXIMUM DAY FACTOR
 2.0 PEAK HOUR FACTOR

NOTES:
 1. For R1 demands:
 a. By Parcel, see attached Table 2.
 b. By Connection, see attached Table 3.
 2. As part of the 7 to 20 year development, the 3 BWS R1 connections noted (near Parcel 45, Fort Barrette Road, and Geiger Road) will be interconnected within the Kalaheo district.
 7 to 20 years: 459,358 GPD ADD
 Over 20 years: 660,752 GPD ADD

LEGEND

ADD	AVERAGE DAY DEMAND
GPD	GALLONS PER DAY
Orange	WITHIN 7 YEARS DEVELOPMENT SCHEDULE
Green	7 TO 20 YEARS DEVELOPMENT SCHEDULE
Blue	OVER 20 YEARS DEVELOPMENT SCHEDULE
E/12"R1	EXISTING IRRIGATION (R1) LINE
12"R1	WITHIN 7 YEARS IRRIGATION (R1) LINE
8"R1	7 TO 20 YEARS IRRIGATION (R1) LINE
6"R1	OVER 20 YEARS IRRIGATION (R1) LINE

FIGURE 2.5-1: DRAFT - KALAELOA NON-POTABLE IRRIGATION (R1) CONCEPT

2.6 SEWER

2.6.1 Background

Within the Kalaeloa CDD, the majority of the existing sewer system would eventually be replaced to: handle the proposed densities; be installed within road ROW; and connect to individual Parcels. All new sewer improvements intended to be dedicated to ENV would be designed and constructed to ENV design standards.

2.6.2 Improvements

Per discussion with DPP, it was concluded that using ENV design standards to calculate wastewater flow based solely on tributary area would result in overly conservative projections, which would result in over-sizing of the sewer system. Upon further discussion with DPP, it was agreed that, developing an average sewer base flow by Building Function and Use and Transect Zone, and then applying the average sewer base flow to the Parcel's Projected Future Buildout would be a more feasible approach. Wastewater Flow Computations based on these criteria for the three development periods are provided in Appendix B – Sewer.

To promote development momentum within the Kalaeloa CDD, connection to the existing sewer system was maximized for development within the initial 7 year time frame. Most of the new sewer infrastructure projected to be needed to serve the Kalaeloa CDD would be required for development in the 7 to 20 year time frame. Minimal additional infrastructure would be required for development in the over 20 year time frame. (Refer to Figure 2.6-1)

Both gravity and force main systems are required to provide service from the Kalaeloa CDD Parcels to the Honouliuli Wastewater Treatment Plant. Additionally some Parcels may require on-site sewage pumping stations (SPS) and force mains to connect to the proposed sewer system; these Parcels were identified on Figure 2-6.

The following describes the proposed sewer improvements. Unless otherwise noted, all improvements are new construction.

- Parcels 1, 1A, 2, 6, 12, 12A, 29, 30, 31, 32, 32A, 32B, 32C, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53 (portion of) would be connected by gravity mains to SPS-E.

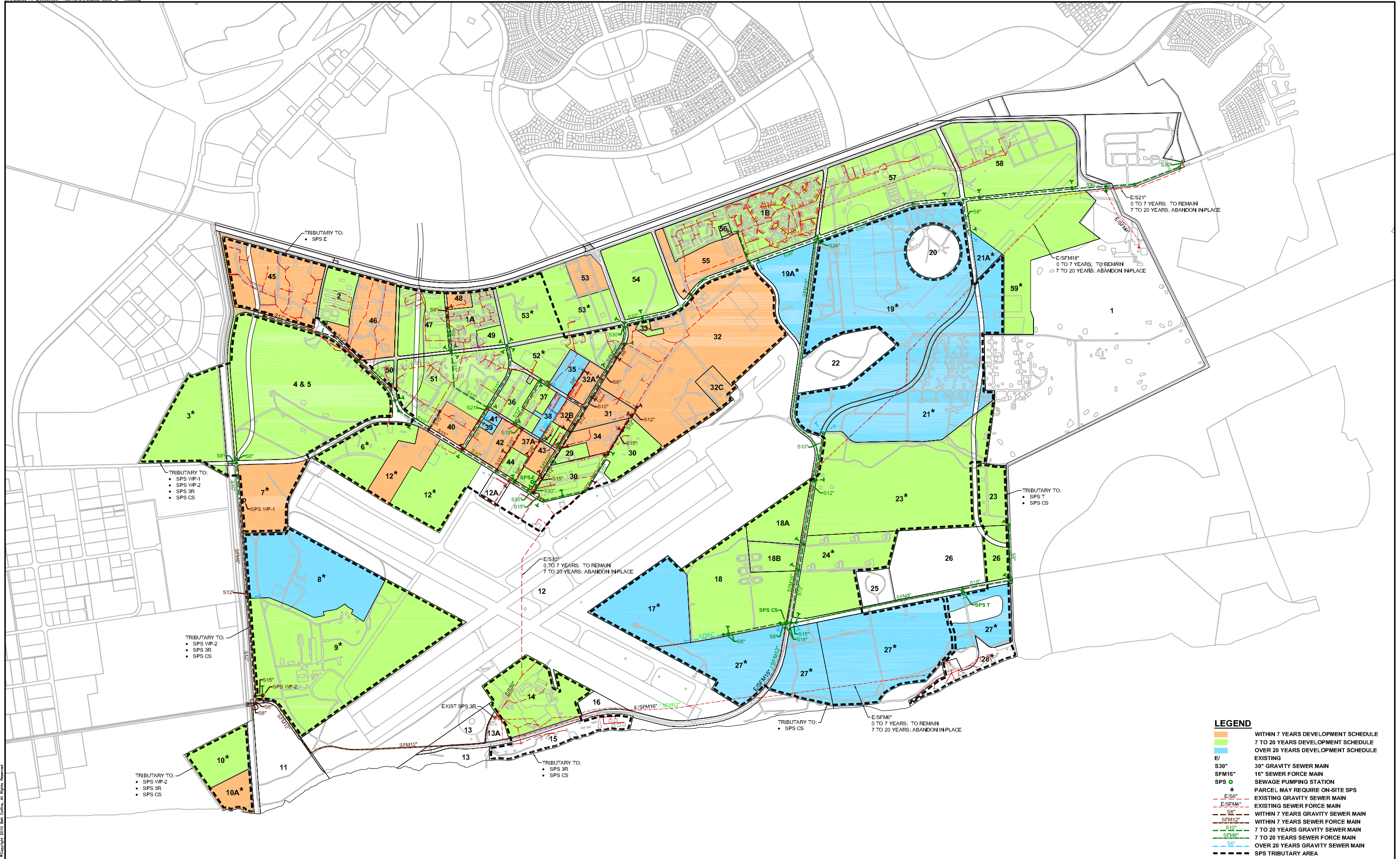
- SPS-E would be connected by force main within Enterprise Avenue to the gravity main within Independence Street.
- Parcels 1B, 53 (portion of), 54, 55, 56, 57 and 58 would be connected by gravity main within Independence Street/Geiger Road to the Honouliuli Wastewater Treatment Plant.
- Parcels 3, 4, 5, and 7 would be connected by gravity mains to SPS WP-1.
- SPS WP-1 would be connected by force main to the gravity main connecting Parcels 8 and 9 to SPS WP-2.
- Parcels 10 and 10A would also be connected by force main (in driveway easements) and gravity mains to SPS WP-2.
- SPS WP-2 would be connected by force main to existing SPS 3R.
- Parcels 14 and 15 are already connected to existing SPS 3R; because these connections are discrete, it is proposed that Parcels 14 and 15 own and maintain the sewer system servicing their lot to the SPS 3R connection.
- Existing SPS 3R would require some refurbishing work.
- SPS 3R would be connected to SPS CS using the existing 16" and 18" force mains, slip-lining in a 12" force main is proposed.
- Parcels 23 (portion of) and 26 would be connected by gravity mains to SPS T.
- Parcels 27 (portion of) and 28 would be connected by force main (in a driveway easement) to SPS T.
- SPS T would be connected by force main to the gravity main connecting Parcels 24 and 27 (portion of) to SPS CS.
- Parcels 17 and 18 would be connected by force and gravity mains (in a driveway easement) to SPS CS.
- Parcels 18A, 18B, 19, 21, 23 (portion of) would also be connected by gravity main to SPS CS.
- SPS CS would be connected by force main to the gravity main within Independence Street.
- Parcels 21A and 59 would be connected by force and gravity mains to the gravity main within Independence Street.

2.6.3 Assessment, facilities charge and monthly service charge

Upon acceptance of Section 2.6 by the City, an OMOPCC for the sewer system as shown on Figure 2.6-1 would be provided. HCDA would use the OMOPCC to prorate an assessment for onsite sewer improvements that developers within the Kalaeloa CDD would be required to pay prior to connecting to the sewer system.

In accordance with the Revised Ordinances of Honolulu, subdivision or development projects would also be required to pay the City a wastewater system facility charge for offsite wastewater transport, treatment, and disposal prior to connecting to the City's sewer system.

Tenants would need to pay a monthly sewer service charge.



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LEGEND

	WITHIN 7 YEARS DEVELOPMENT SCHEDULE
	7 TO 20 YEARS DEVELOPMENT SCHEDULE
	OVER 20 YEARS DEVELOPMENT SCHEDULE
	EXISTING
	S30" 30" GRAVITY SEWER MAIN
	SFM16" 16" SEWER FORCE MAIN
	SEWAGE PUMPING STATION
	PARCEL MAY REQUIRE ON-SITE SPS
	EXISTING GRAVITY SEWER MAIN
	EXISTING SEWER FORCE MAIN
	WITHIN 7 YEARS GRAVITY SEWER MAIN
	WITHIN 7 YEARS SEWER FORCE MAIN
	7 TO 20 YEARS GRAVITY SEWER MAIN
	7 TO 20 YEARS SEWER FORCE MAIN
	OVER 20 YEARS GRAVITY SEWER MAIN
	SPS TRIBUTARY AREA

FIGURE 2.6-1: DRAFT - KALAELOA SEWER CONCEPT

2.7 ELECTRIC, TELEPHONE, CABLE TELEVISION AND DATA (ETC)

2.7.1 Background

The existing ETC systems consist of: Naval Facilities Engineering Command Hawaii (NAVFAC HAW) owned, overhead and underground electric distribution lines energized at 4.16 kilo-volts (kV) and 11.5 kV; communications lines owned and maintained by Naval Computer and Telecommunications Area Master Station (NCTAMS); and private telephone and cable television lines owned and maintained by Hawaiian Telcom (HTCO) and Oceanic Time Warner Cable (OTWC) respectively. Hawaiian Electric Company (HECO) presently provides redundant 46 kV service to the existing NAVFAC HAW Station D, which is located near the intersection of Saratoga and Enterprise Avenues, through a single electric meter. Except for Barbers Point Elementary School, all other buildings and facilities currently within the Kalaeloa CDD are connected to NAVFAC HAW's electrical distribution system and pay prorated electrical costs to NAVFAC HAW. HTCO and OTWC provide telecommunications service to civilian and non-Department of Defense (DOD) facilities within Kalaeloa. These non-DOD facilities include the Kalaeloa Airport and the Hawaii Army National Guard facilities. The remaining DOD facilities within Kalaeloa are served by NCTAMS.

Since the Navy has closed Barbers Point as an active base, NAVFAC HAW and NCTAMS have been pursuing a strategy to wean the remaining facilities off of the Navy's utility systems, but have so far been unsuccessful. In order to limit their maintenance responsibilities, NAVFAC HAW has agreed to maintain electric service to existing buildings and facilities that were energized at the time of the base's closure and would re-energize such buildings and facilities if new tenants lease them. However, NAVFAC HAW has indicated that no new developments would be served from the Navy's system. HECO would provide the electrical service to the Kalaeloa CDD. To facilitate the transition over to HECO service, NAVFAC HAW has agreed to provide temporary service on a limited basis, with the understanding that HECO must provide the permanent electric service.

Although, the local utility provider for the telephone and CATV systems has yet to be determined; in all likelihood, HTCO and OTWC would provide telecommunications services to non-Department of Hawaiian Homes Land (DHHL) and Sandwich Isles Communications (SIC) would provide telecommunication services to DHHL-owned parcels.

2.7.2 Improvements

An Ultimate Electrical & Communications Master Plan was developed (Refer to Figures 2.7-1 and 2.7-2). The following table provides the anticipated electrical and telephone line requirements by Parcel. Although the HAR Chapter 15-215 indicates that most electrical and communications infrastructure would be constructed underground, it is likely that some overhead systems would be constructed and utilized until the full build-out of the City-dedicable roadways takes place. Figure 2.7-1 indicates the anticipated electric and telecommunication ductline requirements for the principal roadways within the Kalaeloa CDD. Also indicated on Figure 2.7-1 are schematic routes for overhead 46 kV HECO-owned lines that would export power from the proposed alternate energy facilities within the Kalaeloa CDD to HECO's energy grid. Initially, it is anticipated that there would be three points where HECO, HTCO and OTWC service would be extended into Kalaeloa CDD: at the end of the City's Kamokila Boulevard Extension project near the western end of the Kalaeloa CDD; at Fort Barrette Road and FDR intersection; and at the FDR and Coral Sea Avenue intersection. Each of these connections consists of underground duct systems containing conduits for electric and communications utility cables. As per their agreement with DHHL, SIC would be responsible to extend SIC infrastructure into Kalaeloa CDD to provide service to the DHHL parcels.

Eventually, based on the proposed long-range development plans, one and possibly two HECO substations may be required, within the Kalaeloa CDD to provide sufficient electrical power. HECO will evaluate the load growth within the Kalaeloa CDD and determine when a substation would be required. HECO would request dedication of land for this substation and would construct the substation and the 46 kV power lines required to feed the substation. Where these lines do not fall within road right-of-way, HECO would request assistance in obtaining easements for the 46 kV power lines. It should be noted that if some or all of the proposed alternate energy facilities are developed within the District, the power output from these facilities would serve to offset the need for development of the second substation.

The proposed telecommunications duct systems provide pathways for HTCO and OTWC to extend their telephone, cable television and broadband services into the Kalaeloa District. Currently, both service providers utilize fiber optic cables for their trunking or transmission facilities and copper, twisted-pair cables, in HTCO's system, or copper, coaxial cables, in OTWC's system, for service lines to residences and commercial properties. These latter types of cables have limitations on the maximum bandwidth or frequency that they are able to support.





However, both HTCO and OTWC are considering, and in some cases, implementing the deployment of fiber optic cables in their distribution networks which considerably increases the bandwidth available to residential and commercial customers.

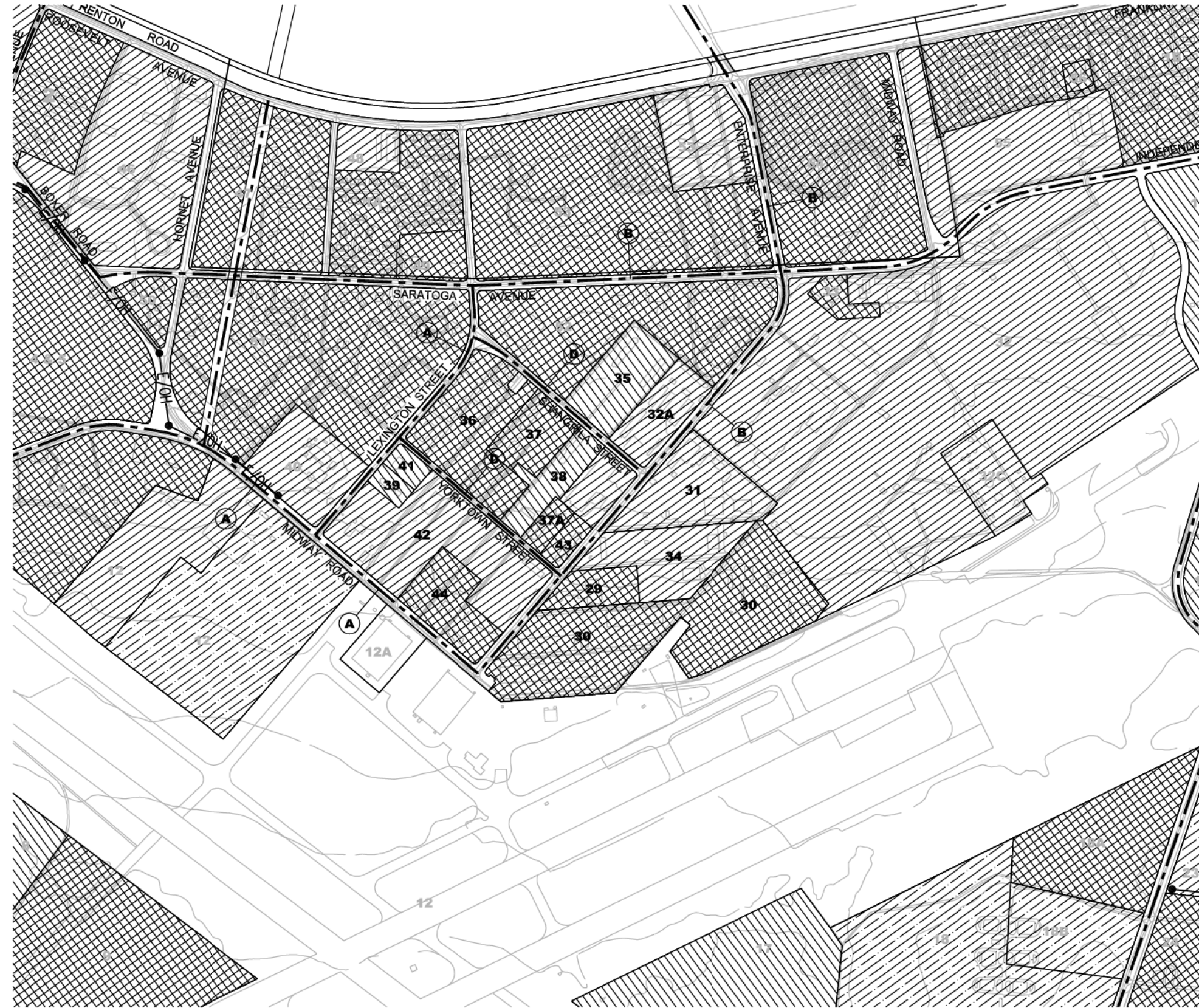
2.7.3 Assessment, facilities charge and monthly fees

Upon acceptance of Section 2.7 by HECO, HTCO and OTWC, an OMOPCC for the ETC system and anticipated HECO facility charges as shown on Figure 2.7-1 will be provided. HCDA would use the OMOPCC to prorate an assessment for onsite ETC improvements that developers within the Kalaeloa CDD would be required to pay prior to connecting to the ETC system. It is noted that the individual alternate energy facility owners, or a consortium of owners, would be responsible to pay HECO for construction of the overhead 46 kV lines from the facilities to the designated point of connection into HECO's energy grid.





Tenants would need to pay monthly ETC fees. Monthly and unit rates are established by the utility provider based upon operations and maintenance costs and usage. These rates are approved by the Public Utilities Commission (PUC) for HECO and HTCO tariffs, and the State Department of Commerce and Consumer Affairs for OTWC.

DEVELOPMENT SCHEDULE YEARS

-  WITHIN 7 YEARS
-  ALTERNATE ENERGY (SITE) (WITHIN 7 YEARS)
-  7 TO 20 YEARS
-  OVER 20 YEARS



LEGEND:

-  EXST. UTILITY FACILITIES
-  PROPOSED HECO 46KV OVERHEAD LINE
-  PROPOSED UNDERGROUND UTILITY LINES
-  EXST. NAVY 46KV OVERHEAD LINE TO REMAIN (LINE TO BE UNDERGROUNDED IN THE FUTURE)

DUCT COMPLEMENT LEGEND:

- A** 2-4" & 3-5" HECO
4-4" HTCO
4" CATV
- B** 2-4" & 4-5" HECO
4-4" HTCO
4" CATV
- C** 4-4" HTCO
- D** 2-4" HECO
2-4" HTCO
4" CATV
- E** 4-5" HECO
4-4" HTCO
4" CATV

**ENLARGED DOWNTOWN ULTIMATE
ELECTRICAL & COMMUNICATIONS AREA PLAN**
SCALE: 1"=400'



RONALD N. S. HO & ASSOCIATES, INC.
Electrical Engineers

HAWAII COMMUNITY DEVELOPMENT AUTHORITY
STATE OF HAWAII
KALAELOA
DEVELOPMENT DISTRICT

**ENLARGED DOWNTOWN ULTIMATE
ELECTRICAL & COMMUNICATIONS AREA PLAN**

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

Signature
DATE: 04.30.2012
Expiration Date of the License

ENGINEER: SS
DRAFTSMAN: CAD
CHECKED BY: SS
DATE: NOVEMBER 2009

EXECUTIVE DIRECTOR, HAWAII COMMUNITY DEVELOPMENT AUTHORITY

REVISION	DATE	BY

FILE	POCKET	FOLDER	NO.

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Kalaeloa Re-development Parcel List and Anticipated Utility Demands

for Belt Collins Hawaii (Hawaii Community Development Authority)

Parcel Assignee	Master Plan Parcel No.	Tax Map Key	Parcel No. (FIV)	Use Description	Transect Designation	Gross Land Area	Commercial Area (SF)	Dwelling Units (DU)	kVA per DU	VA per Comm. SF	Development Time Frame (Elec. Loads in kVA)				Aggregate kVA	Anticipated Tel. Lines
											Existing	0-7 years ***	7-20 years	over 20 years		
DOD	1	9-1-013:018		Barbers Point Golf Course	T2 Rural	275.470					963.00				963.00	10
Carmel	1a	9-1-013:077		Kaimana Housing	T4 Urban Center	16.190	38,856	349	5.00	6.65			2003.39		2,003.39	541
Carmel	1b	9-1-013:014 & 082		Makai/Mahana Housing	T3 General Urban	56.975	68,370	615	5.00	6.65	1167.00		3529.66		3,529.66	923
DOE	2	9-1-013:003		Barbers Point Elementary School	T3 General Urban	14.458	0	173	5.00	1.50	0.00		865.00		865.00	0
DHHL	3	9-1-013:001		Eco-Industrial	T3 General Urban	44.102	30,871			3.38	41.00		104.19		104.19	14
DHHL	4 & 5	9-1-013:028		Eco-Industrial	T3 General Urban	136.938	0			See ***		-5000.00			-5,000.00	0
DHHL	4 & 5	9-1-013:028		Commercial	T3 General Urban		136,938			6.65		910.64			910.64	63
DHHL	6	9-1-013:027		West Central Commercial	SD Spec. District	28.724	40,214			6.65			267.42		267.42	18
DHHL	7	9-1-013:029		West Central Light Industrial	T3 General Urban	29.853	33,435			6.65		-4777.66			-4,777.66	15
NAVY	8	9-1-013:060		Oily Waste Land Farm	T3 General Urban	73.741	82,590			6.65				549.22	549.22	38
DHHL	9	9-1-013:061		Motor Sports Center	T3 General Urban	139.297	195,016			6.65			1296.86		1,296.86	90
BWS/NAVY	10	9-1-013:028		Future Desalinization Plant	T3 General Urban	20.029	28,041			6.65			186.47		186.47	13
HCDA	10a	9-1-013:047		Eco-Industrial	T3 General Urban	10.569	14,797			6.65	12.00	98.40			98.40	7
NAVY/C&C	11	9-1-013:030		Wildlife Preserve	T1 Natural	37.377										
State DOT	12	9-1-013:032		Airport	SD Spec. District	7.522		150	5.00				750.00		750.00	225
State DOT	12	9-1-013:032, 076, 088, 089 & 091		Airport	SD Spec. District	744.694	1,148,700			1.00	178.00	871.30	277.40		1,326.70	
State	12a	9-1-013:087		School	SD Spec. District	4.520					48.00				48.00	
NAVY/C&C	13	9-1-013:031 & 034		Coastal Park	T1 Natural	16.292					1.40				1.40	
NAVY	13a	9-1-013:062		Sewage Pump Station	T2 Rural	3.661										
USCG	14	9-1-013:063		Coast Guard Compound	SD Spec. District	42.964					239.00		59.75		298.75	
NAVY	15	9-1-013:071		Nimitz Beach Recreation Area	T1 Natural	21.308									0.00	0
NAVY/C&C	16	9-1-013:064		Park - Pending	T1 Natural	4.715					34.00				34.00	
NAVY	17	9-1-013:033		Airport - Pending	T2 Rural	45.597	31,918			6.65				212.25	212.25	15
NAVY/HCDA	18	9-1-013:067		Open Space	T2 Rural	65.356	45,749			6.65			304.23		304.23	21
NAVY/HCDA	18a	9-1-013:069		Park	T2 Rural	19.361	13,553			6.65			90.13		90.13	6
NAVY/HCDA	18b	9-1-013:067		Open Space	T2 Rural	11.501	8,051			6.65			53.54		53.54	4
DHHL/HCDA	19	9-1-013:043		Park	T2 Rural	32.000	22,400			6.65				148.96	148.96	10
DHHL/HCDA	19	9-1-013:043		Park	T3 General Urban	134.784	94,349			6.65				627.42	627.42	43
DHHL/HCDA	19a	9-1-013:020		Eco-Industrial	T3 General Urban	22.997	25,757			6.65				171.28	171.28	12
FAA	20	9-1-013:019		Navigation Beacon	SD Spec. District	18.030					1.00				1.00	
DHHL	21	9-1-013:038		Festival Commercial Area	T2 Rural	50.482	50,482			6.65				335.71	335.71	23
DHHL	21	9-1-013:038		Festival Commercial Area	T3 General Urban	47.056	47,056			6.65				312.92	312.92	22
NAVY/C&C	21a	9-1-013:037		Park - Pending	T2 Rural	5.634	5,634			6.65				37.47	37.47	3
DHHL/HCDA	22	9-1-013:044		Coral Pit	T2 Rural	29.960										
DHHL/HCDA	23	9-1-013:039		Park	T2 Rural	131.035	26,207			6.65		-10000.00	174.28		-9,825.72	12
DHHL/HCDA	23	9-1-013:039		Park	T3 General Urban	14.750		177	5.00				885.00			266
DHHL	24	9-1-013:040		Marine Park	T2 Rural	49.177	68,848			6.65			457.84		457.84	32
DHHL/HCDA	25	9-1-013:041		Open Space	T1 Natural	9.303										
HCDA	26	9-1-013:042		Park	T2 Rural	47.556										
HCDA	26	9-1-013:042		Park	T3 General Urban	6.421		64	5.00				320.00		320.00	96
HCDA	26	9-1-013:042		Park	T3 General Urban	3.961		39	5.00				195.00		195.00	59
NAVY/C&C	27	073		Park - Pending	T1 Natural	27.792										
NAVY/C&C	27	073		Park - Pending	T2 Rural	155.678	108,975			6.65				724.68	724.68	50
NAVY/C&C	27	073		Park - Pending	T3 General Urban	28.485		284	5.00				1420.00		1,420.00	426
NAVY	28	9-1-013:074		White Plains Recreation Area	T1 Natural	11.149					35.00					
NAVY	28	9-1-013:074		White Plains Recreation Area	T3 General Urban	4.254										0
FIV	29	9-1-013:047 (por)	10	Airport Related	T3 General Urban	3.809	21,330			6.65	122.00		141.84		141.84	10
NAVY	30	9-1-013:047		DRMO	T3 General Urban	31.746	177,778			6.65	140.00			1182.22	1,182.22	82
NAVY	31	9-1-013:047		PWC Compound	T3 General Urban	10.890	60,984			6.65	125.00			405.54	405.54	28
State DOD	32	9-1-013:045		Hawaii Air National Guard Compound	SD Spec. District	126.434	925,257			6.65	849.00		6152.96		6,152.96	426
State DOD	32	9-1-013:045		Hawaii Air National Guard Compound	SD Spec. District	10.893	79,717			6.65		530.12			530.12	37
State DOD	32	9-1-013:045		Hawaii Air National Guard Compound	SD Spec. District	0.836	6,121			6.65		40.70			40.70	3

