BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1133.1

FEB 23 2001

TO: Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control

Subject: Final Environmental Assessment (EA)/Finding of No Significant Impact (FONSI)
Nanakuli IV Elementary School
Tax Map Key 8-9-02: 65, 23, and portion 1
Nanakuli, Oahu, Hawaii

The Department of Accounting and General Services has reviewed the comments received during the 30-day public comment period which began on November 23, 2000. The agency has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish this notice in the March 8, 2001, issue of *The Environmental Notice.* Enclosed are the following items:

- Four (4) copies of the Final EA
- Completed OEQC Publication Form
- Completed Final EA Distribution Cover Letter to the participants
- Completed Final EA Distribution List
- 3 ½" Disk with Summary of Project Description

If you have any questions regarding the Final EA/FONSI, please call Mr. Earl Matsukawa of Wilson Okamoto & Associates, Inc. at 946-2277. Thank you for your attention to this matter.

Gordon Mt

GORDON MATSUOKA
Public Works Administrator

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Enclosures
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

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APPENDIX C: Transcripts of Interview with Walter Kamanā, Jr.

Interview with: Walter Kamanā, Jr.
Interviewer: Rodney Chiogioji, of Cultural Surveys Hawai'i (CSH)
Subject: Camp Andrews
Date: December, 1999

CSH: Mr. Kamanā, do you know when the camp was built?

WK: The camp was built during the First World War, I think.

CSH: It was already there?

WK: Yeah, before I [was] born, the camp was there already.

CSH: When were you born?

WK: I was born December 16, 1937. But, it was there. Because I had to go school through there. See, I had to go because the military had moved into Lualualei and Barbers Point, so they demolished this military land, what they call Camp Andrews. And it stayed there for awhile, maybe about ten or twenty years or more than that. And it stayed empty. I remember, during the time of the war, I had to improvise because we had to trade with the military guys. What fish I caught, I used to take it to them so I could trade for butter, condensed milk. That was [how we] improvise for the sugar. You see, the plantation was raising us, so not much brown sugar or molasses we could get from there. So, during that time, I know there was this old bar called, Helena's Bar. Before was Mahelona's Bar, then it became Helena's Bar. I remember they control all the service people. There were no other bars except another one down at Maile, they used to call it Green Lantern. But, Saturday nights, during the war time —

CSH: Helena's Bar was in Nānākuli?

WK: Yeah, in Nānākuli, where they call it Pualeka. You know, from the stop light to Haleakalā, that's all Nānākuli. The ending is by Yuen Store. It's still all Hawaiian Land. Only this year or last year, I think, we get 'em back from the military. Besides that, that was the only recourse we had — for us people, local people living in the homestead, the military had served a good purpose to us too, because they went and spent their money here and then we had our things. Because as it turned out, we had hard times. The land in front of Camp Andrews, the school wasn't like today. Today, you have a big section of the school. It was a small school. It was all army camp from where the stop lights, half-way down, all the way to this place they call Depots, you know, when you're going from the school, the beginning of the stop light, half of that stop light and all the way down was military camp. So we had only the old school that we had to stay in. But then, the military loaned us the front so we had to go in the camp to use the camp facility, like the tent and the pavilion. We had to go there and use 'em. In the meantime, the military had their disposal in our ocean. They had their sewer line in our ocean. And, as I grew up, I watched it slowly kill our environment, kill the reef, kill the fish. Like today, we get hard time get back the fish because we lost most of the fishing grounds. And then it started to develop where they would cut off our resources because by doing that, they had shifted the whole nature of the reef and sand dunes. In other words, like this month, the sand all shifted. It's going down to Ulehawa and when it goes to Ulehawa, it takes out the sand. It don't bring 'em back. So, Camp Andrews, the name of the place why it was called Camp Andrews was because it was a military base. And then, we suffered because if anyone can develop in front of Camp Andrews, then we would see the whole coast going down to Ulehawa — across Ulehawa. We would save all that sand dunes from disappearing. Because now, it's disappearing slow. But, Camp Andrews is the main circulation of tide, current and everything. It's one of the biggest currents in that area. So, when the army had 'em, they put their sewer pipes in the reef, and it changed because they had to cut into the coral.

CSH: So, the pipes are still there?

WK: No.

CSH: So, from the time you were born, it was all military?

WK: Military.

CSH: But, was it being used? Before World War II, were they using it already?

WK: Yeah, was in use already.

CSH: Was it Army or Navy? We weren't sure.

WK: It was the Navy. The Navy had the place, but after a while, they started to speak — the Navy and the Army — so both started to use the facilities there.

CSH: What kind of camp was it? Was it a recreation camp or a rest camp?

WK: Well, you can say it was a recreation camp, it was a camp to train guys for war or whatever. It was an improvised camp where they had to do both things, or three things at once.

CSH: So, they had training out here?

WK: Yeah. They had training here. It was close for them to go up to Lualualei side and over to Kolekole Pass. So they made that [Camp Andrews] a place because they was close to go get to Pokai Bay, Wai'anae, because that's where the ships used to come. And the war ships used to come in there. So, they used to protect Lualualei, ride the train, or haul in ammunition to Lualualei, and then protect the coast line, anyway.

CSH: So, guys were stationed out here all the time?

WK: Yeah. They were stationed here all the time. We never had the privilege of, say, overruning this area. As local guys, there was curfew, we had to get home. And we couldn't use the facilities of the area because there were barbed wires, there was military security. Well, when I was small, the only think I can think of is in case a war came out, we were protected. But, besides that, we had a rough time with the government. Although they gave the community protection or help, it was a rough time for us. Because the military, the way they treated us guys, just like they own everything. You had no say in anything. We never knew politics like today. We never knew how Hawaiian Homestead could have this, could be ceded lands or could be returned back. We never know until our people became smart about it. But, in the meantime, growing up here, I had to survive by fishing.

CSH: Is this where your house was?

WK: Oh, my house wasn't here. My house was down in Nānākuli, Pua Avenue, First Road. It was there because my grandmother was there. My grandmother brought me up. You know, when you get old folks, my parents, before they had that property, they were living at Mānoa and at Wahiawa. You know, my brothers were separated from me. I was the only boy that growed up, even how much beating I had from the older people. Because we had to go get water. And the water was the hardest thing. There was only one water tank at Nānākuli. You know, if you're the small guy, you get pushed around, screaming, yelling and everything. So, I learned how to survive with the rougher guys.

CSH: So, you went to school here too?

WK: Yeah, I went to Nānākuli School. We went Nānākuli School where one time a week you go school. Never had much room. That's why I said Camp Andrews was later improvised so we can use the rooms. So, I think it went up to seventh grade then. From there, you had to go up to Waipahu or Wai'anae. Wai'anae, I think, went up to tenth grade or eleventh grade. Those who could, went Wai'anae. Those who was fortunate, went Waipahu. But during that time, after WW I or WW II nobody had cared for the people in the area. Our beaches was all destroyed, our reefs was destroyed from chemicals that they used. You know, as a local boy, it was my grandmother that always said, "If you cannot take care the land, the land won't take care [of] you. And, if you cannot take care the ocean, the ocean won't take care [of] you." I grew up to respect the water, respect the land. Without land, you cannot stabilize your feet. You cannot walk on 'em. If you have the water, you can't stand on it. So, she said, "If you have brackish water, you can live by it, because you can drink 'em. But, not salt water." So, I learn how to live that part of my life. I never like get involved in politics or anything because much of the people that lives here do not know about the current here. The old timers that lived here might have known about the current, but no one lives here anymore. And, they never knew about the changing of the tide, the changing of the moon, the changing of the ocean, the sand and everything move here and there. But, as far as I can understand it, even if the military was in here, they only gave the help to their own kind. Because if you was in the service, was clear. But, if you was out of the service, you keep begging for everything. The only lady that I knew made money in here was Mrs. Mahelona because she had the store, she had the tavern. When the military phase out, she lost 'em, she started to go in debt, she started to sell out.

CSH: How about the camp grounds? Do you remember any kind of buildings? What kind of buildings did they have?

WK: They had a building where they had recreation, a pavilion. At certain times of the month, they invite the community. You say, why they invited them? Because they had more men than girls, so they had to take the Hawaiian girls from here to give the show.

CSH: So, that was wooden buildings?

WK: Oh yeah. There were wooden buildings. If anything was built, different walls or things was built — like in Nānākuli, we have stone walls — it wasn't built with concrete. The only thing I knew that was inside that area was built by concrete, was the bomb shelter.

CSH: But, they just have some concrete foundations there now.

WK: Yeah, they have concrete foundations inside there, was for maybe, showers, but all the buildings in there was all wooden. Nothing was — you know, any iron, or any concrete building that was standing there. All the building was made of lumbar. And they made these small cottages, small, maybe four or six [people] can bunk in one cottage. So, after they left, they got rid of them. They gave 'em to some church people in here. In the forties, they got rid of them, so the school took some of 'em, the church took some of 'em, so that they can have 'em as class[rooms].

CSH: So, they took just took them out?

WK: Yeah. They removed them. They just took 'em out. Let's say, was 20' x 40' or 20' by 30'. So, the people had the use of that because the military was phasing out. And then, the sewage start to get old, 'cause nobody use 'em.

CSH: So, that was right after the war, in [19]45, that's when they shut it down?

WK: They had 'em in use, but not that much in use, until finally they shut it all down.

CSH: Do you remember about what year, maybe?

WK: No, I don't know.

CSH: It was still in the forties, yet?

WK: Yeah, it was still in the forties.

CSH: Because that's also when the church and the school took the buildings?

WK: Yeah. And then they stayed over there because the military never like give up the place. They still check 'em. They check 'em all the way 'til these years.

CSH: Well, now they want to move the school there.

WK: Yeah, now they phase out. But, I still say, all the bulldozing and things they moved for put the rest of the school up, they took away all the frontage barricade. So, now, when you have a big storm or something like that, it cannot last down there. I'm very sorry that our community, or the people that lives in here, from the first government rules came in or the State or health or whatever the rules was, from the beginning of the entrance [of Nānākuli] was all tsunami area, all the way up to Third Road. So, I couldn't figure, even if we owned the land, I couldn't figure how come the government couldn't stop that, because you still eliminating people if one storm come in, one hurricane, one tidal wave come in, 'cause there's only one way in and one way out. Unless, you get permission from the government to go through their property [Kolekole Pass] So, *I couldn't understand why they gonna put the high tech school in that area.* So, only one way I can understand it. If they put high tech school in Nānākuli, in that area, they gotta cut *another field or entrance to Third Road. So, whose house* they going eliminate? How many people they going eliminate from Third Road to cut one road through there to get to *the new school? In an emergency, how fast* can they evacuate that school and move 'em? But up here, we can, because we get big land in the back. You know, we can put the high tech school in here and put one football field down inside there. So, in case one hurricane come, only the football field would be damaged, right? But, by doing this, I don't know how they going work out this thing. But, what they going do with the front? They promise us that the Hawaiians, that we can use that. What I mean by Hawaiian is that everybody in Hawai'i is Hawaiian. There's no such thing as prejudice because you're Filipino, Japanese or Portuguese. Everybody have a right because they live in Hawai'i. They live as Hawaiians. I think everybody should go that school. There's no such thing as, like Kamehameha, only the Hawaiian kids going go school. Well, I no think that's right. Today, we *pau* fight the war. We're at peace. We should share. Give everybody a choice, as the government gave us a choice. Now, to learn our Hawaiian language, before we couldn't speak our Hawaiian language. Today, we get chance. We can. So, we should share. That's the way I feel. But, my homeland been destroyed so bad, that I wish anything else come up, any new park or any new things come up — the school had taken away all that front entrance already . . . And, I remember, the city lost money for digging something in those sewer holes — big, maybe hundred feet or two hundred feet down.

CSH: Where?

WK: In Camp Andrews, maybe about ten years ago. And then they bury 'em all up and they made the sewer go down to Wai'anae. They dig 'em and made 'em and everything costed millions and millions of dollars, then they shut 'em down. Then they run the sewage straight down the road to the main line. I never had any word or any other information saying it was because of this or because of that. I only know that they went eliminate that and all through that hard work making it, and they bury 'em all back up. So what was that called? Throw away money or that was called because they invade the government land that never been turned over? So, if they had put something that never been turned over to the City, but never has been turned back to the Hawaiian people, then I say, whose at fault? I don't know. The two can be blamed. The military let it get built. Or the State let it get built and then they condemn 'em. They either just waiting for this high tech come up or something to improve it. But, I say now, if everybody down the coast can open their stores are gonna make money and we Hawaiian people only get from the hill coming down and down to Yuen Store, this area here, Camp Andrews, is the only facility we get for culture or whatever we like. Because we live in an environment, what the Hawaiians call an *ahupua'a*. In this, the environment is no farther out [and] no farther in and no farther upland. Because it's only one valley that our Queen had put aside for people like Hawaiians. So, if the State or the government take away these lands and put one school up in there, then would get more markets, *more stores in Hawai'i, that we can self-support ourselves.*

CSH: *Nānākuli Ahupua'a?*

WK: Yeah, like Nānākuli Ahupua'a, so we can support ourselves. We have a hundred percent of fishermen here that are getting lost, a hundred percent of farmers here, that gotta rent land for raise their stuff. I no say the government cheating us out of the thing, but I say our Hawaiian OHA or whatever, not investigating this close enough. That always, the government get blamed for stealing or the State get blamed for stealing. What are they doing? Sitting down and running one office controlled by the City. I no say, "Oh, Tom, Dick and Harry is the ones controlling it." I say, "What are they doing for us?" Eliminate the land, you put the school there, we get no resources. What I'm saying is we get people coming to school from out of the zone. If that land has been turned over to the use of the Hawaiian people— so, now I not saying, "Prejudice." We no can get kids from outside come in school. It's open. But what happened with the government plan on Hakimo, a new school there? They put one in Wai'anae Valley. They put one in Maile. How come they no put one more like they promised in Hakimo, so balance out, stabilize the people coming to school? Why should us, in this small *ahupua'a* — we no get much time, say me, I going live forever and remember all what I have to remember. I say, sure like hell, I get three grandchildren growing up. At least I'd like to see them get the benefit of the education of the government or the State. But now stealing land or taking land, which the military did, now they're doing it, now OHA on the slip, then we put something in there, there is no stores that can come up. Yet, it's a beautiful land, it's a beautiful ocean, but if you take this all away from us, what we going get? And if they put that in one tsunami area, why don't they move the school up where we have plenty room? Yeah, we have plenty excess space that's doing no use. They put one new cafeteria for feed the people. But they don't have time to move 700 people or something from down there to up here? That one, I say, poor engineers or poor planning. For me, I'm thankful that today I get a chance to talk to people like you. We never had people come out ask for input. We never had people ask us about the old days. I'm glad that I met you, that you care. Maybe, it won't do much, but maybe it will at least help a little bit.

CSH: Yeah. You try. You gotta make the attempt.

WK: But, I wanted for talk story about how our land got destroyed by the government, by the Navy or the military. I want to see no more of these stories. I want to see it better. We have Camp Andrews, but we used to call 'em Depot.

CSH: Because of the old railroad station?

WK: Yeah. But that was all military. All the way — no park. All military. Was military right where you turn into that one comfort station, all above half-way of the school, of the stop light. Across, there's a building — all there, was all cabins, all military. There were tents put in there like Kāne'ohe Marine Base.

CSH: On the *makai* side?

WK: Yeah, on the ocean side. And there were pavilions put in there, wooden pavilions.

CSH: So, when you talk about Camp Andrews, you just don't mean the 40 something acres, you mean the whole area?

WK: Yeah, right across. They had bathrooms put in over there that we could use for the meantime. The old caretaker used to be there. He died and his family left. But, he wasn't that old, but he take care the military. His name was, I think, Herbert Amina. His kids moved out of there.

CSH: Mr. Kamanā, Camp Andrews was considered from what point to what point?

WK: Camp Andrews, I consider from Nānākuli stop light, all that area all the way down, across the Depot, all the way back half-way, all where you see the knew school they put up, it was all the way to the ocean. From Third Road to the main high road across was Camp Andrews.

CSH: You know, on the maps we've been looking at, some of the geology maps, actually that area is mostly coral reef. There's beach sand on both sides, but the Camp Andrews portion, where it goes up *mauka* is more coral.

WK: It is a coral reef, a coral flat that is on the bottom, but it goes up like a point. It's shaped like, not fully a full moon, but a half-moon. Yeah, it's shaped like that, but it's the bottom coral. So, by them guys cutting holes, whatever for latrine and stuff, these holes can reach by the ocean. Just like, if I cut all this coral away, it stop all brackish water from pouring normal — it takes a different route. That's what happened with us. We lost that reef, that coral top. Gradually, our area was killed from that. Sand was taken away during the war time. So much sand was taken away from our area that the military never did return back to us. They never say, "Thank-you for using your land, and taking this, etc. You know, who going pay for the loss of the sand? If they did pay, this one local boy sure like know where the hell the money went! I waited almost forty years before I can have a sign-up for homestead land. When I first sign in, I was too young, I was sixteen years old. The second time I went sign in, I was seventeen, I was too young. Then, I sign in for the land at Nānākuli, First Road. Oh, I was old enough to have 'em, but, with a guardian. So, then after that, I got big and seen which land is being passed out in my home. We had six in the family, so I had to leave and go out on my own. So, I lived at Makua on the beach because I couldn't live here. If you live here, they chase you out. So I live in Makua. Then, when the military come in and chase me out of there, I lived at Barbers Point, because I was born in Nānākuli, raised in Makua until the age of nineteen, then here back in Nānākuli and was raised with my grandmother because was a promise, yeah? I lived to learn the Hawaiian and that's how I knew Camp Andrews. Because I had to trade as a young boy. I had to trade because my uncle them was all in the service. They never like make the trade. So, I had to make the trade, what fish, lobster, or squid I caught, I went see the cook. And the cook give me butter, the cook give me this. So, I traded with him. No money was dealt across the table.

CSH: So, did you have to stay out of the military side?

WK: Oh, yes. That's why I say that night time, if you would pass through there, they had one guard that said, okay, you could go through, and reach the other guard and [you] get out. 'Cause I remember [it was during] the Model-A and Model-T time. Then, after they [the military] left and we got in the homestead here. Nānākuli was a hard life. Camp Andrews was the only facility for the local people because they could go over there and make a trade and get something. I think there is some part of the old buildings are still there.

CSH: On the camp ground?

WK: No, the school area.

CSH: Have you been inside the camp ground recently or in the last few years? There's only one thing standing up. It's like a concrete —

WK: Gate?

CSH: No, inside the gate, there's like — it's all concrete, but small. It's kind of near the front, but there's a concrete pad and kind of like an incinerator. Have you ever seen it?

WK: Yeah. They had incinerator and surgery was performed there too.

CSH: Surgery? They had some kind of a hospital?

WK: Yeah, a small place. They had a small hospital there. So, they did whatever stuff they could burn there was thrown in there. There is another building that was in there, I think they went demolition 'em. I don't think it's still there. It was a long bomb shelter, facing the canal side. But, when you go in side way, you know, if you walk a little bit further out, then you come across the short one. It's about like this building, like this garage shelter.

CSH: Real small, then.

WK: Yeah. Real quonset hut type. They used to burn stuffs in there. But, what? I know there was medical stuffs that never been transferred down to Yokohama, down to this place we call Keawa'ula. 'Cause the train didn't stop there to pick up the rubbish. But, I know, when I was small, I know the Hawaiians used to pass through there certain times and the smoke used to go up. And they used to say, "Oh, they're burning all the *limu* or something." But, I know there was a furnace in there.

CSH: What about the drainage canal? That came in —

WK: The drainage canal, I think, came in the same time they started over there. The canal across where you see the river now, going all the way down to the ocean. Well, right where the end of the river, the mouth there, there's a small cutting inside the coral reef. Yeah, a square cutting. If you look in that square cutting when it's low tide, or whatever, you find where the fence ends, facing to Maile side, just before that, you going find one ditch. One small little square ditch. And you going find little pegs sticking up like this. That where the pipes used to be. The sewer pipes used to run off right there. More than one pipe. But, they all used to be connected together. Yeah, they all used to dispose their mess inside there. Then after that, until today, our environment slowly died. No more as much fish as my old folks used to harvest. We never had much *akule*, *weke* or menpache come inside there [after that]. The coral never did wake up. Only the seaweed went wake up, because we planted back the seaweed. My family and I planted back. Because, used to be only plain white, on top where you would go looking. Used to be only coral.

CSH: The other concern we have is about burials. Do you have any concerns that there might be any burials in that Camp Andrews area?

WK: There might be a couple. Because, I used to see, anyway, a couple old area[s] that when you went across you see something, maybe two, three or —

CSH: You mean, modern burials? I was thinking about old Hawaiian burials.

WK: Well, there were Hawaiian burials there. You know, there were buried in that area. They would put the land, so that their house is right there. So even that is graveyard under. Yeah, there were burials in there.

CSH: You think there might be something — even in the coral, in the sinks? In the depressions?

WK: Yeah. Because when they came inside there, even during the war time, they *hana 'ino* everything. We cover 'em up, we hush 'em up. Nobody made a fuss about it during that time. But, today, the young generation making the fuss about it. The older people, they come senile. They don't know if get burials or not because they spending their time more sucking 'em up than anything. You know what I mean? But, us, the young guys that play in there, we know there is burials. There is this old cowboys that was buried in there, or train people was buried in there, you know, put out of the way. Because Nānākuli was only a place of *kiawe* trees. And where had our church, like one time, even, we had Catholic church, too. I don't think had much of our people were buried at Wai'anae. I think much of our people were buried at Camp Andrews, but was a lost cause. Nobody know. When the army took 'em away, they took 'em away. But someday, when they gonna develop in there, they're gonna find 'em. And, when we find 'em, what we going tell them? What the military going tell us? We sorry? So, my concern is just that I hope whoever develop in that area is concerned that this is a bottleneck area — there's no way out and there's no way in. Unless, the City consider for us a new back freeway from here. In the meantime, you only causing a bigger problem to the Hawaiian people that live here. We got a problem that the State and whole government like get away with and they come in with one high tech school without considering Camp Andrews for what it is. And what it is, is this is a historical site to us, and to see how they can work with the people that know or the people that doing the surveying over there. You know, City surveyors sometimes, they little bit — they won't go to your house like you folks come and talk. They just say, "Oh, it's all right. We get the map, we get everything. We can go buy it." But the map can show you everything in that square area, but he no show you what's under that area. Many of our people say, "Oh that's alright, yeah. What we get over there?" But, we no was bound to see 'em. But with this, it's an area that to the Hawaiian people, the old people, it was a sanctuary area. But, there is a Hawaiian name for that place. I forget. For that whole flat. That whole area across the reef and over there. It wasn't called Camp Andrews. It was called Camp Andrews because of the military name of that. But, outside of that, that's all I know about Camp Andrews.

CSH: That's more than I knew. So, you agree it was a coral reef?

WK: Yeah.

CSH: With kind of depressions, it could have soil or it could have --

WK: Yeah. Because I think that flat goes all the way up, you can see that thing on the map. There is a point that I forgot how far the end goes.

CSH: But, you know when you were growing up, the military had already done a lot of clearing in the area?

WK: Oh yeah. When I grew up, while I used to go school, there still was engineers around here. They used to have the grader and the bulldozer. They were putting coral so that the mud that was on top there would get more. They were painting everything white, green. You know, they was painting 'em the color of the camouflage color. There were no rubbish trucks for garbage. They had to throw 'em on top of the train car to take 'em all the way down to Yokohama and burn 'em. You see, why the people named that place Yokohama 'cause they were all part-Okinawans, Japanese that take care the rubbish pile down there. But, then the Hawaiians used to chase cattle through there. They used to call that place Keawaʻula. And on top was Kawaihāpai Flat. On top was Kūkalā. Below that was Kawaihāpai.

CSH: So, at that time, Farrington Highway was all straight through?

WK: No. Farrington Highway was little bit zig-zag yet through the coast. The old road was going through the coast. The railroad was one side, the old coral road was one side and then they started to build up and build up and they started from a one-lane road to a two-lane road. In other words, let's say was twenty feet, the roadway lane or fifteen feet, one was shorter than the other. We never had the railroad track hump up. In other words, lifted up where it would be — you had 'em the same station as is now, only the roadway was down because was graded.

CSH: Oh, so the roadway was down, but it wasn't like the railroad was built above that? The railroad was natural?

WK: Yeah. Natural. The walls you see going down wasn't put there before. Was only a few stones, grass, whatever. We had County guys that was there every morning throwing back the sand when it went up. The side of the Depot, now we're speaking about Camp Andrews, was all *kiawe* trees, was full with mesquite trees. And even in between of the camps was full of mesquite trees. But, when the school took over, then they bulldozed it all. Then they left that flat because of river cutting across. Then they gave 'em to the City for [a] park or whatever. And the City took 'em all the way, half-way down. But many of the trees were destroyed. Today, I wish they would keep the trees. They serve their purpose through the storm, because they can fight 'em. But all in Camp Andrews from where you see Third Road, Third Road was only one trail way before. They cut half-way into there when they made the river half-way. So that's why I said it comes from the building, you know, where they sell *huli huli* chicken some times. Well, from that portion over there is all Camp Andrews. Camp Andrews, you couldn't cut the trees, you couldn't touch anything because they needed it for camouflage. The only time was First World War or Second World War, they started to paint white paint markers on the stones so you

APPENDIX D: Transcripts of Interview with Lehua Kapaku

Interview with: Lehua Kapaku (LK)
Date: June 28, 1999
Place of Interview: Nānākuli
Interviewer: Kaʻohulani Mc Guire for Cultural Surveys Hawaiʻi (CSH)

[Before starting the official interview, Aunty Lehua wanted to give me some background information, which ultimately led to talking about the project area. Part-way through, I asked permission to turn on the tape recorder. This is where the tape begins.]

LK: So, if the sun set at the west, which is in the direction of Nānākuli, and we have a hill, or *puʻu*, named Heleakalā, which means *path of the sun*, then, we began to go in there and look at the Māui legends. Ulehawa, Puʻu Heleakalā, and as you know where Princess Kahanu is at now, seems to be the area where the Māui legends seem to concentrate on. For example, the Māui Rock at Garden Grove, coming straight out into where they have a park area, there seems to be sort of a lagoon. And in the lagoon there should be a stone formation where they anchored their canoe, or whatever, on. There's signs of the *līpoa* [*Dictyopteris plagiogramma* and *D. australis*] seaweed growing in that area. Seems like whoever told the story of the Māui legend seemed to have all these clues, or evidence within the area. To Māui's mother, Hina's, home in the cliffs of Paliken. So, that's the Māui legend's connected to Nānākuli. Basing on the fact that the migration came to Kauaʻi, and from Kauaʻi to Kaʻena, Kaʻena to Mākua, Mākaha, and right along this part of the island. We came to agree that the legend begins here. So, that's how far we got to the Māui legends. Okay, second Māui legend, the naming of the place. Scientifically, we learned that the Waiʻanae Volcano was the first on Oʻahu. Remnants of the Waiʻanae Volcano shield is Māʻili Point. So called Puʻu o Hulu is a remnant of the Waiʻanae shield. So, anyway, Māui legends tell us, scientifically, Waiʻanae Volcano is the beginnings of the island of Oʻahu, right? And the Māui legend names off the various places this side of Oʻahu. Māui had so many brothers and he had two sisters. One was Lualualei and [the other was] his baby sister whom he treasured. The baby sister's name was Nānākuʻulei [which means] *look to my pretty lei*. Scientifically, when we did our research, from Waiʻanae Volcano comes Lualualei and the last cauldron, or the last *puka*, of the Waiʻanae Volcano was Nānākuli. Nānākuli overflows and there joins Koʻolau with Waiʻanae through the Nānākuli flow. Now, when you do research on the Hawaiian part, I took the role as being part of my race, part of my people. To have the name "Lualualei" which is *sacred wreath*, and, then having a baby sister [whose name means] *looking deaf*, I just didn't agree. I wasn't satisfied with that. So I accepted the Māui legend part where his baby sister was named Nānākuʻulei. Now, history tells us that when you misspell a Hawaiian word, or forget to put the *ʻokina* or the *kahakō*, it totally changes the meaning of the word. So, if it was Nānākuʻulei, which would be very positive, very good, I don't think the people or anybody would feel negative about it. This is the only place in this whole State to have a derogatory name, *look deaf*. You look at any other place, they have nice names. Could be a special event or a special person. Only Nānākuli. So, it may have been a misprint and it may have been what the *Sites of O'ahu* says, but it depends on how the people react to that name. We've come to even give the name another meaning and that was *perseverance*, just to change the negative attitude. And, we find that this community has been so put down, I tell you — talking about patience and perseverance — and finally Nānākuli is a community that's noted that whatever they do, or whatever they accomplish, they real Hawaiian and give away. I've been here long enough to see that this place has really accomplished a lot of things. Like, for example, this museum [Nānāikapono Community School Museum, Nānākuli]. We are the one and only one in the whole state of Hawai'i. Through this museum came the Hawaiian Studies statewide. Yet, Nānākuli will not take credit. It's something we don't publicize, we don't take the glory, we just let it pass. Whoever wants to take the credit, whoever wants to say anything, we just let them. That's the way it is. When I first came here I was real aggressive. I've come to love this community. I finally accept what the *kūpuna* [elders] told me way back 39 years ago when I first came here.

CSH: So, you really think that, perhaps, the original name, or another name for Nānākuli was really Nānāku'ulei?

LK: Yeah, I say that because there's three so-called meanings of the name Nānākuli. [One meaning is] *look deaf*. I said, "How can you look deaf?" My *kūpuna*, when they wanted to emphasize the point of looking deaf, they would pull your ears and say *pepeiao kuli*. They would not say, "You look deaf". Your ear is deaf, your eye is blind. But never "look deaf". There was no definition, or there is no word that tells us that you "look deaf". Another one is a chief *looking at his penis* and another one *looking at his knee*. *Kuli* in Hawaiian is knee. So, you're looking at your knee, you're looking at your penis, or you're looking deaf. Why? Which lead us to now, the restoration of Nānākuli Valley.

CSH: Okay, we kind of started this interview backwards. [Laughing.] Can we start from the beginning?

LK: Okay. [Laughs.]

CSH: Tell me about yourself. What your full name is and when you were born and where you grew up.

LK: Okay. My name is Virginia Ka Lehua o ka Nani o Pana'ewa me ka Ua Kani Lehua Makekau Kapaku. I was born November 3rd 1934 in Waipi'o Valley on the island of Hawai'i. I am presently the curator of Nānāikapono Community School Museum.

CSH: You spent your childhood in Waipi'o?

LK: I was born in Waipi'o. I grew up in Waipi'o. We moved to Hilo. And I spent some of my childhood years in Miloli'i, Kona.

CSH: And how did you happen to come to O'ahu?

LK: I came to O'ahu to attend the University of Hawai'i.

CSH: And what did you take up there?

LK: What was my major? Business Administration. I did the Teacher's College. I went back to Hawai'i and, then in 1960 I moved to Nānākuli. I lived in Nānākuli for the past 39 years.

CSH: And, in 1960, is that when you started working here at the museum?

LK: No, at the school. The museum was started in 1971, officially. It became part of the Department, DOE, in 1979, when I come in and took over the museum. In that period, [19]71 to [19]79, it was under the Model Cities Project. In 1979, it became officially under the Department of Education.

CSH: Getting back to Waipi'o, did your parents grow taro [*Colocasia esculenta*]? Were they farmers?

LK: No, we were landowners. And we had land in Waipi'o Valley. We had tenants in Waipi'o Valley. When I was born, for three years, I had to be raised by another family in Waipi'o Valley. And at three years old, I was brought up from Waipi'o Valley back to my parents. So I didn't grow taro. We were landowners.

CSH: So when you came up, you went to Hilo?

LK: When I came up, I began to live with my parents up in Kapulena. Then, I think I was five years old, or six years old when we had to migrate to Hilo.

CSH: What do you know about the project area where the proposed reservoir is going to be? This is the map that we got from our client and it shows the reservoir area above the homes.

LK: Yeah, got 'em right here. And this is the ranch right here.

CSH: That's Lyman Ranch. What can you tell me about Lyman Ranch? Any history that you know about it? Past history and who currently owns it.

LK: Well, let's see. History tells us that one of the first ranchers that leased the valley was Manini. Thereafter, when I got here in 1960's, the valley was leased by Hawai'i Meat Company and Tong Ranch. Recently, about 1995, the present rancher, Robert Lyman, has the lease on the valley.

CSH: Do you know if he is related to any of the early Lymans that came to Hawai'i, the missionary Lymans?

LK: That I don't know. However, he once was a cowboy for Tong ranch. So, after Tong ranch give up on their lease, he applied for the lease to continue. So when you go up there and you talk to him you can get his history.

CSH: He's pretty much there all the time?

LK: He works for his wife. Robert and Veronica Lyman. And they have a little house up there.

CSH: And what does he have on his ranch?

LK: Oh, he has cows and horses.

CSH: And you mentioned earlier that it's not really a working ranch, it's a hobby?