Kalaeloa Re-development Parcel List and Anticipated Utility Demands

for Belt Collins Hawaii (Hawaii Community Development Authority)

Parcel Assignee	Master Plan Parcel No.	Tax Map Key	Parcel No. (FIV)	Use Description	Transect Designation	Gross Land Area	Commercial Area (SF)	Dwelling Units (DU)	kVA per DU	VA per Comm. SF	Development Time Frame (Elec. Loads in kVA)				Aggregate kVA	Anticipated Tel. Lines	
											Existing	0-7 years ***	7-20 years	over 20 years			
	32a	9-1-013:050		Hawaii Air National Guard Compound	SD Spec. District	3.567	26,101			6.65			173.57			173.57	12
					SD Spec. District	2.364	17,303			6.65			115.06			115.06	8
	32b	9-1-013:056		Hawaii Air National Guard Compound	SD Spec. District	3.730	27,296			6.65			181.52			181.52	13
	32c	9-1-013:046		Hawaii Air National Guard Compound	SD Spec. District	7.316	53,539			6.65			356.03			356.03	25
FIV	33	9-1-013:021	14	Military and Mixed Use	T3 General Urban	2.039	32,624			6.65	38.00			216.95		216.95	15
DHHL	34	9-1-013:048		Vocational Training	T3 General Urban	9.722	54,443			6.65		362.05				362.05	25
HPHA	35	9-1-013:049		Homeless Shelter	T4 Urban Center	7.550		211	5.00					1055.00		1,055.00	317
FIV	36	9-1-013:023 & 051	9	Mixed Use	T5 Urban Core	13.532	48,715	437	5.00	6.65			2508.95			2,508.95	678
VA	37	9-1-013:052		Homeless Shelter	T4 Urban Center	5.162		144	5.00				720.00			720.00	216
VA	37A	9-1-013:054		Homeless Shelter	T4 Urban Center	1.680		53	5.00				265.00			265.00	80
HPHA	38	9-1-013:053		Homeless Shelter	T4 Urban Center	4.742		132	5.00					660.00		660.00	198
FIV	39	9-1-013:057	8	Mixed Use	T4 Urban Center	1.208		38	5.00					190.00		190.00	57
FIV	40	9-1-013:085	7	Mixed Use	T4 Urban Center	9.454	22,690	204	5.00	6.65		1170.89				1,170.89	316
USPS	41	9-1-013:058		Post Office	T4 Urban Center	1.354	43,328			6.65				288.13		288.13	20
DHHL	42	9-1-013:024		Residential Area & Administrative	T3 General Urban	19.952		239	5.00		76.00	1195.00				1,195.00	359
DHHL	43	9-1-013:055		Homeless/Transitional Shelter	T4 Urban Center	1.527	48,864			6.65			324.95			324.95	22
DHHL	44	9-1-013:059		Park	T2 Rural	6.969	97,566			6.65			648.81			648.81	45
FIV	45	9-1-013:002	1	Light Industrial	T3 General Urban	49.679	596,148			6.65		3964.38				3,964.38	274
FIV	46	9-1-013:004	2	School/Mixed Use	T3 General Urban	30.941	371,292			6.65		2469.09				2,469.09	171
FIV	47	9-1-013:011	3	Mixed Use	T4 Urban Center	25.053	60,127	541	5.00	6.65			3104.84			3,104.84	839
FIV	48	9-1-013:079	4	Mixed Use	T4 Urban Center	3.384		94	5.00			470.00				470.00	141
FIV	49	9-1-013:078	5	Mixed Use	T5 Urban Core	3.950		165	5.00				825.00			825.00	248
FIV	50	9-1-013:010	6b	Mixed Use	T3 General Urban	3.170	4,438	39	5.00	6.65			224.51			224.51	61
FIV	51	9-1-013:026	6a	Mixed Use & Open	T3 General Urban	50.780	60,936	548	5.00	6.65			3145.22			3,145.22	850
FIV	52	9-1-013:022	11	Mixed Use & Open	T4 Urban Center	26.270	126,096	504	5.00	6.65			3358.54			3,358.54	814
FIV	53	9-1-013:012	12	Mixed Use & Open	T2 Rural	13.808	16,570	149	5.00	6.65			855.19			855.19	231
					T3 General Urban	25.000	30,000	270	5.00	6.65			1549.50			1,549.50	419
					T5 Urban Core	20.000	432,000	288	5.00	6.65		1811.38	2501.42			4,312.80	432
FIV	54	9-1-013:013	13	Mixed Use & Open	T2 Rural	21.417	77,101	179	5.00	6.65			1407.72			1,407.72	304
					T4 Urban Center	13.000	62,400	249	5.00	6.65			1659.96			1,659.96	402
FIV	55	9-1-013:081	15	Mixed Use	T3 General Urban	22.068	52,963	211	5.00	6.65		1407.20				1,407.20	341
FIV	56	9-1-013:083	16	Mixed Use	T3 General Urban	0.936	14,976			6.65			99.59			99.59	7
FIV	57	9-1-013:015	17	Mixed Use	T3 General Urban	68.632	823,584			6.65			5476.83			5,476.83	379
FIV	58	9-1-013:016	18	Light Industrial	T3 General Urban	69.568	556,544			6.65			3701.02			3,701.02	256
FIV	59	9-1-013:018 (por)	19	Open and Navy	T2 Rural	70.726				See ***		-5000.00				-5,000.00	0
							282,904			6.65		1881.31				1,881.31	130
							3506.58										
													4,069.40	-6,769.01	50,708.98	8,320.82	50,958.89
																	11636
																	707
								6,546									

Notes:

Yellow highlighted cells represent Special District Commercial Areas used to develop electrical loads but were not included in the Commercial Area (SF) 5,394,508 total.

*** - Negative additional loading within 0-7 year time frame assumes that all alternate energy projects are funded and constructed within that time frame. Note that current PUC limitation for purchase power agreement contracts between HECO and alternate energy facility suppliers is 5,000 kVA (5 MVA) per project. Projected commercial alternate energy projects include Parcel 4&5 - 5 MVA; Parcel 7 - 5 MVA; Parcel 23 - two 5MVA projects; and Parcel 59 - 5MVA. Projects larger than 5,000 kVA (5MVA) require HECO to solicit competitive pricing for the power purchase.

**** - Gross Commercial Area figure includes partial square footages that have been rounded up.

APPENDIX B - ROADWAYS

MEMORANDUM

Date: August 9, 2010

To: Craig McGinnis, Vice President, Hunt Development Group
Trina Onuma - Vice President, Belt Collins Hawaii

From: Daniel Rubins and Sohrab Rashid

Subject: *Kalaeloa Roadway Master Plan Study*

SJ09-1134

This memorandum summarizes the internal roadway infrastructure required to support the proposed Kalaeloa development in the Ewa Region of Oahu, Hawaii. The purpose of this study is to determine the street typology, intersection lane configurations, and anticipated traffic control devices for the roadway system within Kalaeloa under Buildout Conditions and for selected development phases. Specifically, this study identifies the number of travel lanes and the presence of on-street parking and/or bicycle lanes on each facility, as well as the required lane configurations and standard storage pocket lengths at each major intersection within the plan area. The results are presented in the following sections:

- A brief **background**,
- A summary of our **assumptions and methods**,
- **Recommended roadway improvements** describing the master roadway network,
- Summary of **roadway improvement phasing** under interim land use scenarios.

The impacts of the proposed project on roadways outside the Kalaeloa development area (e.g., at the Kapolei Parkway intersections of Fort Barrette Road and at Kualaka`i Parkway) will be addressed as part of a separate analysis.

BACKGROUND

The Hawaii Community Development Authority (HCDA) adopted the *Kalaeloa Master Plan* in March 2006, which lays out the framework for the redevelopment of Kalaeloa. The total Kalaeloa project area is approximately 3,700 acres and is bounded by the Campbell Industrial Park to the west, the City and Villages of Kapolei to the north, Ewa Villages, Ewa by Gentry and Ewa Beach residential communities and open spaces to the east, and the Pacific Ocean to the south. Ford Island Ventures (FIV) is currently in control of developing or redeveloping approximately 550 acres of Kalaeloa. At this point, few specific projects with detailed site plans are identified for development within Kalaeloa (e.g., the FBI building), though proposed development is expected to include a mix of residential, retail, office, and other supporting commercial and public uses. Because this evaluation is at the Master Plan level, not all of the local and sub-collector roadways have been identified within each parcel. As such, the roadway layouts may be modified in the future as specific development proposals are made and more detailed access plans are defined.

ASSUMPTIONS AND METHODS

This section describes the land use and roadway network assumptions and includes a discussion of the project traffic estimate method.

Land Use Assumptions

Hawaii Community Development Authority (HCDA) provided a complete inventory of existing and proposed land uses for Kalaeloa by parcel (see **Figure 1** for parcel locations), which we used to estimate future roadway and intersection volumes. The inventory included the type of use (e.g., single-family dwelling unit vs. multi-family unit) and size (e.g., square feet of retail space or office space, number of hotel rooms, or school enrollment). Based on the information received, more than 5.3 million square feet of commercial/office/light industrial development and 6,438 residential units are estimated for full buildout of the area. The buildout land use summary is presented in **Table 1**, and the land use summary by anticipated development phase is presented in **Table 2**.

TABLE 1 LAND USE SUMMARY BY TRANSECT UNDER BUILDOUT CONDITIONS					
Land Use Type	Land Use by Transect				
	Rural (T2)	General Urban (T3)	Urban Center (T4)	Urban Core (T5)	Special District (SD)
<i>Residential (Dwelling Units)</i>					
Residential Total	328	2659	2411	890	150
<i>Non-Residential (Square Feet)</i>					
Civic	188,975	23,528	0	0	0
R&D	111,068	631,842	0	0	0
Light Industrial	173,370	1,857,076	0	0	40,214
Office	103,416	668,037	153,429	245,229	0
Retail	253,203	466,772	236,932	235,486	0
Non-Residential Total	830,032	3,647,255	390,361	480,715	40,214

Source: Hawaii Community Development Authority (HCDA), May 2010.

**TABLE 2
 LAND USE SUMMARY BY DEVELOPMENT PHASE**

Time Period	Land Use by Transect				
	Rural (T2)	General Urban (T3)	Urban Center (T4)	Urban Core (T5)	Special District (SD)
Residential (Dwelling Units)					
Within 7 Years	0	450	298	120	0
7 to 20 Years	328	1925	1732	770	150
More than 20 Years	0	284	381	0	0
Residential Buildout	328	2659	2411	890	150
Non-Residential (Square Feet)					
Within 7 Years	282,903	1,184,063	22,690	180,000	0
7 to 20 Years	327,720	2,213,441	324,343	300,715	40,214
More than 20 Years	219,409	249,751	43,328	0	0
Non-Residential Buildout	830,032	3,647,255	390,361	480,715	40,214

Source: Hawaii Community Development Authority (HCDA), May 2010.

Roadway Assumptions

Since our evaluation is based on the traffic volumes beyond Year 2030, we made some key assumptions about the surrounding transportation system. The following roadway improvements were included under Buildout Conditions:

- Extension of Kualaka`i Parkway as a 4-lane arterial between Kapolei Parkway and Saratoga Avenue
- Extension of Kualaka`i Parkway as a 2-lane collector between Saratoga Avenue and Keoneula Boulevard
- Extension of Kapolei Parkway as a 6-lane arterial between Kamokila Boulevard and Fort Barrette Road
- Extension of Wakea Avenue as a 4-lane arterial between H-1 and Saratoga Avenue

Kualaka`i Parkway

In early 2010, the Kualaka`i Parkway/H-1 interchange opened and now provides a direct connection from H-1 to Kapolei Parkway. Plans exist to extend Kualaka`i Parkway makai from Kapolei Parkway into Kalaeloa with intersections at Franklin D. Roosevelt Avenue and Saratoga Avenue. In our year 2030 analysis, we assumed that Kualaka`i Parkway will be fully constructed and would extend from H-1 through Kalaeloa and connect to Keoneula Boulevard towards Ocean Point.

Kapolei Parkway

Currently, the segment of Kapolei Parkway between Kamokila Boulevard and Fort Barrette Road is not completed but will be constructed by the City & County of Honolulu. In our 2030 analysis, we assumed that this segment will be in place and that Kapolei Parkway will provide a continuous connection between Kalaeloa Boulevard and Geiger Road. The completion of the missing segment of Kapolei Parkway would have a substantial effect on the traffic volumes on Franklin D. Roosevelt Avenue, as some Ewa-Diamond Head traffic would divert from the existing two-lane road to the six-lane parkway. To encourage more traffic on Kapolei Parkway, we highly recommend that the speed limited on Kapolei Parkway be raised to 35 mph (with the exception of 25 mph school zones when students are present) and that the speed limit on Franklin D. Roosevelt Avenue be lowered to 30 mph.

Wakea Avenue

Currently, the Wakea Avenue segment between H-1 and Saratoga Avenue is not constructed. In the 2030 analysis, this segment is assumed to be constructed, and the Wakea Avenue extension will provide a continuous connection between H-1 and Saratoga Avenue.

Trip Estimates

The amount of traffic added to the roadway system by the proposed development was estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of added traffic to the roadway network. The second step estimates the direction of travel to and from the larger zones. The trips are assigned to specific street segments and intersection turning movements during the third step.

Trip Generation

The amount of traffic added to the surrounding roadway system by the proposed development was estimated by applying the applicable trip generation rates from the *Trip Generation (8th Edition)* published by the Institute of Transportation Engineers (2008).

In a mixed-use and integrated community such as Kalaeloa, a proportion of the total vehicle trips will be made internally within the development site, and some trips will be made by walking or bicycling to destinations due to their close proximity. For example, people who live in the on-site residential units will drive to the retail or restaurant uses within the site, and then return home, and still others will walk instead of driving. Accordingly, their trip-making activity will never reach the external roadway system, but they will be accounted for within the site. By applying an internal capture reduction to the overall project trip generation, the number of estimated vehicle trips added to the surrounding roadway network is reduced.

To account for the interaction of land uses within the project area and the presence of transit, Fehr & Peers estimated an internal capture rate of 15 percent based on recent mixed-use (MXD) trip generation research we have conducted in association with the Federal Environmental Protection Agency (EPA). Our MXD research is based on data from approximately 15 sites in 6 major metropolitan areas. The MXD approach yields less conservative (i.e., more realistic) estimates of vehicle trip generation based on project design and the interaction of uses that allows more trips to be made internally by walking, bicycling, or transit. **Table 3** shows the trip generation estimates and mixed-use trip generation reduction under Buildout Conditions, while **Table 4** presents the trip generation summary by development phase.

**TABLE 3
 VEHICLE TRIP GENERATION ESTIMATES UNDER BUILDOUT CONDITIONS**

Land Use Type	Daily ¹	AM Peak Period ¹			PM Peak Period ¹		
	Total	In	Out	Total	In	Out	Total
Residential Land Use							
<i>Residential Total Gross Vehicle Trips [A]</i>	47,326	759	2,860	3,619	2,991	1,617	4,608
Non-Residential Land Use							
Civic ²	4,905	177	109	286	179	308	487
R&D	8,033	864	176	1,040	156	878	1,034
Light Industrial	14,558	1,545	209	1,754	210	1532	1,742
Office	16,998	2,065	281	2,346	567	2753	3,320
Retail	109,088	1,600	1,025	2,625	4916	5113	10,029
<i>Non-Residential Total Gross Vehicle Trips [B]</i>	153,582	6,251	1,800	8,051	6,028	10,584	16,612
Buildout Land Use							
<i>Total Gross Trips [A + B]</i>	200,908	7,010	4,660	11,670	9,019	12,201	21,220
<i>15% Reduction³</i>	(30,136)	(1,052)	(699)	(1,751)	(1,353)	(1,830)	(3,183)
Total Net New Vehicle Trips	170,772	5,958	3,961	9,919	7,666	10,371	18,037

Notes:

1. *Trip Generation*, 8th Edition, Institute of Transportation Engineers.
2. Civic land use rates developed by Fehr & Peers based on allowable land uses within the *Kalaeloa Master Plan* (March 2006).
3. To account for the interaction of land uses within the project area, Fehr & Peers estimated an internal capture rate of 15 percent based on recent mixed-use (MXD) trip generation research we have conducted in association with the Federal Environmental Protection Agency (EPA).

Source: Fehr & Peers, August 2010.

TABLE 4 VEHICLE TRIP GENERATION ESTIMATES BY DEVELOPMENT PHASE							
Land Use Type	Daily ¹	AM Peak Period ¹			PM Peak Period ¹		
	Total	In	Out	Total	In	Out	Total
Residential Gross Trip Generation							
Within 7-Years	6,751	105	410	515	437	235	672
7 to 20 Years	35,463	576	2,141	2,717	2,222	1,207	3,429
More than 20 Years	5,112	78	309	387	332	175	507
<i>Residential Total Gross Trips [A]</i>	<i>47,326</i>	<i>759</i>	<i>2,860</i>	<i>3,619</i>	<i>2,991</i>	<i>1,617</i>	<i>4,608</i>
Non-Residential Gross Trip Generation							
Within 7 Years	34,875	1,884	431	2,315	1,240	2,678	3,918
7 to 20 Years	97,417	3,729	1,110	4,839	3,910	6,597	10,507
More than 20 Years	21,290	638	259	897	878	1,309	2,187
<i>Non-Residential Total Gross Trips [B]</i>	<i>153,582</i>	<i>6,251</i>	<i>1,800</i>	<i>8,051</i>	<i>6,028</i>	<i>10,584</i>	<i>16,612</i>
Buildout Trip Generation							
<i>Total Gross Trips [A+B]</i>	<i>200,908</i>	<i>7,010</i>	<i>4,660</i>	<i>11,670</i>	<i>9,019</i>	<i>12,201</i>	<i>21,220</i>
<i>15% Reduction²</i>	<i>(30,136)</i>	<i>(1,052)</i>	<i>(699)</i>	<i>(1,751)</i>	<i>(1,353)</i>	<i>(1,830)</i>	<i>(3,183)</i>
Total Net New Trips	170,772	5,958	3,961	9,919	7,666	10,371	18,037
Notes:							
1. Trip Generation, 8 th Edition, Institute of Transportation Engineers.							
2. To account for the interaction of land uses within the project area, Fehr & Peers estimated an internal capture rate of 15 percent based on recent mixed-use (MXD) trip generation research we have conducted in association with the Federal Environmental Protection Agency (EPA).							
Source: Fehr & Peers, August 2010.							

Trip Distribution

After trip generation estimates were determined for each zone, trip distribution patterns (the directions of approach and departure) were estimated. The directions of approach and departure were estimated based on prior studies in the area, existing travel patterns, and the relative location of complementary land uses (e.g., retail and jobs in the City of Kapolei and other areas outside Ewa).

Trip Assignment

Vehicle traffic was then assigned through the roadway network for each land use scenario based on the directions of approach and departure discussed above. The trip assignments were then added to the existing volumes to estimate buildout roadway and intersection volumes.

RECOMMENDED ROADWAY IMPROVEMENTS

We used the TRAFFIX software package to build a model of the roadway system to track the vehicle trips generated by each land use travelling within the Kalaeloa project site, as well as travelling externally to other areas of Ewa and Oahu. The model was used to define the street typology including number of travel lanes, intersection configurations, and anticipated traffic control devices within the project area for the proposed roadways. Smaller two-lane local and sub-collector roadways will be developed as more detailed plans for each parcel are prepared. **Figure 2** presents the required street typology and cross-sections under Buildout Conditions for all primary roadways within the site, which includes the number of travel lanes, the presence of turn lane/median, on-street parking lanes, the presence of on-street parking and/or bicycle lanes, and bicycle paths.

Overall, the traffic demand under Buildout Conditions would require a total of six lanes of roadway capacity in the Ewa-Diamond Head direction, or the provision of a grid network of streets to better distribute peak hour traffic volumes. This latter scenario with a grid system would only require four lanes of throughput across the central part of the study area (e.g., in and near the downtown Kalaeloa area) but some peak congestion is still expected to occur.

We assumed that two-lane collectors and arterials would be posted at 25 or 30 miles per hour (mph) and 4-lane arterials would be posted at 30 or 35 mph. Saratoga Avenue between Boxer Road and Enterprise Street would be posted 25 mph while the downtown ring road including Boxer Road, Midway Street, and Enterprise Street would be posted at 30 to 35 mph.

As we indicated early in this process, the volume of traffic expected to use the mauka-makai streets across Franklin D. Roosevelt Avenue (e.g., Kamokila Boulevard, Wakea Avenue, Fort Barrette Road, and Kualaka'i Parkway) is relatively high and all facilities will need to be 4-lanes. It is possible that buildout of the Kalaeloa area will result in impacts to off-site intersections mauka of the site (e.g., along Kapolei Parkway) that have not previously been anticipated in previous Ewa planning studies. However, that detailed analysis will be conducted as part of a separate effort.

In addition to the mauka-makai 4-lane roadways across Franklin D. Roosevelt Avenue, the proposed 4-lane streets in or near the downtown include:

- Saratoga Avenue between Kamokila Boulevard and Boxer Road,
- Saratoga Avenue between Enterprise Street and Geiger Road.
- Boxer Road between Saratoga Avenue and Wakea Avenue extension
- Midway Street between Wakea Avenue extension and Enterprise Street
- Enterprise Street between Midway Street and Saratoga Avenue

We expect that the proposed two-lane section of Saratoga Avenue will be congested during peak hours because it will be a desirable destination within the Kalaeloa area and will also serve some through traffic across the area because it is the most direct connection between Boxer Road and Enterprise Street. However, peak period congestion should be anticipated and is a sustainable approach to transportation planning; that is increased use of roadways over the course of the day is a better utilization of the investment in the transportation system and avoids overbuilding of roadways to serve a limited number of hours over a 24-hour period. Cross-section 2f proposed for Saratoga Avenue between Boxer Road and Enterprise Street includes two travel lanes, a median

turn lane, and parking plus 9-foot sidewalks on both sides of the street. The project team proposes to divide the sidewalk width between the roadway right-of-way (4 foot sidewalks) and parcel frontage (5 foot within each parcel) along this section. Thus, the proposed right-of-way width is 56 feet and street width is 66 feet. Cross-sections 2e and 2f (street width 66 feet) can serve similar daily vehicle capacity depending on driveway configurations. Thus, cross-section 2f can be used as an alternative roadway cross-section for Lexington Street and Shangri-La Street in downtown Kalaeloa.

Franklin D. Roosevelt Avenue roadway cross-sections (i.e., 2c and 2d) between Kamokila Boulevard and Geiger Road are 2-lane collector streets with 12-foot travel lanes and raised median. For a roadway cross-section of this type, we typically recommend 14-foot travel lanes with a raised median to accommodate bicyclist and turning movements at mid-block driveways. However, with the planned adjacent bicycle path mauka of Franklin D. Roosevelt Avenue and no mid-block driveway cuts with shorter block lengths (e.g., less than 400 feet), the wider travel lanes are not needed. Should block lengths exceed 400 feet and/or mid-block driveway cuts be proposed then 14 foot travel lanes should be constructed.

All roadways in **Figure 2** are proposed to have turn lane/median lanes except the following:

- Copahee Avenue between Saratoga Avenue and Franklin D. Roosevelt Avenue
- Yorktown Street between Lexington Street and Enterprise Street
- West Perimeter Road between Malakole Street and Olai Street
- Local driveway makai from West Perimeter Road toward the Pacific Ocean
- Coral Sea Street makai from Tripoli Street toward the Pacific Ocean

Proposed on-street parking lanes are provided on the following streets within the downtown Kalaeloa area:

- Copahee Avenue between Saratoga Avenue and Franklin D. Roosevelt Avenue
- Lexington Street between Midway Street and Franklin D. Roosevelt Avenue
- Midway Street mauka of Saratoga Avenue
- Saratoga Avenue between Boxer Road and Enterprise Street
- Shangri-La Street between Lexington Street and Enterprise Street
- Yorktown Street between Lexington Street and Enterprise Street

Off-street parking lots within Parcels 13 and/or 27 are proposed rather than providing on-street parking lanes on Coral Sea Street makai of Tripoli Street.

Figure 3 presents the recommended intersection configurations, intersection control, and standard turn lane storage pocket lengths under Buildout Conditions. These proposed intersection turn lane configurations and control devices were developed based on the number of travel lanes for each roadway. One left-turn lane is recommended at each intersection except Enterprise Street and Saratoga Avenue. The eastbound dual left-turn at the intersection is proposed to accommodate the vehicle traffic circulating to the downtown ring road (e.g., Enterprise Street and Midway Street makai of downtown). Separate right-turn lanes are provided

at intersections with higher right-turn volumes. Shared-through right turn lanes are proposed at other locations such as Saratoga Avenue and Coral Sea Street to minimize pedestrian crossing distances across four travel lanes.

To assist intersection design and defining right-of-way requirements, **Figure 3** presents standard storage pocket lengths for left- and right-turn lanes. Because this evaluation is at the Master Plan level, the standard pocket lengths may be modified in the future as specific development proposals are made and more detailed access plans are defined for local and sub-collector roadways within each parcel. Unless noted otherwise in **Figure 3**, the standard length for a left-turn lane is 200 feet for arterial roadways and 125 feet for collector roadways. The standard right-turn lane storage pocket length is 125 feet for arterial and collector roadways.

BICYCLE FACILITIES

The proposed bicycle network is consistent with the *Draft O'ahu Bike Plan: A Bicycle Master Plan* (July 2009) except for the following:

- Bicycle lanes are provided on Midway Street (Wakea Avenue extension to Enterprise Street) and Enterprise Street (Midway Street to Saratoga Avenue), rather than on Saratoga Avenue between Boxer Road and Enterprise Street. This modification is to accommodate the main street feel on Saratoga Avenue, which is envisioned as a lower speed roadway shared by motor vehicles and bicyclist.
- Coral Sea Road makai from Tripoli Street toward the Pacific Ocean includes bicycle lanes, rather than a parallel bicycle path.
- West Perimeter Road between Saratoga Avenue and the Olai Street connection includes bicycle lanes, rather than a parallel bicycle path.

TRANSIT

The land use density proposed for many of the development parcels will be conducive to transit as a primary travel mode. The proposed Honolulu High Capacity Transit Corridor (HHCTC) proposes a Minimum Operation Segment (MOS) that is scheduled to open in April 2019. The MOS includes a station at East Kapolei, which will be located approximately ½-mile from the closest point to Kalaeloa and approximately 2.5 miles from the downtown core in Kalaeloa. A future extension of the line is planned to be constructed to West Kapolei near the Kalaeloa Boulevard/Kapolei Parkway intersection with a station planned in the downtown Kalaeloa core area. While the HHCTC corridor through Kalaeloa is not established at this time, for planning purposes it was assumed the general alignment of the HHCTC extension follows the Kualaka'i Parkway extension, Saratoga Avenue with a portion passing through the downtown core area, and the Wakea Avenue extension into the City of Kapolei. It is anticipated that piers supporting the proposed elevated rail line could be located within the center medians of the roadways within the "Transit Corridor" shown conceptually in **Figure 1**. On **Figure 2**, right-of-way or an easement for the proposed elevated rail line is not shown because the rail location has not been established.

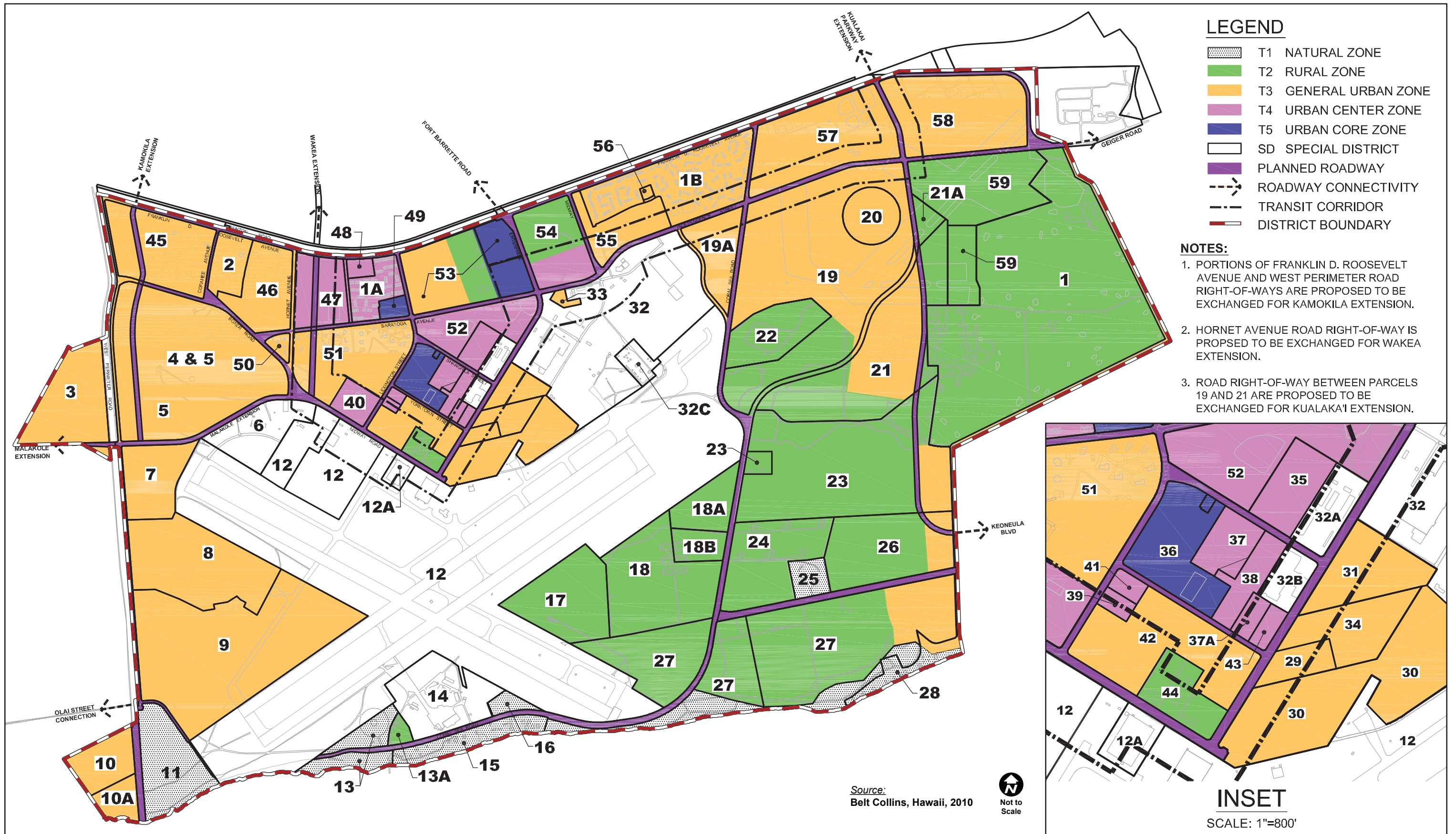
The specific location of the station has not been identified and several factors will determine the appropriate location. Based purely on walking distance and proximity to the highest density and majority of land uses a station within the downtown is ideal for attracting potential riders and promoting transit ridership (i.e., reducing vehicle trips), and is expected to be supported by continuous sidewalks on both sides of all downtown core streets to maximize accessibility to the future station. Provision of a rail station will provide residents, employees and visitors with an

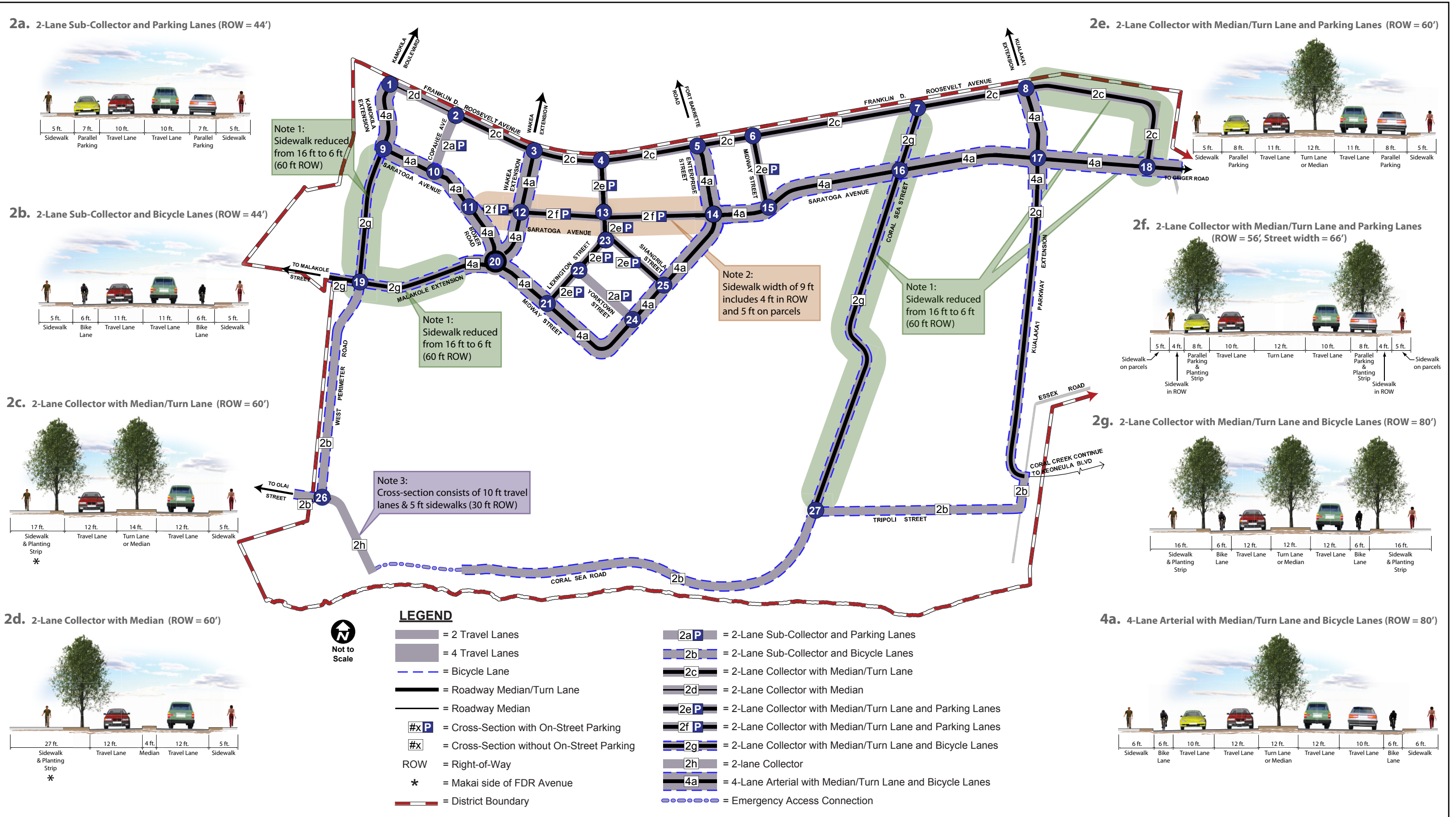
excellent alternative to making a vehicle trip and helping to reduce demand within the study area. Prior to completion of the West Kapolei extension, a public or private local bus circulator should be provided linking Kalaeloa land uses with the East Kapolei station. This service would allow travel to and from Kalaeloa without requiring a car and still providing a convenient form of transportation.

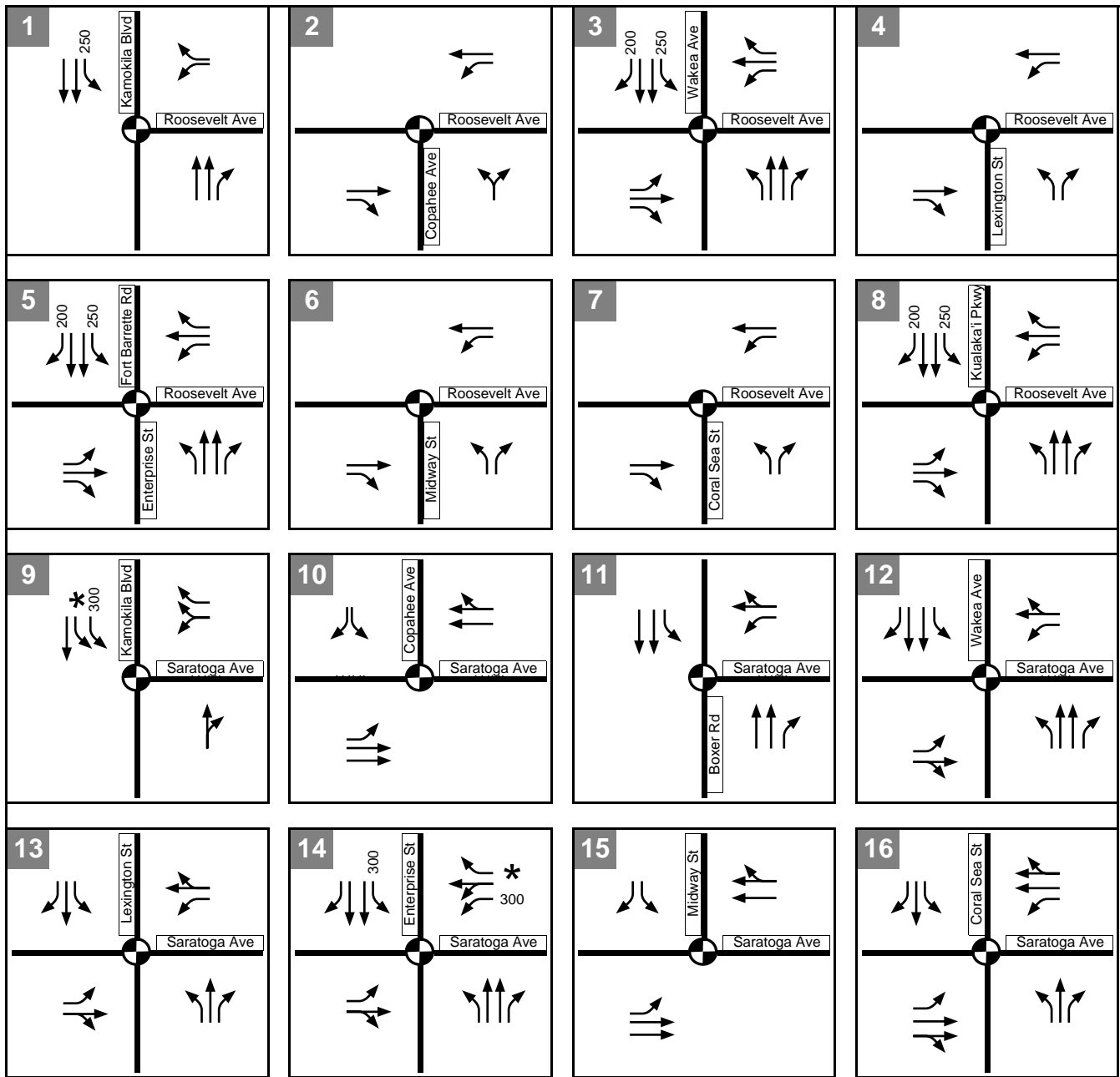
ROADWAY IMPROVEMENT PHASING

Figure 4 presents the proposed roadway typology by development phase. This figure will assist the project team with determining the timing needs for roadways based on three development phases: within seven (7) years, seven (7) to 20 years, and more than 20 years. Roadways recommended within 7 years are located adjacent to parcels being developed first and may include other considerations to alleviate congestion. For example, the development of the parcels near the construction of the Kamokila Boulevard extension and Saratoga Avenue between Kamokila Boulevard and Boxer Road would serve newly developed parcels and provide alternate access to Copahee Avenue. Copahee Avenue includes a very narrow right-of-way (ROW) and provides access to an existing elementary school. Most of the remaining roadway segments or upgrades would need to be constructed within 20 years. The segments required to serve development beyond 20 years serve parcels that are generally located along the makai segment of Coral Sea Road and along Tripoli Street. The extension of Kualaka'i Parkway makai of Parcel 59 is a longer term improvement that could replace Essex Road and provide improved connectivity to the adjacent Ocean Pointe communities.

Attachments





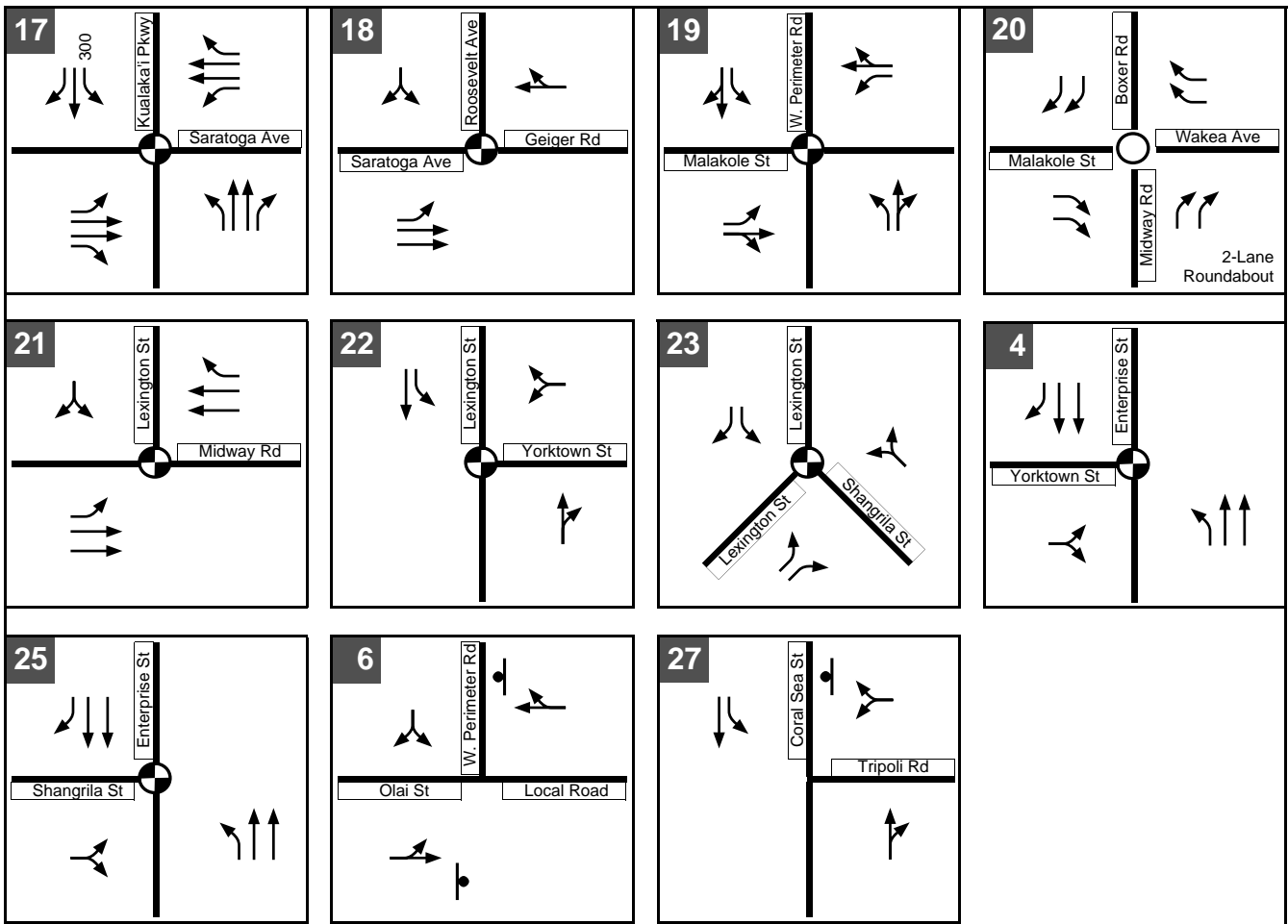


Note:

Unless noted standard length for a left turn storage pocket is 200 feet for arterial roadways and 125 feet for collectors. Standard right turn lane storage pocket length is 125 feet for arterial and collector roadways.

KEY:

- = Signalized Intersection
- = Roundabout
- = Stop Sign
- = Storage Pocket Length in Feet
- = Trap Turn Lane

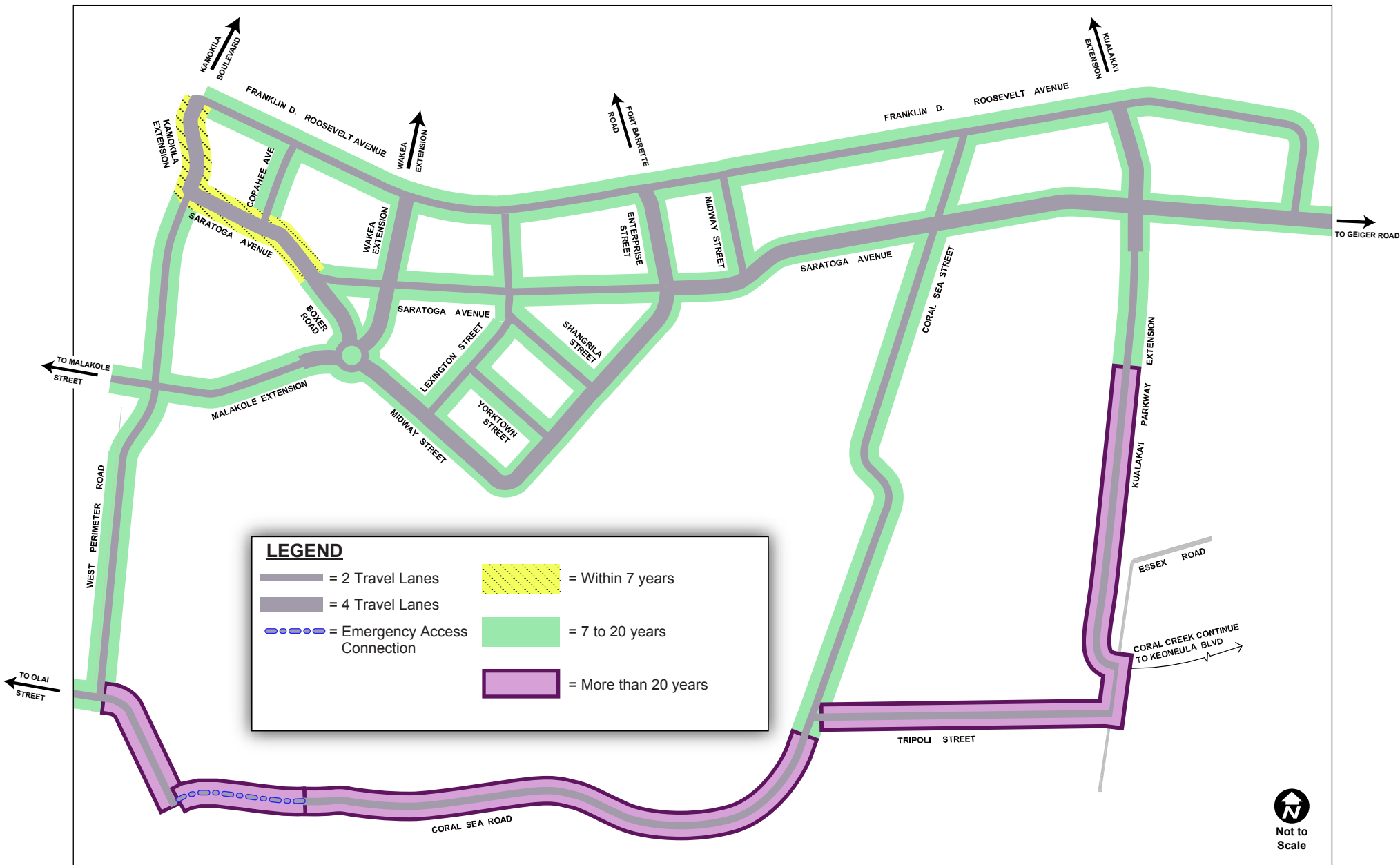


Note:

Unless noted standard length for a left turn storage pocket is 200 feet for arterial roadways and 125 feet for collectors. Standard right turn lane storage pocket length is 125 feet for arterial and collector roadways.

KEY:

- = Signalized Intersection
- = Roundabout
- = Stop Sign
- = Storage Pocket Length in Feet
- = Trap Turn Lane



Kalaeloa Roadway Master Plan Study

APPENDIX B – R1

The following provides an explanation of the Tables and calculations included in this Appendix.

- Table 1 (1 page)
 - Purpose: provide the Water Use Criteria.
 - Since only maximum lawn area is defined in HAR Chapter 15-215, demand is based on 4,080 gallons per day per acre (gpd/acre) of lawn, or Park (Golf Course) Non-Potable Water Use.
- Table 2 (3 pages)
 - Purpose: Provide the R1 demand by Parcel.
 - Calculations:
 - Maximum Buildout: (Land Area) times (Maximum Density).
 - Projected Future Irrigation:
 - Maximum Lawn Area: (Maximum Buildout) times maximum lawn area per Transect Zone designation.
 - T2 and T3 zones: maximum 20%
 - T4 & T5 zones: maximum 10%
 - R1 Demand: (Maximum Lawn Area) divided by 43,560 square feet per acre times 4,080 gpd/acre
- Table 3 (3 pages)
 - Purpose: Calculate R1 Demand by BWS Point of Connection as shown on the Non-Potable Irrigation (R1) Concept plan.
 - Calculations:
 - The Navy's Golf Course connection to the existing BWS 16" diameter R1 main near Honouliuli WWTP is to remain solely for the Navy's Golf Course use.
 - Interconnected System: sum of the two connections - west of Parcel 45 and Fort Barrette Road.