LK: Yeah, it's a hobby.

CSH: Do you know anything about our project area? Are there any sites located in our project area?

[Tape was turned off at Aunty Lehua's request for a break.]

CSH: We're talking about cultural practices in the project area.

LK: Presently, none because these people that — how do I say this? They never knew. It took us this last few years to make these residents of this community aware of what was happening up the valley because they always thought that it was just ranching. They never thought there was historic sites up there. Not even realizing the fact that some of their houses was built right on ancient sites.

CSH: When you mentioned earlier that some people were upset when you folks were saying that possibly there could have been sites up there, why do you think they were upset?

LK: Because they never knew. They always had the assumption that it was just ranching. And I guess because they didn't understand the archaeology or anything about the area, when we brought it to their attention, the first thing they did was to tell me that it's us — that we're trying to say that there's something there — when they've been here for years and years until we found that thing. I didn't find it, Ross didn't find it. It was these people that we took up to hike and to learn about the valley. And Ross just told them to have the experience of archaeology, that they're not to assume. That they're to painstakingly record things, just don't go over there and move. These two boys happened to come to this opening. It was very low. One of the boys assumed that it was a stick. And the other kid said, "Don't assume. If you see something peculiar, go in." And so the boy crawled under and cleaned the dirt around and it wasn't a stick. It was something, a shape. And so he pulled it out and came up with that [a tapa beater]. Since then, we've publicized. We've gone to different organizations and any kine meetings and what not and showed them. And, they don't understand. What they call the cattle corrals and all like that, actually wasn't corrals. It was maybe a habitation. So, now they've come so acceptable of Nānākuli that, like I said, their attitude changed to positive. Now they're real anxious to learn more about their valley, to go up and clean the valley.

CSH: Can you tell me the name of the organization that you're associated with?

LK: Mālama Nānākuli Ahupua'a, Inc.

CSH: And you're a non-profit organization?

LK: I am. And I am the President of that.

CSH: And what is your purpose?

LK: To restore, preserve and establish an educational place for the people of Nānākuli.

CSH: And Ross Cordy?

LK: Ross Cordy is my archaeologist, and we are in partnership with the three schools, Ka'ala Palms, Hawai'i Conservancy, Department of Hawaiian Homes and community organizations like Nānākuli Hawaiian Homestead Association, Hawaiian Civic Club, Queen Liliu'okalani Children's Center. We're all together.

CSH: And when did you form your association?

LK: We started in 1996. I got officially registered October 1998.

CSH: Getting back to the project area then, what can you tell me specifically about it, as far as cultural use? Do you think there was cultural use in the past or is there any cultural use taking place presently?

LK: The Valley or you talking about the spot?

CSH: I'm talking about the actual reservoir spot. Where the proposed reservoir is going to be, on the map.

LK: When we learned about the valley that borders Manawahua and all of Pu'u Heleakalā, better known as Nānākuli Homestead, on the side of the gulch, which is now Nānākuli Ranch, we found to have historical sites, like settlements, and burial sites on the Phase 7 side and on the Wai'anae side of Nānākuli Ranch so called "the Gulch". In that area, all the way up to the present Lyman Ranch area, there was settlements. In fact, there's a swimming hole and a *wiliwili* tree to designate the swimming hole that the children of Nānākuli Homestead used to go swim. However, when the Department of Hawaiian Homes started building their housing projects, they may have destroyed some of the historical sites. But, leaving some sites up to the valley. That's how much I know about that part.

CSH: Do you know if anyone uses that area for any cultural reasons at all? For example, gathering plants?

LK: No, not presently because the people who live in that area had no prior knowledge that there was historical sites in that area. When they came the land area was already developed into a housing development, so they didn't know.

CSH: So to your knowledge, you don't know of any cultural practices currently being done in the area, or in the past?

LK: No, not at this time, but I'm pretty sure it's going to happen now that we're involved in the [work in the valley].

CSH: Do you know anything about the two *pōhaku* on Pua Avenue? Can you tell me about that?

LK: Yeah. Legend tell us that this little brother dies and is buried over there. He had a sister.

[Aunty Lehua asked to turn off tape recorder for a bit.]

CSH: You were telling me about the *pōhaku* on First Road.

LK: That *pōhaku*, it's about a brother and a sister. And if I'm not mistaken, it's on the Ka'ea land. George Ka'ea.

CSH: So the brother died —

LK: And was buried over there.

CSH: And what about the sister?

LK: [can't make out what she says]

CSH: Oh, she died after?

LK: And that family, that the two stones are at, is still there. The man just recently died.

CSH: So, they're related to Ka'eas. That's their *'ohana*?

LK: Yeah. That house lot. In fact, when they went to build and widen the road, Pua Avenue, it's not a straight road because they had problems with the two *pōhaku* and, now, it's kind of like way down. But, at the end of the road, there's this lady, Sarah Kawailima, she's a good one to interview. She used to be the Kāne girl. Her father used to work for the [?]. I know they used to go on horseback go up in the mountains. But, at the end of the road, by the gulch side, there's another stone. So, I'm sorry, depending, on what stone you was asking me about.

CSH: I didn't know about the other stone at the end of the road.

LK: There's another stone, but no connection to these two stones.

CSH: Is there a story about that stone?

LK: It's the *'āweoweo*.

CSH: *'Āweoweo*?

LK: The fish. You need to go into the valley, the gulch, to see that stone.

CSH: So park the car and —

LK: Go in the gulch to the Ranch, look to the left. Maybe now it's all covered with grass or whatever.

CSH: When you say "go to the end of the road", up First Road, or up to the end past Nānākuli Avenue?

LK: No, no. The end of First Road, Pua Avenue. You will see the stone through the gulch. You go in the Ranch area and you look toward that — I hope nobody went destroy 'em.

CSH: And what is the story about that stone?

LK: It's the home of the *'āweoweo*. And Nānākuli is noted for the *'āweoweo* fish.

CSH: And can you tell me anything else about that stone? Any other stories about the *'āweoweo* stone?

LK: No, all I know is that. [Our understanding is the stone was used to attract *āweoweo* fish.]

CSH: Back to the other stones, about the brother and sister, Fred Cachola called it the *Menehune* Stones.

LK: There's a legend that says that the stone came from the Valley. It was brought down and so it cries like it's lost. The story I get was from that Ka'ea family. That stone was there before. There was the story about the brother and the sister. But, you know, it's real difficult for me because I gotta lean on legends and I gotta lean on modern Westernized thinking. Let me tell you about stones. When you look at a stone and there's an image on the stone, I might look at a stone and I don't see nothing. You look at one stone and you see something. Whenever you see, you either gonna have to take care of this stone and be respectful to that *pōhaku*. It's believed that *pōhaku* does travel, so you have to kind of accept the fact that if you were told the *pōhaku* travels and, therefore, it does travel. If the stone, or the *Menehune* stone or what was taken from the Valley it would find its way back to the Valley, one way or the other. I can quote incidences that happened where people find these kind of stones, take them home and they wasn't happy until they took back the stone to where it belonged. So, if the *menehune* stone was taken from the valley and, I now know about the valley, 'cause like I said, on the serious side of me, I really think [?] to see if whatever legend or whatever is told to me is authentic. So, therefore, when we had the question about Nānākuli Valley, I don't know if we are at that part, when we interviewed the people of the community, they told us off. They even retaliated against Ross. Their attitude — you understand? There's nothing in this valley! Nothing [emphasized]! Only ranching and all this and that and this and that. And those people who's telling us grew up in Nānākuli, so who am I to debate with them? But in our research, we find things that's written in the books and if we find that there was living settlements, there was people living up there before [emphasized] that name Nānākuli came up, cannot help but say — if this place is arid and hot and nothing, and the people look deaf and were so ashamed to offer any [food or water] and Hawaiians are people that would give you the shirt off their back, nowhere in the history of Hawai'i that I have ever traveled to or went to that the people are poor, I mean they are so hospitable. I couldn't just accept. So, anyway, to hear this kine and then we have prove it, right? Like I knew [emphasized] that there was people up there, I knew [emphasized] it. The point was what kine people. And I really dug into it to look and I found it. That's why my focus right now is opening up that valley. All I can tell you is about stone. So, I would take the stone theory from that lot. It's more authentic than taking the rock, because when the construction went over there to get that rocks, I mean, these rocks were imbedded in the ground [emphasized]. It wasn't something small that could be carried. These are huge boulders [emphasized]! Huge, huge [emphasized]! Only the top of that stone was protruding. The story I got from the construction, in fact, they came around the neighborhood and because I was active in the community, we get to know about it, so the old timers says, "Hey, gotta make *pā'ina*, make ceremony over there." And so the construction had a ceremony, had *pā'ina*, and after that — see, the equipment was breaking down and there was turmoil among the workers, so they went to find a so-called *kahuna*, or anybody that knew that place. But, the people of the lot and the neighbors said they better accept the legends and what was told so, to clear the thing and the recommendation was make *pā'ina*, have ceremony and all like that and move away from that rock. That's why construction moved away and so [the road] is kind of *keke'e* [crooked].

LK: No, not right now.

CSH: But, around Site number 4440, 4401, 4412? Okay, around that area.

LK: Yeah. That's where we went up.

CSH: Up by the forest reserve?

LK: Yeah, I think one of these over here is one burial. See, the area itself, has gigantic stone structures. And that's why it may have been a cave, eroded, where they found the beater imbedded in the ground.

CSH: But the tapa beater has not been analyzed?

LK: No, not analyzed yet.

CSH: And you don't know what kind of wood it is?

LK: No. Our archaeologist just mentioned that it may be *alahe'e* [*Canthium odoratum*] and it may be about 400 years old. Until it get tested it's being kept in the museum.

CSH: And what about past cultural use?

LK: Of the valley?

CSH: No, specifically of our site area on our map. You know, of the reservoir site area. You mentioned before that possibly there could be sites in the area, but you're not sure.

LK: Yeah.

CSH: And you're basing that on all the other sites found in the upper portions of the valley?

LK: Yeah. And some of the sites was destroyed by development, you know that. And so whether it's in that present project site or what, but it's known that some of the sites was destroyed through development — housing development.

CSH: Does anyone go hunting?

LK: Yeah. In fact one of the interviews that we had, they would go up hunting. They would go up and pick up *maile* [*Alyxia oliviformis*]. But, they're looking at Paliken and not Manawahua. They're looking toward Palikea Reserve.

CSH: The hunting also?

LK: Yeah. Pig hunting

CSH: Are there goats up there?

LK: There's goats. They were hunting for goats and pigs and this gentleman keeps talking that they would go up and pick up *maile*, but not for cultural purposes. I wouldn't even know if there's a *hula hālau* area.

CSH: That was my next question.

LK: But, we know there is a specific *heiau* up there that was either used for religious or other purposes, but we have to do research on that area. It was way up there.

CSH: Do you know any of the *hālau*, the *kumu hula* in the area, Nānākuli, Waiʻanae, that I could talk to? What about Kaulana Kasparavich? He teaches in Waiʻanae?

LK: No, he come from outside and he moved to Waiʻanae so, all of a sudden his *hālau* is from Waiʻanae. But the one in Nānākuli would be John Kaʻimikaua, O'Brian Eselu and Thaddeus Wilson.

CSH: And, Mililani Allen, I know she passed away, but —

LK: She's from Waiʻanae. But, right in Nānākuli, I think his name is Darrel Kaulia. We also have one other *hālau*, but I don't know if they're cultural. Her name is Charmaine Mokiau and her *hālau* is Keikilani. But, other than that, since I've been over here, there was no specific *hālau* in Nānākuli.

CSH: What about Ulehawa side. Do you know anything about how the beach area was used during the War? I know there's bunkers down on the beach. Can you talk about that?

LK: During the war. Let's start with the train. There was a train route. There was a Nānākuli depot station next to Nānāikapono Elementary School. There was a drop-off stop at Hakimo intersection. Presumably, the train traveled past Nānākuli all the way to Waiʻanae. I guess, this is in the early 1900's. During the war, the train was also used and it was the Army's base. So, the Army was here at Nānāikapono across at Camp Andrews, and they had outposts fronting the shoreline. As a matter of fact, even past Puʻu o Hulu there is these bunkers.

CSH: You mean bunkers or pill-boxes?

LK: Or pill-boxes, yeah. So I guess the military was here from Nānākuli all the way to Waiʻanae. One of the interviews we had, this person relates that as a little boy he lived in Kalihi and his grandfather was the engineer for this Oʻahu Railway, the train. They would leave their home in Kalihi, go to Oʻahu Railroad, get on the train, and come all the way to Nānākuli. And the grandfather would drop them off at the Hakimo Junction. And they would walk up Hakimo, at that time was coral and dirt road, to their family home, which was the Grady family. And this occurred during the war. I asked the interviewee what did he visualize around the area, and except for being filled with *kiawe* trees and for this — just like this short train stop. We had to distinguish between the depot and the train stop. A depot was a station where people got on and got off, and the stop was just — it would slow down and you get off. So, that was one of the interviews. He talked about the train and the Army base was here. That was during the war.

CSH: You weren't actually here yet, in Nānākuli?

LK: No, but, however, when we talked to the residents that was here during those times — very coincidentally, is that we're planning for a closure of this school. In 2002 this school is going to be relocated at Camp Andrews. So, we are now initiating publicity on the closing, asking everybody statewide, we're going to put it in the newspapers that if they had any part of Nānākuli in their life, if they would like to come share it with us, so a book can be printed and, if they have old family photographs or anything about Nānākuli, that they can come and have it displayed. Because many of the people from Nānākuli moved away or either passed away, so we have to depend now on their children. Hopefully they remember and can share with us. So the few items of documents that we have kind of give us a small indication of Nānākuli but, not too much to really do something for Nānākuli.

CSH: Now, Ulehawa side, when we talked on the phone, you mentioned that there was a Hawaiian habitation village, a site down there.

LK: We suspected that there is, there should be, prior to the Railroad, because that's how all over here, like you mentioned Mrs. Zablan, most all habitation was down on the beach, the coastal side. We suspect that they would have a village or habitation in that area. But like everything it's destroyed and washed away. So, we're very interested in Ulehawa too. Not only to connect our Māui legends, but if there was actual habitation there, it's something like should be printed or should be known. So, we don't know. I don't know how far up Ulehawa, except an example. We did this interview of this person who just recently died. He tells us that the so-called Nānākuli railroad station or depot, that area was known as "Naupaka". I mean, everybody calls 'em Haleakalā and, yet its not. It's Naupaka, and the common name by all the kids was "Depot". So, Ulehawa, is that its true name? Is it from one end to the next end or was there another name in between there. People talk about it but, we don't know where it's at.

CSH: Can you talk a little bit about the names changing? You mentioned earlier how some of the old names are disappearing and people are starting to use new names, like on the beach, the coastal area.

LK: A good example, like I mentioned the railroad station, commonly known as the "Depot", yet, its actual Hawaiian name for that area is Naupaka. Zablan, it was

APPENDIX E: Transcripts of Interview with Jay Landis

Interview: Jay Landis (JL)
Date: June 28, 1999
Place of Interview: Lualualei
Interviewer: Ka'ohulani Mc Guire for Cultural Surveys Hawai'i (CSH)

CSH: Jay, can you give me your full name and tell me when you were born?

JL: Jay Landis. Born in — can I say it in Hawaiian?

CSH: *Hiki nō.*

JL: *[Ua] hānau [u'au] ma Kapalakiko, Kaleponi.* I was born in San Francisco. I have cousins there who are Hawaiians. The cousins I have there are half Hawaiian. They look Hawaiian, and I'll show you their picture later on. Their children all *po'e haole*, all look like me, all pale-faced. I came out here in about 1933 or '34. My aunt brought me up as one of her own children. I was supposed to go back to the mainland because my aunt over there Kuliko had custody of me. I didn't want to go, so mamma picked me up. I said, "Mama, I don't wanna go." Took me to see old man McCandless. He said, "So, you wanna stay with your auntie? Yes, okay." They called this attorney, they got him to put a court injunction that Mrs. Annie Silva would be my guardian.

CSH: Here?

JL: Yeah, she became my legal guardian. She had six sons of her own. She brought me up as one of her own children. Then I came to Wai'anae.

CSH: How old were you when you came to Wai'anae?

JL: Gee, I was about 13, about 12 years old.

CSH: And when were you born?

JL: I was born March 13, 1919 in San Francisco. I have many cousins over there. I will show you their pictures. They live there, that's their life. I visit them now and then. I don't know, I don't feel at home when I'm on the mainland. Hawai'i is my home. And, I've been ever since in Wai'anae, however, in 1937 or '38, I stayed in town with the Kahoanos. Mrs. Kahoano and my mother were first cousins. They were <u>close</u> [emphasized] to one another. So, I stayed with them. The old man, Sam Kahoano, was the captain of the *Mikimiki*. In those days he was a big *to-ta*. And I stayed over their house, downstairs. War broke out. I worked for the Navy and, after the war, I came home. And I've been home in Wai'anae ever since. In 1948, we moved up here and I have been living here 50 years. The *haole* side of the family, the McCandless', own this property, but they're good to Albert and I. He has 'Ohikilolo on a good lease and I'm the caretaker here. *So I stay in this big house. Once upon a time, there's* four bedrooms. House is falling apart but, I'm right here in the parlor. This is where I do everything over here. Bad arthritis. I love music. I can't *play the piano* anymore because of arthritis. That's all right. I can still *mele ana ē, mele ana ē* and I keep myself busy. I don't cry about it at night anymore. But, I have memoirs I'm writing and putting things together. About seven or eight years ago we got together to say we're gonna have a family reunion, and we all agreed — there were about 10 of us there. Ah Ching Poe, my mother was a Poe, by the way. Ah Ching Poe was the chairman, cousin Albert Silva — and they told me you're gonna be the historian. I walked into a trap. But, oh, the data I got out of it. I got so much data it's not funny. And so, in here, going back to Kalaniopu'u and everything, and thank God I got a good cousin Sharon that help me. And I'm making copies of it to pass out to the family. They have a right to know who they are. I enjoy getting away from myself. I do a lot of traveling, as I said. I woke up after doing community work for a Hawaiian Civic Club. I was President, four years. President of the Wai'anae District Council. I was responsible for getting the book out, *Historic Wai'anae*. In fact, he's coming. He's a rich *haole*. He's a rich *haole*. But he said, "Jay, you gave me, you opened up my way of life. If it wasn't for you I wouldn't be what I am today. He's a millionaire! He said, "Jay, I'm gonna be coming in." And as I understand, he approached the Hawaiian Civic Club. He wants to open up a scholarship in my name. He called me up one night to say, "Hey, Jay, who's the president of the Hawaiian Civic Club?" Next thing I know, he called her up to say that he wanted to open up a scholarship with the Hawaiian Civic Club in my name. He'll foot the bill. You know, when you do good, it always bounces back. Sometimes you get kicked in the *'ōkole*, so what. Anything more you want to know about my life?

CSH: So you came here when you were 12? To Wai'anae?

JL: Yes.

CSH: What was it like when you first came here?

JL: Mākua was a beautiful village, beautiful. I know the old song of Wai'anae. I think I should sing it to you. The name of the song is *Lei Lihu'e*. It's not Lihu'e, Kaua'i. It's Wai'anae. You know where the tennis courts is, in back of the Wai'anae Park, the baseball field?

CSH: Yeah.

JL: That whole area is Lihu'e. And the bay is not Pōka'i. Pōka'i is a coconut grove. The bay is Malaea. And it has the same tune to that of *E Hawai'i*. Same tune. And people say that they stole *E Hawai'i* from us, but the people don't even know that's ours. And it goes this way: [Singing]

Lei Līhuʻe kupukupukupu
Me ka nēnē
Lei nēnē o i ke ala o ka līpoa.

(The bay)
Lei o Malaea i ka nalu
A o e ke ala
(now the coconut grove)
Lei hoʻi ʻoe i ka ulu niu Pōkaʻī
Lei Mākua i ke one ʻōpiopio
Lei kohi aʻe i ka maile . . .

And I could go on six and seven [verses]. But these are old songs that were carried down. And we had Auntie Rachel. The family's also intact. All our families intermarried. But I learned a lot from these people and this is why I got this over here [points to his book of family history] I've been very active. Only now I am getting old and the *poʻo's* not there [memory fails] [and] you kinda forget. So my doctor friend at the clinic tells me, "Jay, you're gonna forget a lot." Keep your mind preoccupied. Read, read, read. I got a big library. I do a lot of reading. And I cherish my Hawaiian. I got a lot citations up there on the wall — from George Ariyoshi, three from John Burns, five years with Dr. Shintani up on the hill there, the Hawaiian cancer research come in. Yeah, we did research for five years. In fact, I got a video of it. And other things like that. All my life is getting away from myself and think of others. There will come the day when this is all coming to an end. A new generation is coming into the field now. You pull out, let them take over for the next 30 years. Then I said, "What the hell I'm gonna do? I know what I'm gonna do. I'm gonna travel." I'm a member of the Lions Club. And I went with the Catholic Church with Father Eli Carter, we went to Israel. Ended up in Rome. Twice I've been in Rome.

CSH: Oh, wow.

JL: But most of my three trips I've made were to the Orient. Lions convention in Tokyo, Hong Kong, and Seoul, Korea. And two years from now, the convention is going to be in Osaka. I will be there. I will be in Hong Kong, Shanzhen, and go on to Shanghai and Beijing.

CSH: Wow, you are a world traveler.

JL: I like to travel.

CSH: Now when you first moved to Waiʻanae, what part of Waiʻanae did you live in?

JL: Right in back of the police station was the court house. Right down there, in that area. My uncle worked for the plantation. He was a machinist. But I never forget the day, the first of April, April Fools' Day, six o'clock in the morning, the mill

JL: That's the Waiʻanae District, Nānākuli. Oh, I got everything in here. These are all *heiau* and everything. Lot of *heiau*. You see, I keep all these things. I accumulate it, because you never can tell when you gonna use it. I told Glen, "If anything happens to me, Glen this is all yours." [Searching through documents]

CSH: It might be in the Lualualei section.

JL: No, Nānākuli. Even tells you what the word "Nānākuli" means, yeah. You know what it means, eh? What does it mean?

CSH: Well, according to that it means "look deaf" or "look at the knee".

JL: "*Ku*" means "stand", "*nānā*" means "to look", and "*kuli*" means "deaf" and "your knees". I got no water, I put my head down. That's what it is. Nānākuli, "Look at your knees". No more water. Ulehawa. That's by the bridge where Joe Dwight is. That's by the big stream, by the big concrete bridge. That's Ulehawa. Joe Dwight lived right next to it. Now why did you get the name? That was the biggest main water coming out of all the mountains drained into there. That's one of the reasons. The deep valley, all that water had to come somewhere. So, it came down from here and going right into Ulehawa.

CSH: The drainage?

JL: The drain. That was the biggest river out of here. The other biggest one is in Waiʻanae at Pōkaʻī. Then you have another big one at Waiʻanae. I gave you the word. Lot of *heiau* on there. [Searching through documents] No, I don't have it. The only thing I have is places, name places. But we know one thing. Ulehawa is where all the water drained. All the water from the Lualualei Naval Ammunition Depot had to go somewhere.

CSH: Well, it's also the beach, right? The beach line?

JL: Well, the beach side, no. The beach side is Nānākuli Valley. Nānākuli Valley and Ulehawa Stream are two different streams.

CSH: Oh, no. I'm not talking about the streams, I'm talking about Ulehawa Beach.

JL: Oh, Ulehawa Beach is down that end, that's right. But you got to remember when you go back to Nānākuli, there was no water, there was no life. Only when they ran the waterline in and they opened up the Hawaiian Homes, then Nānākuli grew. Nānākuli grew. Prior to that, no. Nānākuli was a small little arid place. But look at how it has grown. I don't know if I can help you, but there's very little about Nānākuli.

CSH: Getting back to the tidal wave, did the beach front at Ulehawa change in any way after the tidal wave?

JL: No, it didn't. No, it did not! Not any place did it change [emphasized]. It went back because, even if it did change, you know at the beginning, year after year after year, the sands come back. Only one crazy place named 'Ōhikilolo. That's "crazy crabs". And the reason why they say that, during the Wintery months, because of the make up of the sandy beach, you go in the evening and you come back the next morning and you see all the crabs crossing the road going back to the ocean. That's how the name, when you pass Mākua coming back this way, 'Ōhikilolo, "the crazy crabs". The crabs really came out of the ocean to cross the road!

CSH: I've never heard that before.

JL: That's how the name 'Ōhikilolo came, "crazy crabs". And I seen it for myself when we were kids.

CSH: Okay, so the beachfront at Ulehawa didn't change?

JL: No, nothing changed. Because you know why it didn't change? Because the sands came back, the water would rush down and the sands came back. And it's the same beach.

CSH: What about during the war? There's Army bunkers down there on the beach.

JL: All the way around.

CSH: Were you here during the war?

JL: No, I was in town. I was staying with the Kahoanos.

CSH: But you would come home to visit on weekends?

JL: Oh, I had to come home. I would come back on the bus every day. Ho'ohuli of Nānākuli — they still have that old gas pump at Nānākuli in the homestead. And Ho'ohuli had a big bus. He had busses over there taking people back and forth from Kaka'ako Police Station to Wai'anae. Go in the morning and come back in the evening. He had two busses. That's how we came, not the train.

CSH: So you would go to work everyday and then come home every night?

JL: Well, I sleep with the Kahoanos during the War. I stayed with them.

CSH: Oh, and on the weekend you'd come home?

JL: Yeah, I'd just come home and see how they are.

CSH: Yeah. So, would you know anything about how the bunkers were used during the war?

JL: The what?

CSH: The Army bunkers on the beach.

JL: Well, some places they kept people out of the beach because they're training.

CSH: Do you remember which places?

JL: Oh, yeah. Mākaha and Wai'anae mostly. They had these — where the Kamaile School is, when you pass Nānākuli to Mākaha — there was a camp over there that had about 20,000 soldiers over there. They would go down and practice landing war. During World War II, if they had the bigger LST's [?], they were in Wai'anae and Mākaha Beach. They would practice war landing.

CSH: What about Ulehawa side? There's a couple of bunkers over there.

JL: No, they never did touch Nānākuli.

CSH: They never practiced there?

JL: No, just Wai'anae.

CSH: But there's some bunkers there on the beach.

JL: Oh yeah. Definitely. They had to patrol the whole area, that's why. That's all.

CSH: Was there a curfew? I'm assuming there was curfew.

JL: Oh yeah. Eight o'clock, when you hear "Beep, beep, beep, beeeeeeep." Get home, and then the air raid warden would come around checking up on you. No more lights. They had to shield everything. It was rough.

CSH: So, to your knowledge, the Ulehawa part of the beach was never used for military maneuvers?

JL: No.

CSH: So, did people still go swimming there during the war?

JL: Not that I know of.

CSH: People stayed away from the beach?

JL: People stayed away, because they were gunning. And in some places they put a lot of barbed wire. You know the rolled barbed wire. Oh, yes. That's right.

CSH: Did Ulehawa have that?

JL: That I can't say. Not that I know of. The reason why I say that, because most of the time, during the war years, I lived in Kalihi. I worked for the Navy contractors. Wai'anae and Nānākuli were small. In 1946 the census of Wai'anae was, totally, a little over 4,000. Today its up to 40,000.

CSH: Do you know anything else about Ulehawa? The stream, the drainage or the beachfront?

JL: A very good friend of mine, Mr. Joseph Dwight Sr. who was the President of the Territorial Agriculture and Forestry Board, he was a big *ta-ta*. Well, he — and I like to tell you stories — in 1922, Prince Kūhiō, a delegate to Congress, came to Hawai'i and he called the Hawaiian leaders together. And he told them that President Grover Cleveland is going to sign the Homestead Act, and that means that the President will have to appoint a Governor, and the Governor will appoint a commission and "be careful". So what they did, they organized the Honolulu Hawaiian Civic Club. William Hee was the first President. Lang Akana was the first Vice President. And old man Dwight, Joe Dwight, was the second Vice President. He stayed on — I don't know what kind of a ruckus he got into — but he was a *po'o pa'akikī* [hard-headed, stubborn] guy.But this man was a brilliant man. I'd like to tell you stories about him 'cause it's true. He talked about that his grandfather came around the Cape and the Panama Canal was still being built. So, they came around the Cape to bring the missionaries here. They came down with their wives. He's the only one that didn't have a wife. So, they all scattered around. They gave him Moloka'i to spread the word of God. Two years later, he got kicked out of the church. And why? Because he married a Hawaiian [laughs]. Kicked him out of church! What a bunch of hypocrites! But, Joe tells me, in fact, Joe Dwight himself, through his effort, created the Association of Hawaiian Civic Clubs. We had a council of Hawaiian Civic Clubs. And we went into this meeting. Supposed to meet at 9:30. We had a quorum by 9:00. He says, "Lets go into this convention, give me the right to say that we approve it right now, we can call the meeting to order, that we're going to create the Association of Hawaiian Civic Clubs, and give me one year to put everything in motion and we'll get committees set up for it. We went along with him. So when they called the meeting at Princess Ka'iulani, that was our first meeting of the convention of the Association of Hawaiian Civic Clubs. I have learned a lot from this old man. Practical experience. That was my second home.

CSH: Did he tell you anything about Ulehawa?

JL: He lived right next to it. No. Because it was just a big stream that came up all the way from [miss a few words] all the water from over here from the ranger station, on that end of it, by the mountain side, they had their own stream going down there to Mā'ili'ili. But this end, all the water went down from here, up in the valley here, down to Ulehawa. That's what it is. But hardly any people lived around there, outside of Dwight. Today, what? Can you imagine, as I said and I'd like to repeat,

JL: No. But there were, I know. The only thing that I can tell you is what is in here. I know what the meaning of Lualualei means because it's in here [Referring to *Sites of O'ahu*]. Now, lets think about Mākua. [Starts singing: *lei Mākua i ke one pi'o piopio, lei Ko'iahi.*] Ko'iahi. Here's Ka'ena point. Here's Mākua. And up on the hillside, you see everything green up there. And that's because the way the mountain is, this and this, the clouds would come right into Ko'iahi and bring the dew and water there. That's why the song is *Lei Ko'iahi i ka Maile Lau Li'i*. This is where all the *maile* was. That was the only part of Mākua that was green. During the wintery months, it was green like hell. Everything was green, but, basically, as a whole, Ko'iahi had the mist coming in over the gap in the mountains coming in to Ko'iahi. Mākaha *mauka* had [water], but most of the water was really in Wai'anae. And there's a pocket up here where the Navy is — that used to be all taro patch land.

There was maybe about two or three hundred people living in all Nānākuli. All in the lower area.

CSH: Down by the beach?

JL: Yeah, down by the beach. And as you come in there's the Elis. And old man Simeona Eli and them. They were one of the few first.

CSH: But he passed away?

JL: Oh, yes. His son is Danny, and Danny's not is good shape. One thing I like about Danny, he was the first Hawaiian that went off to University. He turned out to be a surveyor. And he's a member of our Lualualei Lions Club, but he's not in good health. All of us, we're all getting old now. We're *'elemākule, paha* [old men].

CSH: So, you don't really know anything about the area *mauka* of Nānākuli High School.

JL: No. As I said, the only thing over there, there was no people 'cause there was no water. It was dry. Now, people used to go up there hunting, bring their dogs and go *mauka* side, way *mauka* here. It's wet up there. They go for wild pigs.

CSH: I noticed that Palikea is really green right now.

JL: That's right. So, you see, where you see water even 'til today, that means its always been there. But outside of that area, no. As I said, the development of Nānākuli, like any other thing, began here and then it worked its way up. Until today, Nānākuli looks so big. I was up there the other day driving around. Oh, my God, I got practically lost.

CSH: All those houses are new to you?

JL: Well, let me put it to you this way. We have about over 40,000 people living in the Wai'anae District. In 1946 there was only about 4,000 people that lived in this whole area. It has grown tremendously. And the Hawaiian Homes is gonna continue to grow big, because why? They got the land. It's happening right in front of our house. Look at Waiʻanae *mauka*, all Hawaiian Homes. And right below the Hawaiian Homes is an area, right down by the side of the Mountain, is an area known as Anā. This was all taro patch lands.

CSH: What area is that?

JL: Upper Waiʻanae valley, when you go up Hawaiian Homes on this side, right near the mountain. You can see all the Hawaiian Homes coming down. At the bottom of it was Anā. And they had a big trestle going into the tunnel. I get angry sometimes. The reason why I say that, they dammed *mauka* to divert the water and all the Hawaiians, including my grandmother, Nāʻuhane and them, everything dried up. That's what the white man did. And you know where they diverted the water to? The biggest coconut grove on this island was here at Pōkaʻī — *ulu niu o Pōkaʻī*, the coconut grove of Pōkaʻī. From the mountain all the way up was a huge coconut grove and it was because all that water coming out of Kūmaipō came down alongside of the mountain and came this way. When they dammed up the thing, half of the coconut grove was wiped out. The plantation planted cane.

CSH: What year was that, about?