SUBJECT: **Non-Potable Irrigation (RI) Master Plan** JOB NO: 2009.33.060
 CLIENT: Ford Island Ventures, LLC BY: tho
 SUBJECT: Table I: Water Use Criteria DATE: 15-Nov-10
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\non-pot irrig\RI.xls]Table I

Water Use Criteria

Land Use	Unit	All Potable System	Dual System			
			Average Water Use		Average Daily Demand ⁽¹⁾	
			Potable	Non-Potable	Potable	Non-Potable
Residential						
Single Family	GPD/Unit	500	345	155	414	186
Multi-Family Low Rise	GPD/Unit	400	276	124	331	149
Multi-Family High Rise	GPD/Unit	300	207	93	248	112
Commercial	GPD/Acre	3,000	1,800	1,200	2,160	1,440
Park (Golf Course)	GPD/Acre	4,000	600	3,400	720	4,080
School	GPD/Student	60	35	25	42	30
Industrial	GPD/Acre	4,000	1,184	2,816	1,421	3,379
Commercial/Industrial	GPD/1,000 Ft ²	100	60	40	72	48
Commercial/Residential	GPD/1,000 Ft ²	120	83	37	100	44

(1) For land uses to be serviced by a dual system, a 1.2 factor is applied to the Average Water Use to derive the Average Daily Demand. For land uses served only by the potable system, Average Water Use and Average Daily Demand are identical.

Reference - the above are per the Ewa Non-Potable Master Plan, dated January 2007 - Table 4-1.

NOTE: Both the Ewa Non-Potable Water Master Plan, dated 2007 and Kapolei Regional Non-Potable Water Master Plan, draft dated May 2009 included the following Kalaeloa uses:

1. 0.6 MGD - Barber's Point Golf Course; and
2. 2.448 MGD - Kalaeloa Regional Park (600 acres times 4,080 gpd/acre).

Since only maximum lawn area is defined in HAR Chapter 15-215, non-potable demand is based on 4,080 gallons per day per acre of lawn, or Park (Golf Course) Non-Potable Water Use.

PROJECT: **Non-Potable Irrigation (R1) Master Plan**

CLIENT: Ford Island Ventures, LLC
 SUBJECT: Table 2: Demand by Parcel

JOB NO: 2009.33.0600
 BY: tho
 DATE: 15-Nov-10

Parcel # (MP ref #)	Transect Designation & Land Use HCDA HAR Chapter 15-215		Land Area Acres	Maximum Buildout, per Transect Parameters		Projected Future Irrigation		R1 Demand per Development Timerframe			Notes
				100% Non-Residential				Within 7 yrs GPD	7 to 20 yrs GPD	over 20 yrs GPD	
				Density, Sq Ft/Ac	Maximum Buildout in Sq Ft	Maximum Lawn Area in Sq Ft	R1 Demand in GPD				
1	T2	Rural	275.470	na	-	exist golf course	600,000	600,000	600,000	600,000	Ref. Kapolei Regional Non-Potable Water Master Plan, dated May 2009.
1A	T4	Urban Center	16.190	40,000	647,600	64,760	6,066	0	6,066	6,066	
1B	T3	General Urban	56.975	20,000	1,139,500	227,900	21,346	0	21,346	21,346	
2	T3	General Urban	14.458	20,000	289,160	57,832	5,417	0	5,417	5,417	
3	T3	General Urban	44.102	20,000	882,040	176,408	16,523	0	16,523	16,523	
4 & 5	T3	General Urban	136.938	20,000	2,738,760	547,752	51,305	0	51,305	51,305	
6	SD	Special District	28.724	20,000	574,480	57,448	5,381	0	5,381	5,381	Assumed lawn area = 10% of maximum non-residential buildout.
7	T3	General Urban	29.853	20,000	597,060	119,412	11,185	11,185	11,185	11,185	
8	T3	General Urban	73.741	20,000	1,474,820	294,964	27,627	0	0	27,627	
9	T3	General Urban	139.297	20,000	2,785,940	557,188	52,188	0	52,188	52,188	
10	T3	General Urban	20.029	20,000	400,580	80,116	7,504	0	7,504	7,504	
10A	T3	General Urban	10.569	20,000	211,380	42,276	3,960	3,960	3,960	3,960	
11	T1	Natural	37.377	na	-	0	0	0	0	0	Continue to use potable water for wetlands "make-up" water.
12	SD	Special District	752.216	20,000	15,044,320	87,120	8,160	8,160	8,160	8,160	SDOT maintains approximately 2 acres of landscaping
12A	SD	Special District	4.520	varies	-	0	0	0	0	0	No existing/future irrigation.
13	T1	Natural	16.292	na	-	0	0	0	0	0	No existing/future irrigation.
13A	T2	Rural	3.661	na	-	0	0	0	0	0	No existing/future irrigation.
14	SD	Special District	42.964	varies	-	0	0	0	0	0	USCG will be manufacturing own R1 water or use potable water for irrigation.
15	T1	Natural	21.308	na	-	0	0	0	0	0	Navy has no plans to install an R1 system for irrigation.
16	T1	Natural	4.715	na	-	0	0	0	0	0	No existing/future irrigation.
17	T2	Rural	45.597	20,000	911,940	182,388	17,083	0	0	17,083	
18	T2	Rural	65.356	20,000	1,307,120	261,424	24,486	0	24,486	24,486	
18A	T2	Rural	19.361	20,000	387,220	77,444	7,254	0	7,254	7,254	
18B	T2	Rural	11.501	20,000	230,020	46,004	4,309	0	4,309	4,309	
19	T2	Rural	32.000	20,000	640,000	128,000	11,989	0	0	11,989	
	T3	General Urban	134.784	20,000	2,695,680	539,136	50,498	0	0	50,498	
19A	T3	General Urban	22.997	20,000	459,940	91,988	8,616	0	0	8,616	
20	SD	Special District	18.030	varies	-	0	0	0	0	0	No existing/future irrigation.
21	T2	Rural	50.482	20,000	1,009,644	201,929	18,913	0	0	18,913	
	T3	General Urban	47.056	20,000	941,116	188,223	17,630	0	0	17,630	
21A	T2	Rural	5.634	20,000	112,680	22,536	2,111	0	0	2,111	
22	T2	Rural	29.960	na	-	0	0	0	0	0	No existing/future irrigation.
23	T2	Rural	131.035	20,000	2,620,698	524,140	49,093	0	49,093	49,093	
	T3	General Urban	14.750	20,000	295,002	59,000	5,526	0	5,526	5,526	
24	T2	Rural	49.177	20,000	983,540	196,708	18,424	0	18,424	18,424	
25	T1	Natural	9.303	na	-	0	0	0	0	0	Ordy Pond. No existing/future irrigation.

PROJECT: **Non-Potable Irrigation (R1) Master Plan**

CLIENT: Ford Island Ventures, LLC
 SUBJECT: Table 2: Demand by Parcel

JOB NO: 2009.33.0600

BY: tho
 DATE: 15-Nov-10

Parcel # (MP ref #)	Transect Designation & Land Use HCDA HAR Chapter 15-215		Land Area Acres	Maximum Buildout, per Transect Parameters		Projected Future Irrigation		R1 Demand per Development Timerframe			Notes
				100% Non-Residential				Within 7 yrs GPD	7 to 20 yrs GPD	over 20 yrs GPD	
				Density, Sq Ft/Ac	Maximum Buildout in Sq Ft	Maximum Lawn Area in Sq Ft	R1 Demand in GPD				
26	T2	Rural	47.556	na	-	87,120	8,160				0
	T3	General Urban	6.421	20,000	128,411	25,682	2,405	0	2,405	2,405	
	T3	General Urban	3.961	20,000	79,213	15,843	1,484	0	1,484	1,484	
27	T1	Natural	27.792	na	-	0	0	0	0	0	No existing/future irrigation.
	T2	Rural	155.678	20,000	3,113,563	622,713	58,326	0	0	58,326	
	T3	General Urban	28.485	20,000	569,703	113,941	10,672	0	0	10,672	
28	T1	Natural	11.149	na	-	0	0	0	0	0	Navy has no plans to install an R1 system for irrigation.
	T3	General Urban	4.254	20,000	85,088	0	0	0	0	0	
29	T3	General Urban	3.809	20,000	76,180	15,236	1,427	0	1,427	1,427	
30	T3	General Urban	31.746	20,000	634,920	126,984	11,894	0	11,894	11,894	
31	T3	General Urban	10.890	20,000	217,800	43,560	4,080	4,080	4,080	4,080	
32	SD	Special District	138.164	varies	1,103,659	110,366	10,337	7,967	10,337	10,337	HIARNG stated 10% of building sf for Parcel 32 and 32C is adequate. Parcels 32A and 32B have 150,000 sf of existing landscaped area.
32A	SD	Special District	5.931	varies	40,870	75,000	7,025	7,025	7,025	7,025	
32B	SD	Special District	3.730	varies	80,350	75,000	7,025	7,025	7,025	7,025	
32C	SD	Special District	7.316	varies	-	0	0	0	0	0	
33	T3	General Urban	2.039	20,000	40,780	8,156	764	0	764	764	
34	T3	General Urban	9.722	20,000	194,440	38,888	3,642	3,642	3,642	3,642	
35	T4	Urban Center	7.550	40,000	302,000	30,200	2,829	0	0	2,829	
36	T5	Urban Core	13.532	60,000	811,920	81,192	7,605	0	7,605	7,605	
37	T4	Urban Center	5.162	40,000	206,480	20,648	1,934	0	1,934	1,934	
37A	T4	Urban Center	1.680	40,000	67,200	6,720	629	0	629	629	
38	T4	Urban Center	4.742	40,000	189,680	18,968	1,777	0	0	1,777	
39	T4	Urban Center	1.208	40,000	48,320	4,832	453	0	0	453	
40	T4	Urban Center	9.454	40,000	378,160	37,816	3,542	3,542	3,542	3,542	
41	T4	Urban Center	1.354	40,000	54,160	5,416	507	0	0	507	
42	T3	General Urban	19.952	20,000	399,040	79,808	7,475	7,475	7,475	7,475	
43	T4	Urban Center	1.527	40,000	61,080	6,108	572	0	572	572	
44	T2	Rural	6.969	20,000	139,380	27,876	2,611	0	2,611	2,611	
45	T3	General Urban	49.679	20,000	993,580	198,716	18,613	18,613	18,613	18,613	
46	T3	General Urban	30.941	20,000	618,820	123,764	11,592	11,592	11,592	11,592	
47	T4	Urban Center	25.053	40,000	1,002,120	100,212	9,386	0	9,386	9,386	
48	T4	Urban Center	3.384	40,000	135,360	13,536	1,268	1,268	1,268	1,268	
49	T5	Urban Core	3.950	60,000	237,000	23,700	2,220	0	2,220	2,220	
50	T3	General Urban	3.170	20,000	63,400	12,680	1,188	0	1,188	1,188	
51	T3	General Urban	50.780	20,000	1,015,600	203,120	19,025	0	19,025	19,025	
52	T4	Urban Center	26.270	40,000	1,050,800	105,080	9,842	0	9,842	9,842	
53	T5	Urban Core	20.000	60,000	871,200	87,120	8,160	8,160	8,160	8,160	
	T3	General Urban	25.000	20,000	500,000	100,000	9,366	0	9,366	9,366	
	T2	Rural	13.808	20,000	276,160	55,232	5,173	0	5,173	5,173	

PROJECT: **Non-Potable Irrigation (R1) Master Plan**

JOB NO: 2009.33.0600

CLIENT: Ford Island Ventures, LLC

BY: tho

SUBJECT: Table 2: Demand by Parcel

DATE: 15-Nov-10

Parcel # (MP ref #)	Transect Designation & Land Use HCDA HAR Chapter 15-215		Land Area Acres	Maximum Buildout, per Transect Parameters		Projected Future Irrigation		R1 Demand per Development Timerframe			Notes
				100% Non-Residential				Within 7 yrs GPD	7 to 20 yrs GPD	over 20 yrs GPD	
				Density, Sq Ft/Ac	Maximum Buildout in Sq Ft	Maximum Lawn Area in Sq Ft	R1 Demand in GPD				
54	T2	Rural	21.417	20,000	428,340	85,668	8,024				0
	T4	Urban Center	13.000	40,000	520,000	52,000	4,871	0	4,871	4,871	
55	T3	General Urban	22.068	20,000	441,360	88,272	8,268	8,268	8,268	8,268	
56	T3	General Urban	0.936	20,000	18,720	3,744	351	0	351	351	
57	T3	General Urban	68.632	20,000	1,372,640	274,528	25,713	0	25,713	25,713	
58	T3	General Urban	69.568	20,000	1,391,360	278,272	26,064	0	26,064	26,064	
59	T2	Rural	70.726	20,000	1,414,520	282,904	26,498	0	26,498	26,498	
Totals:			3,506.58		60,753,618	8,598,716	1,405,391	711,962	1,176,360	1,405,391	

Notes:

1. Maximum lawn (or landscaping requiring watering or irrigation) area calculation is based on HAR Chapter 15-215 Draft #8, Subsection 47 (8):
 - a. No more than 20% of the area not occupied by buildings in T2 and T3 zones.
 - b. No more than 10% of the area not occupied by buildings in T4 and T5 zones.
 To be conservative, calculation is based on the entire area of maximum non-residential buildout.
2. Non-potable demand is based on 4,080 gallons per day per acre of lawn (park/golf course) area. See Table 1.



SUBJECT: **Non-Potable Irrigation (R1) Master Plan** JOB NO: 2009.33.0600
 CLIENT: Ford Island Ventures, LLC BY: tho
 SUBJECT: Table 3: Demand by BWS Connection DATE: 15-Nov-10
 FILE: M:\Kalaehoa FIP\2009330601 HCDA\Design\Calculations\non-pot irrig[R1.xls]Table 1

Parcel # (MP ref #)	Transect Designation & Land Use HCDA HAR Chapter 15-215		Land Area Acres	Transect Parameters		Projected Future Irrigation		Projected Development Timeframe, years		
				100% Non-Residential		Maximum Lawn Area in Sq Ft	Non-Potable Demand in GPD	Within 7 yrs GPD	7 to 20 yrs GPD	over 20 yrs GPD
				Max Non-Resid Density, Sq Ft/Ac	Max Non-Resid Buildout in Sq Ft					
Olai Street Connection to E/12"R1										
9	T3	General Urban	139.297	20,000	2,785,940	557,188	52,188	0	52,188	52,188
10	T3	General Urban	20.029	20,000	400,580	80,116	7,504	0	7,504	7,504
10A	T3	General Urban	10.569	20,000	211,380	42,276	3,960	3,960	3,960	3,960
Subtotal			169.90		3,397,900	679,580	63,652	3,960	63,652	63,652
Malakole Street Connection to E/12"R1										
3	T3	General Urban	44.102	20,000	882,040	176,408	16,523	0	16,523	16,523
half of 4 & 5	T3	General Urban	68.469	20,000	1,369,380	273,876	25,652	0	25,652	25,652
7	T3	General Urban	29.853	20,000	597,060	119,412	11,185	11,185	11,185	11,185
8	T3	General Urban	73.741	20,000	1,474,820	294,964	27,627	0	0	27,627
Subtotal			216.17		4,323,300	864,660	80,987	11,185	53,360	80,987
Connection to E/12"R1 west of Parcel 45										
45	T3	General Urban	49.679	20,000	993,580	198,716	18,613	18,613	18,613	18,613
2	T3	General Urban	14.458	20,000	289,160	57,832	5,417	0	5,417	5,417
46	T3	General Urban	30.941	20,000	618,820	123,764	11,592	11,592	11,592	11,592
half of 4 & 5	T3	General Urban	68.469	20,000	1,369,380	273,876	25,653	0	25,653	25,653
Subtotal			163.55		3,270,940	654,188	61,275	30,205	61,275	61,275
Fort Barrette Road Connection to E/12"R1										
1A	T4	Urban Center	16.190	40,000	647,600	64,760	6,066	0	6,066	6,066
1B	T3	General Urban	56.975	20,000	1,139,500	227,900	21,346	0	21,346	21,346
6	SD	Special District	28.724	20,000	574,480	57,448	5,381	0	5,381	5,381
11	T1	Natural	37.377	na	-	0	0	0	0	0
12	SD	Special District	752.216	20,000	15,044,320	87,120	8,160	8,160	8,160	8,160
12A	SD	Special District	4.520	varies	-	0	0	0	0	0
13	T1	Natural	16.292	na	-	0	0	0	0	0
13A	T2	Rural	3.661	na	-	0	0	0	0	0
14	SD	Special District	42.964	varies	-	0	0	0	0	0
15	T1	Natural	21.308	na	-	0	0	0	0	0
16	T1	Natural	4.715	na	-	0	0	0	0	0
17	T2	Rural	45.597	20,000	911,940	182,388	17,083	0	0	17,083
18	T2	Rural	65.356	20,000	1,307,120	261,424	24,486	0	24,486	24,486
18A	T2	Rural	19.361	20,000	387,220	77,444	7,254	0	7,254	7,254
18B	T2	Rural	11.501	20,000	230,020	46,004	4,309	0	4,309	4,309
19	T2	Rural	32.000	20,000	640,000	128,000	11,989	0	0	11,989
	T3	General Urban	134.784	20,000	2,695,680	539,136	50,498	0	0	50,498
19A	T3	General Urban	22.997	20,000	459,940	91,988	8,616	0	0	8,616
20	SD	Special District	18.030	varies	-	0	0	0	0	0



SUBJECT: **Non-Potable Irrigation (RI) Master Plan** JOB NO: 2009.33.0600
 CLIENT: Ford Island Ventures, LLC BY: tho
 SUBJECT: Table 3: Demand by BWS Connection DATE: 15-Nov-10
 FILE: M:\Kalaehoa FIP\2009330601 HCDA\Design\Calculations\non-pot irrig\RI.xls\Table 1

Parcel # (MP ref #)	Transect Designation & Land Use HCDA HAR Chapter 15-215		Land Area Acres	Transect Parameters		Projected Future Irrigation		Projected Development Timeframe, years		
				100% Non-Residential		Maximum Lawn Area in Sq Ft	Non-Potable Demand in GPD	Within 7 yrs GPD	7 to 20 yrs GPD	over 20 yrs GPD
				Max Non-Resid Density, Sq Ft/Ac	Max Non-Resid Buildout in Sq Ft					
21	T2	Rural	50.482	20,000	1,009,644	201,929	18,913	0	0	18,913
	T3	General Urban	47.056	20,000	941,116	188,223	17,630	0	0	17,630
21A	T2	Rural	5.634	20,000	112,680	22,536	2,111	0	0	2,111
22	T2	Rural	29.960	na	-	0	0	0	0	0
23	T2	Rural	131.035	20,000	2,620,698	524,140	49,093	0	49,093	49,093
	T3	General Urban	14.750	20,000	295,002	59,000	5,526	0	5,526	5,526
24	T2	Rural	49.177	20,000	983,540	196,708	18,424	0	18,424	18,424
25	T1	Natural	9.303	na	-	0	0	0	0	0
26	T2	Rural	47.556	na	-	87,120	8,160	0	8,160	8,160
	T3	General Urban	6.421	20,000	128,411	25,682	2,405	0	2,405	2,405
	T3	General Urban	3.961	20,000	79,213	15,843	1,484	0	1,484	1,484
27	T1	Natural	27.792	na	-	0	0	0	0	0
	T2	Rural	155.678	20,000	3,113,563	622,713	58,326	0	0	58,326
	T3	General Urban	28.485	20,000	569,703	113,941	10,672	0	0	10,672
28	T1	Natural	11.149	na	-	0	0	0	0	0
	T3	General Urban	4.254	20,000	85,088	0	0	0	0	0
29	T3	General Urban	3.809	20,000	76,180	15,236	1,427	0	1,427	1,427
30	T3	General Urban	31.746	20,000	634,920	126,984	11,894	0	11,894	11,894
31	T3	General Urban	10.890	20,000	217,800	43,560	4,080	4,080	4,080	4,080
32	SD	Special District	138.164	varies	1,103,659	110,366	10,337	7,967	10,337	10,337
32A	SD	Special District	5.931	varies	40,870	75,000	7,025	7,025	7,025	7,025
32B	SD	Special District	3.730	varies	80,350	75,000	7,025	7,025	7,025	7,025
32C	SD	Special District	7.316	varies	-	0	0	0	0	0
33	T3	General Urban	2.039	20,000	40,780	8,156	764	0	764	764
34	T3	General Urban	9.722	20,000	194,440	38,888	3,642	3,642	3,642	3,642
35	T4	Urban Center	7.550	40,000	302,000	30,200	2,829	0	0	2,829
36	T5	Urban Core	13.532	60,000	811,920	81,192	7,605	0	7,605	7,605
37	T4	Urban Center	5.162	40,000	206,480	20,648	1,934	0	1,934	1,934
37A	T4	Urban Center	1.680	40,000	67,200	6,720	629	0	629	629
38	T4	Urban Center	4.742	40,000	189,680	18,968	1,777	0	0	1,777
39	T4	Urban Center	1.208	40,000	48,320	4,832	453	0	0	453
40	T4	Urban Center	9.454	40,000	378,160	37,816	3,542	3,542	3,542	3,542
41	T4	Urban Center	1.354	40,000	54,160	5,416	507	0	0	507
42	T3	General Urban	19.952	20,000	399,040	79,808	7,475	7,475	7,475	7,475
43	T4	Urban Center	1.527	40,000	61,080	6,108	572	0	572	572
44	T2	Rural	6.969	20,000	139,380	27,876	2,611	0	2,611	2,611
47	T4	Urban Center	25.053	40,000	1,002,120	100,212	9,386	0	9,386	9,386
48	T4	Urban Center	3.384	40,000	135,360	13,536	1,268	see note 1	1,268	1,268



SUBJECT: **Non-Potable Irrigation (R1) Master Plan** JOB NO: 2009.33.0600
 CLIENT: Ford Island Ventures, LLC BY: tho
 SUBJECT: Table 3: Demand by BWS Connection DATE: 15-Nov-10
 FILE: M:\Kalaehoa FIP\2009330601 HCD\Design\Calculations\non-pot irrig[R1.xls]Table 1

Parcel # (MP ref #)	Transect Designation & Land Use		Land Area Acres	Transect Parameters		Projected Future Irrigation		Projected Development Timeframe, years		
				100% Non-Residential		Maximum Lawn Area in Sq Ft	Non-Potable Demand in GPD	Within 7 yrs GPD	7 to 20 yrs GPD	over 20 yrs GPD
				Max Non-Resid Density, Sq Ft/Ac	Max Non-Resid Buildout in Sq Ft					
49	T5	Urban Core	3.950	60,000	237,000	23,700	2,220	0	2,220	2,220
50	T3	General Urban	3.170	20,000	63,400	12,680	1,188	0	1,188	1,188
51	T3	General Urban	50.780	20,000	1,015,600	203,120	19,025	0	19,025	19,025
52	T4	Urban Center	26.270	40,000	1,050,800	105,080	9,842	0	9,842	9,842
53	T5	Urban Core	20.000	60,000	871,200	87,120	8,160	8,160	8,160	8,160
	T3	General Urban	25.000	20,000	500,000	100,000	9,366	0	9,366	9,366
	T2	Rural	13.808	20,000	276,160	55,232	5,173	0	5,173	5,173
54	T2	Rural	21.417	20,000	428,340	85,668	8,024	0	8,024	8,024
	T4	Urban Center	13.000	40,000	520,000	52,000	4,871	0	4,871	4,871
55	T3	General Urban	22.068	20,000	441,360	88,272	8,268	8,268	8,268	8,268
56	T3	General Urban	0.936	20,000	18,720	3,744	351	0	351	351
57	T3	General Urban	68.632	20,000	1,372,640	274,528	25,713	0	25,713	25,713
58	T3	General Urban	69.568	20,000	1,391,360	278,272	26,064	0	26,064	26,064
59	T2	Rural	70.726	20,000	1,414,520	282,904	26,498	0	26,498	26,498
Subtotal			2,681.50	49,761,478		6,400,288	599,477	65,344	398,073	599,477
Connection to E/16"R1 near Honouliuli WWTP										
1	T2	Rural	275.470	na	-	exist golf course	600,000	600,000	600,000	600,000
Totals:			3,506.58		60,753,618	8,598,716	1,405,391	710,694	1,176,360	1,405,391

add back Parcel 48: 711,962
 Table 2 checks: 711,962 1,176,360 1,405,391

Interconnected System (west of Parcel 45, Fort Barrette and future 24" BWS at end of Independence)

							-	459,348	660,752
--	--	--	--	--	--	--	---	---------	---------

Notes:

1. Parcel 48 is initially connected to the potable water system. As part of the 7 to 20 year development, when the R1 main is extended, Parcel 48 would connect to the R1 system.

APPENDIX B – SEWER

The following provides an explanation of the Tables and Spreadsheets, including the calculations, included in this Appendix. .

TABLES:

- Table 1 (1 page)
 - Purpose: provide the Average Base Flow by Transect Zone designation for each CDD Building Function Category.
 - Calculation - Average by Transect. Sum the Average Base Flow for uses allowed, then divide the sum by the number of allowed uses.
 - Notes:
 - The Residential/Lodging (Hotel) results are provided on Table 3, page 3 of 3.
 - The tabularized results for the 5 non-residential use categories (Civil, R&D, Light Ind, Office and Retail) are provided on Table 3, page 3 of 3.
 - The Transportation use category is only applicable to the Special District Transect Zone; and therefore, not used in Table 3.
- Table 2 (4 pages)
 - Purpose:
 - Provide the existing wastewater flow by Parcel; or
 - For Special Districts, provide the existing and future wastewater flow by Parcel.
 - Calculation - Total Base Average Daily Flow. Multiply the Estimated Daily Population by the Flow per Unit for each Structure.
- Table 3 (3 pages)
 - Purpose: Provide the wastewater flow by Parcel.
 - Calculations:
 - Maximum Buildout: multiply the Maximum Density by the Land Area.
 - Projected Future Buildout:
 - Residential: (Maximum Residential Buildout) times (Land Utilization) times (% Residential)
 - Non-Residential: (Maximum Non-Residential Buildout) times (Land Utilization) times (% Non-Residential)
 - Future Non-Residential Buildout Allocation by Category: multiply % Allocation by Category by Projected Future Buildout

- Projected Future Sewer Flow (Non-Residential). Multiply the Projected Future Buildout Sq. Ft. Allocation in each of the 5 categories (Civil, R&D, Light Ind, Office and Retail) by the Average Base Flow applicable to the Parcel's Transect Zone designation for each of the 5 categories (provided on page 3 of 3). The sum of the calculation for the 5 categories is the Projected Future Sewer Flow (Non-Residential) for that particular Parcel.
- Projected Future Sewer Flow (Residential). Multiply the Projected Future Buildout Residential # Units by the Residential flow (gpd/unit) for a multi-family (MF), single-family (SF) or hotel unit, or combination thereof, depending on the Parcel's Transect Zone designation (provided on page 3 of 3).
- The Sewer Flow for a Parcel is the sum of the Non-Residential and Residential Uses, or as calculated in Table 2.

SPREADSHEETS:

- Purpose: Present Design Peak Flow, associated Design Minimum pipe diameter, and Existing or Proposed pipe diameter by sewer line segment.
- Calculation:
 - Tributary Equivalent Population:
 - Residential Units:
 - If only MF unit is highlighted – value is per Table 3 – Projected Future Buildout Residential # Units.
 - If both SF and MF units are highlighted, Parcel is either designated Transect Zone T2 or T3; 1/3 of the Table 3 – Projected Future Buildout Residential # Units are single-family.
 - Residential Capita: in accordance with the “Design Standards of the Department of Wastewater Management, Volume 1” dated July 1993 (City Standards)
 - Other Capita: Table 3 - Sewer Flow per Development Timeframe divided by Average per Capita Flow (80 gpcd).
 - Wastewater Flow Computation and Pipe Diameter selection: in accordance with the City Standards.

- Based on existing topographical information, the assumption that sewer flows for particular parcels would be split between sewer segments was made and was noted with the “(Por)” designation adjacent to the Parcel number.
- Spreadsheets are provided for the following development timeframes:
 - 0 to 7 Year Sewer System (3 pages)
 - 7 to 20 Year Sewer System (3 pages).
 - 20+ Year Sewer System (3 pages).

ABBREVIATIONS USED:

- gpcd: gallons per capita per day
- gpd/unit: gallons per day per unit
- Light Ind.: Light Industrial
- R&D: research and development
- Sq. Ft.: square foot

PROJECT: **Table 1 - Average Base Flow by Transect Zone for Each CDD Building Function Category**

CLIENT: Ford Island Ventures, LLC

Per HAR Chapter 215-15 Table 4 - Kalaeloa CDD Building Function and Use		Average Base Flow (gpd/unit or gpd/sf of building area)	Transect Zone					Assumptions
Building Function Category	Specific Use Allowed by Right by Transect (see note 1)		T2	T3	T4	T5	SD	
Residential	Residential multi-family - per unit	224		x	x	x		2.8 X 80 = 224 gpd/unit (City Std) 4 X 80 = 320 gpd/unit (City Std)
	Residential detached Single Family, lot < 4,001 sq. ft. - per unit (see note 2)	320		+	+	+		
Lodging	Lodging, incl. hotels, spas, executive suites and bed and breakfasts - per unit	160		x	x	x		300 sf/unit average (Internet), 160 gpd/unit (City Std non-luxury)
Office	Offices, incl. medical offices and clinics	0.133			x	x		150 sf/employee average (City informal policy), 20 gpd/employee (DOH) 150 sf/employee average (City informal policy), 20 gpd/employee (DOH)
	Offices in support of business or industry otherwise permitted	0.133		x	x	x	x	
		Average by Transect	0.000	0.133	0.133	0.133	0.133	
Retail	ATMs and money exchange kiosks	0.133		x	x	x	x	150 sf/employee average (City informal policy), 20 gpd/employee (DOH), ignore zero flow for ATM 230 sf/employee average (ITE), 20 gpd/employee (DOH) 427 sf/employee average (ITE), 20 gpd/employee (DOH). 7000 sf/unit (assumed), 10 gal/carwash (DOH), 50 carwashes/day average (assumed), 2 gpd/customer (M&E), 50 customers/day (assumed) 200 sf/student average (Internet), 25 gpd/student with showers (DOH), 1 employee/10 students (DOH), 20 gpd/employee (DOH) 207 sf/employee average (ITE), 25 gpd/employee with showers (M&E), three shifts 50 gpd/100 sf (internet) + 20 gpd/employee (DOH), 1 employee/92 sf (ITE) 150 sf/employee average (City informal policy), 20 gpd/employee (DOH) 150 sf/employee average (City informal policy), 20 gpd/employee (DOH) 938 sf/employee average (USDOE), 20 gpd/employee (DOH), 2 shifts + 2 gpd/customer (M&E), 2500 customers/day (Internet), 20000 sq ft store (Internet) 400 sf/unit average (Internet), 20 gpd/employee (DOH), 2 employees/unit assumed 7000 sf/unit average (Internet), 20 gpd/employee (DOH), 7 employees/unit assumed + 10 gal/carwash (DOH), 50 carwashes/day average (Internet) + 2 gpd/customer (M&E), 500 customers/day (assumed) 150 sf/employee average (City informal policy), 20 gpd/employee (DOH) 7000 sf/unit average (Internet), 25 gpd/employee with showers (M&E), 10 employees/unit assumed + 2 gpd/customer (M&E), 100 customers/day (assumed) 2500 sf/unit average (Internet), 150 seats average (Internet), 3 gpd/seat/seating (per meal, M&E), 5 seatings (assumed) + 100sf/employee average (ITE), 20 gpd/employee (DOH) 150 sf/employee average (City informal policy), 20 gpd/employee (DOH) 150 sf/employee average (City informal policy), 20 gpd/employee (DOH) 150 sf/employee average (City informal policy), 20 gpd/employee (DOH)
	Bulk postal services	0.087		x				
	Car, truck and equipment rental agencies	0.133		x				
	Community services, incl. community centers, daycare and private schools	0.135		x	x	x		
	Community services, incl. emergency services and fire and police stations	0.362	x	x	x	x	x	
	Drive-through facilities	0.717		x	x	x		
	Electronic equipment sales and repairs	0.133		x	x	x	x	
	Financial, insurance, and real estate services, incl. banks and offices	0.133		x	x	x		
	Food stores	0.293			x	x		
	Food vending, incl. sidewalk and lunch wagons	0.100		x	x	x	x	
	Gas stations, incl. carwash, accessory retail and towing	0.234		x	x			
	Personal services	0.133		x	x	x		
	Repair services for cars, trucks, machines and appliances	0.064					x	
	Restaurants and other "sit-down" eating establishments	1.100			x	x		
	Retail merchandise	0.133			x	x		
	Retail reprographic services	0.133		x	x	x		
	Retail trades	0.133			x	x		
		Average by Transect	0.362	0.203	0.277	0.280	0.159	
Civic	Amusement enterprises (under 25 acres)	0.051			x	x	x	20000 sf/unit average (internet, assumed use type = skating rink), 6 employees/shift (Internet), one shift, 20 gpd/employee (DOH) + 2 gpd/customer(M&E), 300 customers/day (assumed) + 100 meals (assumed), 3 gpd/meal (M&E) 20000 sf/unit average (internet, assumed use type = skating rink), 6 employees/shift (Internet), one shift, 20 gpd/employee (DOH) + 2 gpd/customer(M&E), 300 customers/day (assumed) + 100 meals (assumed), 3 gpd/meal (M&E) 3000 sf/unit average (Internet, small hanger), one employee, 20 gpd/employee (DOH), one student, 15 gpd/student no shower (DOH) 10 sf/customer (Internet, banquet hall), 1 employee/30 customers (Internet), 7 gpd/meal (M&E), 20 gpd/employee (DOH) 150 sf/employee average (City informal policy), 20 gpd/employee (DOH), 15 sf/visitor (NFPA 101 occupancy limit not concentrated), 3 gpd/visitor (M&E) 10 sf/customer (Internet), 1 employee/100 customers (assumed), 3 gpd/seat (M&E), 20 gpd/employee (DOH) 3000 sf/unit average (Internet, small spa w/ 8 treatment rooms), 4 employees (assumed), 20 gpd/employee (DOH), 25 customers (assumed), 25 gpd/customer w/shower (M&E)
	Amusement enterprises (land-intensive, over 25 acres)	0.051		x				
	Aviation flight schools	0.012					x	
	Banquet halls, dance halls/discotheques and exhibit/convention halls	0.767		x				
	Cultural facilities, incl. libraries, art galleries and museums	0.333		x	x	x	x	
	Cinemas, theatres and auditoria, except sport halls and arenas	0.320		x	x	x	x	
	Health clubs, swim clubs, tennis clubs and gymnasias	0.235	x	x	x	x		
			Average by Transect	0.235	0.341	0.235	0.235	
Industry, Manufacturing & Processing, Wholesaling (see note 3)	Laboratories, but not incl. hospitals, medical offices and clinics	0.133	+	x				150 sf/employee average (City informal policy), 20 gpd/employee (DOH) 3000 sf/unit average (Internet), 4 employees (assumed), 20 gpd/employee (DOH), 60 sf/washing machine (Internet), 550 gpd/washing machine (M&E) 150 sf/employee average (City informal policy), 20 gpd/employee (DOH) 150 sf/employee average (City informal policy), 35 gpd/employee (DOH) 781 sf/employee average (ITE), 20 gpd/employee (DOH) 427 sf/employee average (ITE), 20 gpd/employee (DOH) 781 sf/employee average (ITE), 20 gpd/employee (DOH)
	Laundries, industrial, for clothes, carpets and chemical cleaning (see note 4)	9.193		x				
	Light industrial facilities	0.133	+	x				
	Manufacturing/Light	0.233		x				
	Self-storage facilities	0.026		x				
	Transportation yards and freight	0.047		x				
	Warehousing	0.026		x			x	
		Average by Transect	0.133	0.100	0.000	0.000	0.026	
Research & Development (see note 3)	Research and development	0.133	+	x				150 sf/employee average (City informal policy), 20 gpd/employee (DOH)
		Average by Transect	0.133	0.133	0.000	0.000	0.000	
Transportation	Airports and aircraft transportation services	0.133					x	14600 sf/unit (Kapalua Airport Terminal), 27 flights average per day (DOT), 24 plane capacity average (DeHaviland Dash-9-100 can carry 39, Cessna Caravan 208 can carry 9, approx 50/50 split on flights), 60% load factor (assumed), 5 gpd/passenger (DOH)
		Average by Transect	0.000	0.000	0.000	0.000	0.133	

Notes:

1. Only the Specific Uses allowed by right are reflected in this table and are noted with the 'x' symbol. Exceptions are noted below.
2. Single family development is allowed; but, requires approval by the Authority as noted by the '+' symbol.
3. The buildout projection assumes this building function in Transect T2; however, no specific use is allowed by right. Therefore, specific uses allowed but requiring approval by the Authority are noted with the '+' symbol.
4. Assume there is a single 3,000 sf unit per Parcel in Transect T3; i.e., 27,580 gpd per Parcel.

Sources:

City Std - Design Standards of the Department of Wastewater Management, Volume 1, July 1993, City and County of Honolulu
Internet - Internet search

M&E - Metcalf & Eddy, 3rd Edition, Wastewater Engineering, 1991
ITE - Institute of Transportation Engineers
USDOE - US Dept. of Energy
NFPA - National Fire Protection Association
DOH - State of Hawaii Dept. of Health
DOT - State of Hawaii Dept. of Transportation

PROJECT: **Table 2 - Existing and Special District Sewer Flow Calculation**

CLIENT: Ford Island Ventures, LLC

Parcel	Owner	Structure ID	Gross Leasable Building Area (SF)	Estimated Daily Population or Units	Flow Per Person or Unit (gpd)	Total Base Average Daily Flow (gpd)	Comments/Assumptions	existing sewer flow (gpd)	0 to 7 year sewer flow (gpd)	7 to 20 year sewer flow (gpd)	20+ year sewer flow (gpd)
1	NAVY	Golf Course - no new development	Total	1	10,000	10,000	1 unit. Assumed golf course clubhouse, maintenance, pro shops, snack bar	10,000	10,000	10,000	10,000
1a	Carmel	Residential		120	224	26,880	Multi-family units	26,880	26,880		
1b	Carmel	Residential		396	224	88,704	Multi-family units	88,704	88,704		
2	State DOE	Barber's Point Elementary School		504	25	13,880	Total	13,880	13,880		
				64	20	1,280	Student Instructors, workers				
3	DHHL	vacant lot					no sewer or water				
4 & 5	DHHL	345: General Warehouse	3,720	2	0	0	no sewer or water, purely storage use				
6	DHHL	187: Office/storage/training	12,368	10	20	200	Total	200	200		
		191: Office/storage	4,900	10	20	200	workers				
		105: Office/storage	1,600	10	20	200	workers-cesspool connection workers-cesspool connection				
7	DHHL	vacant lot					no sewer or water				
8	Navy	Birrem/Oily Waste Land Farm					no sewer or water				
9	DHHL	various					no sewer or water, purely storage use; exception PASHA (auto storage) - water for car washing				
10	BWS	vacant lot					no sewer or water				
10A	HCDA	vacant lot					no sewer or water				
11	USFWA	wildlife habitat - no new development					no sewer or water				
12	DOT-Airport	4: Tower		15	20	300	Existing Total	3,825			
		110: Hangar		17	35	595	Workers				
		1792: Museum		1	20	20	Factory Workers				
		Hangars		3	35	105	Workers				
		1755/1880: Airport Rescue/Fire Fighters		18	150	2,700	Factory Workers				
		115: Baseyard		3	35	105	Resident worker, 24-hr shift				
							Factory Workers				
	0 to 7 years	Additional: T-Hangars		288	5	1,440	0 to 7 Year Total		44,045		
		Lease Lots	165,700	739	20	14,780	Assumed one pilot + one passenger per hangar				
		Hotel Units		150	160	24,000	Assumed 1 workers per 224 sf Hotel units				
	7 to 20 years	Additional: T-Hangars		144	10	1,440	7 to 20 Year Total			70,245	70,245
		Lease Lots	277,400	1238	20	24,760	Assumed one pilot + one passenger per hangar				
							Assumed 1 workers per 224 sf				
12A	State DOE	111: Hangar - no new development		125	20	2,500	Worker	2,500	2,500	2,500	2,500
13	Park	vacant lot - no new development					no sewer or water				
13A	SPS	existing SPS				0					
14	USCG	Existing assumes RO project on-line		250	35	8,750	Existing Total	10,900	10,900		
						2,150	Factory Workers				
							Non-personnel use				
	7 to 20 years	Additional:		50	35	1,750	7 to 20 Year Total			13,010	13,010
						360	Factory Workers				
							Non-personnel use				
15	NAVY	Navy Rec. Area - no new development				6,260	Existing Total	6,260	6,260	6,260	6,260
		1811: public toilet		100	5	500	picnic w/ showers				
		1812: public toilet		100	0	0	picnic w/ showers				
		existing cottages		18	320	5,760	single family units				
16	Park Pending	vacant lot - no new development					no sewer or water				
17	Airport Pending	various					no sewer or water				
18 all	HCDA	various					no sewer or water				
19 all	Park Pending	various					no sewer; check water				
20	FAA	Beacon - no new development					no sewer or water				
21	DHHL	warehouse storage/aircraft revetments					no sewer or water				
21A	DHHL	vacant lot					no sewer or water				
22	Park Pending	vacant lot - no new development					no sewer or water				
23	HCDA	various					no sewer or water				
24	DHHL	various					Only water for livestock/stable use.				
25	HCDA	vacant lot					no sewer or water				
26	HCDA	vacant lot					no sewer or water				
27	Park Pending	1873: bathroom campsite - 13, ea. 10 person max.		130	32	4,160	campground w/ central comfort station	4,160	4,160	4,160	4,160
28	NAVY	Navy Rec. Area - no new development				5,880	Existing Total	5,880	5,880	5,880	5,880
		1805: public toilet		200	5	1,000	picnic w/ showers				
		1978: exchange snack stand		200	5	1,000	Meals				
		1797: rec services facility		2	20	40	Workers				
		existing cottages		12	320	3,840	single family units				
29	FIV - Parcel 10	152: Commissary	28,420	63	41	2,589	Assumed 1 user/450 sf	2,589	2,589		

PROJECT: **Table 2 - Existing and Special District Sewer Flow Calculation**

CLIENT: Ford Island Ventures, LLC

Parcel	Owner	Structure ID	Gross Leasable Building Area (SF)	Estimated Daily Population or Units	Flow Per Person or Unit (gpd)	Total Base Average Daily Flow (gpd)	Comments/Assumptions	existing sewer flow (gpd)	0 to 7 year sewer flow (gpd)	7 to 20 year sewer flow (gpd)	20+ year sewer flow (gpd)
30	NAVY - DRMO	88: personnel shelter	286			600	Use existing water meter data	600	600		
		140-142: warehouse	206,128								
31	NAVY - PWC	1885: rec pavilion				0	Navy in process of disposing property				
		2185: not found									
32	HIARNG	629: not found				24,740	Existing Total	24,740			
		681: transformer w/i P34	336								
32	HIARNG	793: transformer w/i P34	336			24,740	Existing Total	24,740			
32	HIARNG	91: shop, armory	15,960			0	Navy in process of disposing property				
		116: office/warehouse	15,370								
32	HIARNG	118: compressor bldg	2,010			24,740	Existing Total	24,740			
		98: repair shop	4,073								
32	HIARNG	790: veh grease rack/shop	2,016			24,740	Existing Total	24,740			
		785: transformer	336								
32	HIARNG	90: garage, veh. Maint	18,831			24,740	Existing Total	24,740			
		99: maint. Shop	3,848								
32	HIARNG	1874: Weapons Systems Trainer Bldg		131	20	2,620	Workers				
		134: 93rd CST Ready Building		22	20	440	Workers				
32	HIARNG	282: Maintenance Hangar		741	20	14,820	Workers				
		1898: Avionics Shop		156	20	3,120	Workers				
32	HIARNG	117: Maint. Hangar Admin/Office		187	20	3,740	Workers				
		175: EDC Test Bldg		0	20	0	Workers				
32	HIARNG	Additional:				37,360	0 to 7 Year Total		37,360		
		282: Maintenance Hangar - to be demolished		-741	20	-14,820	Workers				
32	HIARNG	117/150077: Combined Support Maint. Fac. (Remodel/Addition)	12000 new construction	89	20	1,780	Workers				
		663: Armament Shop (remodel)									
32	HIARNG	175: EDC to Mail Distribution Center (Remodel)		8	20	160	Workers				
		PN 150023 Army Aviation Support Facility AASF P1 (new construction)	211,658	338	20	6,760	Workers				
32	HIARNG	PN 150043 Readiness Center (RC) BDE P1 (new construction)	69,462	937	20	18,740	Workers				
		Additional:									
32	HIARNG	150301: Readiness Center HIARNG (new construction) adjacent to 1874	102,024	89	20	1,780	Workers				
		282/150091 Readiness Center Aviation	117,024	457	20	9,140	Workers				
32	HIARNG	PN 150093 AASF P2 (150023 addition)	to be determined				included in 150023				
		PN 150084 RC BDE P2 (150043 addition)	137,371				included in 150043				
32	HIARNG	PN 150092 RC BDE P3, Military Vehicle Covered Storage	165,000				included in 150043				
32	Airforce	1922: HIARNG Admin		121	20	2,420	Workers	2,420	2,420	2,420	2,420
		1923: HIARNG Maintenance					included in 1922				
32A	HIARNG	1784: Basic Enlisted Quarters (BEQ)		5	80	400	Sleeping Quarters, # people				
		1785: Basic Enlisted Quarters (BEQ)		9	80	720	Sleeping Quarters, # people				
32A	YouthChallenge	1786: BEQ Youth Challenge		98	80	7,840	Sleeping Quarters, # people				
		1786: BEQ/Office		10	20	200	Admin, workers				
32A	YouthChallenge	1787: BEQ Youth Challenge		52	80	4,160	Sleeping Quarters, # people				
		1787: BEQ/Office		10	20	200	Admin, workers				
32A	YouthChallenge	1788: Laundry		0	20	0	Admin, workers				
		46: BEQ		77	80	6,160	Sleeping Quarters, # people				
32A	YouthChallenge	1789: Chilled Water Plant					Incidental				
		1826: Parking Shed									
32B	HIARNG	19: Galley/Fitness		8	20	160	Workers				
		19: Learning Center		150	20	3,000	students/faculty				
32B	YouthChallenge	Additional:									
		19/15001-00019: Dining Room to Readiness Center (Remodel)		45	20	900	Workers				
32C	Airport Pending	various				no sewer or water					
33	FIV - Parcel 14	1869: Auto Hobby Shop	9,000	9	20	180	Assumed 1 workers per 1,000 sf	180	180		
34	DHHL	144: Office/storage	8,100	7	20	140	Workers				
		283: Warehouse/Office	9,600	15	20	300	Workers				
34	DHHL	129: Auto Repair Facility	4,000	5	20	100	Workers				
35	HPHA	48: Enlisted Quarters/Housing	27,621	60	224	13,440	Multi-family units				
		50: Enlisted Quarters/Housing	27,621	60	224	13,440	Multi-family units				

PROJECT: **Table 2 - Existing and Special District Sewer Flow Calculation**

CLIENT: Ford Island Ventures, LLC

Parcel	Owner	Structure ID	Gross Leasable Building Area (SF)	Estimated Daily Population or Units	Flow Per Person or Unit (gpd)	Total Base Average Daily Flow (gpd)	Comments/Assumptions	existing sewer flow (gpd)	0 to 7 year sewer flow (gpd)	7 to 20 year sewer flow (gpd)	20+ year sewer flow (gpd)
36	FIV - Parcel 9	1844: NEX	44,473	1,000	5	8,850	Total	8,850	8,850		
		1659: Furniture store	18,230	50	5	5,000	Restroom use				
		1744: McDonald's	8,069	300	10	250	Restroom use				
		715: Tennis/Basketball Court		50		3,000	Restroom use and meals				
		965: Former Bank Building	3,500	20	5	0	Waterfountain use only				
		1867: West Oahu Credit Union	4,860	100	5	100	Restroom use				
					500	Restroom use					
37	VA	37: Enlisted Quarters/Housing	27,621	60	80	9,600	Total	9,600	9,600		
		1772: Enlisted Quarters/Housing		60	80	4,800	Sleeping Quarters, # people				
						4,800	Sleeping Quarters, # people				
37A	VA	34: Enlisted Quarters/Housing	27,621	60	80	4,800	Sleeping Quarters, # people	4,800	4,800		
38	HPHA	39: Enlisted Quarters/Housing		60	224	13,820	Total	13,820	13,820	13,820	
		32: Office	2,946	19	20	13,440	Multi-family units				
					380	Office worker/shift					
39	FIV - Parcel 8	84-25: Chapel	2,496	25	5	125	Assumed use	125	125	125	
40	FIV - Parcel 7	740: Kona Breeze Swimming Pool	11,300	500	10	6,600	Total	6,600			
		756: Pool Treatment Facility				5,000	Assumed snack bar and restroom				
		782: Swimming Pool Bathhouse	1,241	150	10	1,500	Assumed shower facilities				
		1661: Wading Pool									
		1695: Women's Dressing Room	400								
		1696: Men's Dressing Room	400								
		1697: Swimming Pool Office	256	10	10	100	Assumed restroom use				
		1723: Racquetball Court	4,050								
		1761: Transformer Station									
		1762: Powerpoint Gym	14,500								
		1888: Pool Pavilion	216								
41	USPS	3: Post Office	4,917	1	20	20	Office worker/shift	20	20	20	
42	DHHL	1: School/Office		50	25	2,710	Total	2,710			
		2: Office/Storage	4,872	10	20	1,250	Student				
		1756: Office/Storage	9,362	15	20	200	Workers				
		Child Care Facility	1,500	12	80	300	Workers				
					960	4-bedroom house, # people					
43	HCD	36: BEQ	27,621	60	224	13,440	Multi-family units	13,440	13,440		
44	DHHL	1709: Fire Station	9,362	62	20	2,060	Total	2,060	2,060		
		1710: Survival Equipment Shop	6,225	41	20	1,240	Workers				
					820	Office use					
45	FIV - Parcel 1	vacant lot				0					
46	FIV - Parcel 2	vacant lot				0					
47	FIV - Parcel 3	77: BOQ	98,173	79	100	12,440	Total	12,440	12,440		
		73: Paradise West Club Complex	20,766	300	10	7,900	Assumed 1 apartment/700sf, corridor efficiency 70%, 80% occupancy, flow per UFC 3-240-02N				
		713: Tennis Courts				3,000	Assumed snack bar and restroom use				
		941: Outdoor Swimming Pool									
		943: Pool Bathhouse	1,333	150	10	1,500	Assumed shower facilities				
		945: Pool Treatment Facility									
1692: Cold Storage	200	0		0	Assumed chiller flow incidental						
1724: Transformer Station											
1906: Tennis Pro Shop	1,404	2	20	40	Assumed workers						
48	FIV - Parcel 4	55: YMCA Administrative Offices	13,184	25	10	250	Assumed restroom use	250			
49	FIV - Parcel 5	1890: Fire Station	6,257	20	150	3,000	Assumed resident workers, 24-hr shift	3,000	3,000		
50	FIV - Parcel 6B	vacant lot				0		0	0		
51	FIV - Parcel 6A	Residential		10	320	5,280	Total	5,280	5,280		
		853	3,097	20	20	3,200	Single-family units				
		1793	2,048	13	20	400	Assumed office use				
		1919	1,392	9	20	260	Assumed office use				
		1940	1,000	6	20	180	Assumed office use				
		1897	1,392	9	20	120	Assumed office use				
		1832	7,112	47	20	180	Assumed office use				
							940	Assumed office use			