JL: About 1946. They took everything away. No, that was before, lets say about 1920's. They did away with all the coconut trees and they planted sugarcane. In 1946 the Capital Investment Company came in and they demolished all the rest of the coconut grove. That's why they talk about Pōkaʻī, *ulu niu o Pōkaʻī*, the coconut grove of Pōkaʻī, all the way down to the ocean. But we did some crazy things. Look at that breakwater. If I knew that, I was one of the biggest supporters of it. I was President of the District Council. We went for it. Just because our good friends were all Japanese sampans. We went along with it. We made a big mistake. We should have put it way down on the other end. There were two sites. But, because of the canoes and the sampans — take care of them. You know what we did, we wiped out a beautiful area by Kāneʻilio Point. During wintery months, all the sand would shift and go all the way down on the Army rest camp side [Waiʻanae Army Recreation Center]. Then, when just about spring comes, the current changes and all of a sudden the sand was coming back. I take that back. The sand was there, but during the summer months, all the sand would shift and go back to the Army beach side. And when it did, they had waves down by Kāneʻilio Point, waves about two or three feet. We used to go surfing with the canoes. We go borrow the canoes, and one day my cousin, Albert Silva was coming down. Catch a good wave, about three feet. Gee, we saw this big stone, big coral stone — cracked the canoe! We got up and ran away. *Kolohe!* I had a good life. Never to hurt people.

CSH: Can you think of any other songs or chants that mention Ulehawa or Nānākuli.

JL: Very few. Nānākuli, as I said, came after, I would say in the [19]30's when the

Hawaiian Homes opened up that property. That was the beginning. Before that was all ranch land. They put *pipi* [cattle] in there. Lou Warner. He had *pipi* up there.

CSH: He had a lease?

JL: He had the lease from the Territory of Hawaiʻi. And McCandless did the same thing — a lot of lease lands. All Mākua, Keawaʻula, ʻŌhikilolo was his. But, all the rest and Kokolā [?] on top was all Territory of Hawaiʻi. Waiʻanae was a big ranching area. I used to like to tell crazy things. Just during the war, before the war, they used to come up and radio station, and certain times of the day they would — because it was dry up there — they had to shift cattle . So in Waiʻanae, we lived right in back of the police station. And, maybe twice in three months, about nine o'clock in the night, you'd hear the cattle with the bells over there on their neck. They'd ring 'em. And they go through the town of Waiʻanae. All the cows and all the cowboys in back going right through the town of Waiʻanae. "Boom, boom, boom!" You could hear their hoofs and the cowboys whack with the whips, going all the way down to Mākua. Waiʻanae was really a cowboy town, really.

CSH: So, it was mostly ranching and sugar.

JL: Yes. Later on sugar, yes. That's right.

CSH: Sugar came in . . . ?

JL: Oh, way back in the 1890's they started out. Oh, I tell you, it was so beautiful, but I saw so much suffering . Under the plantation caste system, the white man was God. I remember that. I hated that system. You had to be an Anglo-Saxon. And, I'd like to tell you, I'm glad you have that on [referring to tape recorder]. This particular day, right down Mākaha, at the end, by the surfing beach, that was Field 28. They had a lot of sugar over there. And the field boss was a part-Hawaiian by the name of Jack Meyer. Kauki was German-Hawaiian. He was the boss of everything over there. I was just a young kid. By the road, the railroad track, and then the cane field. If it got on this side, falling down from the cane cars, we would have to throw 'em on the other side. And once a week they'd go over to cut through (they put that gate in) and take 'em down to the mill.

CSH: Now, you mentioned that you were cousins with Sonny Poe?

JL: All the Poes in Waiʻanae, we're all related to one another. And who [do] we come from?

JL: Kiwalaʻō. We can trace our line. I tell people about it. We did it! And I don't take credit for it. We [emphasized] did it. We get the data. The wives of Kalaniʻōpuʻu. Oh, my god! *Kū ka paila!* Then it gives you the break down of all the *aliʻi* in this one here. And then Kahaopoe, she died in 1899. I know where her grave is. In fact, the other day, I was visiting it when one of us died. And, this one was the friends and

JL: Yeah.

CSH: Now, did you work for the plantation a little bit when you were young?

JL: Yes, I did. Seventy-five cents a day. Wai`anae Sugar Company.

CSH: What kind of work?

JL: Oh, cut grass, clean after a big storm — all the rivers are blocked up. I had to go in there and cut grass. Seventy-five cents, a dollar a day contract. It was a lousy lot. I hated the system!

CSH: How long did you work there?

JL: Oh, about three or four years. Then I moved to town. I went to school in town. I stayed with the Kahoanos.

CSH: How old were you when you worked for the sugar company?

JL: Oh, we were kids. We were students. They called it the Smith-Hughes Act. So once a week we'd go out into the cane fields and work for them. But afterward, I never did work for them. But, I really felt sorry for the Filipinos. The white man was God. He lived on Lihu`e Street in Wai`anae. All the beautiful homes and everything. They had the *Pākē* [Chinese] Camp going out the Army street. There was a *Pākē* Camp. Where the Wai`anae Elementary School is, facing that way was the *mauka* camp. But, mostly Japanese. I'd like to tell you a story and I'm gonna tell it. It goes this way. I'm going to tell you because it's in the book *Historic Wai`anae* anyway. This particular day, the Japanese had their *furo* [Japanese bath] up there. Men one side, women one side. This particular day, Blackie and I drilled a hole for the plug. We stayed out until like six o'clock in the afternoon. All the *wāhine* [women] start walking through, all common bath, all the *wāhine* together. We pull the plug, look, laughing away. The *wāhine* start screaming like hell. We ran away. The next day, the Camp Police, Mike Moss, he weighed about 300 pounds, came looking for us. "Mrs. Silva, where's that nephew?" "Oh, he's here. Why?" "Mamma, I nevah do nothing!" "Come on Mrs. Silva, we just wanna talk to him. Oh, its all right. We just wanna talk to him." "Okay, you're sure?" "Yeah, sure." As soon as he got me in the car, he said, "You damn dirty *keiki makua `ole* [orphan], you!" We go down there in front of the plantation manager's house and Fricke comes out — that jerk with his glasses and his elephant hat. "Come inside here! Where were you at six o'clock in the afternoon?" "I was down da beach." "No, no, no. You was not down da beach. You were up at the *mauka* camp. You were a peeping tom!" "Not me!" "Yes, you got blue eyes, you the only one who got caught!" [Laughs.] I told them to put that in the book [*Historic Wai`anae*].

CSH: And they didn't?

JL: They didn't! Eh, angels are in heaven! You're on earth, you're a sinner! I'm nuts, huh! [Laughs.]

CSH: That's a cute story.

JL: I made sure it was in the book *Historic Wai`anae*. By the way, that book, *Historic Wai`anae*, the author of it is coming down to see me. He's a very rich man today. And he tells me, "You know Jay, you gave my start in life. You don't realize, when you got that money of $30,000 for that book and you guided me, what people, to write the book *Historic Wai`anae*, you don't know that you changed my life completely." He got married to a Japanese school teacher at Baldwin High and they moved to the mainland. Today, he is very wealthy. He came up with, they call it *South Pacific Prints* in Los Angeles. It's a big company. He's very wealthy. And you know what he says, "Jay , you gave me a start in life when you got the money for the book of $30,000." And, who helped me? It was Danny Akaka. Yeah. All these guys were a part of my life. Danny was involved because of the Progressive Neighborhood Program. State Act 299. And I was appointed by the Governor to sit on this Board for nine years. Every month, I made up a meeting. Not too long ago, I was at the Community Center and I met this Akaka. Two of 'em are doctors — two cousins. So, when I went one day, recently, and it came out this way. "You're Akaka. Is Kahu your uncle or Dan?" "Oh, Dan is my father." "Good. Gee, I hope to see him. When is he coming back?" "Oh, he's coming back next week, this week coming." "Do me a favor. You know what you do? When you see Dad, tell him, 'Hey, I saw Jay'". He was a part of my life, for nine years we served on the Progressive Neighborhood Programs, State Act 299. Every month I went in for a meeting. And George Ariyoshi was Governor. I got citations on the wall I'd like you to see from two governors. I received the Lions International award, Say No to Drugs. I did everything under the sun to get away from myself to think about this. I'm Catholic, but I'm very open on religion. On day we had Monsignor Vierra and Father Caravalle who later on became a Monsignor. He said, "You know, Jay, you would make a good priest." Father Caravalle said, "Oh no. God wanted him to take care of his Auntie." He's right. Everybody got married, they all went out. They all wanted to take her. "No, Mamma, stay with us." "No, I'm gonna stay with Jay." There's a reason for it — the yard and her friends. They all grew up with her. Auntie Rachel Kaliwahea, all the old bunch, they all were members. They were the founders of the Hawaiian Civic Club. They were all close together. And at the end, I took my aunt all over the place. I went 28 days in the Orient, she went with me. She was about 85 years old, we took her! And I took movies of it. That's my hobby, to take movies. But I've lived a full life. Not to hurt anybody, but have fun, make people laugh. I like to sing Hawaiian songs.

CSH: Do you have any old photographs of Ulehawa to Nānākuli side?

JL: No, all the pictures I had were taken away. I don't know from who. I don't wanna accuse anybody.

CSH: Too bad.

JL: Just one of those things. But as I said, I had a good life. So, I gotta remember your name, 'cause I'm gonna see Glen shortly.

CSH: I'll give you my card.

JL: Please. Yeah, I gotta see Glen.

CSH: Are you going to Hilo?

JL: Oh, yeah. Everytime I go I stay up his place. He got a beautiful home about seven miles from Hilo. Two-story home with four bedrooms. Oh, we all pile in over there, when his sister and brother — I love Kalena Silva. He was very close to his Grandma. Very, very close. In fact, she gave him his start. Every Saturday, every Friday, take him back, Monday come home. Back and forth that way during the school times. And, by the time he was over six years old, he was already speaking Hawaiian. Took him to a convention, Maui Convention and they had the big Hawaiian play and everything. Half-time at the Baldwin Auditorium, [it was] hot, they had a fifteen-minute break, we went outside. All the old people got together. Then, when Glen started to open up, they couldn't believe it. Look at this young kid, going for broke.

CSH: That's pretty loud. You hear that all the time [referring to helicopters flying overhead]?

JL: Oh yeah. But I don't think for long. I firmly believe that sooner or later this whole area's gonna be declared surplus by the Navy. I can see it coming, just like at Mākua. And, I think I know who's gonna get the property back. The McCandless heirs. That was their property. They were forced out through condemnation. Well, anyway that's them. But, they been good to me. They <u>really</u> [emphasized] been good to me.

CSH: Do you know anything about Mākua Valley or any sites there?

JL: Mākua Valley, *mauka side*, as I said, where there's water, there's life. Lower Mākua, the only good thing or good about it was it was a good ranch land. Limitation was water. Where there's water, there's life. No water, no life. So cattle was in there. Cattle. Just like Nānākuli. No water. Ranching in there. Out there was McCandless. Lualualei was McCandless. Mākua was McCandless.

CSH: Do you know anything about Lyman Ranch? I asked Lehua Kapaku if she knew if they were related to the missionary Lymans, and she didn't know.

JL: Oh, they would know. As I said, I went into this very deep. We can go all the way back to our *Tūtū* Palea. Palea is a royal name. I tell you, I have it here. I'll give you a copy of it. I keep my things all over the place. You can keep that. That's the history of us. Kalani‘ōpu‘u, Kaleiopu‘u. Kalani‘ōpu‘u, Kaleiopu‘u, when his wife, Kalola, was six month *hāpai*, she called the baby Kalei‘ōpu‘u. But, they changed it to Kalani‘ōpu‘u and that was done by the King himself. But, we have a good concept of what the family is about. And *Tūtū* Kanani, as I said, was able to trace our family through the Hawaiian chant. It took Glen to transpose it from Hawaiian into English.

CSH: That's really awesome.

JL: I've been blessed so much. I had children come over here, that's why I bought the mat, the mats over here, television. The kids get kicked out of the house and come over here, 'cause I'm the landlord, more or less. I don't do no collecting rents, but the kids come. I encourage them they come.

CSH: Well, I want to thank you for participating in our study.

JL: Good.

[End of Interview.]

Appendix F

Phase I Environmental Site Assessment

PHASE I
ENVIRONMENTAL SITE ASSESSMENT

AND

LIMITED PHASE II
ENVIRONMENTAL SITE ASSESSMENT

PROPOSED NANAKULI IV ELEMENTARY SCHOOL
TMK 8-9-02: PARCELS 23, 65, AND
PORTION OF PARCEL 1
NANAKULI, OAHU, HAWAII

October 2000

MASA FUJIOKA & ASSOCIATES
Job Number 99096-021

M F A MASA FUJIOKA & ASSOCIATES
A PROFESSIONAL PARTNERSHIP
ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS
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October 4, 2000
MFA Job Number 99096-021

Wilson Okamoto & Associates, Inc.
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Fax # 946-2253

Attention: Mr. Earl Matsukawa

Subject: **Phase I Environmental Site Assessment and Limited Phase II Environmental Site Assessment**
Proposed Nanakuli IV Elementary School
Portion of TMK 8-9-02: Parcels 23, 65, and a Portion of Parcel 1
Nanakuli, Oahu, Hawaii

Dear Mr. Matsukawa:

Masa Fujioka & Associates (MFA) has performed a Phase I Environmental Site Assessment (ESA) and limited Phase II soil sampling of the subject site. The purpose of this investigation was to evaluate the presence or likely presence of materials, considered hazardous to human health and the environment, that may affect the property.

Our Phase I ESA was conducted in accordance with the scope of work contained in our proposal, dated June 10, 1999 and approved on December 1, 1999. An addendum approved on August 3, 2000 increased the area addressed by our investigation. A Phase I ESA comprises a number of individual elements whose basic nature and extent are determined in accordance with the standard of care applicable to Phase I ESAs. The standard of care is commonly defined as the care applied by the ordinary practitioner at the time and in the area where the ESA was performed. We believe that we have complied with the applicable standard of care within the limits of our scope of service described in our proposal and repeated below.

The accompanying report is an instrument of service of MFA. The report summarizes our findings and relates our opinions with respect to the site history and potential sources of contamination at the site. Note that our findings and opinions are based on information that we obtained on given dates, through records review, site review, and related activities. It is possible that other information exists or subsequently has become known, just as it is possible for conditions we observed to have changed after our observation. For these and associated reasons, MFA and many of its peers routinely advise clients for ESA services that it would be a mistake to place unmerited faith in findings and opinions conveyed via ESA reports. MFA cannot under any circumstances warrant or guarantee that not finding indicators of hazardous materials means that hazardous materials do not exist.

It has been a pleasure performing this assessment for you. Please contact us at 484-5366 if you have questions regarding this report.

Respectfully submitted,

MASA FUJIOKA & ASSOCIATES
A Professional Partnership

Janice C. Marsters

Janice C. Marsters, Ph.D.
Principal

Two (2) copies submitted

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PROPOSED NANAKULI IV ELEMENTARY SCHOOL
PORTION OF TMK 8-9-02: PARCELS 23, 65, AND PORTION OF PARCEL 1
NANAKULI, OAHU, HAWAII

1.0 INTRODUCTION

1.1 OVERVIEW

This report presents the results of Masa Fujioka & Associates' (MFA's) Phase I Environmental Site Assessment (ESA) and follow-up soil sampling for the subject site. The general location of the site is shown on Figure 1 (Map of Area).

Our work was performed as summarized in our proposal, approved on December 1, 1999, and the addendum, approved on August 3, 2000, which constitutes the contractual agreement between MFA and Wilson Okamoto & Associates, Inc. for the services provided. Our Phase I investigation was performed in accordance with the American Society for Testing and Materials (ASTM) "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process" (ASTM Designation E1527).

1.2 PURPOSE AND SCOPE OF WORK

MFA conducted the ESA to evaluate whether materials considered to be hazardous to human health and the environment, present at the project site or in the surrounding area, may affect the subject project. We conducted the environmental assessment using available information sources with the potential to identify past or on-going problems at the project site. We performed the following tasks in our ESA:

- **Review of site history.** MFA examined readily available documents, consisting of topographic maps, insurance maps, site maps, and aerial photographs.
- **Review of regulatory records.** We examined government records regarding environmental conditions, citations, complaints, and permits at the site and at neighboring properties. We reviewed records from or contacted the following agencies: U. S. Environmental Protection Agency (EPA), State of Hawaii Department of Health (DOH) Hazardous Waste Program, DOH Underground Storage Tank (UST) Program, DOH Underground Injection Control Program, and DOH Hazard Evaluation and Emergency Response (HEER) Program.
- **Review of site geology and hydrogeology.** We reviewed readily available published information on surface and subsurface conditions at the site and surrounding area. We used this information to assess topography, drainage, surface water bodies, anticipated subsurface geology, and groundwater occurrence and usage in the area.

- **Site reconnaissance.** We performed a site reconnaissance of the property to note visual signs of contamination and conduct a brief assessment of neighboring properties. We performed an additional site visit to note visual signs of contamination on the additional area noted in the addendum approved on August 3, 2000. During our two site visits we specifically looked for stained soil, dead or stressed vegetation, hazardous materials, electrical transformers and capacitors, above ground and underground storage tanks, disposal areas, maintenance areas, groundwater wells, sumps, storm drains, and cesspools/sewers.
- **Data evaluation and report preparation.** We evaluated the information collected and prepared this report documenting our assessment and providing our conclusions.

We also conducted follow-up sampling in select areas of the site. Our scope of work consisted of the following:

- **Coordination and Meetings with DOH.** MFA consulted with DOH toxicologists and attended a site meeting with DOH personnel to discuss the planned sampling.
- **Obtain samples.** We obtained nine samples and one background sample. Standard environmental sampling techniques, including appropriate decontamination procedures, were followed. Samples were submitted to Environmental Laboratory of the Pacific (ELP) for analysis.
- **Laboratory Testing & QA/QC Review.** The nine samples were analyzed for fuel scan (EPA Method SW8015M), PCBs/pesticides (EPA Method 8080A), eight total metals (EPA Method SW6010A) and semivolatile organics, including PCP (EPA Method SW8270A). The background sample was analyzed for total metals. MFA reviewed the laboratory data for compliance with QA/QC standards, and followed up with the laboratory as required.
- **Data Evaluation.** We analyzed the data and included it within this report.

1.3 SPECIAL TERMS AND CONDITIONS

Wilson Okamoto & Associates, Inc. contracted MFA to perform this Phase I ESA. The ESA was conducted and this report was prepared for the sole use of Wilson Okamoto & Associates, Inc. and the State of Hawaii, Department of Accounting and General Services (DAGS). This report shall not be relied upon by or transferred to any other party without express written authorization from MFA.

1.4 LIMITATIONS AND EXCEPTIONS OF ASSESSMENT

Phase I ESAs, by their very nature, are limited. MFA has endeavored to meet what it believes is the applicable standard of care and, in so doing, is obliged to advise Wilson

Okamoto & Associates, Inc. of Phase I ESA limitations. This ESA did not include any investigation with respect to site geotechnical concerns, and did not include any investigation with respect to asbestos, lead paint, radon, or methane. Limited subsurface sampling was performed, as described in later sections. In addition, the ESA addresses only the portion of TMK 8-9-02: Parcels 23, 65, and a portion of Parcel 1 identified in the figures attached to this report.

MFA has made one exception to the Phase I ESA procedures specified by ASTM E1527. Because the State of Hawaii does not compile a list of hazardous waste sites identified for investigation or remediation (State NPL or CERCLIS equivalents), we are unable to include such a list in our records review. We reviewed the DOH HEER Sites of Interest Database instead (see section 3.1.4)

1.5 LIMITING CONDITIONS

The conclusions presented in this report are professional opinions based solely upon visual observations of the site and vicinity, and our interpretation of the available historical and regulatory information and documents reviewed. They are intended exclusively for the purpose outlined herein and apply only to the site location and project indicated. This report is intended for the sole use of Wilson Okamoto & Associates, Inc. and DAGS. The scope of services performed in execution of this investigation may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of said user.

Opinions and recommendations presented herein apply to site conditions existing at the time of our investigation and those reasonably foreseeable; they cannot necessarily apply to site changes of which this office is not aware and has not had the opportunity to evaluate.

2.0 SITE DESCRIPTION

2.1 LOCATION AND LEGAL DESCRIPTION

The subject site is located along Farrington Highway, between Haleakala Avenue and Nanakuli Avenue in Nanakuli (Figure 1 - Site Map).

According to maps supplied by Wilson Okamoto & Associates, Inc., the proposed Nanakuli IV Elementary School will be constructed in parcels 23, 65, and a portion of parcel 1 of TMK 8-9-02 (Figure 2 - TMK Map). This assessment addressed the area of the property indicated by maps provided to us to be the proposed site of the Nanakuli IV Elementary School.

2.2 SITE AND VICINITY CHARACTERISTICS

The subject site is a vacant lot. The majority of the site is densely vegetated with grasses, haole koa, and keawe. The surrounding area is a residential development.

2.3 DESCRIPTIONS OF STRUCTURES AND OTHER IMPROVEMENTS ON THE SITE

The proposed Nanakuli IV Elementary School will be located on a portion of Parcels 23, 65, and a portion of parcel 1 of TMK 8-9-02 (Figure 2). The subject site is currently a vacant lot.

Some of the foundations from the former U. S. Army Camp Andrews (the Base Company Quarters, the Cooks Quarters, the two latrines, and a cabin) are present at the subject site (Figure 3). An additional concrete foundation is present near Farrington Highway (see Figure 3). It is unknown what this foundation was originally used for or when it was built. Small shelters, presumably homeless encampments, were also observed at the subject site.

According to a map obtained from the U. S. Navy, Pacific Division, Real Estate Office, the former Camp Andrews had underground water and sewer pipelines (Figure 4). MFA was unable to determine if these pipelines are still present at the subject site. However, shower floor drains and toilet sewer pipes were still present in the two latrines.

A sink hole was noted at the site (Figure 3). The area surrounding the sink hole has been roped off and flagged.

2.4 ENVIRONMENTAL LIENS OR SPECIALIZED KNOWLEDGE OR EXPERIENCE

No records of environmental liens were found.

2.5 CURRENT USES OF THE PROPERTY

The property is currently a vacant lot. We observed no use of the property except for dumping of waste and potential homeless shelters.

2.6 PAST USES OF THE PROPERTY

Prior to the construction of Camp Andrews, the property was used as agricultural land. Camp Andrews was constructed prior to 1942 and, according to Mr. Ron Darlington of the U. S. Navy Pacific Division Real Estate Office (U. S. Navy, 1999), the property was used as Camp Andrews by the U. S. Army until 1952. Camp Andrews consisted of cabins, cook houses, a canteen, septic systems, a barber shop, an armory, etc. (Figure 4). The U. S. Navy acquired the property from the U. S. Army in 1952. All structures on the property were demolished by the U. S. Army prior to transfer to the U. S. Navy. The U. S. Navy had planned to use the property for Navy housing. The property was transferred to the State of Hawaii on December 18, 1962 as part of the Statehood Act. The property has remained vacant land since 1952.

2.7 CURRENT AND PAST USES OF ADJOINING PROPERTIES

Property immediately surrounding the site has been a residential area since 1953. Prior to 1953, the surrounding area was agricultural land.

3.0 RECORDS REVIEW

3.1 STANDARD ENVIRONMENTAL RECORD SOURCES

3.1.1 Overview

MFA used a regulatory database search service, EcoSearch Environmental Resources, Incorporated (EcoSearch), to review standard federal and state government databases of known or potential sources of hazardous materials or waste. The site assessment report provided to MFA by EcoSearch is attached. ASTM E1527 (ASTM, 1997) specifies a minimum search distance for specific environmental record sources. The search distances for each of the records is shown in Table 1.

3.1.2 U. S. EPA National Priorities List (NPL)

The NPL is a list of properties with the highest priority for cleanup under the EPA Hazard Ranking System (40 CFR Part 300). The list is compiled by the EPA pursuant to CERCLA 42 USC §9605 (a)(8)(B). EcoSearch found no NPL sites listed within one (1) mile of the proposed project site (EcoSearch, 1999).

3.1.3 U. S. EPA RCRA TSD Facilities List

The RCRA list is compiled by the EPA and contains those regulated facilities that have notified EPA as hazardous waste generators, transporters or treatment, storage or disposal facilities under RCRA. TSD facilities are those facilities on which treatment, storage, and/or disposal of hazardous wastes takes place, as defined and regulated by RCRA. EcoSearch found no RCRA TSD facilities listed within one (1) mile of the proposed project site (EcoSearch, 1999).

Table 1. Search Distances for Standard Environmental Record Sources

Standard Environmental Record Sources	Minimum Search Distance (miles)
Federal NPL (National Priorities List) site list	1.0
Federal RCRA (Resource Conservation and Recovery Act) CORRACTS TSD (treatment, storage, and/or disposal) facilities list	1.0
State hazardous waste sites * (NPL or CERCLA (Comprehensive Environmental Response, Compensation and Liability Information System) equivalents)	1.0
Federal RCRA non- CORRACTS TSD facilities list	1.0
Federal CERCLA list	0.5
State landfill and/or solid waste disposal site list	0.5
State LUST (leaking underground storage tank) list	0.5
State registered underground storage tank (UST) list	property and adjoining
Federal ERNS (Emergency Response Notification System) list	property only
Federal RCRA generators list	property and adjoining

* Since there is no State database of NPL or CERCLA equivalents, this database was not included in EcoSearch's report. MFA reviewed the State of Hawaii Department of Health (DOH) Office of Hazard Evaluation and Emergency Response (HEER) "Releases" database, "Sites of Interest" database, and "HEPCRA" database (DOH, 2000) instead.

3.1.4 State of Hawaii DOH Hazardous Waste Sites

The DOH HEER office maintains a Sites of Interest Database, which includes sites that HEER has earmarked for additional investigation, for the period of available record (January 1992 to February 2000). We searched the database (DOH, 2000) for incidents within the same zip code and vicinity of the subject site and found 121 incidents. Of the 121 incidents found, only 26 incidents did not receive a No Further Action (NFA) determination. Of the 26 non-NFA incidents, only 2 incidents were within one (1) mile of the subject site. The two incidents are discussed below:

1) In 1995, construction crews digging around the area of Farrington Highway and Mohihi Street, approximately 5,250 feet from the subject site, for placement of a water pipeline may have come across contaminated soils. The Board of Water Supply is listed as intending to conduct an investigation.

2) In 1998, a subsurface fire was reported at PVT Landfill, Inc. on Lualualei Road, approximately 3,900 feet from the subject site. PVT Landfill, Inc., took action in 1998 and 1999 to control the subsurface fire.

Due to the nature and distance from the site of the above incidents, they are unlikely to affect the subject site.

3.1.5 U.S. EPA CERCLIS List

This list is compiled by EPA and contains sites that EPA has investigated or is currently investigating for potential hazardous substance contamination for possible inclusion on the NPL. EcoSearch found no CERCLIS sites listed within one-half (0.5) mile of the proposed project site.

3.1.6 State of Hawaii Landfill / Solid Waste Disposal Sites

EcoSearch examined DOH Solid and Hazardous Waste Branch's list of permitted landfills in the State of Hawaii for landfills or disposal sites located within one-half (0.5) mile of the proposed project site. None of the permitted landfills on Oahu are within one-half (0.5) mile of the proposed project site (EcoSearch, 1999).

3.1.7 State of Hawaii DOH Leaking UST List

This database is compiled by the State DOH Solid and Hazardous Waste Branch UST Section. EcoSearch searched the database and found one leaking UST located within one-half (0.5) mile of the proposed project site. The Tesoro Gas Express, 87-2070 Farrington Highway, is located approximately 0.49 miles west-northwest of the subject site. Due to its location, this leaking UST is unlikely to affect the subject site.

3.1.8 U.S. EPA RCRA Generators List

The RCRA database is compiled by the EPA and contains those regulated facilities that have notified the EPA as being hazardous waste generators, transporters or treatment, storage or disposal (TSD) facilities under RCRA. TSD facilities were discussed in Section 3.1.3. No RCRA generators are listed adjacent to the subject site (EcoSearch, 1999).

3.1.9 State of Hawaii DOH UST Section Database Listing

This list is compiled by the State DOH Solid and Hazardous Waste Branch UST Section. EcoSearch searched the database and found no USTs located on or adjacent to the proposed project site.

3.1.10 U.S. EPA ERNS List

This list is compiled by the EPA and contains reported CERCLA hazardous substance releases or spills in quantities greater than the reportable quantity, as maintained at the National Response Center. EcoSearch examined this list, and found no reported incidents to have occurred on the proposed project site.

3.1.11 Other Regulatory Databases

A number of other regulatory databases, not specified by ASTM guidance, are included in EcoSearch's report. These databases include PADS (PCB Activity Database), TRI (Toxic Release Inventory), SSTS (Section Seven Tracking System (pesticide producers), DOCKET (Civil Enforcement cases), and TSCA (Toxic Substances Control Act). EcoSearch did not report any incidents or sites on these databases within one mile of the subject site (EcoSearch, 1999).

3.2 PHYSICAL SETTING SOURCES

3.2.1 USGS Topographic Maps

Topographic map coverage of the proposed project vicinity is provided by USGS Ewa, Waianae, and Schofield Barracks quadrangles at a scale of 1:24,000 (USGS, 1983a, 1983b, and 1983c). The proposed project site is located at approximately 21°23'10" north latitude and 158°8'46" west longitude. The proposed project site sits at an elevation of approximately 20 feet above mean sea level.

3.2.2 Current Land Use and Zoning

The site is zoned as a Residential District (R-5) (C&C, 1999). According to the Land Use Ordinance, the intent of the R-5 residential district is to "provide areas for urban residential development" (DLU, 1997). Elementary, intermediate, or high school use within R-5 district requires an approved site plan review (DLU, 1997).

The subject site is located in an area where flood hazards are undetermined, classified as Zone D (FIRM, 1990).

3.2.3 Geologic and Hydrogeologic Setting

MFA reviewed published geologic and hydrogeologic reports and maps to obtain information regarding conditions in the general area of the site.

Geology

The subject site is located on the lower western slopes of Puu Heleakala in Lualualei. Lualualei is a broad amphitheatre-headed valley on the west site of the Waianae Range, the older of two volcanoes which formed the island of Oahu (Stearns and Vaksvik, 1935). Lualualei is in a late stage of valley development. The flat valley floor covers about 14 square miles. Coral reefs and near-shore sediments were deposited on most of the valley floor during historical higher stands of the sea.

Soils

According to the U.S. Soil Conservation Service (Foote et al., 1972), soils in the proposed project area are classified as Coral outcrop (CR) and Mamala stony silty clay loam, 0 to 12 percent slopes (MnC). Coral outcrop consists of coral or cemented calcareous sand on the island of Oahu. The coral reefs formed in shallow ocean water during the time the ocean stand was at a higher level. Small areas of CR are exposed on the ocean shore, on the coastal plains, and at the foot of the uplands. Coral makes up about 80 to 90 percent of this classification. The remaining 10 to 20 percent consists of a thin layer of friable, red soil material in cracks, crevices, and depressions within the CR. This soil material is similar to that of the Mamala series (Foote et al., 1972). Solution cavities may be present in coral deposits. One such cavity was observed as a sinkhole at the site (see Figure 3 for approximate location).

The Mamala series consists of shallow, well-drained soils along the coastal plains on the island of Oahu and Kauai. Mamala stony silty clay loam has a slope ranging from 0 to 12 percent, but in most places the slope does not exceed 6 percent. Stones, mostly coral rock fragments, are common in the surface layer and in the profiles. In a representative profile the surface layer is dark reddish-brown stony silty clay loam about 8 inches thick. The subsoil is dark reddish-brown silty clay loam about 11 inches thick. The soil is underlain by coral limestone and consolidated calcareous sand at depths of 8 to 20 inches. The soil is neutral to mildly alkaline. Permeability is moderate, runoff is very slow to medium, and the erosion hazard is slight to moderate (Foote et al., 1972).

Hydrogeology

Groundwater resources in the area are listed as being in the Nanakuli aquifer system of the Waianae aquifer sector. According to Mink and Lau (1990), two aquifers underlie the area of the subject site. Both aquifers are listed as basal (i.e., fresh water in contact with seawater). Both aquifers are also characterized as replaceable, as highly saline (i.e., 5,000 to 15,000 mg/l Cl^-), as having a potential use, and as neither a drinking water source nor ecologically important. The upper aquifer is listed as an unconfined (i.e., where the water table is the upper surface of the saturated aquifer), sedimentary aquifer (i.e., nonvolcanic lithology) and as highly vulnerable to contamination. The deeper aquifer is listed as a confined (i.e., aquifer bounded by impermeable or poorly permeable formations, and top of the saturated aquifer is below groundwater surface), dike aquifer (i.e., occurring in volcanic dike formations) and has a low vulnerability to contamination.

The subject site is located below the DOH underground injection control line (DOH, 1983).