PROJECT: **Table 2 - Existing and Special District Sewer Flow Calculation**

CLIENT: Ford Island Ventures, LLC

Parcel	Owner	Structure ID	Gross Leasable Building Area (SF)	Estimated Daily Population or Units	Flow Per Person or Unit (gpd)	Total Base Average Daily Flow (gpd)	Comments/Assumptions	existing sewer flow (gpd)	0 to 7 year sewer flow (gpd)	7 to 20 year sewer flow (gpd)	20+ year sewer flow (gpd)					
52	FIV - Parcel 11	1829: Medical/Dental Clinic	54,216	100	5	4,060	Total	4,060	4,060							
		1837: Sewer Lift Station				500	Assumed restroom use									
		960: Baseball Dugout	14,014	200	5	1,000	Assumed restroom use									
		1831: Bowling Alley				1,000	Assumed meals									
		1835: Snack Bar				1,000										
		1897: Sewer Lift Station														
		1924: Hobby Shop	8,065	53	20	1,060	Assumed office use									
		1962: Kids Room	1,000													
		723: Playing Field/Baseball	768													
		724: Grandstand														
		743: Pointer Field														
		962: Baseball Dugout														
		1878: Old Glory Stage	290	50	5	250	Assumed restroom use									
1901: Baseball Field Toilet	290	50	5	250	Assumed restroom use											
1902: Baseball Field Toilet	308															
1974: Dugout																
53	FIV - Parcel 12	1928: Touch-N-Go Mini Mart	12,122	200	5	1,000	Assumed restroom use	1,000	1,000							
		Additional:	134,254	895	20	19,150	0 to 7 Year Total									
		FBI/GSA				17,900	Office use									
						250	Visitor									
54	FIV - Parcel 13	vacant lot				0										
55	FIV - Parcel 15	1965: Day Care Center	8,773	400	5	2,100	Total	2,100								
		476: Warehouse	3,720	10	5	2,000	Assumed restroom use									
		477: Battery Storage Warehouse	3,720	10	5	50	Assumed restroom use									
		1883: Sonabouy Storage	2,400			50	Assumed restroom use									
		1955: Covered Pad	1,120													
56	FIV - Parcel 16	128: Navy Reserve Storage	5,760	5	5	25	Assumed restroom use	25	25							
		484: Transformer Substation														
57	FIV - Parcel 17	1141: Supply Warehouse	20,907	10	5	3,400	Total	3,400	3,400							
		1142: Warehouse	29,657	10	5	50	Assumed restroom use									
		1143: C&C Warehouse	11,413	10	5	50	Assumed restroom use									
		1145: C&C Warehouse	11,440	10	5	50	Assumed restroom use									
		1147: NEX Warehouse	4,000	10	5	50	Assumed restroom use									
		929: MWR Administration Office	10,850	100	5	500	Assumed restroom use									
		1144: NEX Maintenance Shop	8,200	25	5	125	Assumed restroom use									
		1149: Maintenance Facility	8,200	25	5	125	Assumed restroom use									
		1150: MWR Warehouse	8,200	10	5	50	Assumed restroom use									
		1152: MWR Warehouse	8,200	10	5	50	Assumed restroom use									
		1153: Rec Services Maintenance	8,200	20	5	100	Assumed restroom use									
		1562: Recycling Center	4,100	20	5	100	Assumed restroom use									
		1570: Recycling Center	4,100	20	5	100	Assumed restroom use									
		1759: Transformer Station														
		1850: Sewer Lift Station														
		1853: Baseball Field	384	200	5	1,000	Assumed restroom use									
		1882: Restrooms														
		1916: Baseball Field														
		1917: Baseball Field														
		1918: Baseball Field	448	200	5	1,000	Assumed meals									
1958: Concession Stand																
1966: MWR Beach Cottage Support																
1979: Pride Field Picnic Pavement																
1980: Pride Field Picnic Pavement	1,040															
58	FIV - Parcel 18	972: Admin Building	25,272	25	5	350	Total	350	350							
		1767: Equipment Building	10,494	20	5	125	Assumed restroom use									
		1768: Contractor Office	2,496	25	5	100	Assumed restroom use									
		1769: Electrical Power Plant	3,000			125	Assumed restroom use									
		1822: Concrete Pad	7,298													
		1770: Sewer Lift Station	100													
		1834: Transformer Station														
		1841: Satellite Dish														
		59	FIV - Parcel 19	vacant lot								0				
		Total:										347,908	389,448	227,340	186,495	
								existing	0 to 7	7 to 20	20+					

PROJECT: **Table 3 - Wastewater Flow by Parcel**

CLIENT: Ford Island Ventures, LLC

Parcel # (MP ref #)	Transect Designation & Land Use HCDA HAR Chapter 15-215		Land Area Acres	Maximum Buildout, Per Transect Parameters				Projected Future Buildout. Per HAR Chapter 15-215, Table 4 - CDD Building Function (See Notes 1, 2 & 3)															Projected Future Sewer Flows (gpd)		Sewer Flow (gpd) per Development Timeframe, years				
				100% Non-Residential		100% Residential		Future Non-Residential Buildout Allocation					Land Utilization & Residential vs Non-Residential Inputs			Projected Future Buildout													
				Max Non-Residential Density, Sq Ft/Ac	Max Non-Residential Buildout in Sq Ft	Max Residential Density, Units/Acre	Max Residential Buildout, # Units	% Allocation by Category					Allocation by Category (sf)					Land Utilization	% Non-Residential	% Residential	Residential # Units	Non-Residential Sq Ft	Non-Residential	Residential	Within 7 yrs	7 to 20 yrs	over 20 yrs		
								Civic	R&D	Light Ind	Office	Retail	Civic	R&D	Light Ind	Office	Retail												
1	T2	Rural	275.470	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,000	10,000	10,000	
1A	T4	Urban Center	16.190	40,000	647,600	40	647	-	-	-	-	-	-	100%	-	-	-	-	38,856	60%	10%	90%	349	38,856	10,755	78,176	26,880	88,931	88,931
1B	T3	General Urban	56.975	20,000	1,139,500	20	1,139	-	-	-	-	50%	50%	-	-	-	34,185	34,185	60%	10%	90%	615	68,370	11,495	157,440	88,704	168,935	168,935	
2	T3	General Urban	14.458	20,000	289,160	20	289	-	-	-	-	-	-	-	-	-	-	-	60%	-	100%	173	-	0	44,320	13,880	44,320	44,320	
3	T3	General Urban	44.102	20,000	882,040	20	882	-	20%	80%	-	-	-	-	-	6,174	24,697	-	-	3.5%	100%	-	-	30,871	30,566	0	30,566	30,566	
4 & 5	T3	General Urban	136.938	20,000	2,738,760	20	2,738	-	20%	80%	-	-	-	-	-	27,388	109,550	-	-	5.0%	100%	-	-	136,938	41,852	0	41,852	41,852	
6	SD	Special District	28.724	20,000	574,480	varies	-	-	-	100%	-	-	-	-	-	-	40,214	-	-	7.0%	100%	-	-	40,214	1,030	200	1,030	1,030	
7	T3	General Urban	29.853	20,000	597,060	20	597	-	20%	80%	-	-	-	-	-	6,687	26,748	-	-	5.6%	100%	-	-	33,435	30,839	30,839	30,839	30,839	
8	T3	General Urban	73.741	20,000	1,474,820	20	1,474	-	20%	80%	-	-	-	-	-	16,518	66,072	-	-	5.6%	100%	-	-	82,590	36,069	0	0	36,069	
9	T3	General Urban	139.297	20,000	2,785,940	20	2,785	-	20%	80%	-	-	-	-	-	39,003	156,013	-	-	7.0%	100%	-	-	195,016	48,032	0	48,032	48,032	
10	T3	General Urban	20.029	20,000	400,580	20	400	-	20%	80%	-	-	-	-	-	5,608	22,432	-	-	7.0%	100%	-	-	28,041	30,265	0	30,265	30,265	
10A	T3	General Urban	10.569	20,000	211,380	20	211	-	20%	80%	-	-	-	-	-	2,959	11,837	-	-	7.0%	100%	-	-	14,797	28,855	28,855	28,855	28,855	
11	T1	Natural	37.377	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	
12	SD	Special District	752.216	20,000	15,044,320	20	15,044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44,045	70,245	70,245	
12A	SD	Special District	4.520	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,500	2,500	2,500	
13	T1	Natural	16.292	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	
13A	T2	Rural	3.661	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	
14	SD	Special District	42.964	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,900	13,010	13,010	
15	T1	Natural	21.308	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,260	6,260	6,260	
16	T1	Natural	4.715	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	
17	T2	Rural	45.597	20,000	911,940	na	-	-	-	100%	-	-	-	-	-	-	31,918	-	-	3.5%	100%	-	-	31,918	4,256	0	0	4,256	
18	T2	Rural	65.356	20,000	1,307,120	na	-	50%	-	-	-	-	50%	-	-	22,875	-	-	22,875	3.5%	100%	-	-	45,749	13,663	0	13,663	13,663	
18A	T2	Rural	19.361	20,000	387,220	na	-	50%	-	-	-	-	50%	-	-	6,776	-	-	6,776	3.5%	100%	-	-	13,553	4,048	0	4,048	4,048	
18B	T2	Rural	11.501	20,000	230,020	na	-	50%	-	-	-	-	50%	-	-	4,025	-	-	4,025	3.5%	100%	-	-	8,051	2,404	0	2,404	2,404	
19	T2	Rural	32.000	20,000	640,000	na	-	50%	-	-	-	-	50%	-	-	11,200	-	-	11,200	3.5%	100%	-	-	22,400	6,690	0	0	6,690	
	T3	General Urban	134.784	20,000	2,695,680	20	2,695	-	20%	50%	20%	10%	-	-	-	18,870	47,174	18,870	9,435	3.5%	100%	-	-	94,349	38,930	0	0	38,930	
19A	T3	General Urban	22.997	20,000	459,940	20	459	-	20%	50%	20%	10%	-	-	-	5,151	12,878	5,151	2,576	5.6%	100%	-	-	25,757	30,461	0	0	30,461	
20	SD	Special District	18.030	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	
21	T2	Rural	50.482	20,000	1,009,644	na	-	50%	-	-	-	-	50%	-	-	25,241	-	-	25,241	5.0%	100%	-	-	50,482	15,077	0	0	15,077	
	T3	General Urban	47.056	20,000	941,116	20	941	50%	-	-	-	-	50%	-	-	-	23,528	-	-	23,528	5.0%	100%	-	-	47,056	12,802	0	0	12,802
21A	T2	Rural	5.634	20,000	112,680	na	-	50%	-	-	-	-	50%	-	-	2,817	-	-	2,817	5.0%	100%	-	-	5,634	1,683	0	0	1,683	
22	T2	Rural	29.960	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	

↑

yellow highlighted values - see Table 2, typical

PROJECT: **Table 3 - Wastewater Flow by Parcel**

CLIENT: Ford Island Ventures, LLC

Parcel # (MP ref #)	Transect Designation & Land Use HCDA HAR Chapter 15-215		Land Area Acres	Maximum Buildout, Per Transect Parameters				Projected Future Buildout. Per HAR Chapter 15-215, Table 4 - CDD Building Function (See Notes 1, 2 & 3)															Projected Future Sewer Flows (gpd)		Sewer Flow (gpd) per Development Timeframe, years		
				100% Non-Residential		100% Residential		Future Non-Residential Buildout Allocation					Land Utilization & Residential vs Non-Residential Inputs			Projected Future Buildout											
				Max Non-Residential Density, Sq Ft/Ac	Max Non-Residential Buildout in Sq Ft	Max Residential Density, Units/Acre	Max Residential Buildout, # Units	% Allocation by Category					Allocation by Category (sf)			Land Utilization	% Non-Residential	% Residential	Residential	Non-Residential	Non-Residential	Residential					
								Civic	R&D	Light Ind	Office	Retail	Civic	R&D	Light Ind	Office	Retail				# Units	Sq Ft					
23	T2	Rural	131.035	20,000	2,620,698	na	-	50%	-	-	-	50%	13,103	-	-	-	13,103	1.0%	100%	-	-	26,207	7,827		0	7,827	7,827
	T3	General Urban	14.750	20,000	295,002	20	295	-	-	-	-	-	-	-	-	-	-	60%	-	100%	177	-	0	45,312	0	45,312	45,312
24	T2	Rural	49.177	20,000	983,540	na	-	50%	-	-	-	50%	34,424	-	-	-	34,424	7.0%	100%	-	-	68,848	20,562		0	20,562	20,562
25	T1	Natural	9.303	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		0	0	0	
26	T2	Rural	47.556	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	0	0	
	T3	General Urban	6.421	20,000	128,411	20	128	-	-	-	-	-	-	-	-	-	-	50%	-	100%	64	-	0	16,352	0	16,352	16,352
	T3	General Urban	3.961	20,000	79,213	20	79	-	-	-	-	-	-	-	-	-	-	50%	-	100%	39	-	0	9,984	0	9,984	9,984
27	T1	Natural	27.792	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			4,160	4,160	4,160	
	T2	Rural	155.678	20,000	3,113,563	na	-	30%	50%	-	-	20%	32,692	54,487	-	-	21,795	3.5%	100%	-	-	108,975	22,844		0	0	22,844
	T3	General Urban	28.485	20,000	569,703	20	569	-	-	-	-	-	-	-	-	-	-	50%	-	100%	284	-	0	72,736	0	0	72,736
28	T1	Natural	11.149	na	-	na	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			5,880	5,880	5,880	
	T3	General Urban	4.254	20,000	85,088	20	85	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	0		0	0	0
29	T3	General Urban	3.809	20,000	76,180	20	76	-	-	50%	30%	20%	-	-	10,665	6,399	4,266	28%	100%	-	-	21,330	30,063		2,589	30,063	30,063
30	T3	General Urban	31.746	20,000	634,920	20	634	-	-	50%	30%	20%	-	-	88,889	53,333	35,556	28%	100%	-	-	177,778	50,467		600	50,467	50,467
31	T3	General Urban	10.890	20,000	217,800	20	217	-	-	50%	30%	20%	-	-	30,492	18,295	12,197	28%	100%	-	-	60,984	35,235		35,235	35,235	35,235
32	SD	Special District	138.164	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		39,780	50,700	50,700	
32A	SD	Special District	5.931	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		19,680	19,680	19,680	
32B	SD	Special District	3.730	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		4,060	4,060	4,060	
32C	SD	Special District	7.316	varies	-	varies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	0	0	
33	T3	General Urban	2.039	20,000	40,780	20	40	-	-	100%	-	-	-	-	32,624	-	-	80%	100%	-	-	32,624	30,533		180	30,533	30,533
34	T3	General Urban	9.722	20,000	194,440	20	194	-	-	50%	30%	20%	-	-	27,222	16,333	10,889	28%	100%	-	-	54,443	34,382		34,382	34,382	34,382
35	T4	Urban Center	7.550	40,000	302,000	40	302	-	-	-	-	-	-	-	-	-	-	70%	-	100%	211	-	0	47,264	26,880	26,880	47,264
36	T5	Urban Core	13.532	60,000	811,920	60	811	-	-	-	60%	40%	-	-	29,229	19,486	-	60%	10%	90%	437	48,715	9,354	97,888	8,850	107,242	107,242
37	T4	Urban Center	5.162	40,000	206,480	40	206	-	-	-	-	-	-	-	-	-	-	70%	-	100%	144	-	0	32,256	9,600	32,256	32,256
37A	T4	Urban Center	1.680	40,000	67,200	40	67	-	-	-	-	-	-	-	-	-	-	80%	-	100%	53	-	0	11,872	4,800	11,872	11,872
38	T4	Urban Center	4.742	40,000	189,680	40	189	-	-	-	-	-	-	-	-	-	-	70%	-	100%	132	-	0	29,568	13,820	13,820	29,568
39	T4	Urban Center	1.208	40,000	48,320	40	48	-	-	-	-	-	-	-	-	-	-	80%	-	100%	38	-	0	8,512	125	125	8,512
40	T4	Urban Center	9.454	40,000	378,160	40	378	-	-	-	30%	70%	-	-	6,807	15,883	-	60%	10%	90%	204	22,690	5,304	45,696	51,000	51,000	51,000
41	T4	Urban Center	1.354	40,000	54,160	40	54	-	-	-	-	100%	-	-	-	43,328	-	80%	100%	-	-	43,328	11,992		20	20	11,992
42	T3	General Urban	19.952	20,000	399,040	20	399	-	-	-	-	-	-	-	-	-	-	60%	-	100%	239	-	0	61,216	61,216	61,216	61,216
43	T4	Urban Center	1.527	40,000	61,080	40	61	-	-	-	80%	20%	-	-	39,091	9,773	-	80%	100%	-	-	48,864	7,917		13,440	7,917	7,917
44	T2	Rural	6.969	20,000	139,380	na	-	50%	-	-	-	50%	48,783	-	-	-	48,783	70%	100%	-	-	97,566	29,139		2,060	29,139	29,139
45	T3	General Urban	49.679	20,000	993,580	20	993	-	20%	50%	10%	20%	-	119,230	298,074	59,615	119,230	60%	100%	-	-	596,148	105,033		105,033	105,033	105,033
46	T3	General Urban	30.941	20,000	618,820	20	618	-	20%	50%	20%	10%	-	74,258	185,646	74,258	37,129	60%	100%	-	-	371,292	73,122		73,122	73,122	73,122



SUBJECT: Kalaeloa Sewer Master Plan
 CLIENT: Ford Island Ventures, LLC
 SUBJECT: 0 to 7 Year Sewer System
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\sewer\[sewer- 0 to 7.xls]0 to 7

JOB NO: 2009.33.0600
 DATE: 12-Nov-10
 BY: tho

Branch Sewers	Tributary Area (acres)			Tributary Equivalent Population					Wastewater Flow Computation							Pipe Diameter (in)	
				Residential			Other	Cumulative Total Capita	Average Flow (mgd)	Max Flow (mgd)	Dry Weather I/I (mgd)	Design Avg Flow (mgd)	Design Max Flow (mgd)	Wet Weather Flow (mgd)	Design Peak Flow (mgd)	Design Min (in)	Exist or Proposed (in)
	SF Units	MF Units	Capita	Capita	Gross	Net	Total										
Sewer Line A - Boxer/Midway																	
45, FIV P1	49.68	22.81	22.81	0	0	0	1,312.91	1,312.91	0.105	0.497	0.007	0.112	0.504	0.029	0.532	10	12
2	14.46	6.64	29.45	0	0	0	173.50	1,486.41	0.119	0.549	0.007	0.126	0.557	0.037	0.593	10	12
46, FIV P2	30.94	14.21	43.65	0	0	0	914.03	2,400.44	0.192	0.806	0.012	0.204	0.818	0.055	0.872	12	12
5 (Bldg 345)	136.94	0.00	43.65	0	0	0	0.00	2,400.44	0.192	0.806	0.012	0.204	0.818	0.055	0.872	12	12
6 (Bldg 187)	28.72	0.00	43.65	0	0	0	2.50	2,402.94	0.192	0.807	0.012	0.204	0.819	0.055	0.873	12	12
50, FIV P6B	3.17	0.00	43.65	0	0	0	0.00	2,402.94	0.192	0.807	0.012	0.204	0.819	0.055	0.873	12	12
51, FIV P6A (853 & 1793)	0.00	0.00	43.65	0	0	0	8.25	2,411.19	0.193	0.809	0.012	0.205	0.821	0.055	0.875	12	12
Sewer Line B - Franklin																	
48, FIV P4	3.38	3.11	3.11	0	94	263.2	0.00	263.20	0.021	0.105	0.001	0.022	0.107	0.004	0.110	6	8
1A - Carmel Partners	16.19	14.87	17.97	0	120	336.0	0.00	599.20	0.048	0.240	0.003	0.051	0.243	0.022	0.265	8	8
47, FIV P3	25.05	23.01	40.98	0	0	0	155.50	754.70	0.060	0.302	0.004	0.064	0.306	0.051	0.357	8	10
49 FIV P5	3.95	3.95	44.93	0	0	0	37.50	792.20	0.063	0.317	0.004	0.067	0.321	0.056	0.377	8	12
51, FIV P6A (Por)	43.31	19.89	64.82	3	0	12.0	0.00	804.20	0.064	0.322	0.004	0.068	0.326	0.081	0.407	10	12
Sewer Line A	263.91	43.65	108.47	0	0	0	2,411.19	3,215.39	0.257	1.018	0.016	0.273	1.034	0.136	1.170	15	15
40, FIV P7	9.45	8.68	117.15	0	0	0	637.50	3,852.89	0.308	1.177	0.019	0.327	1.196	0.146	1.342	15	15
Existing Line - Lexington St																	
36, FIV P9 (1844, 1659,	13.25	13.53	13.53	0	0	0	103.13	103.13	0.008	0.041	0.001	0.009	0.042	0.017	0.059	6	8
51, FIV P6A (Por)	0.00	0.00	13.53	0	0	0	17.75	120.88	0.010	0.048	0.001	0.010	0.049	0.017	0.066	6	8
39, FIV P8	1.21	1.11	14.64	0	0	0	1.56	122.44	0.010	0.049	0.001	0.010	0.050	0.018	0.068	6	8
Sewer Line B	365.25	117.15	131.79	3	214	611.2	3,241.69	3,975.32	0.318	1.207	0.020	0.338	1.226	0.165	1.391	15	15
42 (zero)	0.00	0.00	131.79	0	0	0	0.00	3,975.32	0.318	1.207	0.020	0.338	1.226	0.165	1.391	15	15
Leyte St																	
53 - FIV P12	58.81	12.00	12.00	0	0	0	239.38	239.38	0.019	0.096	0.001	0.020	0.097	0.015	0.112	6	6
52 - FIV P11 (por)	4.74	4.35	16.35	0	0	0	38.25	277.63	0.022	0.111	0.001	0.024	0.112	0.020	0.133	6	6
35 - (Bldg 50)	3.78	3.47	19.82	0	60	168.0	0.00	445.63	0.036	0.178	0.002	0.038	0.180	0.025	0.205	6	10
51 - FIV P6A (Por)	7.47	3.43	23.24	7	0	28.0	0.00	473.63	0.038	0.189	0.002	0.040	0.192	0.029	0.221	8	12
36, FIV P9 (965, 1867)	0.28	0.28	23.52	0	0	0	7.50	481.13	0.038	0.192	0.002	0.041	0.195	0.029	0.224	8	12
52 - FIV P11 (B 1829)	12.56	11.54	35.06	0	0	0	6.25	487.38	0.039	0.195	0.002	0.041	0.197	0.044	0.241	8	12
37	5.16	4.74	39.80	0	0	0	120.00	607.38	0.049	0.243	0.003	0.052	0.246	0.050	0.296	8	15
41	1.35	1.24	41.04	0	0	0	0.25	607.63	0.049	0.243	0.003	0.052	0.246	0.051	0.297	8	18
42 (1/2)	9.98	4.58	45.62	40	79	381.2	0.00	988.83	0.079	0.396	0.005	0.084	0.400	0.057	0.458	10	15
Bunker Hill-1																	
35 - (Bldg 48)	3.78	3.47	3.47	0	60	168.0	0.00	168.00	0.013	0.067	0.001	0.014	0.068	0.004	0.072	6	8
32A (1785-1788, 46)	2.97	2.97	6.43	0	0	0	241.00	409.00	0.033	0.164	0.002	0.035	0.166	0.008	0.174	6	8
Bunker Hill-2																	
38 (Bldgs 32 & 39)	4.74	4.35	10.79	0	60	168.0	4.75	4.75	0.000	0.002	0.000	0.000	0.002	0.013	0.015	6	12
32B (1/2-19)	1.87	1.87	12.65	0	0	0	25.38	30.13	0.002	0.012	0.000	0.003	0.012	0.016	0.028	6	12
37A - VA	1.68	1.54	14.19	0	0	0	60.00	90.13	0.007	0.036	0.000	0.008	0.037	0.018	0.054	6	8
42 (1/4)	4.99	2.29	16.48	20	40	192.0	0.00	282.13	0.023	0.113	0.001	0.024	0.114	0.021	0.135	6	8

yellow highlight - trunk sewer line, typical

beige highlight - 0 to 7 year development data, see Table 3, typical



SUBJECT: Kalaeloa Sewer Master Plan
 CLIENT: Ford Island Ventures, LLC
 SUBJECT: 0 to 7 Year Sewer System
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\sewer\[sewer- 0 to 7.xls]0 to 7

JOB NO: 2009.33.0600
 DATE: 12-Nov-10
 BY: tho

Branch Sewers	Tributary Area (acres)			Tributary Equivalent Population					Wastewater Flow Computation							Pipe Diameter (in)		
				Residential			Other	Cumulative Total Capita	Average Flow (mgd)	Max Flow (mgd)	Dry Weather I/I (mgd)	Design Avg Flow (mgd)	Design Max Flow (mgd)	Wet Weather Flow (mgd)	Design Peak Flow (mgd)	Design Min (in)	Exist or Proposed (in)	
	SF Units	MF Units	Capita	Capita	Gross	Net	Total											
Enterprise																		
33-FIV P14	2.04	0.94	0.94	0	0	0	2.25	2.25	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.002	6	8
52 - FIV P11 (rec)	8.97	8.24	9.17	0	0	0	6.25	8.50	0.001	0.003	0.000	0.001	0.003	0.011	0.015	0.015	6	8
32 (1/2-117)	0.00	0.00	9.17	0	0	0	34.50	43.00	0.003	0.017	0.000	0.004	0.017	0.011	0.029	0.029	6	8
32A (1784, 1826, 1789)	2.97	2.97	12.14	0	0	0	5.00	48.00	0.004	0.019	0.000	0.004	0.019	0.015	0.035	0.035	6	10
31 (1/2)	0.00	0.00	12.14	0	0	0	220.22	268.22	0.021	0.107	0.001	0.023	0.109	0.015	0.124	0.124	6	10
Bunker Hill-1				0	60	168	241.00	677.22	0.054	0.271	0.003	0.058	0.274	0.000	0.274	0.274	8	12
32B (1/2-19)	1.87	1.87	14.01	0	0	0	25.38	702.59	0.056	0.281	0.004	0.060	0.285	0.018	0.302	0.302	8	12
43	1.53	1.40	15.41	0	60	168.0	0.00	870.59	0.070	0.348	0.004	0.074	0.353	0.019	0.372	0.372	8	12
34 (1/2)	4.86	2.23	17.64	0	0	0	214.89	1,085.48	0.087	0.427	0.005	0.092	0.433	0.022	0.455	0.455	10	12
42 (1/4)	4.99	2.29	19.93	20	40	192.0	0.00	1,277.48	0.102	0.487	0.006	0.109	0.493	0.025	0.518	0.518	10	15
30 (1/4 water meter)	7.94	3.64	23.57	0	0	0	1.88	1,087.35	0.087	0.428	0.005	0.092	0.433	0.029	0.463	0.463	10	15
Existing Line - Midway A																		
Lexington St	379.71	131.79	131.79	3	214	611.2	3,364.12	3,975.32	0.318	1.207	0.020	0.338	1.226	0.165	1.391	1.391	15	18
12 (1792, hangars)	5.00	5.00	136.79	0	0	0	504.31	4,479.64	0.358	1.328	0.022	0.381	1.350	0.171	1.521	1.521	18	18
42 (zero)	0.00	0.00	136.79	0	0	0	0.00	4,479.64	0.358	1.328	0.022	0.381	1.350	0.171	1.521	1.521	18	18
Leyte St	104.12	45.62	182.42	47	139	577.2	411.63	5,468.46	0.437	1.557	0.027	0.465	1.585	0.228	1.813	1.813	18	21
12A (UH-Hanger 111)	4.52	4.52	186.94	0	0	0	31.25	5,499.71	0.440	1.564	0.027	0.467	1.592	0.234	1.826	1.826	18	21
44 (1710)	0.00	0.00	186.94	0	0	0	10.25	5,509.96	0.441	1.567	0.028	0.468	1.594	0.234	1.828	1.828	18	21
Bunker Hill-2	20.02	16.48	203.42	20	100	360.0	90.13	5,960.09	0.477	1.668	0.030	0.507	1.698	0.254	1.952	1.952	18	21
44 (1709)	6.97	3.20	206.62	0	0	0	15.50	5,975.59	0.478	1.672	0.030	0.508	1.702	0.258	1.960	1.960	18	21
Enterprise	35.15	23.57	230.19	20	160	528.0	751.35	7,254.94	0.580	1.952	0.036	0.617	1.989	0.288	2.276	2.276	21	24
12 (Hanger 110)	5.00	5.00	235.19	0	0	0	7.44	7,262.38	0.581	1.954	0.036	0.617	1.990	0.294	2.284	2.284	21	24
Midway B - spur																		
31 (1/2)	10.89	10.89	10.89	0	0	0	220.22	220.22	0.018	0.088	0.001	0.019	0.089	0.014	0.103	0.103	6	12
34 (1/2)	4.86	2.23	13.12	0	0	0	214.89	435.10	0.035	0.174	0.002	0.037	0.176	0.016	0.193	0.193	6	15
30 (3/4 water meter)	23.81	10.93	24.05	0	0	0	5.63	440.73	0.035	0.176	0.002	0.037	0.178	0.030	0.209	0.209	6	15
Existing Line - Midway B																		
58-FIV P18	69.57	31.94	31.94	0	0	0	4.38	4.38	0.000	0.002	0.000	0.000	0.002	0.040	0.042	0.042	6	10
57-FIV P17	68.63	31.51	63.45	0	0	0	42.50	46.88	0.004	0.019	0.000	0.004	0.019	0.079	0.098	0.098	6	8
1b - Carmel Partners	56.98	26.16	89.61	0	396	1,108.8	0.00	1,155.68	0.092	0.449	0.006	0.098	0.455	0.112	0.567	0.567	10	18
56-FIV P16	0.94	0.43	90.04	0	0	0	0.31	1,155.99	0.092	0.449	0.006	0.098	0.455	0.113	0.568	0.568	10	18
55-FIV P15	22.07	10.13	100.17	0	0	0	767.68	1,923.67	0.154	0.675	0.010	0.164	0.685	0.125	0.810	0.810	12	18
32 (134, 282, 1874)	32.14	32.14	132.31	0	0	0	357.00	2,280.67	0.182	0.774	0.011	0.194	0.785	0.165	0.950	0.950	15	18/21
32 (1898, 1922, 1923)	18.49	18.49	150.80	0	0	0	69.25	2,349.92	0.188	0.792	0.012	0.200	0.804	0.189	0.993	0.993	15	21
32 (1/2-117, 663, 175)	87.54	87.54	238.34	0	0	0	36.50	2,386.42	0.191	0.802	0.012	0.203	0.814	0.298	1.112	1.112	15	21
Midway B Spur	39.56	24.05	262.39	0	0	0	440.73	2,827.14	0.226	0.919	0.014	0.240	0.933	0.328	1.261	1.261	15	21
29-FIV P10	3.81	1.75	264.14	0	0	0	32.37	2,859.51	0.229	0.927	0.014	0.243	0.941	0.330	1.272	1.272	15	21
12 (Bldg 1755, 1880 & 1	2.00	2.00	266.14	0	0	0	35.06	2,894.57	0.232	0.936	0.014	0.246	0.951	0.333	1.283	1.283	15	21
Midway A	560.49	235.19	501.33	90	613	2,076.4	5,185.98	10,156.95	0.813	2.555	0.051	0.863	2.606	0.627	3.233	3.233	24	24
West Perimeter																		
7	29.85	29.85	29.85	0	0	0	385.48	385.48	0.031	0.154	0.002	0.033	0.156	0.037	0.193	0.193	6	12
10A	10.57	10.57	40.42	0	0	0	360.69	746.18	0.060	0.298	0.004	0.063	0.302	0.051	0.353	0.353	8	15



SUBJECT: Kalaeloa Sewer Master Plan
 CLIENT: Ford Island Ventures, LLC
 SUBJECT: 0 to 7 Year Sewer System
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\sewer\[sewer- 0 to 7.xls]0 to 7

JOB NO: 2009.33.0600
 DATE: 12-Nov-10
 BY: tho

Branch Sewers	Tributary Area (acres)			Tributary Equivalent Population					Wastewater Flow Computation							Pipe Diameter (in)	
				Residential			Other	Cumulative Total Capita	Average Flow (mgd)	Max Flow (mgd)	Dry Weather I/I (mgd)	Design Avg Flow (mgd)	Design Max Flow (mgd)	Wet Weather Flow (mgd)	Design Peak Flow (mgd)	Design Min (in)	Exist or Proposed (in)
	SF Units	MF Units	Capita	Capita													
to SPS 3R	Gross	Net	Total														
Midway B	962.21	501.33	501.33	90	1,009	3,185.2	6,971.75	10,156.95	0.813	2.555	0.051	0.863	2.606	0.627	3.233	24	30
12 (Bldg 4)	740.22	0.00	501.33	0	0	0	3.75	10,160.70	0.813	2.556	0.051	0.864	2.607	0.627	3.234	24	30
14 - USCG	42.96	42.96	544.30	0	0	0	136.25	10,296.95	0.824	2.584	0.051	0.875	2.635	0.680	3.315	24	30
15	21.31	21.31	565.61	18	0	72.0	6.25	10,375.20	0.830	2.599	0.052	0.882	2.651	0.707	3.358	24	30
West Perimeter	40.42	40.42	606.03	0	0	0	746.18	11,121.38	0.890	2.748	0.056	0.945	2.803	0.758	3.561	24	30
Existing to WWTP																	
SPS 3R	1807.12	606.03	606.03	108	1,009	3,257.2	7,864.18	11,121.38	0.890	2.748	0.056	0.945	2.803	0.758	3.561	24	16 sfm
28	15.40	15.40	621.43	12	0	48.0	25.50	11,194.88	0.896	2.762	0.056	0.952	2.818	0.777	3.595	24	16 sfm
27	211.96	0.00	621.43	0	0	0	52.00	11,246.88	0.900	2.773	0.056	0.956	2.829	0.777	3.606	24	18 sfm
1	275.47	10.00	631.43	0	0	0	125.00	11,371.88	0.910	2.797	0.057	0.967	2.854	0.789	3.643	24	exist 21

check w/Table 3

120	1,009	3,305.2	8,066.7	11,371.88	0.910
120	1,009	3,305.2	8,066.7	11,371.88	0.910
ok	ok	ok	ok	ok	ok

Design Avg Flow (mgd) Calculated: 0.967
 Design Peak Hour Flow (mgd) 3.643
 Honouliuli WWTP limitation: 1.500 4.300

Constants:
 Dry Weather I/I Factor 5 gpcd
 Wet Weather I/I Factor 1250 gad
 Average per Capita Flow 80 gpcd
 SF Density 4 capita / unit
 MF Density 2.8 capita / unit

Pipe Criteria:			
Qfull (mgd)	Q90% (mgd)	Dia (in)	Min Slope (ft/ft)
0.243	0.219	6	0.0060
0.448	0.403	8	0.0044
0.693	0.624	10	0.0032
1.054	0.949	12	0.0028
1.615	1.454	15	0.0020
2.349	2.114	18	0.0016
3.233	2.909	21	0.0010
5.599	5.039	21	0.0030
4.128	3.715	24	0.0008
6.482	5.834	30	0.0006
9.622	8.660	36	0.0005

<= existing 21"

sewer force main checks:
 calculated peak flow (gpm) = 2473
 existing sfm 16" flow (gpm) @ 5 fps = 3,083
 calculated peak flow (gpm) = 2504
 existing sfm 18" flow (gpm) @ 5 fps = 3,686

90% assumed % of existing pipe full capacity - used to check existing pipe size.
 Reference for minimum slope, pipe diameter 6 to 24", inclusive: Design Standards of the Department of Wastewater Management, Volume 1, July 1993, C&C Honolulu
 Otherwise, full flow capacity calculated using minimum velocity = 2 ft/sec and n=.013 for pipes larger than 18".



SUBJECT: Kalaeloa Sewer Master Plan
 CLIENT: Ford Island Ventures, LLC
 SUBJECT: 7 to 20 Year Sewer System
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\sewer[sewer- 7 to 20r.xls]7 to 20

JOB NO: 2009.33.0600
 DATE: 12-Nov-10
 BY: tho

Branch Sewers	Tributary Area (acres)			Tributary Equivalent Population					Wastewater Flow Computation								Pipe Dia. Design Min (in)
				Residential			Other	Cumulative Total Capita	Average Flow (mgd)	Max Flow (mgd)	Dry Weather I/I (mgd)	Design Avg Flow (mgd)	Design Max Flow (mgd)	Wet Weather Flow (mgd)	Design Peak Flow (mgd)		
	Gross	Net	Total	SF Units	MF Units	Capita	Capita										
Sewer Line A - Boxer/Midway																	
45, FIV P1	49.68	22.81	22.81	0	0	0.00	1,312.91	1,312.91	0.105	0.497	0.007	0.112	0.504	0.029	0.532	10	upslope to S12", pipe slope
2	14.46	6.64	29.45	58	115	554.00	0.00	1,866.91	0.149	0.659	0.009	0.159	0.668	0.037	0.705	12	
46, FIV P2	30.94	14.21	43.65	0	0	0.00	914.03	2,780.94	0.222	0.907	0.014	0.236	0.921	0.055	0.975	15	
50, FIV P6B	3.17	1.46	45.11	13	26	124.80	8.17	2,913.91	0.233	0.941	0.015	0.248	0.956	0.056	1.012	15	
51, FIV P6A (1/4)	12.70	5.83	50.94	46	91	438.80	28.04	3,380.75	0.270	1.060	0.017	0.287	1.077	0.064	1.140	15	
6	28.72	13.19	64.13	0	0	0.00	12.87	3,393.62	0.271	1.063	0.017	0.288	1.080	0.080	1.160	15	
40, FIV P7	9.45	8.68	72.81	0	204	571.20	66.30	4,031.12	0.322	1.220	0.020	0.343	1.240	0.091	1.331	18	
Franklin																	
48, FIV P4	3.38	3.11	3.11	0	94	263.20	0.00	263.20	0.021	0.105	0.001	0.022	0.107	0.004	0.110	6	S8" min w/l road
1a - Carmel Partners	16.19	14.87	17.97	0	349	977.20	134.43	1,374.83	0.110	0.516	0.007	0.117	0.523	0.022	0.545	10	
47, FIV P3	25.05	23.01	40.98	0	541	1,514.80	121.78	3,011.41	0.241	0.966	0.015	0.256	0.981	0.051	1.033	15	
51, FIV P6A (1/2)	25.39	11.66	52.64	91	183	876.40	56.08	3,943.89	0.316	1.199	0.020	0.335	1.219	0.066	1.284	15	
Lexington																	
53-FIV 12, T3	25.00	11.48	11.48	90	180	864.00	63.05	927.05	0.074	0.371	0.005	0.079	0.375	0.014	0.390	10	SFM 6"
52, FIV P11 (1/4)	6.57	6.03	17.51	0	126	352.80	92.11	1,371.96	0.110	0.515	0.007	0.117	0.522	0.022	0.544	10	
49 FIV P5	3.95	3.95	21.46	0	165	462.00	0.00	1,833.96	0.147	0.650	0.009	0.156	0.659	0.027	0.686	12	
51, FIV P6A (1/4)	12.70	5.83	27.29	46	91	438.80	28.04	2,300.80	0.184	0.779	0.012	0.196	0.791	0.034	0.825	12	
36, FIV P9 (2/3)	9.02	9.02	36.31	0	291	814.80	77.95	3,193.55	0.255	1.013	0.016	0.271	1.029	0.045	1.074	15	
Franklin	70.02	52.64	88.95	91	1167	3,631.60	312.29	7,137.44	0.571	1.927	0.036	0.607	1.963	0.111	2.074	21	
41	1.35	1.24	90.19	0	0	0.00	0.25	7,137.69	0.571	1.927	0.036	0.607	1.963	0.113	2.076	21	
39, FIV P8	1.21	1.11	91.30	0	0	0.00	1.56	7,139.25	0.571	1.927	0.036	0.607	1.963	0.114	2.077	21	
Boxer/Midway	149.12	72.81	164.11	117	436	1,688.80	2,342.32	11,170.37	0.894	2.757	0.056	0.949	2.813	0.205	3.018	24	
Leyte																	
52, FIV P11 (1/2)	13.14	12.06	12.06	0	252	705.60	184.22	889.82	0.071	0.356	0.004	0.076	0.360	0.015	0.375	10	upslope to S15"
35 - (Bldg 50)	3.78	3.47	15.53	0	60	168.00	0.00	1,057.82	0.085	0.418	0.005	0.090	0.424	0.019	0.443	10	
37	5.16	4.74	20.27	0	144	403.20	0.00	1,461.02	0.117	0.542	0.007	0.124	0.549	0.025	0.574	12	
36, FIV P9 (1/3)	4.51	4.51	24.78	0	146	408.80	38.98	1,908.79	0.153	0.671	0.010	0.162	0.680	0.031	0.711	12	
42 (1/2)	9.98	4.58	29.36	40	79	381.20	0.00	2,289.99	0.183	0.776	0.011	0.195	0.788	0.037	0.824	12	
Bunker Hill																	
38	4.74	4.35	4.35	0	60	168.00	4.75	172.75	0.014	0.069	0.001	0.015	0.070	0.005	0.075	6	upslope to S8"
32B (1/2-19)	1.87	1.87	6.22	0	0	0.00	25.38	198.13	0.016	0.079	0.001	0.017	0.080	0.008	0.088	6	
37A - VA	1.68	1.54	7.76	0	53	148.40	0.00	346.53	0.028	0.139	0.002	0.029	0.140	0.010	0.150	6	
42 (1/4)	4.99	2.29	10.05	20	40	192.00	0.00	538.53	0.043	0.215	0.003	0.046	0.218	0.013	0.231	8	
Enterprise																	
33-FIV P14	2.04	0.94	0.94	0	0	0.00	381.66	381.66	0.031	0.153	0.002	0.032	0.155	0.001	0.156	6	S8" min w/l road
52, FIV P11 (1/4)	6.57	6.03	6.97	0	126	352.80	92.11	826.57	0.066	0.331	0.004	0.070	0.335	0.009	0.343	8	
32 (1/2-117)	0.00	0.00	6.97	0	0	0.00	34.50	861.07	0.069	0.344	0.004	0.073	0.349	0.009	0.357	8	
32A (1784, 1826, 1789)	2.97	2.97	9.93	0	0	0.00	5.00	866.07	0.069	0.346	0.004	0.074	0.351	0.012	0.363	10	
31 (1/2)	0.00	0.00	9.93	0	0	0.00	220.22	1,086.29	0.087	0.427	0.005	0.092	0.433	0.012	0.445	10	
35 - (Bldg 48)	3.78	3.47	13.40	0	60	168.00	0.00	1,254.29	0.100	0.479	0.006	0.107	0.486	0.017	0.503	10	
32A (1785-1788, 46)	2.97	2.97	16.36	0	0	0.00	241.00	1,495.29	0.120	0.552	0.007	0.127	0.559	0.020	0.580	12	
32B (1/2-19)	1.87	1.87	18.23	0	0	0.00	25.38	1,520.66	0.122	0.559	0.008	0.129	0.567	0.023	0.590	12	
43	1.53	1.40	19.63	0	0	0.00	98.96	1,619.62	0.130	0.588	0.008	0.138	0.596	0.025	0.621	12	
34 (1/2)	4.86	2.23	21.86	0	0	0.00	214.89	1,834.51	0.147	0.650	0.009	0.156	0.659	0.027	0.686	12	
29-FIV P10	3.81	1.75	23.61	0	0	0.00	375.79	2,210.30	0.177	0.754	0.011	0.188	0.765	0.030	0.795	12	
42 (1/4)	4.99	2.29	25.90	20	40	192.00	0.00	2,402.30	0.192	0.806	0.012	0.204	0.818	0.032	0.851	15	

green highlight - 7 to 20 year development data - see Table 3, typical



SUBJECT: Kalaeloa Sewer Master Plan
 CLIENT: Ford Island Ventures, LLC
 SUBJECT: 7 to 20 Year Sewer System
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\sewer-[sewer- 7 to 20r.xls]7 to 20

JOB NO: 2009.33.0600
 DATE: 12-Nov-10
 BY: tho

Branch Sewers	Tributary Area (acres)			Tributary Equivalent Population					Wastewater Flow Computation								Pipe Dia. Design Min (in)
	Gross	Net	Total	Residential			Other	Cumulative Total Capita	Average Flow (mgd)	Max Flow (mgd)	Dry Weather I/I (mgd)	Design Avg Flow (mgd)	Design Max Flow (mgd)	Wet Weather Flow (mgd)	Design Peak Flow (mgd)		
				SF Units	MF Units	Capita	Capita										
Midway A																	
Lexington	278.93	164.11	164.11	344	2456	8,252.80	2,917.57	11,170.37	0.894	2.757	0.056	0.949	2.813	0.205	3.018	24	
12 (1792, hangars)	54.50	54.50	218.61	0	0	0.00	831.81	12,002.19	0.960	2.921	0.060	1.020	2.981	0.273	3.254	24	
Leyte	36.56	29.36	247.97	40	681	2,066.80	223.19	14,292.18	1.143	3.358	0.071	1.215	3.430	0.310	3.740	30	
12A (UH-Hanger 111)	4.52	4.52	252.49	0	0	0.00	31.25	14,323.43	1.146	3.364	0.072	1.217	3.436	0.316	3.752	30	
44 (2/3)	4.65	2.13	254.62	0	0	0.00	242.83	14,566.26	1.165	3.410	0.073	1.238	3.483	0.318	3.801	30	
Bunker Hill	13.28	10.05	264.67	20	153	508.40	30.13	15,104.78	1.208	3.510	0.076	1.284	3.586	0.331	3.917	30	
44 (1/3)	2.32	1.07	265.74	0	0	0.00	121.41	15,226.19	1.218	3.533	0.076	1.294	3.609	0.332	3.941	30	
Midway B (to SPS E)																	
32 (134, 282, 1874)	32.14	32.14	32.14	0	0	0.00	493.50	493.50	0.039	0.197	0.002	0.042	0.200	0.040	0.240	8	
32 (1898, 1922, 1923)	18.49	18.49	50.63	0	0	0.00	69.25	562.75	0.045	0.225	0.003	0.048	0.228	0.063	0.291	8	
32 (1/2-117, 663, 175)	87.54	87.54	138.16	0	0	0.00	36.50	599.25	0.048	0.240	0.003	0.051	0.243	0.173	0.415	10	
31 (1/2)	10.89	5.00	143.16	0	0	0.00	220.22	819.47	0.066	0.328	0.004	0.070	0.332	0.179	0.511	10	
34 (1/2)	4.86	2.23	145.40	0	0	0.00	214.89	1,034.35	0.083	0.411	0.005	0.088	0.416	0.182	0.598	12	
30 (3/4 water meter)	23.81	10.93	156.33	0	0	0.00	473.13	1,507.49	0.121	0.555	0.008	0.128	0.563	0.195	0.758	12	
12 (Bldg 1755 & 115)	7.00	7.00	163.33	0	0	0.00	35.06	1,542.55	0.123	0.566	0.008	0.131	0.573	0.204	0.778	12	
12 (Hanger 110)	5.00	5.00	168.33	0	0	0.00	7.44	1,549.99	0.124	0.568	0.008	0.132	0.576	0.210	0.786	12	
30 (1/4)	7.94	3.64	171.97	0	0	0.00	157.71	1,707.70	0.137	0.614	0.009	0.145	0.622	0.215	0.837	12	
12 (Bldg 4)	685.72	0.00	171.97	0	0	0.00	3.75	1,711.45	0.137	0.615	0.009	0.145	0.623	0.215	0.838	12	
Midway A	394.76	265.74	437.71	404	3290	10,828.00	4,398.19	16,937.64	1.355	3.847	0.085	1.440	3.932	0.547	4.479	30	
Enterprise	35.36	25.90	463.61	20	226	712.80	1,689.50	19,339.94	1.547	4.278	0.097	1.644	4.375	0.580	4.954	30	
Olai																	
P10A-SPS	10.57	4.85	4.85	0	0	0.00	360.69	360.69	0.029	0.144	0.002	0.031	0.146	0.006	0.152	6	
P10	20.03	9.20	14.05	0	0	0.00	378.31	739.00	0.059	0.296	0.004	0.063	0.299	0.018	0.317	8	
West Perimeter (to SPS WP 2)																	
3	44.10	20.25	20.25	0	0	0.00	382.07	382.07	0.031	0.153	0.002	0.032	0.155	0.025	0.180	6	
4/5	136.94	62.87	83.12	0	0	0.00	523.15	905.23	0.072	0.362	0.005	0.077	0.367	0.104	0.471	10	
7 (SPS WP 1)	29.85	13.71	96.83	0	0	0.00	385.48	1,290.71	0.103	0.491	0.006	0.110	0.497	0.121	0.618	12	
8	73.74	0.00	96.83	0	0	0.00	0.00	1,290.71	0.103	0.491	0.006	0.110	0.497	0.121	0.618	12	
9	139.30	63.96	160.79	0	0	0.00	600.40	1,891.11	0.151	0.666	0.009	0.161	0.675	0.201	0.876	15	
Olai	30.60	14.05	174.83	0	0	0.00	739.00	2,630.11	0.210	0.867	0.013	0.224	0.880	0.219	1.099	15	
to SPS 3R																	
14 - USCG	42.96	42.96	42.96	0	0	0.00	162.63	162.63	0.013	0.065	0.001	0.014	0.066	0.054	0.120	6	
15	21.31	21.31	64.27	18	0	72.00	6.25	240.88	0.019	0.096	0.001	0.020	0.098	0.080	0.178	6	
West Perim-SPS	454.53	174.83	239.11	0	0	0.00	2,630.11	2,870.99	0.230	0.930	0.014	0.244	0.944	0.299	1.243	15	
Tripoli																	
23-T3	14.75	6.77	6.77	59	118	566.40	0.00	566.40	0.045	0.227	0.003	0.048	0.229	0.008	0.238	8	
26-T3	10.38	4.77	11.54	34	69	329.20	0.00	895.60	0.072	0.358	0.004	0.076	0.363	0.014	0.377	10	
26-T2	47.56	0.00	11.54	0	0	0.00	0.00	895.60	0.072	0.358	0.004	0.076	0.363	0.014	0.377	10	
27 - T3	28.49	0.00	11.54	0	0	0.00	0.00	895.60	0.072	0.358	0.004	0.076	0.363	0.014	0.377	10	
28	15.40	15.40	26.94	12	0	48.00	25.50	969.10	0.078	0.388	0.005	0.082	0.392	0.034	0.426	10	
24	49.18	22.58	49.52	0	0	0.00	257.03	1,226.13	0.098	0.471	0.006	0.104	0.477	0.062	0.539	10	
27-T2 (por)	139.19	0.00	49.52	0	0	0.00	0.00	1,226.13	0.098	0.471	0.006	0.104	0.477	0.062	0.539	10	



SUBJECT: Kalaeloa Sewer Master Plan
 CLIENT: Ford Island Ventures, LLC
 SUBJECT: 7 to 20 Year Sewer System
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\sewer[sewer- 7 to 20.xls]7 to 20