3.3 HISTORICAL USE INFORMATION

Historical use of the subject site and its immediate vicinity was obtained by reviewing readily available historical topographic maps, fire insurance maps, and historical aerial photographs. Historical topographic maps of the Nanakuli-Makaha quadrangle (USGS, 1913) and the Schofield Barracks quadrangle (USGS, 1943, 1953, 1960, 1967, and 1983a) were examined. A plan of the general layout of Camp Andrews (USN, 1942) provided by Ron Darlington of the U.S. Navy, Pacific Division Real Estate Office was also examined. EcoSearch checked Sanborn and other fire insurance databases for maps of the proposed project area and found none (EcoSearch, 1999). Historical aerial photographs (USGS, 1951; USDA, 1965; USGS, 1965; USGS, 1977; NASA, 1992a and 1992b) were also reviewed.

In 1913, the subject site and surrounding area is shown as agricultural land by historical topographic maps. A rock wall along the northern portion of the subject site and a railroad running along the current Farrington Highway are indicated in the 1913 map.

The 1942 U. S. Navy plan (Figure 4) shows the following structures present within the study area:

- Base Company Quarters
- Latrine
- Officers Mess Hall
- Mess Hall
- 291 Cabins and other small structures
- 2 Storehouses
- Utility and Laundry
- 2 Dispensaries
- Paint Storage
- Barber Shop
- Septic Tank
- Chief Master's Arms Cabin
- Fuel Tank
- Cooks Quarters
- 2 Splinter Shelters
- Officers Latrine
- 14 Officers Cabins
- Mess Hall
- Galley
- Camp Headquarters
- Theater
- Canteen
- Administration
- Booster Pump House
- Pump House and cylinder tank

The 1942 U. S. Navy plan shows the northeastern corner and the northern border of the subject site to have been undeveloped. This plan does not cover the area of Parcel 23.

The 1943 topographic map shows the subject site labeled as "Nanakuli Station" and the surrounding area to the north is labeled as "Lualualei Homesteads."

The 1951 aerial photo shows a "U" shaped structure at the entrance to Parcel 65 from Farrington Highway. The majority of the subject site is obscured by dense tree cover and surrounded by residential housing.

Topographic maps for 1953, 1960, and 1967 indicate that the subject site contained a Naval Reservation. However, according to Mr. Ron Darlington of the U. S. Navy Pacific Division Real Estate Office (USN, 1999), the property was transferred to the State of Hawaii on December 18, 1962 as part of the Statehood Act. The 1965 aerial photograph shows a dirt road leading into Parcel 65 from Farrington Highway with three small structures west of the road and one large structure east of the road. Four structures are shown further north along the dirt road. The rest of the subject area is obscured by dense tree cover.

The 1977 aerial photograph shows no structures on the subject site although the majority of the subject site is obscured by dense tree cover.

The 1983 USGS map shows the subject site to be vacant except for a dirt road and a small structure at the end of the dirt road. The subject site is shown to be surrounded by a residential area with Lualualei Homesteads to the northwest, Nanakuli High School to the northeast, and Nanai Kapono School to the southwest, across Farrington Highway.

In the 1992 aerial photograph, the subject site and immediate vicinity are obscured by cloud cover.

4.0 INFORMATION FROM SITE RECONNAISSANCE

4.1 HAZARDOUS SUBSTANCES, WASTES AND MATERIALS

During our site reconnaissance on December 17, 1999, we observed the following potentially hazardous substances or wastes on the proposed project site:

- 1- and 5-gallon paint cans, with unknown contents;
- 55-gallon drums, apparently empty, former contents unknown;
- high pressure cylinders, with unknown contents;
- potential asbestos-containing roofing shingles;
- transite-like pipes;
- used car batteries;
- abandoned cars;
- used household appliances (televisions, computer monitors, reach-in freezer, refrigerator, and air conditioning equipment) that may contain potentially hazardous materials; and
- used tires.

During a follow-up visit in August 2000, we observed the following potentially hazardous waste, in addition to the items listed above, on the project site.

- empty propane tanks;
- metal piping (either septic and/or water line);
- more abandoned cars;
- more batteries; and
- more drums and 1- and 5-gal cans.

The above items were readily observed by MFA staff during our two site visits. There may be additional potentially hazardous substances or wastes located on the subject site hidden by tall grass and dense vegetation. In addition, due to the unsecured nature of the site, it may be subject to further fugitive dumping prior to the start of project construction.

Soil sampling was conducted beneath piles of drums located along the northwest site boundary (see Figure 3 and Figure 5 for sampling locations). Sampling results did not indicate significant contamination of soil from release of drum contents (if release occurred). Sampling results are discussed in detail in Section 5.0.

4.2 STORAGE TANKS

No storage tanks were observed on the subject site. Current regulatory information does not indicate that storage tanks were or are present on the subject site or in the immediate surrounding area. However, historical information indicated that a septic tank and a cylinder tank were located on Parcel 65, within the subject area (Figure 4).

4.3 INDICATIONS OF PCBs

We did not observe transformers or fluorescent light ballasts at the subject site. We observed numerous 55-gallon drums; their contents or former contents are not known. Soil samples were tested for PCBs. Five of the nine samples were reported to contain detectable concentrations of the PCB compound Aroclor 1260. Reported concentrations ranged from 0.0507 mg/kg to 0.275 mg/kg; all concentrations were below the DOH Tier 1 Soil Action Level (SAL) of 1.0 mg/kg.

4.4 INDICATIONS OF SOLID WASTE DISPOSAL

There were indications of solid waste disposal in the proposed project area. The following items were observed during our site visits:

- drywall;
- furniture (sofas, chairs, and bookshelves);
- metal (corrugated metal sheeting, metal sheeting, metal chairs, and chicken wire);
- piles of soil and rocks;
- used household appliances (oven, stove, washing machine, dryer, and water heaters);
- various household and municipal waste, including burned solid waste;
- wood (2x4s, pallets, and wood sheeting); and
- construction and demolition debris (concrete piles with/without rebar).

The above items were readily observed by MFA staff during our two site visits. There may be more solid waste hidden in tall grass or dense vegetation at the subject site .

4.5 OTHER ENVIRONMENTAL ISSUES

Migration of Off-Site Contamination

Our investigation also revealed no evidence of petroleum fuel spills at properties on or adjacent to the subject site. As discussed in Section 3.1.4, no releases from USTs have occurred at properties located within one-half mile of the subject site. However, MFA observed 55-gallon drums on neighboring residential properties. These drums may present a risk of migration of contamination from off-site areas.

Former Agricultural Land Use Concerns

Our review of past land use indicated the site was formerly used for agriculture. Herbicide, pesticide, insecticide, nematicide, fungicide, and growth regulator residues could be present in the soil and groundwater beneath the site, depending on what was grown at the site. However, when applied according to the label, herbicide, pesticide, insecticide, nematicide, fungicide, and growth regulator application for agricultural purposes is presently excluded from regulation under RCRA and CERCLA (Superfund), and does not result in a regulated hazardous waste. Also, the site was used for agricultural use prior to 1942, and pesticide residues are unlikely to be of concern. Soil beneath discarded drums was tested for pesticides; the results are discussed in Section 5.4.

Radon

The geologic formations of the Hawaiian Islands generally do not provide elevated radon concentrations. Two studies conducted by the State Department of Health (DOH) in cooperation with the U.S. Environmental Protection Agency (EPA) concluded that radon is generally not a hazard in the State (DOH, 1998).

Asbestos

MFA observed potential asbestos-containing materials (ACM), including roofing material and transite-like pipe, during site reconnaissance. Additional potential ACM may be hidden by tall grass and dense vegetation at the subject site. Suspect materials should be assumed to be asbestos-containing until laboratory analysis indicates otherwise.

Lead-Based Paint

MFA observed 1- and 5-gallon paint cans at the subject site. MFA did not observe painted surfaces at the subject site. However, painted surfaces and additional paint cans may be hidden by tall grass and dense vegetation at the subject site. These cans and painted surfaces should be assumed to contain lead-based paint until laboratory analysis indicates otherwise.

Air Emissions

No sources of particulate air emissions, other than from traffic on Farrington Highway and within the adjacent residential development, were observed during the site reconnaissance.

Dry-Cleaning Operations

This site investigation did not reveal information that would indicate the subject site may have contained for dry-cleaning operations.

5.0 SOIL SAMPLING

5.1 SAMPLING METHODS

MFA collected nine soil samples (Samples NED-1 through NED-9) beneath drum disposal locations (see Figure 5 for sample locations). Soil samples were collected by moving drums and solid waste debris and collecting underlying surface soil. One background soil sample (Sample NED-10) was also obtained away from drum disposal areas. Samples were collected in 8-ounce and 16-ounce glass jars. The samples were labeled, placed in a cooler containing ice, and delivered to the analytical laboratory. Chain-of-custody documentation was used during sample collection and transfer of the samples to the laboratory.

5.2 LABORATORY TESTING

The nine samples were analyzed for total petroleum hydrocarbon (TPH) fuel scan; PCBs; pesticides; eight total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver); and semivolatile organic compounds (SVOCs), including pentachlorophenol (PCP). The background sample was analyzed for eight total metals. Chain-of-custody records and laboratory results are presented in Appendix B.

5.3 PROJECT ACTION LEVELS

Project action levels provide a framework for the assessment of remedial actions. State DOH Tier 1 Soil Action Levels (SALs) for sites where a drinking water source is not threatened and where the annual rainfall is less than 200 cm/year were used. SALs are not available for all analytes; for analytes without SALs, the EPA Preliminary Remediation Goals (PRGs) are referenced.

EPA PRGs are generally chemical concentrations that correspond to fixed levels of risk, i.e., either a one-in-one million (10^{-6}) cancer risk or a noncarcinogenic hazard quotient of 1. However, the EPA generally considers a cancer risk of between 10^{-4} and 10^{-6} to be acceptable. The EPA provides PRGs for residential and industrial scenarios. We have used the residential PRGs as they are more conservative. However, we note that the residential PRG likely overestimates the risk, since residential assumptions of long-term exposure are not applicable to an elementary school.

5.4 DISCUSSION OF RESULTS

Analytical results are summarized in Table 2. Total arsenic was reported at concentrations ranging from 6 mg/kg to 114 mg/kg. There is no DOH SAL for arsenic, but the reported concentrations are greater than the EPA PRG of 0.39 for residential soil. Total arsenic was not detected above the reporting limit of 5 mg/kg in the background sample. However, elevated background arsenic concentrations have been reported for a number of studies on Oahu. Levine & Frick (1995) reported a background concentration of arsenic in soil of 38 mg/kg for soil at a Honolulu site, and a study of background metals concentrations at Pearl Harbor reported concentrations of 0.38 to 38 mg/kg (USN, 1997). Similarly elevated arsenic concentrations have measured in agricultural soils on Oahu.

Total lead was reported at concentrations ranging from 21 mg/kg to 883 mg/kg. Only one sample contained a concentration greater than the SAL and PRG of 400 mg/kg. A concentration of 35.2 was reported for the background sample.

Total cadmium was reported as not detected or at concentrations below the SAL of 38 mg/kg. Total barium, chromium, mercury, selenium, and silver were reported as not detected or at concentrations less than the PRGs (there are no SALs for these metals).

TPH compounds were generally not detected, with the exception of unidentified TPH in the motor oil and diesel range. Reported concentrations ranged from 175 mg/kg to 468 mg/kg in the motor oil range, and from 26.0 mg/kg to 45.8 mg/kg in the diesel range. All TPH concentrations are well below the SALs.

PCB compounds were not detected, with the exception of Aroclor 1260 reported for five of the nine samples. Concentrations of Aroclor 1260 ranged from 0.0507 mg/kg to 0.275 mg/kg, all below the SAL of 1.0 mg/kg.

The majority of pesticide compounds were reported as not detected for all nine samples. One sample was reported to contain 0.202 mg/kg 4,4'-DDT, less than the DOH SAL of 0.82 mg/kg for DDT. Another sample was reported to contain 4.73 mg/kg 4,4'-DDE, slightly greater than the SAL of 1.3 mg/kg for DDE.

Only one SVOC was detected; bis(2-ethylhexyl)phthalate (BEHP) was reported in three samples at concentrations ranging from 2.04 mg/kg to 4.82 mg/kg. There is no SAL for BEHP, but both concentrations are well below the PRG of 35 mg/kg. Reporting limits for some of the SVOC analytes are greater than the PRGs and, in one case, above the SALs. However, due to the general lack of SVOCs detected, SVOCs and these elevated reporting limits are not a concern.

Table 2a. Summary of Analytical Results (mg/kg)

Analyzed Parameter	Sample I.D.					DOH SAL	EPA PRG
	NED-1	NED-2	NED-3	NED-4	NED-5		
Total Arsenic	6.00	47.1	114	16.5	25.8	none	0.39
Total Barium	30.5	170	114	104	107	none	5,400
Total Cadmium	ND (<2.00)	ND (<2.00)	2.48	ND (<2.00)	3.73	38	37
Total Chromium	33.3	43.8	61.4	45.2	50.9	none	210
Total Lead	21.4	833	124	93.4	307	400	400
Total Mercury	ND (<0.200)	ND (<0.200)	ND (<0.200)	0.329	ND	none	23
Total Selenium	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)	none	390
Total Silver	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	none	390
TPH Fuel Scan	221(oil)[a]	221(oil)[a]	26.0(diesel); 313(oil)[b]	43.8(diesel); 444(oil)[b]	40.9(diesel), 338(oil)[b]	5,000; 2,000[c]	none
PCB'S	ND (<.0333-.0667)	0.179[d]	ND (<.0333-.0667)	0.0507[d]	0.110[d]	1.0	0.22 (Aroclor 1260)
Pesticides	ND[e] (<.017-1.70)	0.202[f]	ND[e] (<.034-3.40)	ND[e] (<.034-3.40)	ND[e] (<.034-3.40)	0.82 (DDT)	1.7 (DDT)
SVOC's	ND[g] (<.990-5.10)	3.67 (BEHP)[h]	ND[g] (<.990-5.10)	1.82 (BEHP)[h]	2.05 (BEHP)[h]	none (BEHP)	35 (BEHP)

SAL DOH Tier 1 Soil Action Level (for sites below the UIC line and receiving <200" rain/year)

PRG EPA Region 9 Preliminary Remediation Goal (October 1999) for residential soils

ND Not detected above reporting limit (given in brackets)

[a] All reported ND except for *TPH(Unidentified Hydrocarbons as Motor Oil)*. Reporting limits for other TPH analytes ranged from 25 - 100 mg/kg.

[b] All reported ND except for *TPH(Unidentified Hydrocarbons as Diesel) and TPH (Unidentified Hydrocarbons as Motor Oil)* Reporting limits for other TPH analytes ranged from 25 - 100 mg/kg.

[c] SAL is 5,000 mg/kg for diesel and motor oil, and 2,000 mg/kg for gasoline.

[d] All reported ND except for *Aroclor 1260*, reported at concentration shown. For other Aroclor compounds analyzed, reporting limits were below SAL and PRGs.

[e] All reported ND. Reporting limits were below SALs and PRGs for residential soil, except for toxaphene, whose reporting limit is greater than the PRG of 0.44 mg/kg.

[f] All reported ND except for *4,4'-DDT*. Reporting limits were less than SALs and PRGs, except for *toxaphene*, whose reporting limit is greater than the PRG of 0.44 mg/kg.

[g] All reported ND. Reporting limits were less than SALs, but were above PRGs for a number of analytes.

[h] All reported ND except for *Bis(2-ethylhexyl)phthalate (BEHP)*, reported at concentration known. Reporting limits for remaining analytes were less than SALs, but were greater than PRGs for a number of analytes.

Table 2b. Summary of Analytical Results (mg/kg)

Analyzed Parameter	Sample I.D.					DOH SAL	EPA PRG
	NED-6	NED-7	NED-8	NED-9	NED-10		
Total Arsenic	12.6	6.17	11.1	14.5	ND (<5.00)	none	0.39
Total Barium	84.3	56.7	42.9	232	81.0	none	5,400
Total Cadmium	ND (<2.00)	ND (<2.00)	ND (<2.00)	ND (<2.00)	ND (<2.00)	38	37
Total Chromium	71.8	42.1	40.5	74.7	52.1	none	210
Total Lead	38.8	39.2	43.7	184	35.2	400	400
Total Mercury	ND (<0.200)	ND (<0.200)	ND (<0.200)	ND (<0.200)	ND (<0.200)	none	23
Total Selenium	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)	ND (<20.0)	none	390
Total Silver	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	ND (<5.00)	none	390
TPH Fuel Scan	15.8 (diesel); 468 (oil)[b]	28.5 (diesel); 414 (oil)[b]	31.7 (diesel); 332 (oil)[b]	175 (oil)[c]	NA	5,000/ 2,000[c]	none
PCB'S	0.247[d]	ND (<.0333-.0667)	0.275[d]	ND (<.0333-.0667)	NA	1.0	0.22 (Aroclor 1260)
Pesticides	ND[e] (<.034-3.40)	ND[e] (<.034-3.40)	ND[e] (<.034-3.40)	4.73[f]	NA	1.3 (DDE)	1.7 (DDE)
SVOC's	ND[g] (<.990-5.10)	ND[h] (<3.3-17)	ND[h] (<3.3-17)	ND[g] (<.33-1.7)	NA	varies	varies

SAL DOH Tier 1 Soil Action Level (for sites below the UIC line and receiving <200" rain/year)

PRG EPA Region 9 Preliminary Remediation Goal (October 1999) for residential soils

ND Not detected above reporting limit (given in brackets)

NA Not Analyzed

[a] All reported ND except for *TPH(Unidentified Hydrocarbons as Motor Oil)*. Reporting limits for other TPH analytes ranged from 25 - 100 mg/kg.

[b] All reported ND except for *TPH(Unidentified Hydrocarbons as Diesel) and TPH (Unidentified Hydrocarbons as Motor Oil)* Reporting limits for other TPH analytes ranged from 25 - 100 mg/kg.

[c] SAL is 5,000 mg/kg for diesel and motor oil, and 2,000 mg/kg for gasoline.

[d] All reported ND except for *Aroclor 1260*, reported at concentration shown. For other Aroclor compounds analyzed, reporting limits were below SAL and PRGs.

[e] All reported ND. Reporting limits were below SALs and PRGs for residential soil, except for toxaphene, whose reporting limit is greater than the PRG of 0.44 mg/kg.

[f] All reported ND except for *4,4'-DDE*. Reporting limits were less than SALs and PRGs, except for *toxaphene*, whose reporting limit is greater than the PRG of 0.44 mg/kg.

[g] All reported ND. Reporting limits were less than SALs, but were above PRGs for a number of analytes.

[h] All reported ND. Reporting limits were less than SALs, except for benzo[a]pyrene. Reporting limits were greater than PRGs for a number of analytes.

5.5 RISK EVALUATION

5.5.1 Representative Concentrations

Soil samples from the subject property were found to contain lead and DDE above the SALs and arsenic (for which no SAL is available) above the PRG for residential soil. There are several options in selecting a representative contaminant concentration to compare to the PRGs. Nine (9) soil samples (excluding background sample) were obtained. The most conservative scenario would use the greatest concentration, but this approach often skews the results in favor of a "hot spot" that is not really representative of the contaminant concentration contributing to the risk, i.e., this approach is unnecessarily conservative. However, use of the average concentration likely does not give sufficient weight to "hot spots". Instead, risk assessors often use the 95th percentile concentration, i.e., the concentration that is statistically equal to or greater than 95 percent of the concentrations. Calculated 95th percentile concentrations for contaminants of concern are shown in Table 3.

Table 3. 95th Percentile Soil Concentrations

Sample ID	Arsenic (mg/kg)	Lead (mg/kg)	DDE (mg/kg)
NED-1	6	21.4	0.033*
NED-2	47.1	883	0.066*
NED-3	114	124	0.066*
NED-4	16.5	93.4	0.066*
NED-5	25.8	307	0.066*
NED-6	12.6	38.8	0.066*
NED-7	6.17	39.2	0.066*
NED-8	11.1	43.7	0.066*
NED-9	14.5	184	4.73
Average	28.2	192.7	0.6
95th Percentile	87.2	652.6	2.9
SAL	none	400	1.3
PRG Residential	0.39^{ca}, 22^{nc}	400^{nc}	1.7^{ca}

ca cancer PRG
nc noncancer PRG
* reported not detected, so the reporting limit used as the concentration

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5.5.2 Potential Receptors and Exposure Pathways

The assessment of potentially exposed populations on and near the site includes evaluation of characteristics that influence exposures, i.e., the location of the population relative to the site, activity patterns, and the presence of sensitive subpopulations. Exposure, as defined by EPA (1989), is the contact of an organism with a chemical or physical agent. The exposure assessment addresses potential pathways a chemical can take from its source at the site to a receptor (potentially exposed individual). Factors that contribute to exposure pathways include climate, vegetation, and groundwater and surface water hydrology.

The potentially exposed populations include children and adults at the proposed elementary school and children and adults at nearby residences. The contaminants of concern are not volatile, so potential means of contact are via ingestion or dermal contact with contaminated soil or inhalation, ingestion, or dermal contact with contaminated dust.

Potential ecological receptors were also considered and, based on the site information gathered, there are no sensitive ecological receptors (flora or fauna) likely to be affected. The groundwater beneath the site is not used for drinking water. Nearby surface water bodies are unlikely to be affected.

5.5.3 Risk Evaluation

Total Arsenic

The concentrations of total arsenic in soil ranged from 6 to 114 mg/kg, with a 95th percentile concentration of 87.2 mg/kg. This concentration exceeds the cancer PRG of 0.39 for residential soil, and also exceeds the concentrations (0.39 to 39 mg/kg) that equates to EPA's "acceptable" cancer risk range of 10^{-4} to 10^{-6} (EPA, 1999). If the "hotspot" arsenic concentration of 114 mg/kg (Sample NED-3) was removed, the 95th percentile concentration would be 39.6 mg/kg, corresponding to a cancer risk range of about 10^{-4}, within EPA's "acceptable" cancer risk range. Removing the "hotspot" area at Sample NED-2, with an arsenic concentration of 47.1 mg/kg (and lead concentration of 883 mg/kg) further reduces the 95th percentile arsenic concentration to 23.0 mg/kg. With these two "hotspots" removed, remaining concentrations are within the range that has been reported for background arsenic concentrations at other sites on Oahu, and correspond to a cancer risk within the EPA's "acceptable" cancer risk range of 10^{-4} to 10^{-6}.

Total Lead

Only one total lead concentration (Sample NED-2 at 883 mg/kg) was greater than the SAL of 400 mg/kg (also the PRG for residential soil). Excavation of the soil at arsenic "hotspot" areas NED-2 and NED-3 would also result in removing this lead contamination above the SAL.

4,4'-DDE

One sample was reported to contain DDE at a concentration (4.73 mg/kg) greater than the SAL of 1.3 mg/kg. However, the reported concentration is only about 4 times the SAL, and the 95th percentile concentration is only about twice the SAL. The reported concentrations would result in a cancer risk between 10^{-5} and 10^{-6}, within the EPA's "acceptable" cancer risk range of 10^{-4} to 10^{-6}.

6.0 CONCLUSIONS

We have performed a Phase I Environmental Site Assessment of TMK 8-9-02: Parcels 23, 65, and a portion of Parcel 1 which consist of the proposed Nanakuli IV Elementary School project site. We also conducted limited Phase II soil sampling beneath discarded drums at the site.

This assessment has indicated the following environmental issues that may affect the property:

- Solid Waste
  We observed solid waste dumping at the subject site. We found drywall, furniture (sofas, chairs, and bookshelves), metal (corrugated metal sheeting, metal sheeting, metal chairs, and chicken wire), piles of soil and rocks, used household appliances (oven, stove, washing machine, dryer, and water heaters), various household and municipal waste (including burned solid waste), construction and demolition debris (concrete with/without rebar), and wood (2x4s, pallets, and wood sheeting). More solid waste may be present at the subject site hidden by tall grass and dense vegetation.

- Potential Hazardous Materials/Wastes
  We observed the presence of potentially hazardous materials/wastes at the subject site during our site visit. Paint cans, drums, high pressure cylinders, used car batteries, used cars, used household appliances (televisions, computer monitors, reach-in freezer, refrigerator, and air conditioning equipment), empty propane tanks, metal piping, and used tires were observed on the site. Roofing debris and transite-like pipe, potentially containing asbestos, were observed on the site.

- Drum Disposal Areas
  Soil sampling in three areas of drum disposal was conducted to assess whether drum contents or former contents have resulted in soil contamination. Nine samples were analyzed for TPH fuel scan, PCBs, pesticides, eight total metals, and SVOCs. Only total arsenic, total lead, and 4,4'-DDE were reported at concentrations exceeding SALs (or PRGs for arsenic since no SAL is available for arsenic). The reported 4,4'-DDE concentration was on the same order of magnitude as the SAL and, therefore, the risk from 4,4'-DDE is within EPA's acceptable range of 10^{-4} to 10^{-6}. However, the concentrations of arsenic in one area (Samples NED-2 and NED-3) are well above the PRG for residential soil and correspond to a cancer risk greater than EPA's acceptable range. In addition, Sample NED-2 also contained the only lead concentration greater than the SAL.

- Other Potential Concerns
  We note that due to the dense nature of the vegetation, we were unable to access or observe the entire surface area of the site. While we did access areas such as roadways, trails, and clearings, where disposal of hazardous materials or wastes could have occurred, such items may be located beneath dense vegetation in other areas. Should potentially hazardous materials be found during clearing and grading of this site, the disposition of such materials should be discussed with an environmental consultant.

7.0 RECOMMENDATIONS

Surface soil in the area of Samples NED-2 and NED-3 should be excavated and placed in 55-gallon drums. We recommend removing an area approximately 20 feet by 20 feet and 1 foot deep (i.e., approximately 400 cubic feet, or 15 cubic yards). The recommended excavation area is shown on Figure 5. Confirmatory samples are recommended to be analyzed for total arsenic. Drum contents should be tested as necessary for disposal of soil. Soil could likely be disposed of at PVT Landfill. This work could be conducted prior to construction by an environmental consultant, or could be conducted by the contractor under supervision of an environmental consultant.

Site earthwork, including clearing, grubbing, and grading, must consider the high potential for hazardous materials and wastes to be encountered. The project construction specifications should include a discussion of the types of materials that may be encountered and provide instruction on handling of such materials. During earthwork activities, testing, handling, and disposal of such materials should be coordinated with an environmental consultant.

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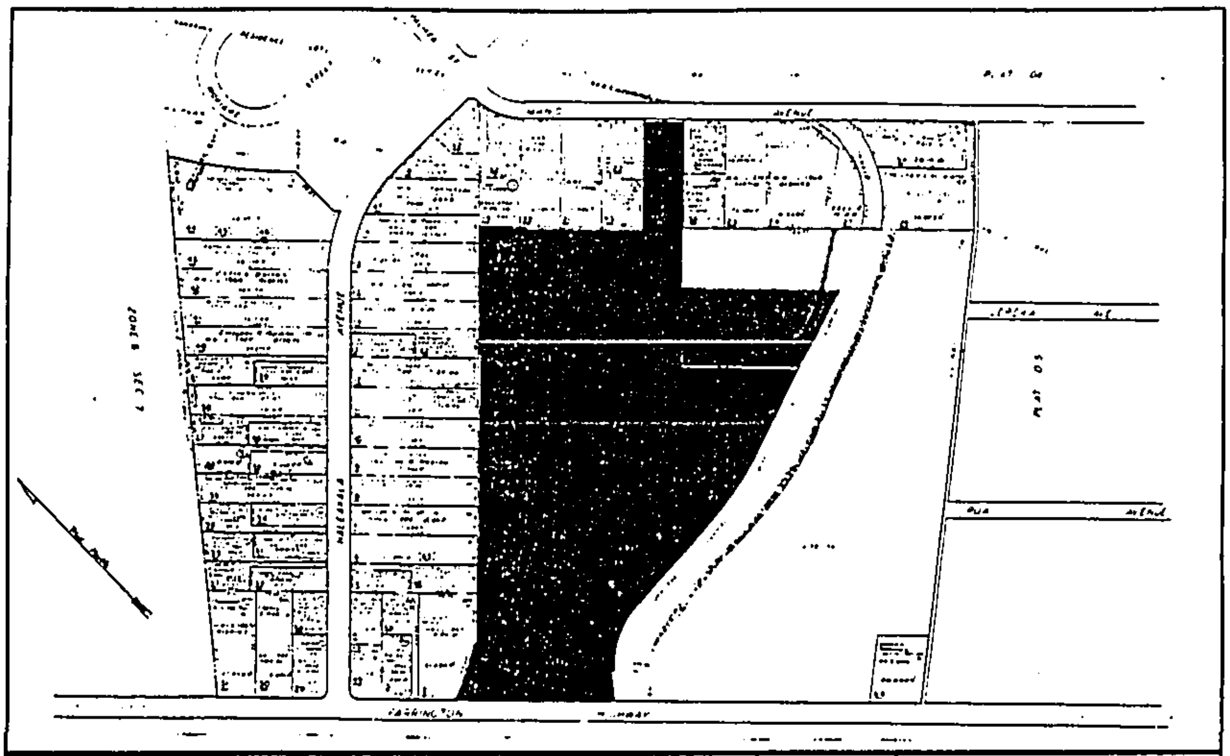
LIST OF ACRONYMS

ACM	asbestos-containing material
ASTM	American Society for Testing and Materials
BEHP	bis(2-ethylhexyl)phthalate
C&C	City and County of Honolulu
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CORRACTS	TSD facilities subject to Corrective Action under RCRA
DAGS	Department of Accounting and General Services (State of Hawaii)
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DLU	Department of Land Utilization (C&C)
DOCKET	Civil Enforcement Docket
DOH	*Department of Health (State of Hawaii)*
EPA	U. S. Environmental Protection Agency
ERNS	*Emergency Response Notification System*
ESA	Environmental Site Assessment
HEER	*DOH Office of Hazard Evaluation and Emergency Response*
LUST	leaking underground storage tank
MFA	Masa Fujioka and Associates
NASA	National Aeronautical and Space Administration
NFA	No Further Action
NPL	National Priorities List (Superfund sites)
PADS	PCB Activity Database
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PRG	Preliminary Remediation Goal (EPA Region IX, October 1999)
RCRA	Resource Conservation and Recovery Act
SAL	Soil Action Level (DOH Tier 1)
SSTS	Section Seven Tracking System
TMK	Tax Map Key
TPH	total petroleum hydrocarbons
TRI	Toxic Release Inventory
TSCA	Toxic Substance Control Act
TSD	treatment, storage or disposal (category of RCRA facility)
USDA	United States Department of Agriculture
USGS	United States Geological Survey (U. S. Dept. of the Interior)
UST	underground storage tank

FIGURES AND PLATES



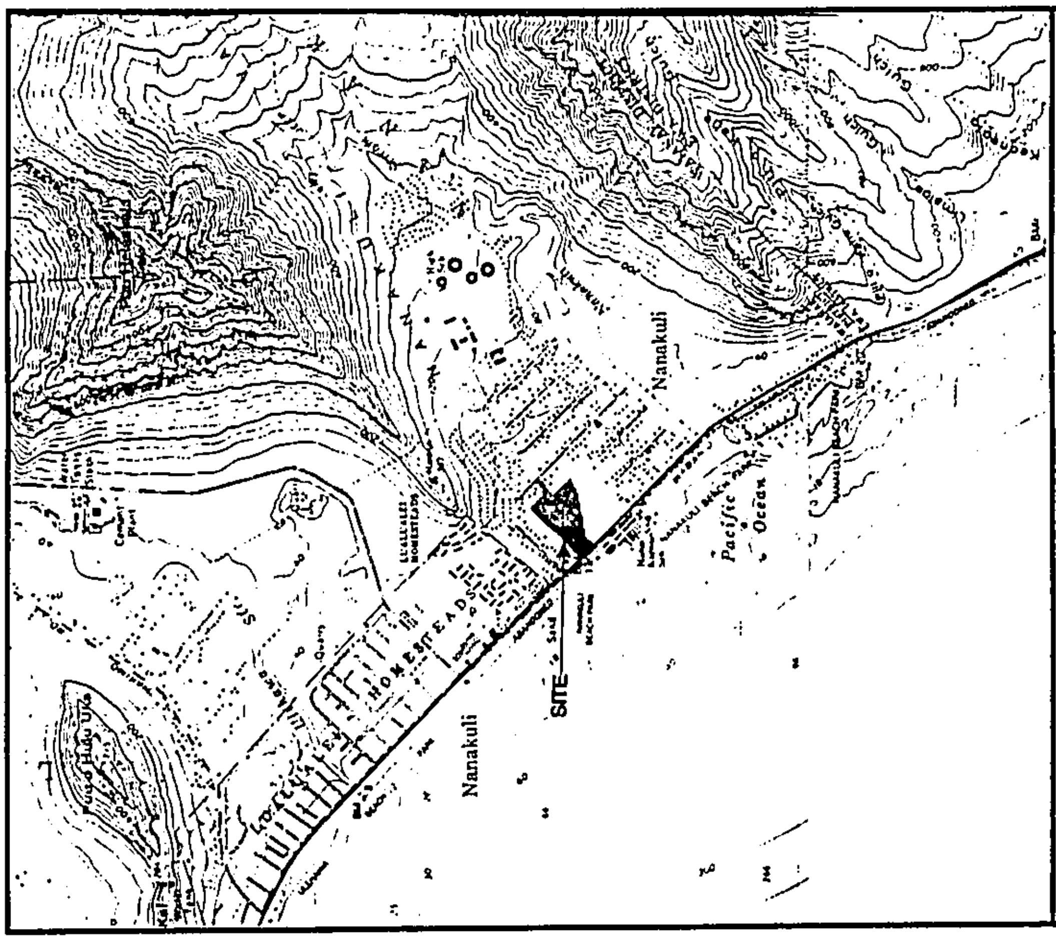
0 300 600
Scale In Feet

Base Map: Taxation Map Bureau
First Division
Zone 8, Section 9, Plat 02

Project No	99096-021
Drawing No	02
Approved By	JCM
Drawn By	JM
Rev	01
Date	8-11-00
Scale	1" = 300'