JOB NO: 2009.33.0600
 DATE: 12-Nov-10
 BY: tho

Branch Sewers	Tributary Area (acres)			Tributary Equivalent Population					Wastewater Flow Computation							Pipe Dia. Design Min (in)		
				Residential			Other	Cumulative Total Capita	Average Flow (mgd)	Max Flow (mgd)	Dry Weather I/I (mgd)	Design Avg Flow (mgd)	Design Max Flow (mgd)	Wet Weather Flow (mgd)	Design Peak Flow (mgd)			
	SF Units	MF Units	Capita	Capita	Gross	Net	Total											
to SPS CS																		
19	166.78	0.00	0.00	0	0	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6
21	97.54	0.00	0.00	0	0	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6
23-T2	131.03	60.16	60.16	0	0	0.00	97.84	97.84	0.008	0.039	0.000	0.008	0.040	0.075	0.115	0.115	0.115	6
18A	19.36	8.89	69.05	0	0	0.00	50.60	148.43	0.012	0.059	0.001	0.013	0.060	0.086	0.146	0.146	0.146	6
18B	11.50	5.28	74.33	0	0	0.00	30.06	178.49	0.014	0.071	0.001	0.015	0.072	0.093	0.165	0.165	0.165	6
Tripoli	304.94	49.52	123.85	105	187	943.60	282.53	1,404.61	0.112	0.525	0.007	0.119	0.532	0.155	0.687	0.687	0.687	12
SPS 3R	518.80	239.11	362.96	18	0	72.00	2,798.99	4,275.60	0.342	1.279	0.021	0.363	1.300	0.454	1.754	1.754	1.754	18
18	65.36	30.01	392.97	0	0	0.00	170.79	4,446.39	0.356	1.320	0.022	0.378	1.342	0.491	1.833	1.833	1.833	18
17	45.60	0.00	392.97	0	0	0.00	0.00	4,446.39	0.356	1.320	0.022	0.378	1.342	0.491	1.833	1.833	1.833	18
27 (por)	44.28	0.00	392.97	0	0	0.00	52.00	4,498.39	0.360	1.332	0.022	0.382	1.354	0.491	1.846	1.846	1.846	18
Independence																		
53-FIV P12: 1/2 T2, T5	33.81	26.34	26.34	50	387	1,283.60	861.65	2,145.25	0.172	0.737	0.011	0.182	0.747	0.033	0.780	0.780	0.780	12
SPS E	1313.50	463.61	489.95	424	3,516	11,540.80	7,799.14	21,485.19	1.719	4.653	0.107	1.826	4.761	0.612	5.373	5.373	5.373	30
54-FIV P14	34.42	21.77	511.72	60	368	1,270.40	398.79	23,154.38	1.852	4.940	0.116	1.968	5.056	0.640	5.696	5.696	5.696	30
55-FIV P15	22.07	10.13	521.86	70	141	674.80	92.88	23,922.06	1.914	5.071	0.120	2.033	5.191	0.652	5.843	5.843	5.843	30
56-FIV P16	0.94	0.43	522.28	0	0	0.00	24.96	23,947.02	1.916	5.075	0.120	2.035	5.195	0.653	5.848	5.848	5.848	30
P1B	56.98	26.16	548.44	205	410	1,968.00	143.69	26,058.71	2.085	5.430	0.130	2.215	5.561	0.686	6.246	6.246	6.246	30
19A	23.00	0.00	548.44	0	0	0.00	0.00	26,058.71	2.085	5.430	0.130	2.215	5.561	0.686	6.246	6.246	6.246	30
SPS CS	1,405.20	392.97	941.41	123	187	1,015.60	3,482.79	30,557.10	2.445	6.168	0.153	2.597	6.321	1.177	7.498	7.498	7.498	30
57-FIV P17	68.63	31.51	972.92	0	0	0.00	1,612.05	32,169.15	2.574	6.427	0.161	2.734	6.588	1.216	7.804	7.804	7.804	30
58-FIV P18	69.57	31.94	1004.86	0	0	0.00	1,199.93	33,369.08	2.670	6.618	0.167	2.836	6.785	1.256	8.041	8.041	8.041	30
21A	5.63	0.00	1004.86	0	0	0.00	0.00	33,369.08	2.670	6.618	0.167	2.836	6.785	1.256	8.041	8.041	8.041	30
59-FIV P19	70.73	32.47	1037.34	0	0	0.00	552.48	33,921.57	2.714	6.706	0.170	2.883	6.875	1.297	8.172	8.172	8.172	30
1	275.47	10.00	1047.34	0	0	0.00	125.00	34,046.57	2.724	6.725	0.170	2.894	6.896	1.309	8.205	8.205	8.205	30
check w/ Table 3	3,379.92	1047.34		932	5009	17,753.20	16,293.37	34,046.57	2.724									
ok	ok	ok		ok	ok	ok	ok	ok	ok									

Constants:

Dry Weather I/I Factor	5	gpcd
Wet Weather I/I Factor	1250	gad
Average per Capita Flow	80	gpcd
SF Density	4	capita / unit
MF Density	2.8	capita / unit

Gravity Sewer Pipe Size Criteria:

Qfull (mgd)	Q80% (mgd)	Dia (in)	Min Slope (ft/ft)
0.243	0.194	6	0.0060
0.448	0.359	8	0.0044
0.693	0.554	10	0.0032
1.054	0.843	12	0.0028
1.615	1.292	15	0.0020
2.349	1.879	18	0.0016
3.233	2.586	21	0.0010
4.128	3.302	24	0.0008
6.482	5.186	30	0.0006
7.939	6.351	30	0.0009
8.368	6.695	30	0.0010
11.535	9.228	30	0.0019
9.622	7.698	36	0.0005
12.982	10.386	42	0.0004

Sewer Force Main Sizing

size	Maximum flow @ 5 fps	
	(gpm)	(mgd)
SFM 6"	440.0	0.634
SFM 8"	782.0	1.126
SFM 12"	1760.0	2.534
SFM 16"	3132.0	4.510
SFM 18"	3968.0	5.714

assumed % of pipe full capacity - used for pipe size selection: 80%



SUBJECT: Kalaeloa Sewer Master Plan
 CLIENT: Ford Island Ventures, LLC
 SUBJECT: 20+ Year Sewer System
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\sewer-[sewer- 20+ r.xls]20+

JOB NO: 2009.33.0600
 DATE: 12-Nov-10
 BY: tho

Branch Sewers	Tributary Area (acres)			Tributary Equivalent Population					Wastewater Flow Computation								Pipe Dia. Design Min (in)
	Gross	Net	Total	Residential			Other	Cumulative Total Capita	Average Flow (mgd)	Max Flow (mgd)	Dry Weather I/I (mgd)	Design Avg Flow (mgd)	Design Max Flow (mgd)	Wet Weather Flow (mgd)	Design Peak Flow (mgd)		
				SF Units	MF Units	Capita	Capita										
Sewer Line A - Boxer/Midway																	
45, FIV P1	49.68	22.81	22.81	0	0	0.00	1,312.91	1,312.91	0.105	0.497	0.007	0.112	0.504	0.029	0.532	10	upslope to S12", pipe slope
2	14.46	6.64	29.45	58	115	554.00	0.00	1,866.91	0.149	0.659	0.009	0.159	0.668	0.037	0.705	12	
46, FIV P2	30.94	14.21	43.65	0	0	0.00	914.03	2,780.94	0.222	0.907	0.014	0.236	0.921	0.055	0.975	15	
50, FIV P6B	3.17	1.46	45.11	13	26	124.80	8.17	2,913.91	0.233	0.941	0.015	0.248	0.956	0.056	1.012	15	
51, FIV P6A (1/4)	12.70	5.83	50.94	46	91	438.80	28.04	3,380.75	0.270	1.060	0.017	0.287	1.077	0.064	1.140	15	
6	28.72	13.19	64.13	0	0	0.00	12.87	3,393.62	0.271	1.063	0.017	0.288	1.080	0.080	1.160	15	
40, FIV P7	9.45	8.68	72.81	0	204	571.20	66.30	4,031.12	0.322	1.220	0.020	0.343	1.240	0.091	1.331	18	
Franklin																	
48, FIV P4	3.38	3.11	3.11	0	94	263.20	0.00	263.20	0.021	0.105	0.001	0.022	0.107	0.004	0.110	6	S8" min w/l road
1a - Carmel Partners	16.19	14.87	17.97	0	349	977.20	134.43	1,374.83	0.110	0.516	0.007	0.117	0.523	0.022	0.545	10	
47, FIV P3	25.05	23.01	40.98	0	541	1,514.80	121.78	3,011.41	0.241	0.966	0.015	0.256	0.981	0.051	1.033	15	
51, FIV P6A (1/2)	25.39	11.66	52.64	91	183	876.40	56.08	3,943.89	0.316	1.199	0.020	0.335	1.219	0.066	1.284	15	
Lexington																	
53-FIV 12, T3	25.00	11.48	11.48	90	180	864.00	63.05	927.05	0.074	0.371	0.005	0.079	0.375	0.014	0.390	10	SFM 6" upslope to S15", pipe slope
52, FIV P11 (1/4)	6.57	6.03	17.51	0	126	352.80	92.11	1,371.96	0.110	0.515	0.007	0.117	0.522	0.022	0.544	10	
49 FIV P5	3.95	3.95	21.46	0	165	462.00	0.00	1,833.96	0.147	0.650	0.009	0.156	0.659	0.027	0.686	12	
51, FIV P6A (1/4)	12.70	5.83	27.29	46	91	438.80	28.04	2,300.80	0.184	0.779	0.012	0.196	0.791	0.034	0.825	12	
36, FIV P9 (2/3)	9.02	9.02	36.31	0	291	814.80	77.95	3,193.55	0.255	1.013	0.016	0.271	1.029	0.045	1.074	15	
Franklin	70.02	52.64	88.95	91	1167	3,631.60	312.29	7,137.44	0.571	1.927	0.036	0.607	1.963	0.111	2.074	21	
41	1.35	1.24	90.19	0	0	0.00	149.91	7,287.35	0.583	1.959	0.036	0.619	1.996	0.113	2.109	21	
39, FIV P8	1.21	1.11	91.30	0	38	106.40	0.00	7,393.75	0.591	1.982	0.037	0.628	2.019	0.114	2.133	21	
Boxer/Midway	149.12	72.81	164.11	117	436	1,688.80	2,342.32	11,424.87	0.914	2.808	0.057	0.971	2.865	0.205	3.070	24	
Leyte																	
52, FIV P11 (1/2)	13.14	12.06	12.06	0	252	705.60	184.22	889.82	0.071	0.356	0.004	0.076	0.360	0.015	0.375	10	S8" min w/l road
35 (1/2)	3.78	3.47	15.53	0	106	296.80	0.00	1,186.62	0.095	0.459	0.006	0.101	0.465	0.019	0.484	10	
37	5.16	4.74	20.27	0	144	403.20	0.00	1,589.82	0.127	0.580	0.008	0.135	0.588	0.025	0.613	12	
36, FIV P9 (1/3)	4.51	4.51	24.78	0	146	408.80	38.98	2,037.59	0.163	0.707	0.010	0.173	0.717	0.031	0.748	12	
42 (1/2)	9.98	4.58	29.36	40	79	381.20	0.00	2,418.79	0.194	0.811	0.012	0.206	0.823	0.037	0.860	15	
Bunker Hill																	
38	4.74	4.35	4.35	0	132	369.60	0.00	369.60	0.030	0.148	0.002	0.031	0.150	0.005	0.155	6	S8" min w/l road
32B (1/2-19)	1.87	1.87	6.22	0	0	0.00	25.38	394.98	0.032	0.158	0.002	0.034	0.160	0.008	0.168	6	
37A - VA	1.68	1.54	7.76	0	53	148.40	0.00	543.38	0.043	0.217	0.003	0.046	0.220	0.010	0.230	8	
42 (1/4)	4.99	2.29	10.05	20	40	192.00	0.00	735.38	0.059	0.294	0.004	0.063	0.298	0.013	0.310	8	
Enterprise																	
33-FIV P14	2.04	0.94	0.94	0	0	0.00	381.66	381.66	0.031	0.153	0.002	0.032	0.155	0.001	0.156	6	S8" min w/l road
52, FIV P11 (1/4)	6.57	6.03	6.97	0	126	352.80	92.11	826.57	0.066	0.331	0.004	0.070	0.335	0.009	0.343	8	
32 (1/2-117)	0.00	0.00	6.97	0	0	0.00	34.50	861.07	0.069	0.344	0.004	0.073	0.349	0.009	0.357	8	
32A (1784, 1826, 1789)	2.97	2.97	9.93	0	0	0.00	5.00	866.07	0.069	0.346	0.004	0.074	0.351	0.012	0.363	10	
31 (1/2)	0.00	0.00	9.93	0	0	0.00	220.22	1,086.29	0.087	0.427	0.005	0.092	0.433	0.012	0.445	10	
35 (1/2)	3.78	3.47	13.40	0	105	294.00	0.00	1,380.29	0.110	0.518	0.007	0.117	0.525	0.017	0.541	10	
32A (1785-1788, 46)	2.97	2.97	16.36	0	0	0.00	241.00	1,621.29	0.130	0.589	0.008	0.138	0.597	0.020	0.617	12	
32B (1/2-19)	1.87	1.87	18.23	0	0	0.00	25.38	1,646.66	0.132	0.596	0.008	0.140	0.604	0.023	0.627	12	
43	1.53	1.40	19.63	0	0	0.00	98.96	1,745.62	0.140	0.625	0.009	0.148	0.633	0.025	0.658	12	
34 (1/2)	4.86	2.23	21.86	0	0	0.00	214.89	1,960.51	0.157	0.685	0.010	0.167	0.695	0.027	0.723	12	
29-FIV P10	3.81	1.75	23.61	0	0	0.00	375.79	2,336.30	0.187	0.789	0.012	0.199	0.800	0.030	0.830	12	
42 (1/4)	4.99	2.29	25.90	20	40	192.00	0.00	2,528.30	0.202	0.840	0.013	0.215	0.853	0.032	0.885	15	

blue highlight - 20+ year development data - see Table 3, typical



SUBJECT: Kalaeloa Sewer Master Plan
 CLIENT: Ford Island Ventures, LLC
 SUBJECT: 20+ Year Sewer System
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\sewer\[sewer- 20+r.xls]20+

JOB NO: 2009.33.0600
 DATE: 12-Nov-10
 BY: tho

Branch Sewers	Tributary Area (acres)			Tributary Equivalent Population					Wastewater Flow Computation								Pipe Dia. Design Min (in)
	Gross	Net	Total	Residential			Other	Cumulative Total Capita	Average Flow (mgd)	Max Flow (mgd)	Dry Weather I/I (mgd)	Design Avg Flow (mgd)	Design Max Flow (mgd)	Wet Weather Flow (mgd)	Design Peak Flow (mgd)		
				SF Units	MF Units	Capita	Capita										
Midway A																	
Lexington	278.93	164.11	164.11	344	2494	8,359.20	3,065.67	11,424.87	0.914	2.808	0.057	0.971	2.865	0.205	3.070	24	
12 (1792, hangars)	54.50	54.50	218.61	0	0	0.00	831.81	12,256.68	0.981	2.970	0.061	1.042	3.031	0.273	3.305	30	
Leyte	36.56	29.36	247.97	40	727	2,195.60	223.19	14,675.47	1.174	3.430	0.073	1.247	3.504	0.310	3.814	30	
12A (UH-Hanger 111)	4.52	4.52	252.49	0	0	0.00	31.25	14,706.72	1.177	3.436	0.074	1.250	3.510	0.316	3.825	30	
44 (2/3)	4.65	2.13	254.62	0	0	0.00	242.83	14,949.55	1.196	3.481	0.075	1.271	3.556	0.318	3.874	30	
Bunker Hill	13.28	10.05	264.67	20	225	710.00	25.38	15,684.92	1.255	3.618	0.078	1.333	3.696	0.331	4.027	30	
44 (1/3)	2.32	1.07	265.74	0	0	0.00	121.41	15,806.34	1.265	3.640	0.079	1.344	3.719	0.332	4.051	30	
Midway B (to SPS E)																	
32 (134, 282, 1874)	32.14	32.14	32.14	0	0	0.00	493.50	493.50	0.039	0.197	0.002	0.042	0.200	0.040	0.240	8	
32 (1898, 1922, 1923)	18.49	18.49	50.63	0	0	0.00	69.25	562.75	0.045	0.225	0.003	0.048	0.228	0.063	0.291	8	
32 (1/2-117, 663, 175)	87.54	87.54	138.16	0	0	0.00	36.50	599.25	0.048	0.240	0.003	0.051	0.243	0.173	0.415	10	
31 (1/2)	10.89	5.00	143.16	0	0	0.00	220.22	819.47	0.066	0.328	0.004	0.070	0.332	0.179	0.511	10	
34 (1/2)	4.86	2.23	145.40	0	0	0.00	214.89	1,034.35	0.083	0.411	0.005	0.088	0.416	0.182	0.598	12	
30 (3/4)	23.81	10.93	156.33	0	0	0.00	473.13	1,507.49	0.121	0.555	0.008	0.128	0.563	0.195	0.758	12	
12 (Bldg 1755 & 115)	7.00	7.00	163.33	0	0	0.00	35.06	1,542.55	0.123	0.566	0.008	0.131	0.573	0.204	0.778	12	
12 (Hanger 110)	5.00	5.00	168.33	0	0	0.00	7.44	1,549.99	0.124	0.568	0.008	0.132	0.576	0.210	0.786	12	
30 (1/4)	7.94	3.64	171.97	0	0	0.00	157.71	1,707.70	0.137	0.614	0.009	0.145	0.622	0.215	0.837	12	
12 (Bldg 4)	685.72	0.00	171.97	0	0	0.00	3.75	1,711.45	0.137	0.615	0.009	0.145	0.623	0.215	0.838	12	
Midway A	394.76	265.74	437.71	404	3446	11,264.80	4,541.54	17,517.78	1.401	3.952	0.088	1.489	4.040	0.547	4.587	30	
Enterprise	35.36	25.90	463.61	20	271	838.80	1,689.50	20,046.08	1.604	4.402	0.100	1.704	4.503	0.580	5.082	30	
Olai																	
P10A-SPS	10.57	4.85	4.85	0	0	0.00	360.69	360.69	0.029	0.144	0.002	0.031	0.146	0.006	0.152	6	
P10	20.03	9.20	14.05	0	0	0.00	378.31	739.00	0.059	0.296	0.004	0.063	0.299	0.018	0.317	8	
West Perimeter (to SPS WP-2)																	
3	44.10	20.25	20.25	0	0	0.00	382.07	382.07	0.031	0.153	0.002	0.032	0.155	0.025	0.180	6	
4/5	136.94	62.87	83.12	0	0	0.00	523.15	905.23	0.072	0.362	0.005	0.077	0.367	0.104	0.471	10	
7 (SPS WP-1)	29.85	13.71	96.83	0	0	0.00	385.48	1,290.71	0.103	0.491	0.006	0.110	0.497	0.121	0.618	12	
8	73.74	33.86	130.69	0	0	0.00	450.86	1,741.57	0.139	0.623	0.009	0.148	0.632	0.163	0.796	12	
Olai	30.60	14.05	144.73	0	0	0.00	739.00	2,480.58	0.198	0.827	0.012	0.211	0.840	0.181	1.021	15	
9	139.30	63.96	208.69	0	0	0.00	600.40	3,080.98	0.246	0.984	0.015	0.262	0.999	0.261	1.260	15	
to SPS 3R																	
14 - USCG	42.96	42.96	42.96	0	0	0.00	162.63	162.63	0.013	0.065	0.001	0.014	0.066	0.054	0.120	6	
15	21.31	21.31	64.27	18	0	72.00	6.25	240.88	0.019	0.096	0.001	0.020	0.098	0.080	0.178	6	
SPS WP-2	454.53	208.69	272.96	0	0	0.00	3,080.98	3,321.85	0.266	1.045	0.017	0.282	1.062	0.341	1.403	18	
Tripoli																	
23-T3	14.75	6.77	6.77	59	118	566.40	0.00	566.40	0.045	0.227	0.003	0.048	0.229	0.008	0.238	8	
26-T3	10.38	4.77	11.54	34	69	329.20	0.00	895.60	0.072	0.358	0.004	0.076	0.363	0.014	0.377	10	
26-T2	47.56	0.00	11.54	0	0	0.00	0.00	895.60	0.072	0.358	0.004	0.076	0.363	0.014	0.377	10	
27 - T3	28.49	13.08	24.62	95	189	909.20	0.00	1,804.80	0.144	0.642	0.009	0.153	0.651	0.031	0.681	12	
28	15.40	15.40	40.02	12	0	48.00	25.50	1,878.30	0.150	0.662	0.009	0.160	0.672	0.050	0.722	12	
24	49.18	22.58	62.60	0	0	0.00	257.03	2,135.33	0.171	0.734	0.011	0.182	0.745	0.078	0.823	12	
27-T2 (por)	139.19	51.15	113.75	0	0	0.00	256.33	3,300.86	0.264	1.040	0.017	0.281	1.056	0.142	1.199	15	

upsized to S12", pipe slope
 upsized to S12", pipe slope
 upsized to S15", pipe slope
 upsized to S15", pipe slope
 upsized to S15", pipe slope
 upsized to S15", pipe slope
 upsized to S15", pipe slope

SFM 8"

S8" min w/l road

SFM 6"

SFM 12"

SFM 12"

SFM 8"



SUBJECT: Kalaeloa Sewer Master Plan
 CLIENT: Ford Island Ventures, LLC
 SUBJECT: 20+ Year Sewer System
 FILE: M:\Kalaeloa FIP\2009330601 HCDA\Design\Calculations\sewer\sewer-20+.xls]20+

JOB NO: 2009.33.0600
 DATE: 12-Nov-10
 BY: tho

Branch Sewers	Tributary Area (acres)			Tributary Equivalent Population					Wastewater Flow Computation							Pipe Dia. Design Min (in)	
	Gross	Net	Total	Residential			Other	Cumulative Total Capita	Average Flow (mgd)	Max Flow (mgd)	Dry Weather I/I (mgd)	Design Avg Flow (mgd)	Design Max Flow (mgd)	Wet Weather Flow (mgd)	Design Peak Flow (mgd)		
				SF Units	MF Units	Capita	Capita										
to SPS CS																	
19	166.78	76.58	76.58	0	0	0.00	570.25	570.25	0.046	0.228	0.003	0.048	0.231	0.096	0.327	8	
21	97.54	44.78	121.36	0	0	0.00	348.49	918.74	0.073	0.367	0.005	0.078	0.372	0.152	0.524	10	
23-T2	131.03	60.16	181.52	0	0	0.00	97.84	1,016.57	0.081	0.405	0.005	0.086	0.410	0.227	0.637	12	
18A	19.36	8.89	190.41	0	0	0.00	50.60	1,067.17	0.085	0.421	0.005	0.091	0.427	0.238	0.665	12	
18B	11.50	5.28	195.69	0	0	0.00	30.06	1,097.22	0.088	0.431	0.005	0.093	0.436	0.245	0.681	12	
Tripoli	304.94	113.75	309.44	200	376	1,852.80	538.86	3,488.88	0.279	1.087	0.017	0.297	1.104	0.387	1.491	18	
SPS 3R	518.80	272.96	582.40	18	0	72.00	3,249.85	6,810.74	0.545	1.856	0.034	0.579	1.890	0.728	2.618	24	
18	65.36	30.01	612.41	0	0	0.00	170.79	6,981.53	0.559	1.893	0.035	0.593	1.928	0.766	2.694	24	
17	45.60	20.94	633.34	0	0	0.00	53.20	7,034.73	0.563	1.905	0.035	0.598	1.940	0.792	2.732	24	
27 (por)	44.28	20.33	653.68	0	0	0.00	81.22	7,115.95	0.569	1.922	0.036	0.605	1.958	0.817	2.775	24	

SFM 16"

Independence																
53-FIV P12: T2, T5	33.81	26.34	26.34	50	387	1,283.60	861.65	2,145.25	0.172	0.737	0.011	0.182	0.747	0.033	0.780	12
SPS E	1313.50	463.61	489.95	424	3,717	12,103.60	7,942.48	22,191.33	1.775	4.775	0.111	1.886	4.886	0.612	5.499	30
54-FIV P14	34.42	21.77	511.72	60	368	1,270.40	398.79	23,860.52	1.909	5.061	0.119	2.028	5.180	0.640	5.820	30
55-FIV P15	22.07	10.13	521.86	70	141	674.80	92.88	24,628.20	1.970	5.190	0.123	2.093	5.314	0.652	5.966	30
56-FIV P16	0.94	0.43	522.28	0	0	0.00	24.96	24,653.16	1.972	5.195	0.123	2.096	5.318	0.653	5.971	30
P1B	56.98	26.16	548.44	205	410	1,968.00	143.69	26,764.85	2.141	5.548	0.134	2.275	5.682	0.686	6.367	30
19A	23.00	10.56	559.00	0	0	0.00	380.76	27,145.61	2.172	5.611	0.136	2.307	5.746	0.699	6.445	30
SPS CS	1,405.20	653.68	1212.68	218	376	1,924.80	5,191.15	34,261.56	2.741	6.759	0.171	2.912	6.931	1.516	8.447	30
57-FIV P17	68.63	31.51	1244.19	0	0	0.00	1,612.05	35,873.61	2.870	7.013	0.179	3.049	7.192	1.555	8.747	30
58-FIV P18	69.57	31.94	1276.13	0	0	0.00	1,199.93	37,073.54	2.966	7.200	0.185	3.151	7.385	1.595	8.980	30
21A	5.63	2.59	1278.72	0	0	0.00	21.03	37,094.57	2.968	7.203	0.185	3.153	7.388	1.598	8.987	30
59-FIV P19	70.73	32.47	1311.19	0	0	0.00	552.48	37,647.06	3.012	7.289	0.188	3.200	7.477	1.639	9.116	30
1	275.47	10.00	1321.19	0	0	0.00	125.00	37,772.06	3.022	7.308	0.189	3.211	7.497	1.651	9.148	30

	3,379.92	1321.19		1027	5399	19,225.20	18,546.86	37,772.06	3.022	7.308	0.189	3.211	7.497	1.651	9.148	
check w/ Table 3	3,379.92	1,321.19		1027	5399	19,225.20	18,546.86	37,772.06	3.022	7.308	0.189	3.211	7.497	1.651	9.148	
	ok	ok		ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	

Constants:

Dry Weather I/I Factor	5	gpcd
Wet Weather I/I Factor	1250	gad
Average per Capita Flow	80	gpcd
SF Density	4	apita / unit
MF Density	2.8	apita / unit

Gravity Sewer Pipe Size Criteria:

Qfull (mgd)	Q80% (mgd)	Dia (in)	Min Slope (ft/ft)
0.243	0.194	6	0.0060
0.448	0.359	8	0.0044
0.693	0.554	10	0.0032
1.054	0.843	12	0.0028
1.615	1.292	15	0.0020
2.349	1.879	18	0.0016
3.233	2.586	21	0.0010
4.128	3.302	24	0.0008
6.482	5.186	30	0.0006
7.939	6.351	30	0.0009
8.368	6.695	30	0.0010
11.535	9.228	30	0.0019
9.622	7.698	36	0.0005
12.982	10.386	42	0.0004

Sewer Force Main Sizing

size	Maximum flow @ 5 fps	
	(gpm)	(mgd)
SFM 4"	195.0	0.281
SFM 6"	440.0	0.634
SFM 8"	782.0	1.126
SFM 12"	1760.0	2.534
SFM 16"	3132.0	4.510
SFM 18"	3968.0	5.714

assumed % of pipe full capacity - used for pipe size selection: 80%