Figure 2
TMK Map
Proposed Nanakuli IV Elementary School
TMK (1) 8-9-02: Parcels 23, 65 &
Portion of Parcel 1
Nanakuli, Oahu, Hawaii

MASA FUJIOKA & ASSOCIATES
ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS



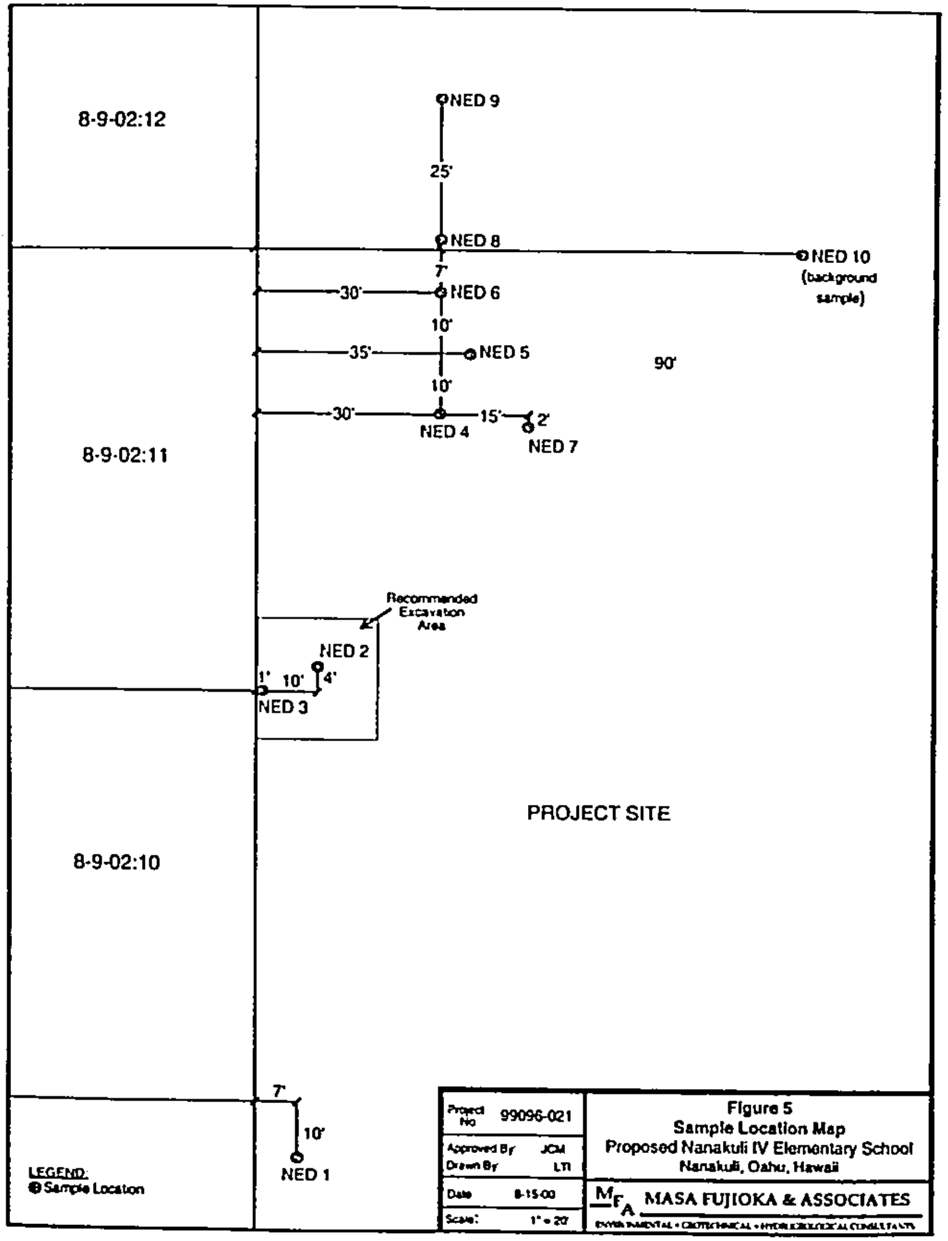
0 2000 4000
Scale In Feet

Source: United States Geologic Survey
Topographic Map
Ewa, Waianae, & Schofield Barracks Quadrangles, 1983

Project No	99096-021
Drawing No	01
Approved By	JCM
Drawn By	JM
Rev	01
Date	8-11-00
Scale	1:24000

Figure 1
Map of Area
Proposed Nanakuli IV Elementary School
TMK (1) 8-9-02: Parcels 23, 65, &
Portion of Parcel 1
Nanakuli, Oahu, Hawaii

MASA FUJIOKA & ASSOCIATES
ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS



Project No	99096-021
Approved By	JCM
Drawn By	LTI
Date	8-15-00
Scale:	1" = 20'

Figure 5
Sample Location Map
Proposed Nanakuli IV Elementary School
Nanakuli, Oahu, Hawaii

MASA FUJIOKA & ASSOCIATES
ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS


PHOTO 1 - 55-gallon metal drums


PHOTO 2 - 55-gallon drums


PHOTO 3 - 55-gallon drums


PHOTO 4 - Dumping area (one of many)

Plate 1

MASA FUJIOKA & ASSOCIATES
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DOCUMENT CAPTURED AS RECEIVED

APPENDIX A

EcoSearch Environmental Resources, Inc.
Environmental Site Assessment Report


PHOTO 5 - Empty 55-gal drums and metal debris

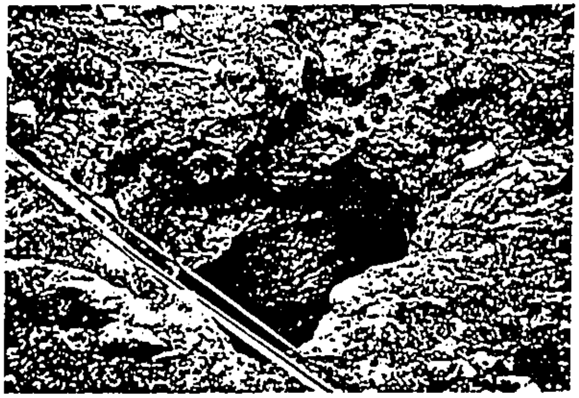
PHOTO 6 - Sink hole


PHOTO 7 - Municipal debris (Parcel 23)


PHOTO 8 - Dumping area (Parcel 23)

Plate 2

MASA FUJIOKA & ASSOCIATES

Environmental Laboratory of the Pacific Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Project: Nanakuli Elementary
Lab Order: 0008087

CASE NARRATIVE

Samples were analyzed using the methods outlined in the following references:

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition.

All method blanks, laboratory spikes, and/or matrix spikes met quality assurance objectives.

Mercury analysis was performed by North Creek Analytical. EPA 8270 was re-extracted one day past EPA recommended holding time and re-analyzed to confirm original results.

All "J" qualifers in the QC report are irrelevant and unnecessary information. The "J" qualifier can be ignored without impact in data quality.

All "NIs" in the TPH Fuel Scan results represent "Non-Identified".

Q02: The spike recovery for this QC sample is outside of established control limits due to sample matrix interference.

Q03: The percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte already present in the sample.

Q29: The recovery of this analyte is outside control limits due to sample dilution required from high analyte concentration and/or matrix interferences.

Q31: The Matrix Spike/Duplicate for this batch could not be reported. Source sample contains high levels of target analyte, non-target analyte, and/or matrix interference requiring high dilution.

S01: The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interferences.

S04: The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.

S06: The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interferences.

Environmental Laboratory of the Pacific Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Project: Nanakuli Elementary
Work Order: 0008087
Date Received: 08/10/2000

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Collection Date	Sample On Hold
0008087-01A	NED-1	08/10/2000 0.00	☐
0008087-02A	NED-2	08/10/2000 0.00	☐
0008087-03A	NED-3	08/10/2000 0.00	☐
0008087-04A	NED-4	08/10/2000 0.00	☐
0008087-05A	NED-5	08/10/2000 0.00	☐
0008087-06A	NED-6	08/10/2000 0.00	☐
0008087-07A	NED-7	08/10/2000 0.00	☐
0008087-08A	NED-8	08/10/2000 0.00	☐
0008087-09A	NED-9	08/10/2000 0.00	☐
0008087-10A	NED-10	08/10/2000 0.00	☐

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-1
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-01A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
ICP METALS-RCRA, TOTAL		SW6010A								
Arsenic	8.00	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL		
Barium	20.5	10.0	mg/Kg	1						
Cadmium	ND	2.00	mg/Kg	1						
Chromium	33.3	5.00	mg/Kg	1						
Lead	21.4	20.0	mg/Kg	1						
Selenium	ND	20.0	mg/Kg	1						
Silver	ND	5.00	mg/Kg	1						
MERCURY, TOTAL		SW7471								
Mercury	ND	0.200	mg/Kg	1	8/21/2000	8/22/2000	0080421	SUB		
ORGANOCHLORINE PESTICIDES		SW8081								
4,4'-DDD	ND	0.0330	mg/Kg	10	8/18/2000	8/23/2000	2502	AS		
4,4'-DDE	ND	0.0330	mg/Kg	10						
4,4'-DDT	ND	0.0330	mg/Kg	10						
Aldrin	ND	0.0170	mg/Kg	10						
alpha-BHC	ND	0.0170	mg/Kg	10						
beta-BHC	ND	0.0170	mg/Kg	10						
Chlordane	ND	0.330	mg/Kg	10						
delta-BHC	ND	0.0170	mg/Kg	10						
Dieldrin	ND	0.0330	mg/Kg	10						
Endosulfan I	ND	0.0170	mg/Kg	10						
Endosulfan II	ND	0.0330	mg/Kg	10						
Endosulfan sulfate	ND	0.0330	mg/Kg	10						
Endrin	ND	0.0330	mg/Kg	10						
Endrin aldehyde	ND	0.0330	mg/Kg	10						
gamma-BHC	ND	0.0170	mg/Kg	10						
Heptachlor	ND	0.0170	mg/Kg	10						
Heptachlor epoxide	ND	0.0170	mg/Kg	10						
Methoxychlor	ND	0.170	mg/Kg	10						
Toxaphene	ND	1.70	mg/Kg	10						
Surr: Decachlorobiphenyl	85.0	50-150	%REC	10						
Surr: Tetrachloro-m-xylene	84.2	50-150	%REC	10						

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-1
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-01A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
PCBS IN SOIL OR SOLID WASTE		SW8082								
Aroclor 1016	ND	0.0333	mg/Kg	1	8/17/2000	8/22/2000	2501	AS		
Aroclor 1221	ND	0.0667	mg/Kg	1						
Aroclor 1232	ND	0.0333	mg/Kg	1						
Aroclor 1242	ND	0.0333	mg/Kg	1						
Aroclor 1248	ND	0.0333	mg/Kg	1						
Aroclor 1254	ND	0.0333	mg/Kg	1						
Aroclor 1260	ND	0.0333	mg/Kg	1						
Surr: Decachlorobiphenyl	87.0	50-150	%REC	1						
Surr: Tetrachloro-m-xylene	93.6	50-150	%REC	1						

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-1
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0.00
Lab ID:	0008087-01A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
SEMIVOLATILE ORGANICS		SW8270A								
1,2,4,5-Tetrachlorobenzene	ND	0.990	mg/Kg	3	8/16/2000	9/13/2000	2485	AS		
1,2,4-Trichlorobenzene	ND	0.990	mg/Kg	3						
1,2-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,3-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,4-Dichlorobenzene	ND	0.990	mg/Kg	3						
1-Chloronaphthalene	ND	0.990	mg/Kg	3						
1-Naphthylamine	ND	0.990	mg/Kg	3						
2,3,4,6-Tetrachlorophenol	ND	0.990	mg/Kg	3						
2,4,5-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4,6-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dimethylphenol	ND	0.990	mg/Kg	3						
2,4-Dinitrophenol	ND	5.10	mg/Kg	3						
2,4-Dinitrotoluene	ND	0.990	mg/Kg	3						
2,6-Dichlorophenol	ND	0.990	mg/Kg	3						
2,6-Dinitrotoluene	ND	0.990	mg/Kg	3						
2-Chloronaphthalene	ND	0.990	mg/Kg	3						
2-Chlorophenol	ND	0.990	mg/Kg	3						
2-Methylnaphthalene	ND	0.990	mg/Kg	3						
2-Methylphenol	ND	0.990	mg/Kg	3						
2-Naphthylamine	ND	0.990	mg/Kg	3						
2-Nitroaniline	ND	5.10	mg/Kg	3						
2-Nitrophenol	ND	0.990	mg/Kg	3						
2-Picoline	ND	0.990	mg/Kg	3						
3,3'-Dichlorobenzidine	ND	0.990	mg/Kg	3						
3-Methylcholanthrene	ND	0.990	mg/Kg	3						
3-Nitroaniline	ND	5.10	mg/Kg	3						
4,6-Dinitro-2-methylphenol	ND	5.10	mg/Kg	3						
4-Aminobiphenyl	ND	0.990	mg/Kg	3						
4-Bromophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Chloro-3-methylphenol	ND	0.990	mg/Kg	3						
4-Chloroaniline	ND	0.990	mg/Kg	3						
4-Chlorophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Methylphenol	ND	0.990	mg/Kg	3						
4-Nitroaniline	ND	0.990	mg/Kg	3						
4-Nitrophenol	ND	5.10	mg/Kg	3						
7,12-Dimethylbenz(a)anthracene	ND	0.990	mg/Kg	3						
a,a-Dimethylphenethylamine	ND	5.10	mg/Kg	3						
Acenaphthene	ND	0.990	mg/Kg	3						
Acenaphthylene	ND	0.990	mg/Kg	3						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-1
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0.00
Lab ID:	0008087-01A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
Acetophenone	ND	0.990	mg/Kg	3						
Aniline	ND	0.990	mg/Kg	3						
Anthracene	ND	0.990	mg/Kg	3						
Azobenzene	ND	0.990	mg/Kg	3						
Benz(a)anthracene	ND	0.990	mg/Kg	3						
Benzidine	ND	5.10	mg/Kg	3						
Benzo(a)pyrene	ND	0.990	mg/Kg	3						
Benzo(b)fluoranthene	ND	0.990	mg/Kg	3						
Benzo(g,h,i)perylene	ND	0.990	mg/Kg	3						
Benzo(k)fluoranthene	ND	0.990	mg/Kg	3						
Benzoic acid	ND	5.10	mg/Kg	3						
Benzyl alcohol	ND	0.990	mg/Kg	3						
Bis(2-chloroethoxy)methane	ND	0.990	mg/Kg	3						
Bis(2-chloroethyl)ether	ND	0.990	mg/Kg	3						
Bis(2-chloroisopropyl)ether	ND	0.990	mg/Kg	3						
Bis(2-ethylhexyl)phthalate	ND	0.990	mg/Kg	3						
Butyl benzyl phthalate	ND	0.990	mg/Kg	3						
Chrysene	ND	0.990	mg/Kg	3						
Di-n-butyl phthalate	ND	0.990	mg/Kg	3						
Di-n-octyl phthalate	ND	0.990	mg/Kg	3						
Dibenz(a,h)anthracene	ND	0.990	mg/Kg	3						
Dibenz(a,j)acridine	ND	0.990	mg/Kg	3						
Dibenzofuran	ND	0.990	mg/Kg	3						
Diethyl phthalate	ND	0.990	mg/Kg	3						
Dimethyl phthalate	ND	0.990	mg/Kg	3						
Ethyl methanesulfonate	ND	0.990	mg/Kg	3						
Fluoranthene	ND	0.990	mg/Kg	3						
Fluorene	ND	0.990	mg/Kg	3						
Hexachlorobenzene	ND	0.990	mg/Kg	3						
Hexachlorobutadiene	ND	0.990	mg/Kg	3						
Hexachlorocyclopentadiene	ND	0.990	mg/Kg	3						
Hexachloroethane	ND	0.990	mg/Kg	3						
Indeno(1,2,3-cd)pyrene	ND	0.990	mg/Kg	3						
Isophorone	ND	0.990	mg/Kg	3						
Methyl methanesulfonate	ND	0.990	mg/Kg	3						
N-Nitroso-di-n-butylamine	ND	0.990	mg/Kg	3						
N-Nitrosodi-n-propylamine	ND	0.990	mg/Kg	3						
N-Nitrosodimethylamine	ND	0.990	mg/Kg	3						
N-Nitrosodiphenylamine	ND,	0.990	mg/Kg	3						
N-Nitrosopiperidine	ND	0.990	mg/Kg	3						
Naphthalene	ND	0.990	mg/Kg	3						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-1
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0.00
Lab ID:	0008087-01A	**Matrix:**	SOIL

Analytes	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst QualNotes
Nitrobenzene	ND	0.990	mg/Kg	3				
p-Dimethylaminoazobenzene	ND	0.990	mg/Kg	3				
Pentachloronitrobenzene	ND	0.990	mg/Kg	3				
Pentachlorophenol	ND	5.10	mg/Kg	3				
Phenacetin	ND	0.990	mg/Kg	3				
Phenanthrene	ND	0.990	mg/Kg	3				
Phenol	ND	0.990	mg/Kg	3				
Pronamide	ND	0.990	mg/Kg	3				
Pyrene	ND	0.990	mg/Kg	3				
Pyridine	ND	0.990	mg/Kg	3				
Surr: 2,4,6-Tribromophenol	62.9	19-122	%REC	3	8/25/2000	8/26/2000	2540	
Surr: 2-Fluorobiphenyl	65.8	30-122	%REC	3				
Surr: 2-Fluorophenol	53.7	25-121	%REC	3				
Surr: 4-Terphenyl-d14	68.8	18-137	%REC	3				
Surr: Nitrobenzene-d5	56.0	23-120	%REC	3				
Surr: Phenol-d6	52.8	24-113	%REC	3				
TPH (FUEL FINGERPRINT)		SW8015M						
TPH (Diesel)	*NI*	25.0	mg/Kg	5	8/16/2000	8/19/2000	2485	AS
TPH (Jet A)	ND	25.0	mg/Kg	5				
TPH (JP-4)	ND	25.0	mg/Kg	5				
TPH (JP-5)	ND	25.0	mg/Kg	5				
TPH (Kerosene)	ND	25.0	mg/Kg	5				
TPH (Motor Oil)	*NI*	100	mg/Kg	5				
TPH (Paint Thinner)	ND	25.0	mg/Kg	5				
TPH (Unidentified Hydrocarbons as Diesel)	ND	25.0	mg/Kg	5				
TPH (Unidentified Hydrocarbons as Motor Oil)	*221*	100	mg/Kg	5				
Surr: Pentacosane	82.8	26.8-143	%REC	5				
TPH (GASOLINE)		SW8015M						
TPH (Gasoline)	ND	1.00	mg/Kg	1	8/18/2000	8/18/2000	R6355	KAL
Surr: a,a,a-Trifluorotoluene	81.2	70-130	%REC	1				

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* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-2
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0.00
Lab ID:	0008087-02A	**Matrix:**	SOIL

Analytes	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst QualNote
ICP METALS-RCRA, TOTAL		SW6010A						
Arsenic	*47.1*	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL
Barium	*170*	10.0	mg/Kg	1				
Cadmium	ND	2.00	mg/Kg	1				
Chromium	*43.8*	5.00	mg/Kg	1				
Lead	*883*	100	mg/Kg	5		8/21/2000		
Selenium	ND	20.0	mg/Kg	1		8/18/2000		
Silver	ND	5.00	mg/Kg	1				
MERCURY, TOTAL		SW7471						
Mercury	ND	0.200	mg/Kg	1	8/21/2000	8/22/2000	0060421	SUB
ORGANOCHLORINE PESTICIDES		SW8081						
4,4'-DDD	ND	0.0660	mg/Kg	20	8/18/2000	8/22/2000	2502	AS
4,4'-DDE	ND	0.0660	mg/Kg	20				
4,4'-DDT	*0.202*	0.0660	mg/Kg	20				
Aldrin	ND	0.0340	mg/Kg	20				
alpha BHC	ND	0.0340	mg/Kg	20				
beta BHC	ND	0.0340	mg/Kg	20				
Chlordane	ND	0.660	mg/Kg	20				
delta BHC	ND	0.0340	mg/Kg	20				
Dieldrin	ND	0.0660	mg/Kg	20				
Endosulfan I	ND	0.0340	mg/Kg	20				
Endosulfan II	ND	0.0660	mg/Kg	20				
Endosulfan sulfate	ND	0.0660	mg/Kg	20				
Endrin	ND	0.0660	mg/Kg	20				
Endrin aldehyde	ND	0.0660	mg/Kg	20				
gamma-BHC	ND	0.0340	mg/Kg	20				
Heptachlor	ND	0.0340	mg/Kg	20				
Heptachlor epoxide	ND	0.0340	mg/Kg	20				
Methoxychlor	ND	0.340	mg/Kg	20				
Toxaphene	ND	3.40	mg/Kg	20				
Surr: Decachlorobiphenyl	102	50-150	%REC	20				
Surr: Tetrachloro-m-xylene	74.8	50-150	%REC	20				

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-02A

Client Sample ID: NED-2
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
PCBS IN SOIL OR SOLID WASTE		SW8082								
Aroclor 1016	ND	0.0333	mg/Kg	1	8/17/2000	8/22/2000	2501	AS		
Aroclor 1221	ND	0.0667	mg/Kg	1						
Aroclor 1232	ND	0.0333	mg/Kg	1						
Aroclor 1242	ND	0.0333	mg/Kg	1						
Aroclor 1248	ND	0.0333	mg/Kg	1						
Aroclor 1254	ND	0.0333	mg/Kg	1						
Aroclor 1260	*0.179*	0.0333	mg/Kg	1						
Surr: Decachlorobiphenyl	79.5	50-150	%REC	1						
Surr: Tetrachloro-m-xylene	78.9	50-150	%REC	1						

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-02A

Client Sample ID: NED-2
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
SEMIVOLATILE ORGANICS		SW8270A								
1,2,4,5-Tetrachlorobenzene	ND	1.65	mg/Kg	5	8/16/2000	9/13/2000	2485	AS		
1,2,4-Trichlorobenzene	ND	1.65	mg/Kg	5						
1,2-Dichlorobenzene	ND	1.65	mg/Kg	5						
1,3-Dichlorobenzene	ND	1.65	mg/Kg	5						
1,4-Dichlorobenzene	ND	1.65	mg/Kg	5						
1-Chloronaphthalene	ND	1.65	mg/Kg	5						
1-Naphthylamine	ND	1.65	mg/Kg	5						
2,3,4,6-Tetrachlorophenol	ND	1.65	mg/Kg	5						
2,4,5-Trichlorophenol	ND	1.65	mg/Kg	5						
2,4,6-Trichlorophenol	ND	1.65	mg/Kg	5						
2,4-Dichlorophenol	ND	1.65	mg/Kg	5						
2,4-Dimethylphenol	ND	1.65	mg/Kg	5						
2,4-Dinitrophenol	ND	8.50	mg/Kg	5						
2,4-Dinitrotoluene	ND	1.65	mg/Kg	5						
2,6-Dichlorophenol	ND	1.65	mg/Kg	5						
2,6-Dinitrotoluene	ND	1.65	mg/Kg	5						
2-Chloronaphthalene	ND	1.65	mg/Kg	5						
2-Chlorophenol	ND	1.65	mg/Kg	5						
2-Methylnaphthalene	ND	1.65	mg/Kg	5						
2-Methylphenol	ND	1.65	mg/Kg	5						
2-Naphthylamine	ND	1.65	mg/Kg	5						
2-Nitroaniline	ND	8.50	mg/Kg	5						
2-Nitrophenol	ND	1.65	mg/Kg	5						
2-Picoline	ND	1.65	mg/Kg	5						
3,3'-Dichlorobenzidine	ND	1.65	mg/Kg	5						
3-Methylcholanthrene	ND	1.65	mg/Kg	5						
3-Nitroaniline	ND	8.50	mg/Kg	5						
4,6-Dinitro-2-methylphenol	ND	8.50	mg/Kg	5						
4-Aminobiphenyl	ND	1.65	mg/Kg	5						
4-Bromophenyl phenyl ether	ND	1.65	mg/Kg	5						
4-Chloro-3-methylphenol	ND	1.65	mg/Kg	5						
4-Chloroaniline	ND	1.65	mg/Kg	5						
4-Chlorophenyl phenyl ether	ND	1.65	mg/Kg	5						
4-Methylphenol	ND	1.65	mg/Kg	5						
4-Nitroaniline	ND	1.65	mg/Kg	5						
4-Nitrophenol	ND	8.50	mg/Kg	5						
7,12-Dimethylbenz(a)anthracene	ND	1.65	mg/Kg	5						
a,a-Dimethylphenethylamine	ND	8.50	mg/Kg	5						
Acenaphthene	ND	1.65	mg/Kg	5						
Acenaphthylene	ND	1.65	mg/Kg	5						

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-02A

Client Sample ID: NED-2
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
Acetophenone	ND	1.65	mg/Kg	5						
Aniline	ND	1.65	mg/Kg	5						
Anthracene	ND	1.65	mg/Kg	5						
Azobenzene	ND	1.65	mg/Kg	5						
Benz(a)anthracene	ND	1.65	mg/Kg	5						
Benzidine	ND	8.50	mg/Kg	5						
Benzo(a)pyrene	ND	1.65	mg/Kg	5						
Benzo(b)fluoranthene	ND	1.65	mg/Kg	5						
Benzo(g,h,i)perylene	ND	1.65	mg/Kg	5						
Benzo(k)fluoranthene	ND	1.65	mg/Kg	5						
Benzoic acid	ND	8.50	mg/Kg	5						
Benzyl alcohol	ND	1.65	mg/Kg	5						
Bis(2-chloroethoxy)methane	ND	1.65	mg/Kg	5						
Bis(2-chloroethyl)ether	ND	1.65	mg/Kg	5						
Bis(2-chloroisopropyl)ether	ND	1.65	mg/Kg	5						
Bis(2-ethylhexyl)phthalate	*2.67*	1.65	mg/Kg	5						
Butyl benzyl phthalate	ND	1.65	mg/Kg	5						
Chrysene	ND	1.65	mg/Kg	5						
Di-n-butyl phthalate	ND	1.65	mg/Kg	5						
Di-n-octyl phthalate	ND	1.65	mg/Kg	5						
Dibenz(a,h)anthracene	ND	1.65	mg/Kg	5						
Dibenz(a,j)acridine	ND	1.65	mg/Kg	5						
Dibenzofuran	ND	1.65	mg/Kg	5						
Diethyl phthalate	ND	1.65	mg/Kg	5						
Dimethyl phthalate	ND	1.65	mg/Kg	5						
Ethyl methanesulfonate	ND	1.65	mg/Kg	5						
Fluoranthene	ND	1.65	mg/Kg	5						
Fluorene	ND	1.65	mg/Kg	5						
Hexachlorobenzene	ND	1.65	mg/Kg	5						
Hexachlorobutadiene	ND	1.65	mg/Kg	5						
Hexachlorocyclopentadiene	ND	1.65	mg/Kg	5						
Hexachloroethane	ND	1.65	mg/Kg	5						
Indeno(1,2,3-cd)pyrene	ND	1.65	mg/Kg	5						
Isophorone	ND	1.65	mg/Kg	5						
Methyl methanesulfonate	ND	1.65	mg/Kg	5						
N-Nitroso-di-n-butylamine	ND	1.65	mg/Kg	5						
N-Nitrosodi-n-propylamine	ND	1.65	mg/Kg	5						
N-Nitrosodimethylamine	ND	1.65	mg/Kg	5						
N-Nitrosodiphenylamine	ND	1.65	mg/Kg	5						
N-Nitrosopiperidine	ND	1.65	mg/Kg	5						
Naphthalene	ND	1.65	mg/Kg	5						

Qualifiers:		
	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-02A

Client Sample ID: NED-2
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
Nitrobenzene	ND	1.65	mg/Kg	5						
p-Dimethylaminoazobenzene	ND	1.65	mg/Kg	5						
Pentachloronitrobenzene	ND	1.65	mg/Kg	5						
Pentachlorophenol	ND	8.50	mg/Kg	5						
Phenacetin	ND	1.65	mg/Kg	5						
Phenanthrene	ND	1.65	mg/Kg	5						
Phenol	ND	1.65	mg/Kg	5						
Pronamide	ND	1.65	mg/Kg	5						
Pyrene	ND	1.65	mg/Kg	5						
Pyridine	ND	1.65	mg/Kg	5						
Surr: 2,4,6-Tribromophenol	64.7	19-122	%REC	3	8/25/2000	8/26/2000	2540			
Surr: 2-Fluorobiphenyl	71.8	30-122	%REC	3						
Surr: 2-Fluorophenol	55.2	25-121	%REC	3						
Surr: 4-Terphenyl-d14	78.1	18-137	%REC	3						
Surr: Nitrobenzene-d5	61.2	23-120	%REC	3						
Surr: Phenol-d6	60.6	24-113	%REC	3						
TPH (FUEL FINGERPRINT)		SW8015M								
TPH (Diesel)	ND	25.0	mg/Kg	5	8/16/2000	8/19/2000	2485	AS		
TPH (Jet A)	ND	25.0	mg/Kg	5						
TPH (JP-4)	ND	25.0	mg/Kg	5						
TPH (JP-5)	ND	25.0	mg/Kg	5						
TPH (Kerosene)	ND	25.0	mg/Kg	5						
TPH (Motor Oil)	*NI*	100	mg/Kg	5						
TPH (Paint Thinner)	ND	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Diesel)	ND	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Motor Oil)	*221*	100	mg/Kg	5						
Surr: Pentacosane	72.9	26.8-143	%REC	5						
TPH (GASOLINE)		SW8015M								
TPH (Gasoline)	ND	1.00	mg/Kg	1	8/18/2000	8/18/2000	R6355	KAL		
Surr: a,a,a-Trifluorotoluene	80.5	70-130	%REC	1						

Qualifiers:		
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	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-03A

Client Sample ID: NED-3
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
ICP METALS-RCRA, TOTAL		SW6010A								
Arsenic	*114*	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL		
Barium	*114*	10.0	mg/Kg	1						
Cadmium	*2.48*	2.00	mg/Kg	1						
Chromium	*61.4*	5.00	mg/Kg	1						
Lead	*114*	20.0	mg/Kg	1						
Selenium	ND	20.0	mg/Kg	1						
Silver	ND	5.00	mg/Kg	1						
MERCURY, TOTAL		SW7471								
Mercury	ND	0.200	mg/Kg	1	8/21/2000	8/22/2000	0080421	SUB		
ORGANOCHLORINE PESTICIDES		SW8081								
4,4'-DDD	ND	0.0660	mg/Kg	20	8/18/2000	8/22/2000	2502	AS		
4,4'-DDE	ND	0.0660	mg/Kg	20						
4,4'-DDT	ND	0.0660	mg/Kg	20						
Aldrin	ND	0.0340	mg/Kg	20						
alpha BHC	ND	0.0340	mg/Kg	20						
beta BHC	ND	0.0340	mg/Kg	20						
Chlordane	ND	0.660	mg/Kg	20						
delta BHC	ND	0.0340	mg/Kg	20						
Dieldrin	ND	0.0660	mg/Kg	20						
Endosulfan I	ND	0.0340	mg/Kg	20						
Endosulfan II	ND	0.0660	mg/Kg	20						
Endosulfan sulfate	ND	0.0660	mg/Kg	20						
Endrin	ND	0.0660	mg/Kg	20						
Endrin aldehyde	ND	0.0660	mg/Kg	20						
gamma BHC	ND	0.0340	mg/Kg	20						
Heptachlor	ND	0.0340	mg/Kg	20						
Heptachlor epoxide	ND	0.0340	mg/Kg	20						
Methoxychlor	ND	0.340	mg/Kg	20						
Toxaphene	ND	3.40	mg/Kg	20						
Surr: Decachlorobiphenyl	91.5	50-150	%REC	20						
Surr: Tetrachloro-m-xylene	81.7	50-150	%REC	20						

Qualifiers:
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* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-03A

Client Sample ID: NED-3
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
PCBS IN SOIL OR SOLID WASTE		SW8082								
Aroclor 1016	ND	0.0333	mg/Kg	1	8/17/2000	8/22/2000	2501	AS		
Aroclor 1221	ND	0.0667	mg/Kg	1						
Aroclor 1232	ND	0.0333	mg/Kg	1						
Aroclor 1242	ND	0.0333	mg/Kg	1						
Aroclor 1248	ND	0.0333	mg/Kg	1						
Aroclor 1254	ND	0.0333	mg/Kg	1						
Aroclor 1260	ND	0.0333	mg/Kg	1						
Surr: Decachlorobiphenyl	81.9	50-150	%REC	1						
Surr: Tetrachloro-m-xylene	87.9	50-150	%REC	1						

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
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* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-3
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-03A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
SEMIVOLATILE ORGANICS		SW8270A								
1,2,4,5-Tetrachlorobenzene	ND	0.990	mg/Kg	3	8/16/2000	9/14/2000	2485	AS		
1,2,4-Trichlorobenzene	ND	0.990	mg/Kg	3						
1,2-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,3-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,4-Dichlorobenzene	ND	0.990	mg/Kg	3						
1-Chloronaphthalene	ND	0.990	mg/Kg	3						
1-Naphthylamine	ND	0.990	mg/Kg	3						
2,3,4,6-Tetrachlorophenol	ND	0.990	mg/Kg	3						
2,4,5-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4,6-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dimethylphenol	ND	0.990	mg/Kg	3						
2,4-Dinitrophenol	ND	5.10	mg/Kg	3						
2,4-Dinitrotoluene	ND	0.990	mg/Kg	3						
2,6-Dichlorophenol	ND	0.990	mg/Kg	3						
2,6-Dinitrotoluene	ND	0.990	mg/Kg	3						
2-Chloronaphthalene	ND	0.990	mg/Kg	3						
2-Chlorophenol	ND	0.990	mg/Kg	3						
2-Methylnaphthalene	ND	0.990	mg/Kg	3						
2-Methylphenol	ND	0.990	mg/Kg	3						
2-Naphthylamine	ND	0.990	mg/Kg	3						
2-Nitroaniline	ND	5.10	mg/Kg	3						
2-Nitrophenol	ND	0.990	mg/Kg	3						
2-Picoline	ND	0.990	mg/Kg	3						
3,3'-Dichlorobenzidine	ND	0.990	mg/Kg	3						
3-Methylcholanthrene	ND	0.990	mg/Kg	3						
3-Nitroaniline	ND	5.10	mg/Kg	3						
4,6-Dinitro-2-methylphenol	ND	5.10	mg/Kg	3						
4-Aminobiphenyl	ND	0.990	mg/Kg	3						
4-Bromophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Chloro-3-methylphenol	ND	0.990	mg/Kg	3						
4-Chloroaniline	ND	0.990	mg/Kg	3						
4-Chlorophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Methylphenol	ND	0.990	mg/Kg	3						
4-Nitroaniline	ND	0.990	mg/Kg	3						
4-Nitrophenol	ND	5.10	mg/Kg	3						
7,12-Dimethylbenz(a)anthracene	ND	0.990	mg/Kg	3						
a,a-Dimethylphenethylamine	ND	5.10	mg/Kg	3						
Acenaphthene	ND	0.990	mg/Kg	3						
Acenaphthylene	ND	0.990	mg/Kg	3						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-3
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-03A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
Acetophenone	ND	0.990	mg/Kg	3						
Aniline	ND	0.990	mg/Kg	3						
Anthracene	ND	0.990	mg/Kg	3						
Azobenzene	ND	0.990	mg/Kg	3						
Benz(a)anthracene	ND	0.990	mg/Kg	3						
Benzidine	ND	5.10	mg/Kg	3						
Benzo(a)pyrene	ND	0.990	mg/Kg	3						
Benzo(b)fluoranthene	ND	0.990	mg/Kg	3						
Benzo(g,h,i)perylene	ND	0.990	mg/Kg	3						
Benzo(k)fluoranthene	ND	0.990	mg/Kg	3						
Benzoic acid	ND	5.10	mg/Kg	3						
Benzyl alcohol	ND	0.990	mg/Kg	3						
Bis(2-chloroethoxy)methane	ND	0.990	mg/Kg	3						
Bis(2-chloroethyl)ether	ND	0.990	mg/Kg	3						
Bis(2-chloroisopropyl)ether	ND	0.990	mg/Kg	3						
Bis(2-ethylhexyl)phthalate	ND	0.990	mg/Kg	3						
Butyl benzyl phthalate	ND	0.990	mg/Kg	3						
Chrysene	ND	0.990	mg/Kg	3						
Di-n-butyl phthalate	ND	0.990	mg/Kg	3						
Di-n-octyl phthalate	ND	0.990	mg/Kg	3						
Dibenz(a,h)anthracene	ND	0.990	mg/Kg	3						
Dibenz(a,j)acridine	ND	0.990	mg/Kg	3						
Dibenzofuran	ND	0.990	mg/Kg	3						
Diethyl phthalate	ND	0.990	mg/Kg	3						
Dimethyl phthalate	ND	0.990	mg/Kg	3						
Ethyl methanesulfonate	ND	0.990	mg/Kg	3						
Fluoranthene	ND	0.990	mg/Kg	3						
Fluorene	ND	0.990	mg/Kg	3						
Hexachlorobenzene	ND	0.990	mg/Kg	3						
Hexachlorobutadiene	ND	0.990	mg/Kg	3						
Hexachlorocyclopentadiene	ND	0.990	mg/Kg	3						
Hexachloroethane	ND	0.990	mg/Kg	3						
Indeno(1,2,3-cd)pyrene	ND	0.990	mg/Kg	3						
Isophorone	ND	0.990	mg/Kg	3						
Methyl methanesulfonate	ND	0.990	mg/Kg	3						
N-Nitroso-di-n-butylamine	ND	0.990	mg/Kg	3						
N-Nitrosodi-n-propylamine	ND	0.990	mg/Kg	3						
N-Nitrosodimethylamine	ND	0.990	mg/Kg	3						
N-Nitrosodiphenylamine	ND	0.990	mg/Kg	3						
N-Nitrosopiperidine	ND	0.990	mg/Kg	3						
Naphthalene	ND	0.990	mg/Kg	3						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-03A

Client Sample ID: NED-3
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
Nitrobenzene	ND	0.990	mg/Kg	3						
p-Dimethylaminoazobenzene	ND	0.990	mg/Kg	3						
Pentachloronitrobenzene	ND	0.990	mg/Kg	3						
Pentachlorophenol	ND	5.10	mg/Kg	3						
Phenacetin	ND	0.990	mg/Kg	3						
Phenanthrene	ND	0.990	mg/Kg	3						
Phenol	ND	0.990	mg/Kg	3						
Pronamide	ND	0.990	mg/Kg	3						
Pyrene	ND	0.990	mg/Kg	3						
Pyridine	ND	0.990	mg/Kg	3						
Surr: 2,4,6-Tribromophenol	60.2	19-122	%REC	3	8/25/2000	8/26/2000	2540			
Surr: 2-Fluorobiphenyl	72.4	30-122	%REC	3						
Surr: 2-Fluorophenol	46.7	25-121	%REC	3						
Surr: 4-Terphenyl-d14	68.3	18-137	%REC	3						
Surr: Nitrobenzene-d5	59.5	23-120	%REC	3						
Surr: Phenol-d6	51.7	24-113	%REC	3						
TPH (FUEL FINGERPRINT)		SW8015M								
TPH (Diesel)	*NI*	25.0	mg/Kg	5	8/16/2000	8/19/2000	2485	AS		
TPH (Jet A)	ND	25.0	mg/Kg	5						
TPH (JP-4)	ND	25.0	mg/Kg	5						
TPH (JP-5)	ND	25.0	mg/Kg	5						
TPH (Kerosene)	ND	25.0	mg/Kg	5						
TPH (Motor Oil)	*NI*	100	mg/Kg	5						
TPH (Paint Thinner)	ND	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Diese	*26.0*	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Motor Oil)	*313*	100	mg/Kg	5						
Surr: Pentacosane	126	26.8-143	%REC	5						
TPH (GASOLINE)		SW8015M								
TPH (Gasoline)	ND	1.00	mg/Kg	1	8/21/2000	8/21/2000	R6383	KAL		
Surr: a,a,a-Trifluorotoluene	74.7	70-130	%REC	1						

Qualifiers:

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B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-04A

Client Sample ID: NED-4
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
ICP METALS-RCRA, TOTAL		SW6010A								
Arsenic	*16.5*	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL		
Barium	*104*	10.0	mg/Kg	1						
Cadmium	ND	2.00	mg/Kg	1						
Chromium	*45.2*	5.00	mg/Kg	1						
Lead	*93.4*	20.0	mg/Kg	1						
Selenium	ND	20.0	mg/Kg	1						
Silver	ND	5.00	mg/Kg	1						
MERCURY, TOTAL		SW7471								
Mercury	*0.229*	0.200	mg/Kg	1	8/21/2000	8/22/2000	0080421	SUB		
ORGANOCHLORINE PESTICIDES		SW8081								
4,4'-DDD	ND	0.0660	mg/Kg	20	8/18/2000	8/22/2000	2502	AS		
4,4'-DDE	ND	0.0660	mg/Kg	20						
4,4'-DDT	ND	0.0660	mg/Kg	20						
Aldrin	ND	0.0340	mg/Kg	20						
alpha-BHC	ND	0.0340	mg/Kg	20						
beta-BHC	ND	0.0340	mg/Kg	20						
Chlordane	ND	0.660	mg/Kg	20						
delta-BHC	ND	0.0340	mg/Kg	20						
Dieldrin	ND	0.0660	mg/Kg	20						
Endosulfan I	ND	0.0340	mg/Kg	20						
Endosulfan II	ND	0.0660	mg/Kg	20						
Endosulfan sulfate	ND	0.0660	mg/Kg	20						
Endrin	ND	0.0660	mg/Kg	20						
Endrin aldehyde	ND	0.0660	mg/Kg	20						
gamma-BHC	ND	0.0340	mg/Kg	20						
Heptachlor	ND	0.0340	mg/Kg	20						
Heptachlor epoxide	ND	0.0340	mg/Kg	20						
Methoxychlor	ND	0.340	mg/Kg	20						
Toxaphene	ND	3.40	mg/Kg	20						
Surr: Decachlorobiphenyl	64.9	50-150	%REC	20						
Surr: Tetrachloro-m-xylene	83.6	50-150	%REC	20						

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-4
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-04A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
PCBS IN SOIL OR SOLID WASTE		SW8082								
Aroclor 1016	ND	0.0333	mg/Kg	1	8/17/2000	8/22/2000	2501	AS		
Aroclor 1221	ND	0.0667	mg/Kg	1						
Aroclor 1232	ND	0.0333	mg/Kg	1						
Aroclor 1242	ND	0.0333	mg/Kg	1						
Aroclor 1248	ND	0.0333	mg/Kg	1						
Aroclor 1254	ND	0.0333	mg/Kg	1						
Aroclor 1260	*0.0507*	0.0333	mg/Kg	1						
Surr: Decachlorobiphenyl	68.7	50-150	%REC	1						
Surr: Tetrachloro-m-xylene	71.1	50-150	%REC	1						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-4
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-04A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
SEMIVOLATILE ORGANICS		SW8270A								
1,2,4,5-Tetrachlorobenzene	ND	0.990	mg/Kg	3	8/16/2000	9/14/2000	2485	AS		
1,2,4-Trichlorobenzene	ND	0.990	mg/Kg	3						
1,2-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,3-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,4-Dichlorobenzene	ND	0.990	mg/Kg	3						
1-Chloronaphthalene	ND	0.990	mg/Kg	3						
1-Naphthylamine	ND	0.990	mg/Kg	3						
2,3,4,6-Tetrachlorophenol	ND	0.990	mg/Kg	3						
2,4,5-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4,6-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dimethylphenol	ND	0.990	mg/Kg	3						
2,4-Dinitrophenol	ND	5.10	mg/Kg	3						
2,4-Dinitrotoluene	ND	0.990	mg/Kg	3						
2,6-Dichlorophenol	ND	0.990	mg/Kg	3						
2,6-Dinitrotoluene	ND	0.990	mg/Kg	3						
2-Chloronaphthalene	ND	0.990	mg/Kg	3						
2-Chlorophenol	ND	0.990	mg/Kg	3						
2-Methylnaphthalene	ND	0.990	mg/Kg	3						
2-Methylphenol	ND	0.990	mg/Kg	3						
2-Naphthylamine	ND	0.990	mg/Kg	3						
2-Nitroaniline	ND	5.10	mg/Kg	3						
2-Nitrophenol	ND	0.990	mg/Kg	3						
2-Picoline	ND	0.990	mg/Kg	3						
3,3'-Dichlorobenzidine	ND	0.990	mg/Kg	3						
3-Methylcholanthrene	ND	0.990	mg/Kg	3						
3-Nitroaniline	ND	5.10	mg/Kg	3						
4,6-Dinitro-2-methylphenol	ND	5.10	mg/Kg	3						
4-Aminobiphenyl	ND	0.990	mg/Kg	3						
4-Bromophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Chloro-3-methylphenol	ND	0.990	mg/Kg	3						
4-Chloroaniline	ND	0.990	mg/Kg	3						
4-Chlorophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Methylphenol	ND	0.990	mg/Kg	3						
4-Nitroaniline	ND	0.990	mg/Kg	3						
4-Nitrophenol	ND	5.10	mg/Kg	3						
7,12-Dimethylbenz(a)anthracene	ND	0.990	mg/Kg	3						
a,a-Dimethylphenethylamine	ND	5.10	mg/Kg	3						
Acenaphthene	ND	0.990	mg/Kg	3						
Acenaphthylene	ND	0.990	mg/Kg	3						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-4
Work Order:	0008037	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-04A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
Acetophenone	ND	0.990	mg/Kg	3						
Aniline	ND	0.990	mg/Kg	3						
Anthracene	ND	0.990	mg/Kg	3						
Azobenzene	ND	0.990	mg/Kg	3						
Benz(a)anthracene	ND	0.990	mg/Kg	3						
Benzidine	ND	5.10	mg/Kg	3						
Benzo(a)pyrene	ND	0.990	mg/Kg	3						
Benzo(b)fluoranthene	ND	0.990	mg/Kg	3						
Benzo(g,h,i)perylene	ND	0.990	mg/Kg	3						
Benzo(k)fluoranthene	ND	0.990	mg/Kg	3						
Benzoic acid	ND	5.10	mg/Kg	3						
Benzyl alcohol	ND	0.990	mg/Kg	3						
Bis(2-chloroethoxy)methane	ND	0.990	mg/Kg	3						
Bis(2-chloroethyl)ether	ND	0.990	mg/Kg	3						
Bis(2-chloroisopropyl)ether	ND	0.990	mg/Kg	3						
Bis(2-ethylhexyl)phthalate	*4.82*	0.990	mg/Kg	3						
Butyl benzyl phthalate	ND	0.990	mg/Kg	3						
Chrysene	ND	0.990	mg/Kg	3						
Di-n-butyl phthalate	ND	0.990	mg/Kg	3						
Di-n-octyl phthalate	ND	0.990	mg/Kg	3						
Dibenz(a,h)anthracene	ND	0.990	mg/Kg	3						
Dibenz(a,j)acridine	ND	0.990	mg/Kg	3						
Dibenzofuran	ND	0.990	mg/Kg	3						
Diethyl phthalate	ND	0.990	mg/Kg	3						
Dimethyl phthalate	ND	0.990	mg/Kg	3						
Ethyl methanesulfonate	ND	0.990	mg/Kg	3						
Fluoranthene	ND	0.990	mg/Kg	3						
Fluorene	ND	0.990	mg/Kg	3						
Hexachlorobenzene	ND	0.990	mg/Kg	3						
Hexachlorobutadiene	ND	0.990	mg/Kg	3						
Hexachlorocyclopentadiene	ND	0.990	mg/Kg	3						
Hexachloroethane	ND	0.990	mg/Kg	3						
Indeno(1,2,3-cd)pyrene	ND	0.990	mg/Kg	3						
Isophorone	ND	0.990	mg/Kg	3						
Methyl methanesulfonate	ND	0.990	mg/Kg	3						
N-Nitroso-di-n-butylamine	ND	0.990	mg/Kg	3						
N-Nitrosodi-n-propylamine	ND	0.990	mg/Kg	3						
N-Nitrosodimethylamine	ND	0.990	mg/Kg	3						
N-Nitrosodiphenylamine	ND	0.990	mg/Kg	3						
N-Nitrosopiperidine	ND	0.990	mg/Kg	3						
Naphthalene	ND	0.990	mg/Kg	3						

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-4
Work Order:	0008037	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-04A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
Nitrobenzene	ND	0.990	mg/Kg	3						
p-Dimethylaminoazobenzene	ND	0.990	mg/Kg	3						
Pentachloronitrobenzene	ND	0.990	mg/Kg	3						
Pentachlorophenol	ND	5.10	mg/Kg	3						
Phenacetin	ND	0.990	mg/Kg	3						
Phenanthrene	ND	0.990	mg/Kg	3						
Phenol	ND	0.990	mg/Kg	3						
Pronamide	ND	0.990	mg/Kg	3						
Pyrene	ND	0.990	mg/Kg	3						
Pyridine	ND	0.990	mg/Kg	3						
Surr: 2,4,6-Tribromophenol	43.3	19-122	%REC	3	8/25/2000	8/26/2000	2540			
Surr: 2-Fluorobiphenyl	45.9	30-122	%REC	3						
Surr: 2-Fluorophenol	35.1	25-121	%REC	3						
Surr: 4-Terphenyl-d14	52.6	18-137	%REC	3						
Surr: Nitrobenzene-d5	38.8	23-120	%REC	3						
Surr: Phenol-d6	35.3	24-113	%REC	3						
TPH (FUEL FINGERPRINT)		SW8015M								
TPH (Diesel)	*NI*	25.0	mg/Kg	5	8/16/2000	8/19/2000	2485	AS		
TPH (Jet A)	ND	25.0	mg/Kg	5						
TPH (JP-4)	ND	25.0	mg/Kg	5						
TPH (JP-5)	ND	25.0	mg/Kg	5						
TPH (Kerosene)	ND	25.0	mg/Kg	5						
TPH (Motor Oil)	*NI*	100	mg/Kg	5						
TPH (Paint Thinner)	ND	25.0	mg/Kg	5						
TPH (Unidentifed Hydrocarbons as Diese	*43.8*	25.0	mg/Kg	5						
TPH (Unidentifed Hydrocarbons as Motor Oil)	*444*	100	mg/Kg	5						
Surr: Pentacosane	91.6	26.8-143	%REC	5						
TPH (GASOLINE)		SW8015M								
TPH (Gasoline)	ND	1.00	mg/Kg	1	8/21/2000	8/21/2000	R6385	KAL		
Surr: a,a,a-Trifluorotoluene	79.7	70-130	%REC	1						

Qualifiers:

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R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-05A

Client Sample ID: NED-5
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
ICP METALS-RCRA, TOTAL		SW6010A								
Arsenic	*25.8*	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL		
Barium	*107*	10.0	mg/Kg	1						
Cadmium	*2.73*	2.00	mg/Kg	1						
Chromium	*50.9*	5.00	mg/Kg	1						
Lead	*307*	20.0	mg/Kg	1						
Selenium	ND	20.0	mg/Kg	1						
Silver	ND	5.00	mg/Kg	1						
MERCURY, TOTAL		SW7471								
Mercury	ND	0.200	mg/Kg	1	8/21/2000	8/22/2000	0080421	SUD		
ORGANOCHLORINE PESTICIDES		SW8081								
4,4'-DDD	ND	0.0660	mg/Kg	20	8/18/2000	8/22/2000	2502	AS		
4,4'-DDE	ND	0.0660	mg/Kg	20						
4,4'-DDT	ND	0.0660	mg/Kg	20						
Aldrin	ND	0.0340	mg/Kg	20						
alpha BHC	ND	0.0340	mg/Kg	20						
beta-BHC	ND	0.0340	mg/Kg	20						
Chlordane	ND	0.660	mg/Kg	20						
delta-BHC	ND	0.0340	mg/Kg	20						
Dieldrin	ND	0.0660	mg/Kg	20						
Endosulfan I	ND	0.0340	mg/Kg	20						
Endosulfan II	ND	0.0660	mg/Kg	20						
Endosulfan sulfate	ND	0.0660	mg/Kg	20						
Endrin	ND	0.0660	mg/Kg	20						
Endrin aldehyde	ND	0.0660	mg/Kg	20						
gamma-BHC	ND	0.0340	mg/Kg	20						
Heptachlor	ND	0.0340	mg/Kg	20						
Heptachlor epoxide	ND	0.0340	mg/Kg	20						
Methoxychlor	ND	0.340	mg/Kg	20						
Toxaphene	ND	3.40	mg/Kg	20						
Surr: Decachlorobiphenyl	117	50-150	%REC	20						
Surr: Tetrachloro-m-xylene	59.5	50-150	%REC	20						

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-05A

Client Sample ID: NED-5
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
PCBS IN SOIL OR SOLID WASTE		SW8082								
Aroclor 1016	ND	0.0333	mg/Kg	1	8/17/2000	8/22/2000	2501	AS		
Aroclor 1221	ND	0.0667	mg/Kg	1						
Aroclor 1232	ND	0.0333	mg/Kg	1						
Aroclor 1242	ND	0.0333	mg/Kg	1						
Aroclor 1248	ND	0.0333	mg/Kg	1						
Aroclor 1254	ND	0.0333	mg/Kg	1						
Aroclor 1260	*0.110*	0.0333	mg/Kg	1						
Surr: Decachlorobiphenyl	103	50-150	%REC	1						
Surr: Tetrachloro-m-xylene	73.2	50-150	%REC	1						

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-5
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-05A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
SEMIVOLATILE ORGANICS		SW8270A								
1,2,4,5-Tetrachlorobenzene	ND	0.990	mg/Kg	3	8/16/2000	9/14/2000	2485	AS		
1,2,4-Trichlorobenzene	ND	0.990	mg/Kg	3						
1,2-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,3-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,4-Dichlorobenzene	ND	0.990	mg/Kg	3						
1-Chloronaphthalene	ND	0.990	mg/Kg	3						
1-Naphthylamine	ND	0.990	mg/Kg	3						
2,3,4,6-Tetrachlorophenol	ND	0.990	mg/Kg	3						
2,4,5-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4,6-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dimethylphenol	ND	0.990	mg/Kg	3						
2,4-Dinitrophenol	ND	5.10	mg/Kg	3						
2,4-Dinitrotoluene	ND	0.990	mg/Kg	3						
2,6-Dichlorophenol	ND	0.990	mg/Kg	3						
2,6-Dinitrotoluene	ND	0.990	mg/Kg	3						
2-Chloronaphthalene	ND	0.990	mg/Kg	3						
2-Chlorophenol	ND	0.990	mg/Kg	3						
2-Methylnaphthalene	ND	0.990	mg/Kg	3						
2-Methylphenol	ND	0.990	mg/Kg	3						
2-Naphthylamine	ND	0.990	mg/Kg	3						
2-Nitroaniline	ND	5.10	mg/Kg	3						
2-Nitrophenol	ND	0.990	mg/Kg	3						
2-Picoline	ND	0.990	mg/Kg	3						
3,3'-Dichlorobenzidine	ND	0.990	mg/Kg	3						
3-Methylcholanthrene	ND	0.990	mg/Kg	3						
3-Nitroaniline	ND	5.10	mg/Kg	3						
4,6-Dinitro-2-methylphenol	ND	5.10	mg/Kg	3						
4-Aminobiphenyl	ND	0.990	mg/Kg	3						
4-Bromophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Chloro-3-methylphenol	ND	0.990	mg/Kg	3						
4-Chloroaniline	ND	0.990	mg/Kg	3						
4-Chlorophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Methylphenol	ND	0.990	mg/Kg	3						
4-Nitroaniline	ND	0.990	mg/Kg	3						
4-Nitrophenol	ND	5.10	mg/Kg	3						
7,12-Dimethylbenz(a)anthracene	ND	0.990	mg/Kg	3						
a,a-Dimethylphenethylamine	ND	5.10	mg/Kg	3						
Acenaphthene	ND	0.990	mg/Kg	3						
Acenaphthylene	ND	0.990	mg/Kg	3						

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-5
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-05A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
Acetophenone	ND	0.990	mg/Kg	3						
Aniline	ND	0.990	mg/Kg	3						
Anthracene	ND	0.990	mg/Kg	3						
Azobenzene	ND	0.990	mg/Kg	3						
Benz(a)anthracene	ND	0.990	mg/Kg	3						
Benzidine	ND	5.10	mg/Kg	3						
Benzo(a)pyrene	ND	0.990	mg/Kg	3						
Benzo(b)fluoranthene	ND	0.990	mg/Kg	3						
Benzo(g,h,i)perylene	ND	0.990	mg/Kg	3						
Benzo(k)fluoranthene	ND	0.990	mg/Kg	3						
Benzoic acid	ND	5.10	mg/Kg	3						
Benzyl alcohol	ND	0.990	mg/Kg	3						
Bis(2-chloroethoxy)methane	ND	0.990	mg/Kg	3						
Bis(2-chloroethyl)ether	ND	0.990	mg/Kg	3						
Bis(2-chloroisopropyl)ether	ND	0.990	mg/Kg	3						
Bis(2-ethylhexyl)phthalate	*2.05*	0.990	mg/Kg	3						
Butyl benzyl phthalate	ND	0.990	mg/Kg	3						
Chrysene	ND	0.990	mg/Kg	3						
Di-n-butyl phthalate	ND	0.990	mg/Kg	3						
Di-n-octyl phthalate	ND	0.990	mg/Kg	3						
Dibenz(a,h)anthracene	ND	0.990	mg/Kg	3						
Dibenz(a,j)acridine	ND	0.990	mg/Kg	3						
Dibenzofuran	ND	0.990	mg/Kg	3						
Diethyl phthalate	ND	0.990	mg/Kg	3						
Dimethyl phthalate	ND	0.990	mg/Kg	3						
Ethyl methanesulfonate	ND	0.990	mg/Kg	3						
Fluoranthene	ND	0.990	mg/Kg	3						
Fluorene	ND	0.990	mg/Kg	3						
Hexachlorobenzene	ND	0.990	mg/Kg	3						
Hexachlorobutadiene	ND	0.990	mg/Kg	3						
Hexachlorocyclopentadiene	ND	0.990	mg/Kg	3						
Hexachloroethane	ND	0.990	mg/Kg	3						
Indeno(1,2,3-cd)pyrene	ND	0.990	mg/Kg	3						
Isophorone	ND	0.990	mg/Kg	3						
Methyl methanesulfonate	ND	0.990	mg/Kg	3						
N-Nitroso-di-n-butylamine	ND	0.990	mg/Kg	3						
N-Nitrosodi-n-propylamine	ND	0.990	mg/Kg	3						
N-Nitrosodimethylamine	ND	0.990	mg/Kg	3						
N-Nitrosodiphenylamine	ND	0.990	mg/Kg	3						
N-Nitrosopiperidine	ND	0.990	mg/Kg	3						
Naphthalene	ND	0.990	mg/Kg	3						

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-5
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-05A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
Nitrobenzene	ND	0.990	mg/Kg	3						
p-Dimethylaminoazobenzene	ND	0.990	mg/Kg	3						
Pentachloronitrobenzene	ND	0.990	mg/Kg	3						
Pentachlorophenol	ND	5.10	mg/Kg	3						
Phenacetin	ND	0.990	mg/Kg	3						
Phenanthrene	ND	0.990	mg/Kg	3						
Phenol	ND	0.990	mg/Kg	3						
Pronamide	ND	0.990	mg/Kg	3						
Pyrene	ND	0.990	mg/Kg	3						
Pyridine	ND	0.990	mg/Kg	3						
Surr: 2,4,6-Tribromophenol	63.5	19-122	%REC	3	8/25/2000	8/26/2000	2540			
Surr: 2-Fluorobiphenyl	65.4	30-122	%REC	3						
Surr: 2-Fluorophenol	50.0	25-121	%REC	3						
Surr: 4-Terphenyl-d14	77.2	18-137	%REC	3						
Surr: Nitrobenzene-d5	57.8	23-120	%REC	3						
Surr: Phenol-d6	54.2	24-113	%REC	3						
TPH (FUEL FINGERPRINT)		SW8015M								
TPH (Diesel)	*NI*	25.0	mg/Kg	5	8/16/2000	8/19/2000	2485	AS		
TPH (Jet A)	ND	25.0	mg/Kg	5						
TPH (JP-4)	ND	25.0	mg/Kg	5						
TPH (JP-5)	ND	25.0	mg/Kg	5						
TPH (Kerosene)	ND	25.0	mg/Kg	5						
TPH (Motor Oil)	*NI*	100	mg/Kg	5						
TPH (Paint Thinner)	ND	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Diese	*40.9*	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Motor Oil)	*318*	100	mg/Kg	5						
Surr: Pentacosane	117	26.8-143	%REC	5						
TPH (GASOLINE)		SW8015M								
TPH (Gasoline)	ND	1.00	mg/Kg	1	8/18/2000	8/18/2000	R6355	KAL		
Surr: a,a,a-Trifluorotoluene	74.6	70-130	%REC	1						

Qualifiers:		
	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-6
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-06A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
ICP METALS-RCRA, TOTAL		SW6010A								
Arsenic	*12.6*	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL		
Barium	*84.3*	10.0	mg/Kg	1						
Cadmium	ND	2.00	mg/Kg	1						
Chromium	*71.8*	5.00	mg/Kg	1						
Lead	*38.8*	20.0	mg/Kg	1						
Selenium	ND	20.0	mg/Kg	1						
Silver	ND	5.00	mg/Kg	1						
MERCURY, TOTAL		SW7471								
Mercury	ND	0.200	mg/Kg	1	8/21/2000	8/22/2000	0080421	SUB		
ORGANOCHLORINE PESTICIDES		SW8081								
4,4'-DDD	ND	0.0660	mg/Kg	20	8/18/2000	8/22/2000	2502	AS		
4,4'-DDE	ND	0.0660	mg/Kg	20						
4,4'-DDT	ND	0.0660	mg/Kg	20						
Aldrin	ND	0.0340	mg/Kg	20						
alpha BHC	ND	0.0340	mg/Kg	20						
beta BHC	ND	0.0340	mg/Kg	20						
Chlordane	ND	0.660	mg/Kg	20						
delta BHC	ND	0.0340	mg/Kg	20						
Dieldrin	ND	0.0660	mg/Kg	20						
Endosulfan I	ND	0.0340	mg/Kg	20						
Endosulfan II	ND	0.0660	mg/Kg	20						
Endosulfan sulfate	ND	0.0660	mg/Kg	20						
Endrin	ND	0.0660	mg/Kg	20						
Endrin aldehyde	ND	0.0660	mg/Kg	20						
gamma BHC	ND	0.0340	mg/Kg	20						
Heptachlor	ND	0.0340	mg/Kg	20						
Heptachlor epoxide	ND	0.0340	mg/Kg	20						
Methoxychlor	ND	0.340	mg/Kg	20						
Toxaphene	ND	3.40	mg/Kg	20						
Surr: Decachlorobiphenyl	145	50-150	%REC	20						
Surr: Tetrachloro-m-xylene	70.0	50-150	%REC	20						

Qualifiers:		
	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-6
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-06A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
PCBS IN SOIL OR SOLID WASTE		SW8082								
Aroclor 1016	ND	0.0333	mg/Kg	1	8/17/2000	8/23/2000	2501	AS		
Aroclor 1221	ND	0.0667	mg/Kg	1						
Aroclor 1232	ND	0.0333	mg/Kg	1						
Aroclor 1242	ND	0.0333	mg/Kg	1						
Aroclor 1248	ND	0.0333	mg/Kg	1						
Aroclor 1254	ND	0.0333	mg/Kg	1						
Aroclor 1260	*0.247*	0.0333	mg/Kg	1						
Surr: Decachlorobiphenyl	137	50-150	%REC	1						
Surr: Tetrachloro-m-xylene	77.4	50-150	%REC	1						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-6
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-06A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
SEMIVOLATILE ORGANICS		SW8270A								
1,2,4,5-Tetrachlorobenzene	ND	0.990	mg/Kg	3	8/16/2000	9/14/2000	2485	AS		
1,2,4-Trichlorobenzene	ND	0.990	mg/Kg	3						
1,2-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,3-Dichlorobenzene	ND	0.990	mg/Kg	3						
1,4-Dichlorobenzene	ND	0.990	mg/Kg	3						
1-Chloronaphthalene	ND	0.990	mg/Kg	3						
1-Naphthylamine	ND	0.990	mg/Kg	3						
2,3,4,6-Tetrachlorophenol	ND	0.990	mg/Kg	3						
2,4,5-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4,6-Trichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dichlorophenol	ND	0.990	mg/Kg	3						
2,4-Dimethylphenol	ND	0.990	mg/Kg	3						
2,4-Dinitrophenol	ND	5.10	mg/Kg	3						
2,4-Dinitrotoluene	ND	0.990	mg/Kg	3						
2,6-Dichlorophenol	ND	0.990	mg/Kg	3						
2,6-Dinitrotoluene	ND	0.990	mg/Kg	3						
2-Chloronaphthalene	ND	0.990	mg/Kg	3						
2-Chlorophenol	ND	0.990	mg/Kg	3						
2-Methylnaphthalene	ND	0.990	mg/Kg	3						
2-Methylphenol	ND	0.990	mg/Kg	3						
2-Naphthylamine	ND	0.990	mg/Kg	3						
2-Nitroaniline	ND	5.10	mg/Kg	3						
2-Nitrophenol	ND	0.990	mg/Kg	3						
2-Picoline	ND	0.990	mg/Kg	3						
3,3'-Dichlorobenzidine	ND	0.990	mg/Kg	3						
3-Methylcholanthrene	ND	0.990	mg/Kg	3						
3-Nitroaniline	ND	5.10	mg/Kg	3						
4,6-Dinitro-2-methylphenol	ND	5.10	mg/Kg	3						
4-Aminobiphenyl	ND	0.990	mg/Kg	3						
4-Bromophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Chloro-3-methylphenol	ND	0.990	mg/Kg	3						
4-Chloroaniline	ND	0.990	mg/Kg	3						
4-Chlorophenyl phenyl ether	ND	0.990	mg/Kg	3						
4-Methylphenol	ND	0.990	mg/Kg	3						
4-Nitroaniline	ND	0.990	mg/Kg	3						
4-Nitrophenol	ND	5.10	mg/Kg	3						
7,12-Dimethylbenz(a)anthracene	ND	0.990	mg/Kg	3						
a,a-Dimethylphenethylamine	ND	5.10	mg/Kg	3						
Acenaphthene	ND	0.990	mg/Kg	3						
Acenaphthylene	ND	0.990	mg/Kg	3						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-6
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-06A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
Acetophenone	ND	0.990	mg/Kg	3						
Aniline	ND	0.990	mg/Kg	3						
Anthracene	ND	0.990	mg/Kg	3						
Azobenzene	ND	0.990	mg/Kg	3						
Benz(a)anthracene	ND	0.990	mg/Kg	3						
Benzidine	ND	5.10	mg/Kg	3						
Benzo(a)pyrene	ND	0.990	mg/Kg	3						
Benzo(b)fluoranthene	ND	0.990	mg/Kg	3						
Benzo(g,h,i)perylene	ND	0.990	mg/Kg	3						
Benzo(k)fluoranthene	ND	0.990	mg/Kg	3						
Benzoic acid	ND	5.10	mg/Kg	3						
Benzyl alcohol	ND	0.990	mg/Kg	3						
Bis(2-chloroethoxy)methane	ND	0.990	mg/Kg	3						
Bis(2-chloroethyl)ether	ND	0.990	mg/Kg	3						
Bis(2-chloroisopropyl)ether	ND	0.990	mg/Kg	3						
Bis(2-ethylhexyl)phthalate	ND	0.990	mg/Kg	3						
Butyl benzyl phthalate	ND	0.990	mg/Kg	3						
Chrysene	ND	0.990	mg/Kg	3						
Di-n-butyl phthalate	ND	0.990	mg/Kg	3						
Di-n-octyl phthalate	ND	0.990	mg/Kg	3						
Dibenz(a,h)anthracene	ND	0.990	mg/Kg	3						
Dibenz(a,j)acridine	ND	0.990	mg/Kg	3						
Dibenzofuran	ND	0.990	mg/Kg	3						
Diethyl phthalate	ND	0.990	mg/Kg	3						
Dimethyl phthalate	ND	0.990	mg/Kg	3						
Ethyl methanesulfonate	ND	0.990	mg/Kg	3						
Fluoranthene	ND	0.990	mg/Kg	3						
Fluorene	ND	0.990	mg/Kg	3						
Hexachlorobenzene	ND	0.990	mg/Kg	3						
Hexachlorobutadiene	ND	0.990	mg/Kg	3						
Hexachlorocyclopentadiene	ND	0.990	mg/Kg	3						
Hexachloroethane	ND	0.990	mg/Kg	3						
Indeno(1,2,3-cd)pyrene	ND	0.990	mg/Kg	3						
Isophorone	ND	0.990	mg/Kg	3						
Methyl methanesulfonate	ND	0.990	mg/Kg	3						
N-Nitroso-di-n-butylamine	ND	0.990	mg/Kg	3						
N-Nitrosodi-n-propylamine	ND	0.990	mg/Kg	3						
N-Nitrosodimethylamine	ND	0.990	mg/Kg	3						
N-Nitrosodiphenylamine	ND	0.990	mg/Kg	3						
N-Nitrosopiperidine	ND	0.990	mg/Kg	3						
Naphthalene	ND	0.990	mg/Kg	3						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-6
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-06A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
Nitrobenzene	ND	0.990	mg/Kg	3						
p-Dimethylaminoazobenzene	ND	0.990	mg/Kg	3						
Pentachloronitrobenzene	ND	0.990	mg/Kg	3						
Pentachlorophenol	ND	5.10	mg/Kg	3						
Phenacetin	ND	0.990	mg/Kg	3						
Phenanthrene	ND	0.990	mg/Kg	3						
Phenol	ND	0.990	mg/Kg	3						
Pronamide	ND	0.990	mg/Kg	3						
Pyrene	ND	0.990	mg/Kg	3						
Pyridine	ND	0.990	mg/Kg	3						
Surr: 2,4,6-Tribromophenol	49.5	19-122	%REC	3	8/25/2000	8/26/2000	2540			
Surr: 2-Fluorobiphenyl	44.9	30-122	%REC	3						
Surr: 2-Fluorophenol	38.0	25-121	%REC	3						
Surr: 4-Terphenyl-d14	58.6	18-137	%REC	3						
Surr: Nitrobenzene-d5	42.7	23-120	%REC	3						
Surr: Phenol-d5	39.8	24-113	%REC	3						
TPH (FUEL FINGERPRINT)		SW8015M								
TPH (Diesel)	*NI*	25.0	mg/Kg	5	8/16/2000	8/19/2000	2485	AS		
TPH (Jet A)	ND	25.0	mg/Kg	5						
TPH (JP-4)	ND	25.0	mg/Kg	5						
TPH (JP-5)	ND	25.0	mg/Kg	5						
TPH (Kerosene)	ND	25.0	mg/Kg	5						
TPH (Motor Oil)	*NI*	100	mg/Kg	5						
TPH (Paint Thinner)	ND	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Diese	*45.8*	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Motor Oil)	*468*	100	mg/Kg	5						
Surr: Pentacosane	108	26.8-143	%REC	5						
TPH (GASOLINE)		SW8015M								
TPH (Gasoline)	ND	1.00	mg/Kg	1	8/21/2000	8/21/2000	R6398	KAL		
Surr: a,a,a-Trifluorotoluene	87.0	70-130	%REC	1						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-7
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0.00
Lab ID:	0008087-07A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
ICP METALS-RCRA, TOTAL		SW6010A								
Arsenic	6.17	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL		
Barium	56.7	10.0	mg/Kg	1						
Cadmium	ND	2.00	mg/Kg	1						
Chromium	42.1	5.00	mg/Kg	1						
Lead	22.2	20.0	mg/Kg	1						
Selenium	ND	20.0	mg/Kg	1						
Silver	ND	5.00	mg/Kg	1						
MERCURY, TOTAL		SW7471								
Mercury	ND	0.200	mg/Kg	1	8/21/2000	8/22/2000	0080421	SUB		
ORGANOCHLORINE PESTICIDES		SW8081								
4,4'-DDD	ND	0.0660	mg/Kg	20	8/18/2000	8/22/2000	2502	AS		
4,4'-DDE	ND	0.0660	mg/Kg	20						
4,4'-DDT	ND	0.0660	mg/Kg	20						
Aldrin	ND	0.0340	mg/Kg	20						
alpha-BHC	ND	0.0340	mg/Kg	20						
beta-BHC	ND	0.0340	mg/Kg	20						
Chlordane	ND	0.660	mg/Kg	20						
delta-BHC	ND	0.0340	mg/Kg	20						
Dieldrin	ND	0.0660	mg/Kg	20						
Endosulfan I	ND	0.0340	mg/Kg	20						
Endosulfan II	ND	0.0660	mg/Kg	20						
Endosulfan sulfate	ND	0.0660	mg/Kg	20						
Endrin	ND	0.0660	mg/Kg	20						
Endrin aldehyde	ND	0.0660	mg/Kg	20						
gamma-BHC	ND	0.0340	mg/Kg	20						
Heptachlor	ND	0.0340	mg/Kg	20						
Heptachlor epoxide	ND	0.0340	mg/Kg	20						
Methoxychlor	ND	0.340	mg/Kg	20						
Toxaphene	ND	3.40	mg/Kg	20						
Surr: Decachlorobiphenyl	66.3	50-150	%REC	20						
Surr: Tetrachloro-m-xylene	76.6	50-150	%REC	20						

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-7
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0.00
Lab ID:	0008087-07A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
PCBS IN SOIL OR SOLID WASTE		SW8082								
Aroclor 1016	ND	0.0333	mg/Kg	1	8/17/2000	8/22/2000	2501	AS		
Aroclor 1221	ND	0.0667	mg/Kg	1						
Aroclor 1232	ND	0.0333	mg/Kg	1						
Aroclor 1242	ND	0.0333	mg/Kg	1						
Aroclor 1248	ND	0.0333	mg/Kg	1						
Aroclor 1254	ND	0.0333	mg/Kg	1						
Aroclor 1260	ND	0.0333	mg/Kg	1						
Surr: Decachlorobiphenyl	79.2	50-150	%REC	1						
Surr: Tetrachloro-m-xylene	75.0	50-150	%REC	1						

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-7
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-07A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual Note
SEMIVOLATILE ORGANICS			SW8270A						
1,2,4,5-Tetrachlorobenzene	ND	3.30	mg/Kg	10	8/16/2000	9/14/2000	2485	AS	
1,2,4-Trichlorobenzene	ND	3.30	mg/Kg	10					
1,2-Dichlorobenzene	ND	3.30	mg/Kg	10					
1,3-Dichlorobenzene	ND	3.30	mg/Kg	10					
1,4-Dichlorobenzene	ND	3.30	mg/Kg	10					
1-Chloronaphthalene	ND	3.30	mg/Kg	10					
1-Naphthylamine	ND	3.30	mg/Kg	10					
2,3,4,6-Tetrachlorophenol	ND	3.30	mg/Kg	10					
2,4,5-Trichlorophenol	ND	3.30	mg/Kg	10					
2,4,6-Trichlorophenol	ND	3.30	mg/Kg	10					
2,4-Dichlorophenol	ND	3.30	mg/Kg	10					
2,4-Dimethylphenol	ND	3.30	mg/Kg	10					
2,4-Dinitrophenol	ND	17.0	mg/Kg	10					
2,4-Dinitrotoluene	ND	3.30	mg/Kg	10					
2,6-Dichlorophenol	ND	3.30	mg/Kg	10					
2,6-Dinitrotoluene	ND	3.30	mg/Kg	10					
2-Chloronaphthalene	ND	3.30	mg/Kg	10					
2-Chlorophenol	ND	3.30	mg/Kg	10					
2-Methylnaphthalene	ND	3.30	mg/Kg	10					
2-Methylphenol	ND	3.30	mg/Kg	10					
2-Naphthylamine	ND	3.30	mg/Kg	10					
2-Nitroaniline	ND	17.0	mg/Kg	10					
2-Nitrophenol	ND	3.30	mg/Kg	10					
2-Picoline	ND	3.30	mg/Kg	10					
3,3'-Dichlorobenzidine	ND	3.30	mg/Kg	10					
3-Methylcholanthrene	ND	3.30	mg/Kg	10					
3-Nitroaniline	ND	17.0	mg/Kg	10					
4,6-Dinitro-2-methylphenol	ND	17.0	mg/Kg	10					
4-Aminobiphenyl	ND	3.30	mg/Kg	10					
4-Bromophenyl phenyl ether	ND	3.30	mg/Kg	10					
4-Chloro-3-methylphenol	ND	3.30	mg/Kg	10					
4-Chloroaniline	ND	3.30	mg/Kg	10					
4-Chlorophenyl phenyl ether	ND	3.30	mg/Kg	10					
4-Methylphenol	ND	3.30	mg/Kg	10					
4-Nitroaniline	ND	3.30	mg/Kg	10					
4-Nitrophenol	ND	17.0	mg/Kg	10					
7,12-Dimethylbenz(a)anthracene	ND	3.30	mg/Kg	10					
a,a-Dimethylphenethylamine	ND	17.0	mg/Kg	10					
Acenaphthene	ND	3.30	mg/Kg	10					
Acenaphthylene	ND	3.30	mg/Kg	10					

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-7
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-07A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual Note
Acetophenone	ND	3.30	mg/Kg	10					
Aniline	ND	3.30	mg/Kg	10					
Anthracene	ND	3.30	mg/Kg	10					
Azobenzene	ND	3.30	mg/Kg	10					
Benz(a)anthracene	ND	3.30	mg/Kg	10					
Benzidine	ND	17.0	mg/Kg	10					
Benzo(a)pyrene	ND	3.30	mg/Kg	10					
Benzo(b)fluoranthene	ND	3.30	mg/Kg	10					
Benzo(g,h,i)perylene	ND	3.30	mg/Kg	10					
Benzo(k)fluoranthene	ND	3.30	mg/Kg	10					
Benzoic acid	ND	17.0	mg/Kg	10					
Benzyl alcohol	ND	3.30	mg/Kg	10					
Bis(2-chloroethoxy)methane	ND	3.30	mg/Kg	10					
Bis(2-chloroethyl)ether	ND	3.30	mg/Kg	10					
Bis(2-chloroisopropyl)ether	ND	3.30	mg/Kg	10					
Bis(2-ethylhexyl)phthalate	ND	3.30	mg/Kg	10					
Butyl benzyl phthalate	ND	3.30	mg/Kg	10					
Chrysene	ND	3.30	mg/Kg	10					
Di-n-butyl phthalate	ND	3.30	mg/Kg	10					
Di-n-octyl phthalate	ND	3.30	mg/Kg	10					
Dibenz(a,h)anthracene	ND	3.30	mg/Kg	10					
Dibenz(a,j)acridine	ND	3.30	mg/Kg	10					
Dibenzofuran	ND	3.30	mg/Kg	10					
Diethyl phthalate	ND	3.30	mg/Kg	10					
Dimethyl phthalate	ND	3.30	mg/Kg	10					
Ethyl methanesulfonate	ND	3.30	mg/Kg	10					
Fluoranthene	ND	3.30	mg/Kg	10					
Fluorene	ND	3.30	mg/Kg	10					
Hexachlorobenzene	ND	3.30	mg/Kg	10					
Hexachlorobutadiene	ND	3.30	mg/Kg	10					
Hexachlorocyclopentadiene	ND	3.30	mg/Kg	10					
Hexachloroethane	ND	3.30	mg/Kg	10					
Indeno(1,2,3-cd)pyrene	ND	3.30	mg/Kg	10					
Isophorone	ND	3.30	mg/Kg	10					
Methyl methanesulfonate	ND	3.30	mg/Kg	10					
N-Nitroso-di-n-butylamine	ND	3.30	mg/Kg	10					
N-Nitrosodi-n-propylamine	ND	3.30	mg/Kg	10					
N-Nitrosodimethylamine	ND	3.30	mg/Kg	10					
N-Nitrosodiphenylamine	ND	3.30	mg/Kg	10					
N-Nitrosopiperidine	ND	3.30	mg/Kg	10					
Naphthalene	ND	3.30	mg/Kg	10					

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-7
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-07A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
Nitrobenzene	ND	3.30	mg/Kg	10						
p-Dimethylaminoazobenzene	ND	3.30	mg/Kg	10						
Pentachloronitrobenzene	ND	3.30	mg/Kg	10						
Pentachlorophenol	ND	17.0	mg/Kg	10						
Phenacetin	ND	3.30	mg/Kg	10						
Phenanthrene	ND	3.30	mg/Kg	10						
Phenol	ND	3.30	mg/Kg	10						
Pronamide	ND	3.30	mg/Kg	10						
Pyrene	ND	3.30	mg/Kg	10						
Pyridine	ND	3.30	mg/Kg	10						
Surr: 2,4,6-Tribromophenol	71.6	19-122	%REC	20	8/25/2000	8/26/2000	2540			
Surr: 2-Fluorobiphenyl	80.4	30-122	%REC	20						
Surr: 2-Fluorophenol	58.4	25-121	%REC	20						
Surr: 4-Terphenyl-d14	82.4	18-137	%REC	20						
Surr: Nitrobenzene-d5	65.2	23-120	%REC	20						
Surr: Phenol-d6	58.2	24-113	%REC	20						
TPH (FUEL FINGERPRINT)		SW8015M								
TPH (Diesel)	*NI*	25.0	mg/Kg	5	8/16/2000	8/19/2000	2485	AS		
TPH (Jet A)	ND	25.0	mg/Kg	5						
TPH (JP-4)	ND	25.0	mg/Kg	5						
TPH (JP-5)	ND	25.0	mg/Kg	5						
TPH (Kerosene)	ND	25.0	mg/Kg	5						
TPH (Motor Oil)	*NI*	100	mg/Kg	5						
TPH (Paint Thinner)	ND	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Diese	*28.5*	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Motor Oil)	*414*	100	mg/Kg	5						
Surr: Pentacosane	148	26.8-143	%REC	5					S	S06
TPH (GASOLINE)		SW8015M								
TPH (Gasoline)	ND	1.00	mg/Kg	1	8/21/2000	8/21/2000	R6383	KAL		
Surr: a,a,a-Trifluorotoluene	81.5	70-130	%REC	1						

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-8
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-08A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
ICP METALS-RCRA, TOTAL		SW6010A								
Arsenic	*11.1*	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL		
Barium	*47.9*	10.0	mg/Kg	1						
Cadmium	ND	2.00	mg/Kg	1						
Chromium	*40.5*	5.00	mg/Kg	1						
Lead	*47.7*	20.0	mg/Kg	1						
Selenium	ND	20.0	mg/Kg	1						
Silver	ND	5.00	mg/Kg	1						
MERCURY, TOTAL		SW7471								
Mercury	ND	0.200	mg/Kg	1	8/21/2000	8/22/2000	0080421	SUB		
ORGANOCHLORINE PESTICIDES		SW8081								
4,4'-DDD	ND	0.0660	mg/Kg	20	8/18/2000	8/22/2000	2502	AS		
4,4'-DDE	ND	0.0660	mg/Kg	20						
4,4'-DDT	ND	0.0660	mg/Kg	20						
Aldrin	ND	0.0340	mg/Kg	20						
alpha-BHC	ND	0.0340	mg/Kg	20						
beta-BHC	ND	0.0340	mg/Kg	20						
Chlordane	ND	0.660	mg/Kg	20						
delta-BHC	ND	0.0340	mg/Kg	20						
Dieldrin	ND	0.0660	mg/Kg	20						
Endosulfan I	ND	0.0340	mg/Kg	20						
Endosulfan II	ND	0.0660	mg/Kg	20						
Endosulfan sulfate	ND	0.0660	mg/Kg	20						
Endrin	ND	0.0660	mg/Kg	20						
Endrin aldehyde	ND	0.0660	mg/Kg	20						
gamma-BHC	ND	0.0340	mg/Kg	20						
Heptachlor	ND	0.0340	mg/Kg	20						
Heptachlor epoxide	ND	0.0340	mg/Kg	20						
Methoxychlor	ND	0.340	mg/Kg	20						
Toxaphene	ND	3.40	mg/Kg	20						
Surr: Decachlorobiphenyl	99.9	50-150	%REC	20						
Surr: Tetrachloro-m-xylene	70.9	50-150	%REC	20						

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-8
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-08A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
PCBS IN SOIL OR SOLID WASTE		SW8082								
Aroclor 1016	ND	0.0333	mg/Kg	1	8/17/2000	8/22/2000	2501	AS		
Aroclor 1221	ND	0.0667	mg/Kg	1						
Aroclor 1232	ND	0.0333	mg/Kg	1						
Aroclor 1242	ND	0.0333	mg/Kg	1						
Aroclor 1248	ND	0.0333	mg/Kg	1						
Aroclor 1254	ND	0.0333	mg/Kg	1						
Aroclor 1260	*0.275*	0.0333	mg/Kg	1						
Surr: Decachlorobiphenyl	104	50-150	%REC	1						
Surr: Tetrachloro-m-xylene	76.2	50-150	%REC	1						

Qualifiers:

ND - Not Detected at the Reporting Limit
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B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-8
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-08A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
SEMIVOLATILE ORGANICS		SW8270A								
1,2,4,5-Tetrachlorobenzene	ND	3.30	mg/Kg	10	8/16/2000	9/14/2000	2485	AS		
1,2,4-Trichlorobenzene	ND	3.30	mg/Kg	10						
1,2-Dichlorobenzene	ND	3.30	mg/Kg	10						
1,3-Dichlorobenzene	ND	3.30	mg/Kg	10						
1,4-Dichlorobenzene	ND	3.30	mg/Kg	10						
1-Chloronaphthalene	ND	3.30	mg/Kg	10						
1-Naphthylamine	ND	3.30	mg/Kg	10						
2,3,4,6-Tetrachlorophenol	ND	3.30	mg/Kg	10						
2,4,5-Trichlorophenol	ND	3.30	mg/Kg	10						
2,4,6-Trichlorophenol	ND	3.30	mg/Kg	10						
2,4-Dichlorophenol	ND	3.30	mg/Kg	10						
2,4-Dimethylphenol	ND	3.30	mg/Kg	10						
2,4-Dinitrophenol	ND	17.0	mg/Kg	10						
2,4-Dinitrotoluene	ND	3.30	mg/Kg	10						
2,6-Dichlorophenol	ND	3.30	mg/Kg	10						
2,6-Dinitrotoluene	ND	3.30	mg/Kg	10						
2-Chloronaphthalene	ND	3.30	mg/Kg	10						
2-Chlorophenol	ND	3.30	mg/Kg	10						
2-Methylnaphthalene	ND	3.30	mg/Kg	10						
2-Methylphenol	ND	3.30	mg/Kg	10						
2-Naphthylamine	ND	3.30	mg/Kg	10						
2-Nitroaniline	ND	17.0	mg/Kg	10						
2-Nitrophenol	ND	3.30	mg/Kg	10						
2-Picoline	ND	3.30	mg/Kg	10						
3,3'-Dichlorobenzidine	ND	3.30	mg/Kg	10						
3-Methylcholanthrene	ND	3.30	mg/Kg	10						
3-Nitroaniline	ND	17.0	mg/Kg	10						
4,6-Dinitro-2-methylphenol	ND	17.0	mg/Kg	10						
4-Aminobiphenyl	ND	3.30	mg/Kg	10						
4-Bromophenyl phenyl ether	ND	3.30	mg/Kg	10						
4-Chloro-3-methylphenol	ND	3.30	mg/Kg	10						
4-Chloroaniline	ND	3.30	mg/Kg	10						
4-Chlorophenyl phenyl ether	ND	3.30	mg/Kg	10						
4-Methylphenol	ND	3.30	mg/Kg	10						
4-Nitroaniline	ND	3.30	mg/Kg	10						
4-Nitrophenol	ND	17.0	mg/Kg	10						
7,12-Dimethylbenz(a)anthracene	ND	3.30	mg/Kg	10						
a,a-Dimethylphenethylamine	ND	17.0	mg/Kg	10						
Acenaphthene	ND	3.30	mg/Kg	10						
Acenaphthylene	ND	3.30	mg/Kg	10						

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-8
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-08A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
Acetophenone	ND	3.30	mg/Kg	10						
Aniline	ND	3.30	mg/Kg	10						
Anthracene	ND	3.30	mg/Kg	10						
Azobenzene	ND	3.30	mg/Kg	10						
Benz(a)anthracene	ND	3.30	mg/Kg	10						
Benzidine	ND	17.0	mg/Kg	10						
Benzo(a)pyrene	ND	3.30	mg/Kg	10						
Benzo(b)fluoranthene	ND	3.30	mg/Kg	10						
Benzo(g,h,i)perylene	ND	3.30	mg/Kg	10						
Benzo(k)fluoranthene	ND	3.30	mg/Kg	10						
Benzoic acid	ND	17.0	mg/Kg	10						
Benzyl alcohol	ND	3.30	mg/Kg	10						
Bis(2-chloroethoxy)methane	ND	3.30	mg/Kg	10						
Bis(2-chloroethyl)ether	ND	3.30	mg/Kg	10						
Bis(2-chloroisopropyl)ether	ND	3.30	mg/Kg	10						
Bis(2-ethylhexyl)phthalate	ND	3.30	mg/Kg	10						
Butyl benzyl phthalate	ND	3.30	mg/Kg	10						
Chrysene	ND	3.30	mg/Kg	10						
Di-n-butyl phthalate	ND	3.30	mg/Kg	10						
Di-n-octyl phthalate	ND	3.30	mg/Kg	10						
Dibenz(a,h)anthracene	ND	3.30	mg/Kg	10						
Dibenz(a,j)acridine	ND	3.30	mg/Kg	10						
Dibenzofuran	ND	3.30	mg/Kg	10						
Diethyl phthalate	ND	3.30	mg/Kg	10						
Dimethyl phthalate	ND	3.30	mg/Kg	10						
Ethyl methanesulfonate	ND	3.30	mg/Kg	10						
Fluoranthene	ND	3.30	mg/Kg	10						
Fluorene	ND	3.30	mg/Kg	10						
Hexachlorobenzene	ND	3.30	mg/Kg	10						
Hexachlorobutadiene	ND	3.30	mg/Kg	10						
Hexachlorocyclopentadiene	ND	3.30	mg/Kg	10						
Hexachloroethane	ND	3.30	mg/Kg	10						
Indeno(1,2,3-cd)pyrene	ND	3.30	mg/Kg	10						
Isophorone	ND	3.30	mg/Kg	10						
Methyl methanesulfonate	ND	3.30	mg/Kg	10						
N-Nitroso-di-n-butylamine	ND	3.30	mg/Kg	10						
N-Nitrosodi-n-propylamine	ND	3.30	mg/Kg	10						
N-Nitrosodimethylamine	ND	3.30	mg/Kg	10						
N-Nitrosodiphenylamine	ND	3.30	mg/Kg	10						
N-Nitrosopiperidine	ND	3.30	mg/Kg	10						
Naphthalene	ND	3.30	mg/Kg	10						

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-8
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-08A	**Matrix:**	SOIL

Analyses	Resul	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
Nitrobenzene	ND	3.30	mg/Kg	10						
p-Dimethylaminoazobenzene	ND	3.30	mg/Kg	10						
Pentachloronitrobenzene	ND	3.30	mg/Kg	10						
Pentachlorophenol	ND	17.0	mg/Kg	10						
Phenacetin	ND	3.30	mg/Kg	10						
Phenanthrene	ND	3.30	mg/Kg	10						
Phenol	ND	3.30	mg/Kg	10						
Pronamide	ND	3.30	mg/Kg	10						
Pyrene	ND	3.30	mg/Kg	10						
Pyridine	ND	3.30	mg/Kg	10						
Surr: 2,4,6-Tribromophenol	0	19-122	%REC	10						
Surr: 2,4,6-Tribromophenol	45.4	19-122	%REC	20	8/25/2000	8/26/2000	2540			
Surr: 2-Fluorobiphenyl	42.4	30-122	%REC	20						
Surr: 2-Fluorophenol	29.0	25-121	%REC	20						
Surr: 4-Terphenyl-d14	48.4	18-137	%REC	20						
Surr: Nitrobenzene-d5	33.2	23-120	%REC	20						
Surr: Phenol-d6	32.2	24-113	%REC	20						
TPH (FUEL FINGERPRINT)		SW8015M								
TPH (Diesel)	*NI*	25.0	mg/Kg	5	8/16/2000	8/19/2000	2485	AS		
TPH (Jet A)	ND	25.0	mg/Kg	5						
TPH (JP-4)	ND	25.0	mg/Kg	5						
TPH (JP-5)	ND	25.0	mg/Kg	5						
TPH (Kerosene)	ND	25.0	mg/Kg	5						
TPH (Motor Oil)	*NI*	100	mg/Kg	5						
TPH (Paint Thinner)	ND	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Diese	*31.7*	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Motor Oil)	*332*	100	mg/Kg	5						
Surr: Pentacosane	97.8	26.8-143	%REC	5						
TPH (GASOLINE)		SW8015M								
TPH (Gasoline)	ND	1.00	mg/Kg	1	8/21/2000	8/21/2000	R6388	KAL		
Surr: a,a,a-Trifluorotoluene	65.3	70-130	%REC	1					S	S04

Qualifiers:	ND - Not Detected at the Reporting Limit	S - Spike Recovery outside accepted recovery limits
	J - Analyte detected below quantitation limits	R - RPD outside accepted recovery limits
	B - Analyte detected in the associated Method Blank	E - Value above quantitation range
	* - Value exceeds Maximum Contaminant Level	

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-9
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-09A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
ICP METALS-RCRA, TOTAL		SW6010A								
Arsenic	14.5	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL		
Barium	232	10.0	mg/Kg	1						
Cadmium	ND	2.00	mg/Kg	1						
Chromium	74.7	5.00	mg/Kg	1						
Lead	184	20.0	mg/Kg	1						
Selenium	ND	20.0	mg/Kg	1						
Silver	ND	5.00	mg/Kg	1						
MERCURY, TOTAL		SW7471								
Mercury	ND	0.200	mg/Kg	1	8/21/2000	8/22/2000	0080421	SUB		
ORGANOCHLORINE PESTICIDES		SW8081								
4,4'-DDD	ND	1.65	mg/Kg	500	8/18/2000	8/22/2000	2502	AS		
4,4'-DDE	4.73	1.65	mg/Kg	500						
4,4'-DDT	ND	1.65	mg/Kg	500						
Aldrin	ND	0.850	mg/Kg	500						
alpha-BHC	ND	0.850	mg/Kg	500						
beta-BHC	ND	0.850	mg/Kg	500						
Chlordane	ND	16.5	mg/Kg	500						
delta-BHC	ND	0.850	mg/Kg	500						
Dieldrin	ND	1.65	mg/Kg	500						
Endosulfan I	ND	0.850	mg/Kg	500						
Endosulfan II	ND	1.65	mg/Kg	500						
Endosulfan sulfate	ND	1.65	mg/Kg	500						
Endrin	ND	1.65	mg/Kg	500						
Endrin aldehyde	ND	1.65	mg/Kg	500						
gamma-BHC	ND	0.850	mg/Kg	500						
Heptachlor	ND	0.850	mg/Kg	500						
Heptachlor epoxide	ND	0.850	mg/Kg	500						
Methoxychlor	ND	8.50	mg/Kg	500						
Toxaphene	ND	85.0	mg/Kg	500						
Surr: Decachlorobiphenyl	0	50-150	%REC	500					S	S01
Surr: Tetrachloro-m-xylene	0	50-150	%REC	500					S	S01

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client:	Masa Fujioka & Associates	**Client Sample ID:**	NED-9
Work Order:	0008087	**Tag Number:**	
Project:	Nanakuli Elementary	**Collection Date:**	08/10/2000 0:00
Lab ID:	0008087-09A	**Matrix:**	SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
PCBS IN SOIL OR SOLID WASTE		SW8082								
Aroclor 1016	ND	0.0333	mg/Kg	1	8/17/2000	8/21/2000	2501	AS		
Aroclor 1221	ND	0.0667	mg/Kg	1						
Aroclor 1232	ND	0.0333	mg/Kg	1						
Aroclor 1242	ND	0.0333	mg/Kg	1						
Aroclor 1248	ND	0.0333	mg/Kg	1						
Aroclor 1254	ND	0.0333	mg/Kg	1						
Aroclor 1260	ND	0.0333	mg/Kg	1						
Surr: Decachlorobiphenyl	92.7	50-150	%REC	1						
Surr: Tetrachloro-m-xylene	72.0	50-150	%REC	1						

Qualifiers:
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B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-09A

Client Sample ID: NED-9
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
SEMIVOLATILE ORGANICS			SW8270A							
1,2,4,5-Tetrachlorobenzene	ND	0.330	mg/Kg	1	8/16/2000	9/14/2000	2485	AS		
1,2,4-Trichlorobenzene	ND	0.330	mg/Kg	1						
1,2-Dichlorobenzene	ND	0.330	mg/Kg	1						
1,3-Dichlorobenzene	ND	0.330	mg/Kg	1						
1,4-Dichlorobenzene	ND	0.330	mg/Kg	1						
1-Chloronaphthalene	ND	0.330	mg/Kg	1						
1-Naphthylamine	ND	0.330	mg/Kg	1						
2,3,4,6-Tetrachlorophenol	ND	0.330	mg/Kg	1						
2,4,5-Trichlorophenol	ND	0.330	mg/Kg	1						
2,4,6-Trichlorophenol	ND	0.330	mg/Kg	1						
2,4-Dichlorophenol	ND	0.330	mg/Kg	1						
2,4-Dimethylphenol	ND	0.330	mg/Kg	1						
2,4-Dinitrophenol	ND	1.70	mg/Kg	1						
2,4-Dinitrotoluene	ND	0.330	mg/Kg	1						
2,6-Dichlorophenol	ND	0.330	mg/Kg	1						
2,6-Dinitrotoluene	ND	0.330	mg/Kg	1						
2-Chloronaphthalene	ND	0.330	mg/Kg	1						
2-Chlorophenol	ND	0.330	mg/Kg	1						
2-Methylnaphthalene	ND	0.330	mg/Kg	1						
2-Methylphenol	ND	0.330	mg/Kg	1						
2-Naphthylamine	ND	0.330	mg/Kg	1						
2-Nitroaniline	ND	1.70	mg/Kg	1						
2-Nitrophenol	ND	0.330	mg/Kg	1						
2-Picoline	ND	0.330	mg/Kg	1						
3,3'-Dichlorobenzidine	ND	0.330	mg/Kg	1						
3-Methylcholanthrene	ND	0.330	mg/Kg	1						
3-Nitroaniline	ND	1.70	mg/Kg	1						
4,6-Dinitro-2-methylphenol	ND	1.70	mg/Kg	1						
4-Aminobiphenyl	ND	0.330	mg/Kg	1						
4-Bromophenyl phenyl ether	ND	0.330	mg/Kg	1						
4-Chloro-3-methylphenol	ND	0.330	mg/Kg	1						
4-Chloroaniline	ND	0.330	mg/Kg	1						
4-Chlorophenyl phenyl ether	ND	0.330	mg/Kg	1						
4-Methylphenol	ND	0.330	mg/Kg	1						
4-Nitroaniline	ND	0.330	mg/Kg	1						
4-Nitrophenol	ND	1.70	mg/Kg	1						
7,12-Dimethylbenz(a)anthracene	ND	0.330	mg/Kg	1						
a,a-Dimethylphenethylamine	ND	1.70	mg/Kg	1						
Acenaphthene	ND	0.330	mg/Kg	1						
Acenaphthylene	ND	0.330	mg/Kg	1						

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
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* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-09A

Client Sample ID: NED-9
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Note
Acetophenone	ND	0.330	mg/Kg	1						
Aniline	ND	0.330	mg/Kg	1						
Anthracene	ND	0.330	mg/Kg	1						
Azobenzene	ND	0.330	mg/Kg	1						
Benz(a)anthracene	ND	0.330	mg/Kg	1						
Benzidine	ND	1.70	mg/Kg	1						
Benzo(a)pyrene	ND	0.330	mg/Kg	1						
Benzo(b)fluoranthene	ND	0.330	mg/Kg	1						
Benzo(g,h,i)perylene	ND	0.330	mg/Kg	1						
Benzo(k)fluoranthene	ND	0.330	mg/Kg	1						
Benzoic acid	ND	1.70	mg/Kg	1						
Benzyl alcohol	ND	0.330	mg/Kg	1						
Bis(2-chloroethoxy)methane	ND	0.330	mg/Kg	1						
Bis(2-chloroethyl)ether	ND	0.330	mg/Kg	1						
Bis(2-chloroisopropyl)ether	ND	0.330	mg/Kg	1						
Bis(2-ethylhexyl)phthalate	ND	0.330	mg/Kg	1						
Butyl benzyl phthalate	ND	0.330	mg/Kg	1						
Chrysene	ND	0.330	mg/Kg	1						
Di-n-butyl phthalate	ND	0.330	mg/Kg	1						
Di-n-octyl phthalate	ND	0.330	mg/Kg	1						
Dibenz(a,h)anthracene	ND	0.330	mg/Kg	1						
Dibenz(a,j)acridine	ND	0.330	mg/Kg	1						
Dibenzofuran	ND	0.330	mg/Kg	1						
Diethyl phthalate	ND	0.330	mg/Kg	1						
Dimethyl phthalate	ND	0.330	mg/Kg	1						
Ethyl methanesulfonate	ND	0.330	mg/Kg	1						
Fluoranthene	ND	0.330	mg/Kg	1						
Fluorene	ND	0.330	mg/Kg	1						
Hexachlorobenzene	ND	0.330	mg/Kg	1						
Hexachlorobutadiene	ND	0.330	mg/Kg	1						
Hexachlorocyclopentadiene	ND	0.330	mg/Kg	1						
Hexachloroethane	ND	0.330	mg/Kg	1						
Indeno(1,2,3-cd)pyrene	ND	0.330	mg/Kg	1						
Isophorone	ND	0.330	mg/Kg	1						
Methyl methanesulfonate	ND	0.330	mg/Kg	1						
N-Nitroso-di-n-butylamine	ND	0.330	mg/Kg	1						
N-Nitrosodi-n-propylamine	ND	0.330	mg/Kg	1						
N-Nitrosodimethylamine	ND	0.330	mg/Kg	1						
N-Nitrosodiphenylamine	ND	0.330	mg/Kg	1						
N-Nitrosopiperidine	ND	0.330	mg/Kg	1						
Naphthalene	ND	0.330	mg/Kg	1						

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R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-09A

Client Sample ID: NED-9
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
Nitrobenzene	ND	0.330	mg/Kg	1						
p-Dimethylaminoazobenzene	ND	0.330	mg/Kg	1						
Pentachloronitrobenzene	ND	0.330	mg/Kg	1						
Pentachlorophenol	ND	1.70	mg/Kg	1						
Phenacetin	ND	0.330	mg/Kg	1						
Phenanthrene	ND	0.330	mg/Kg	1						
Phenol	ND	0.330	mg/Kg	1						
Pronamide	ND	0.330	mg/Kg	1						
Pyrene	ND	0.330	mg/Kg	1						
Pyridine	ND	0.330	mg/Kg	1						
Surr: 2,4,6-Tribromophenol	45.1	19-122	%REC	1	8/25/2000	8/25/2000	2540			
Surr: 2-Fluorobiphenyl	52.0	30-122	%REC	1						
Surr: 2-Fluorophenol	41.5	25-121	%REC	1						
Surr: 4-Terphenyl-d14	60.2	18-137	%REC	1						
Surr: Nitrobenzene-d5	47.3	23-120	%REC	1						
Surr: Phenol-d6	42.1	24-113	%REC	1						
TPH (FUEL FINGERPRINT)		SW8015M								
TPH (Diesel)	ND	25.0	mg/Kg	5	8/16/2000	8/19/2000	2485	AS		
TPH (Jet A)	ND	25.0	mg/Kg	5						
TPH (JP-4)	ND	25.0	mg/Kg	5						
TPH (JP-5)	ND	25.0	mg/Kg	5						
TPH (Kerosene)	ND	25.0	mg/Kg	5						
TPH (Motor Oil)	*NI*	100	mg/Kg	5						
TPH (Paint Thinner)	ND	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Diesel)	ND	25.0	mg/Kg	5						
TPH (Unidentified Hydrocarbons as Motor Oil)	*175*	100	mg/Kg	5						
Surr: Pentacosane	116	26.8-143	%REC	5						
TPH (GASOLINE)		SW8015M								
TPH (Gasoline)	ND	1.00	mg/Kg	1	8/21/2000	8/21/2000	R6388	KAL		
Surr: a,a,a-Trifluorotoluene	55.9	70-130	%REC	1					S	50

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R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

Client: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary
Lab ID: 0008087-10A

Client Sample ID: NED-10
Tag Number:
Collection Date: 08/10/2000 0:00
Matrix: SOIL

Analyses	Result	Reporting Limit	Units	Dilution Factor	Date Prepared	Date Analyzed	Batch ID	Analyst	Qual	Notes
ICP METALS-RCRA, TOTAL		SW6010A								
Arsenic	ND	5.00	mg/Kg	1	8/18/2000	8/18/2000	2505	TKL		
Barium	*81.0*	10.0	mg/Kg	1						
Cadmium	ND	2.00	mg/Kg	1						
Chromium	*57.1*	5.00	mg/Kg	1						
Lead	*35.2*	20.0	mg/Kg	1						
Selenium	ND	20.0	mg/Kg	1						
Silver	ND	5.00	mg/Kg	1						
MERCURY, TOTAL		SW7471								
Mercury	ND	0.200	mg/Kg	1	8/21/2000	8/22/2000	0080421	SUB		

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Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Sample ID: MB-2502 Batch ID: 2502 Test Code: SW8081 Units: mg/Kg Prep Date: 08/18/2000
Client ID Run ID GC1B_000822A SeqNo. 60775 Analysis Date 08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
4,4'-DDD	ND	0.00330	0	0	0%			0	0%	0	J	
4,4'-DDE	ND	0.00330	0	0	0%			0	0%	0	J	
4,4'-DDT	ND	0.00330	0	0	0%			0	0%	0	J	
Aldrin	ND	0.00170	0	0	0%			0	0%	0	J	
alpha-BHC	ND	0.00170	0	0	0%			0	0%	0	J	
beta BHC	ND	0.00170	0	0	0%			0	0%	0	J	
Chlordane	ND	0.0330	0	0	0%			0	0%	0	J	
delta-BHC	ND	0.00170	0	0	0%			0	0%	0	J	
Dieldrin	ND	0.00330	0	0	0%			0	0%	0	J	
Endosulfan I	ND	0.00170	0	0	0%			0	0%	0	J	
Endosulfan II	ND	0.00330	0	0	0%			0	0%	0	J	
Endosulfan sulfate	ND	0.00330	0	0	0%			0	0%	0	J	
Endrin	ND	0.00330	0	0	0%			0	0%	0	J	
Endrin aldehyde	ND	0.00330	0	0	0%			0	0%	0	J	
gamma-BHC	ND	0.00170	0	0	0%			0	0%	0	J	
Heptachlor	ND	0.00170	0	0	0%			0	0%	0	J	
Heptachlor epoxide	ND	0.00170	0	0	0%			0	0%	0	J	
Methoxychlor	ND	0.0170	0	0	0%			0	0%	0	J	
Toxaphene	ND	0.170	0	0	0%			0	0%	0	J	

Qualifiers: ND - Not Detected at the Reporting Limit
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R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Sample ID: MB-2501 Batch ID: 2501 Test Code: SW8081 Units: mg/Kg Prep Date: 08/17/2000
Client ID: Run ID GC1B_000824A SeqNo. 61650 Analysis Date 08/24/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
4,4'-DDD	ND	0.00330	0	0	0%	0	0	0	0%	0	J	
4,4'-DDE	ND	0.00330	0	0	0%	0	0	0	0%	0	J	
4,4'-DDT	ND	0.00330	0	0	0%	0	0	0	0%	0	J	
Aldrin	ND	0.00170	0	0	0%	0	0	0	0%	0	J	
alpha-BHC	ND	0.00170	0	0	0%	0	0	0	0%	0	J	
beta-BHC	ND	0.00170	0	0	0%	0	0	0	0%	0	J	
Chlordane	ND	0.0330	0	0	0%	0	0	0	0%	0	J	
delta-BHC	ND	0.00170	0	0	0%	0	0	0	0%	0	J	
Dieldrin	ND	0.00330	0	0	0%	0	0	0	0%	0	J	
Endosulfan I	ND	0.00170	0	0	0%	0	0	0	0%	0	J	
Endosulfan II	ND	0.00330	0	0	0%	0	0	0	0%	0	J	
Endosulfan sulfate	ND	0.00330	0	0	0%	0	0	0	0%	0	J	
Endrin	ND	0.00330	0	0	0%	0	0	0	0%	0	J	
Endrin aldehyde	ND	0.00330	0	0	0%	0	0	0	0%	0	J	
gamma-BHC	ND	0.00170	0	0	0%	0	0	0	0%	0	J	
Heptachlor	ND	0.00170	0	0	0%	0	0	0	0%	0	J	
Heptachlor epoxide	ND	0.00170	0	0	0%	0	0	0	0%	0	J	
Methoxychlor	ND	0.0170	0	0	0%	0	0	0	0%	0	J	
Toxaphene	ND	0.170	0	0	0%	0	0	0	0%	0	J	

Qualifiers: ND - Not Detected at the Reporting Limit
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S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Sample ID MB-2501 Batch ID 2501 Test Code SW8082 Units mg/Kg Prep Date 08/17/2000
Client ID Run ID GC3A_000821A SeqNo 60475 Analysis Date 08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Aroclor 1016	ND	0 0333	0	0	0%			0	0%	0	J	
Aroclor 1221	ND	0 0667	0	0	0%			0	0%	0	J	
Aroclor 1232	ND	0 0333	0	0	0%			0	0%	0	J	
Aroclor 1242	ND	0 0333	0	0	0%			0	0%	0	J	
Aroclor 1248	ND	0 0333	0	0	0%			0	0%	0	J	
Aroclor 1254	ND	0 0333	0	0	0%			0	0%	0	J	
Aroclor 1260	ND	0 0333	0	0	0%			0	0%	0	J	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Sample ID MB-2540 Batch ID 2540 Test Code SW8270A Units mg/Kg Prep Date 08/25/2000
Client ID. Run ID MSD3_000825A SeqNo 61270 Analysis Date 08/25/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
1,2,4,5-Tetrachlorobenzene	ND	0 330	0	0	0%			0	0%	0	J	
1,2,4-Trichlorobenzene	ND	0 330	0	0	0%			0	0%	0	J	
1,2-Dichlorobenzene	ND	0 330	0	0	0%			0	0%	0	J	
1,3-Dichlorobenzene	ND	0 330	0	0	0%			0	0%	0	J	
1,4-Dichlorobenzene	ND	0 330	0	0	0%			0	0%	0	J	
1-Chloronaphthalene	ND	0 330	0	0	0%			0	0%	0	J	
1-Naphthylamine	ND	0 330	0	0	0%			0	0%	0	J	
2,3,4,6-Tetrachlorophenol	ND	0 330	0	0	0%			0	0%	0	J	
2,4,5-Trichlorophenol	ND	0 330	0	0	0%			0	0%	0	J	
2,4,6-Trichlorophenol	ND	0 330	0	0	0%			0	0%	0	J	
2,4-Dichlorophenol	ND	0 330	0	0	0%			0	0%	0	J	
2,4-Dimethylphenol	ND	0 330	0	0	0%			0	0%	0	J	
2,4-Dinitrophenol	ND	1 70	0	0	0%			0	0%	0	J	
2,4-Dinitrotoluene	ND	0 330	0	0	0%			0	0%	0	J	
2,6-Dichlorophenol	ND	0 330	0	0	0%			0	0%	0	J	
2,6-Dinitrotoluene	ND	0 330	0	0	0%			0	0%	0	J	
2-Chloronaphthalene	ND	0 330	0	0	0%			0	0%	0	J	
2-Chlorophenol	ND	0 330	0	0	0%			0	0%	0	J	
2-Methylnaphthalene	ND	0 330	0	0	0%			0	0%	0	J	
2-Methylphenol	ND	0 330	0	0	0%			0	0%	0	J	
2-Naphthylamine	ND	0 330	0	0	0%			0	0%	0	J	
2-Nitroaniline	ND	1 70	0	0	0%			0	0%	0	J	
2-Nitrophenol	ND	0 330	0	0	0%			0	0%	0	J	
2-Picoline	ND	0 330	0	0	0%			0	0%	0	J	
3,3'-Dichlorobenzidine	ND	0 330	0	0	0%			0	0%	0	J	
3-Methylcholanthrene	ND	0 330	0	0	0%			0	0%	0	J	
3-Nitroaniline	ND	1.70	0	0	0%			0	0%	0	J	
4,6-Dinitro-2-methylphenol	ND	1 70	0	0	0%			0	0%	0	J	
4-Aminobiphenyl	ND	0 330	0	0	0%			0	0%	0	J	
4-Bromophenyl phenyl ether	ND	0 330	0	0	0%			0	0%	0	J	
4-Chloro-3-methylphenol	ND	0 330	0	0	0%			0	0%	0	J	
4-Chloroaniline	ND	0 330	0	0	0%			0	0%	0	J	
4-Chlorophenyl phenyl ether	ND	0 330	0	0	0%			0	0%	0	J	
4-Methylphenol	ND	0 330	0	0	0%			0	0%	0	J	
4-Nitroaniline	ND	0 330	0	0	0%			0	0%	0	J	
4-Nitrophenol	ND	1 70	0	0	0%			0	0%	0	J	
7,12-Dimethylbenz(a)anthracene	ND	0 330	0	0	0%			0	0%	0	J	
a,a-Dimethylphenethylamine	ND	1.70	0	0	0%			0	0%	0	J	
Acenaphthene	ND	0 330	0	0	0%			0	0%	0	J	

Qualifiers:
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J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Acenaphthylene	ND	0.330	0	0	0%	0	0%	0	J
Acetophenone	ND	0.330	0	0	0%	0	0%	0	J
Aniline	ND	0.330	0	0	0%	0	0%	0	J
Anthracene	ND	0.330	0	0	0%	0	0%	0	J
Azobenzene	ND	0.330	0	0	0%	0	0%	0	J
Benz(a)anthracene	ND	0.330	0	0	0%	0	0%	0	J
Benzidine	ND	1.70	0	0	0%	0	0%	0	J
Benzo(a)pyrene	ND	0.330	0	0	0%	0	0%	0	J
Benzo(b)fluoranthene	ND	0.330	0	0	0%	0	0%	0	J
Benzo(g,h,i)perylene	ND	0.330	0	0	0%	0	0%	0	J
Benzo(k)fluoranthene	ND	0.330	0	0	0%	0	0%	0	J
Benzoic acid	ND	1.70	0	0	0%	0	0%	0	J
Benzyl alcohol	ND	0.330	0	0	0%	0	0%	0	J
Bis(2-chloroethoxy)methane	ND	0.330	0	0	0%	0	0%	0	J
Bis(2-chloroethyl)ether	ND	0.330	0	0	0%	0	0%	0	J
Bis(2-chloroisopropyl)ether	ND	0.330	0	0	0%	0	0%	0	J
Bis(2-ethylhexyl)phthalate	0.235	0.330	0	0	0%	0	0%	0	J
Butyl benzyl phthalate	ND	0.330	0	0	0%	0	0%	0	J
Chrysene	ND	0.330	0	0	0%	0	0%	0	J
Di-n-butyl phthalate	ND	0.330	0	0	0%	0	0%	0	J
Di-n-octyl phthalate	ND	0.330	0	0	0%	0	0%	0	J
Dibenz(a,h)anthracene	ND	0.330	0	0	0%	0	0%	0	J
Dibenz(a,j)acridine	ND	0.330	0	0	0%	0	0%	0	J
Dibenzofuran	ND	0.330	0	0	0%	0	0%	0	J
Diethyl phthalate	ND	0.330	0	0	0%	0	0%	0	J
Dimethyl phthalate	ND	0.330	0	0	0%	0	0%	0	J
Ethyl methanesulfonate	ND	0.330	0	0	0%	0	0%	0	J
Fluoranthene	ND	0.330	0	0	0%	0	0%	0	J
Fluorene	ND	0.330	0	0	0%	0	0%	0	J
Hexachlorobenzene	ND	0.330	0	0	0%	0	0%	0	J
Hexachlorobutadiene	ND	0.330	0	0	0%	0	0%	0	J
Hexachlorocyclopentadiene	ND	0.330	0	0	0%	0	0%	0	J
Hexachloroethane	ND	0.330	0	0	0%	0	0%	0	J
Indeno(1,2,3-cd)pyrene	ND	0.330	0	0	0%	0	0%	0	J
Isophorone	ND	0.330	0	0	0%	0	0%	0	J
Methyl methanesulfonate	ND	0.330	0	0	0%	0	0%	0	J
N-Nitroso-di-n-butylamine	ND	0.330	0	0	0%	0	0%	0	J
N-Nitrosodi-n-propylamine	ND	0.330	0	0	0%	0	0%	0	J
N-Nitrosodimethylamine	ND	0.330	0	0	0%	0	0%	0	J
N-Nitrosodiphenylamine	ND	0.330	0	0	0%	0	0%	0	J
N-Nitrosopiperidine	ND	0.330	0	0	0%	0	0%	0	J
Naphthalene	ND	0.330	0	0	0%	0	0%	0	J
Nitrobenzene	ND	0.330	0	0	0%	0	0%	0	J
p-Dimethylaminoazobenzene	ND	0.330	0	0	0%	0	0%	0	J

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Pentachloronitrobenzene	ND	0.330	0	0	0%	0	0%	0	J
Pentachlorophenol	ND	1.70	0	0	0%	0	0%	0	J
Phenacetin	ND	0.330	0	0	0%	0	0%	0	J
Phenanthrene	ND	0.330	0	0	0%	0	0%	0	J
Phenol	ND	0.330	0	0	0%	0	0%	0	J
Pronamide	ND	0.330	0	0	0%	0	0%	0	J
Pyrene	ND	0.330	0	0	0%	0	0%	0	J
Pyridine	ND	0.330	0	0	0%	0	0%	0	J

Qualifiers:
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R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Sample ID BLK081800 Batch ID R6355 Test Code SW5030/8015M/802 Units: mg/Kg Prep Date: 08/18/2000
Client ID Run ID GC4A_000818A SeqNo 60185 Analysis Date 08/18/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Benzene	ND	0.0100	0	0	0%			0	0%	0	J	
Ethylbenzene	ND	0.0100	0	0	0%			0	0%	0	J	
m,p-Xylene	ND	0.0200	0	0	0%			0	0%	0	J	
Methyl-t-butyl ether	ND	0.00500	0	0	0%			0	0%	0	J	
o-Xylene	ND	0.0100	0	0	0%			0	0%	0	J	
Toluene	0.000312	0.0100	0	0	0%			0	0%	0	J	
TPH (Gasoline)	0.0557	1.00	0	0	0%			0	0%	0	J	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Sample ID BLK082100 Batch ID R6388 Test Code SW5030/8015M/802 Units: µg/L Prep Date 08/21/2000
Client ID Run ID GC4A_000821A SeqNo: 60529 Analysis Date 08/21/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Benzene	ND	1.00	0	0	0%			0	0%	0	J	
Ethylbenzene	ND	1.00	0	0	0%			0	0%	0	J	
m,p-Xylene	ND	2.00	0	0	0%			0	0%	0	J	
Methyl-t-butyl ether	ND	5.00	0	0	0%			0	0%	0	J	
o-Xylene	ND	1.00	0	0	0%			0	0%	0	J	
Toluene	0.0687	1.00	0	0	0%			0	0%	0	J	
TPH (Gasoline)	7.71	50.0	0	0	0%			0	0%	0	J	

Qualifiers:
ND - Not Detected at the Reporting Limit
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B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Sample ID: 0080421-BLK1	Batch ID: 0080421	Test Code: SW7471	Units: mg/Kg	Prep Date:	08/21/2000
Client ID:		Run ID: SUB_000822C	SeqNo: 60989	Analysis Date:	08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Mercury	ND	0.200	0	0	0%			0	0%	0		

Qualifiers:
ND - Not Detected at the Reporting Limit
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S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Sample ID: MB-2505	Batch ID: 2505	Test Code: SW6010A	Units: mg/Kg	Prep Date:	08/18/2000
Client ID:		Run ID: ICP1_000818C	SeqNo: 60272	Analysis Date:	08/18/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Arsenic	ND	5.00	0	0	0%			0	0%	0		
Barium	ND	10.0	0	0	0%			0	0%	0		
Cadmium	ND	2.00	0	0	0%			0	0%	0		
Chromium	ND	5.00	0	0	0%			0	0%	0		
Lead	ND	20.0	0	0	0%			0	0%	0		
Selenium	0.629	20.0	0	0	0%			0	0%	0	J	
Silver	ND	5.00	0	0	0%			0	0%	0		

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Method Blank

Sample ID: MB-2485	Batch ID 2485	Test Code SW8015M	Units: mg/Kg	Prep Date:	08/16/2000
Client ID		Run ID GC2B_000816A	SeqNo 59817	Analysis Date	08/16/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
TPH (Diesel)	ND	5.00	0	0	0%			0	0%	0		
TPH (Motor Oil)	ND	20.0	0	0	0%			0	0%	0		

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Sample Matrix Spike Duplicate

Sample ID 0008134-01AMSD	Batch ID 2502	Test Code SW8081	Units: mg/Kg	Prep Date:	08/18/2000
Client ID:		Run ID GC1B_000822A	SeqNo 60786	Analysis Date	08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
4,4'-DDT	ND	0.0660	0.00667	0	0%	40	140	0	0%	50.0	JS	Q31
Aldrin	ND	0.0340	0.00333	0	0%	40	140	0	0%	50.0	JS	Q31
Dieldrin	ND	0.0660	0.00667	0	0%	40	140	0	0%	50.0	JS	Q31
Endrin	ND	0.0660	0.00667	0	0%	40	140	0	0%	50.0	JS	Q31
gamma-BHC	ND	0.0340	0.00333	0	0%	40	140	0	0%	50.0	JS	Q31
Heptachlor	ND	0.0340	0.00333	0	0%	40	140	0	0%	50.0	JS	Q31

Sample ID 0008134-01AMS	Batch ID 2502	Test Code SW8081	Units mg/Kg	Prep Date	08/18/2000
Client ID		Run ID GC1B_000822A	SeqNo 60785	Analysis Date	08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
4,4'-DDT	ND	0.0660	0.00667	0	0%	40	140	0	0%	0	JS	Q31
Aldrin	ND	0.0340	0.00333	0	0%	40	140	0	0%	0	JS	Q31
Dieldrin	ND	0.0660	0.00667	0	0%	40	140	0	0%	0	JS	Q31
Endrin	ND	0.0660	0.00667	0	0%	40	140	0	0%	0	JS	Q31
gamma-BHC	ND	0.0340	0.00333	0	0%	40	140	0	0%	0	JS	Q31
Heptachlor	ND	0.0340	0.00333	0	0%	40	140	0	0%	0	JS	Q31

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Sample Matrix Spike Duplicate

Sample ID 0008124-01AMSD Batch ID 2501 Test Code SW8082 Units mg/Kg Prep Date 08/17/2000
Client ID Run ID GC3A_000821A SeqNo 60471 Analysis Date 08/21/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Aroclor 1016	0.164	0.0333	0.167	0	98.2%	40	140	0.130	23.1%	50.0		
Aroclor 1260	0.164	0.0333	0.167	0	98.2%	40	140	0.154	6.29%	50.0		

Sample ID 0008124-01AMS Batch ID 2501 Test Code SW8082 Units mg/Kg Prep Date 08/17/2000
Client ID Run ID GC3A_000821A SeqNo 60470 Analysis Date 08/21/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Aroclor 1016	0.130	0.0333	0.167	0	77.8%	40	140	0	0%	0		
Aroclor 1260	0.154	0.0333	0.167	0	92.2%	40	140	0	0%	0		

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Sample Matrix Spike Duplicate

Sample ID 0008094-09AMSD Batch ID 2540 Test Code SW8270A Units mg/Kg Prep Date 08/25/2000
Client ID Run ID MSD3_000825A SeqNo 61278 Analysis Date 08/25/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
1,2,4-Trichlorobenzene	0.614	0.330	0.833	0	73.6%	38	107	0.524	15.7%	25.0		
1,4-Dichlorobenzene	0.553	0.330	0.833	0	66.4%	28	104	0.492	11.7%	26.0		
2,4-Dinitrotoluene	0.524	0.330	0.833	0	62.9%	28	89	0.489	6.91%	31.0		
2-Chlorophenol	1.11	0.330	1.67	0	66.8%	25	102	0.997	11.0%	23.0		
4-Chloro-3-methylphenol	1.17	0.330	1.67	0	70.3%	26	103	1.10	6.52%	24.0		
4-Nitrophenol	0.987	1.70	1.67	0	59.2%	11	114	0.993	0%	40.0	J	
Acenaphthene	0.604	0.330	0.833	0	72.5%	31	137	0.566	6.61%	29.0		
N-Nitrosodi-n-propylamine	0.556	0.330	0.833	0	66.8%	41	126	0.516	7.52%	32.0		
Pentachlorophenol	0.889	1.70	1.67	0	53.3%	17	109	0.835	0%	43.0	J	
Phenol	1.08	0.330	1.67	0	64.7%	26	90	0.986	9.01%	20.0		
Pyrene	0.641	0.330	0.833	0	76.9%	35	142	0.589	8.51%	24.0		

Sample ID 0008094-09AMS Batch ID 2540 Test Code SW8270A Units mg/Kg Prep Date 08/25/2000
Client ID Run ID MSD3_000825A SeqNo 61277 Analysis Date 08/25/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
1,2,4-Trichlorobenzene	0.524	0.330	0.833	0	62.9%	38	107	0	0%	25.0		
1,4-Dichlorobenzene	0.492	0.330	0.833	0	59.0%	28	104	0	0%	26.0		
2,4-Dinitrotoluene	0.489	0.330	0.833	0	58.7%	28	89	0	0%	31.0		
2-Chlorophenol	0.997	0.330	1.67	0	59.8%	25	102	0	0%	23.0		
4-Chloro-3-methylphenol	1.10	0.330	1.67	0	65.9%	26	103	0	0%	24.0		
4-Nitrophenol	0.993	1.70	1.67	0	59.6%	11	114	0	0%	40.0	J	
Acenaphthene	0.566	0.330	0.833	0	67.9%	31	137	0	0%	29.0		
N-Nitrosodi-n-propylamine	0.516	0.330	0.833	0	61.9%	41	126	0	0%	32.0		
Pentachlorophenol	0.835	1.70	1.67	0	50.1%	17	109	0	0%	43.0	J	
Phenol	0.986	0.330	1.67	0	59.2%	26	90	0	0%	20.0		
Pyrene	0.589	0.330	0.833	0	70.6%	35	142	0	0%	24.0		

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID 0008132-08AMSD Batch ID R6355 Test Code SW5030/8015M/802 Units: mg/Kg Prep Date: 08/18/2000
Client ID: Run ID GC4A_000818A SeqNo: 60305 Analysis Date 08/18/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Benzene	0.195	0.0100	0.200	0.000402	97.2%	70	130	0.200	2.89%	25.0		
Ethylbenzene	0.183	0.0100	0.200	0	93.9%	70	130	0.193	2.61%	25.0		
m,p-Xylene	0.370	0.0200	0.400	0.000308	92.2%	70	130	0.382	3.15%	25.0		
o-Xylene	0.191	0.0100	0.200	0.000581	95.2%	70	130	0.197	2.97%	25.0		
Toluene	0.189	0.0100	0.200	0.00122	93.8%	70	130	0.194	2.86%	25.0		

Sample ID 0008132-08AMS Batch ID R6355 Test Code SW5030/8015M/802 Units mg/Kg Prep Date 08/18/2000
Client ID Run ID GC4A_000818A SeqNo 60304 Analysis Date 08/18/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Benzene	0.200	0.0100	0.200	0.000402	100%	70	130	0	0%	0		
Ethylbenzene	0.193	0.0100	0.200	0	96.4%	70	130	0	0%	0		
m,p-Xylene	0.382	0.0200	0.400	0.000908	95.2%	70	130	0	0%	0		
o-Xylene	0.197	0.0100	0.200	0.000581	98.1%	70	130	0	0%	0		
Toluene	0.194	0.0100	0.200	0.00122	96.6%	70	130	0	0%	0		

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: 0080421-MSD1 Batch ID 0080421 Test Code SW7471 Units: mg/Kg Prep Date 08/21/2000
Client ID Run ID SUB_000822C SeqNo: 61005 Analysis Date 08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Mercury	2.82	0.200	0.127	3.11	-228%	75	125	2.63	6.97%	20.0	S	O03

Sample ID 0080421-MS1 Batch ID: 0080421 Test Code SW7471 Units: mg/Kg Prep Date: 08/21/2000
Client ID: Run ID SUB_000822C SeqNo. 61004 Analysis Date 08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Mercury	2.63	0.200	0.123	3.11	-390%	75	125	0	0%	20.0	S	O03

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Sample Matrix Spike Duplicate

Sample ID 0008124-01AMSD Batch ID 2505 Test Code SW6010A Units: mg/Kg Prep Date: 08/18/2000
Client ID Run ID ICP1_000818C SeqNo. 60303 Analysis Date 08/18/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Arsenic	62.9	5.00	100	1.87	61.0%	80	120	61.8	1.85%	20.0	S	Q02
Barium	182	10.0	100	119	62.8%	80	120	187	2.79%	20.0	S	Q02
Cadmium	70.8	2.00	100	0	70.8%	80	120	66.2	6.67%	20.0	S	Q02
Chromium	149	5.00	100	85.5	63.4%	80	120	152	2.24%	20.0	S	Q02
Lead	119	20.0	100	54.3	64.8%	80	120	191	46.3%	20.0	SR	Q02
Selenium	49.8	20.0	100	0	49.8%	80	120	53.9	7.86%	20.0	S	Q02
Silver	7.99	5.00	10.0	0	79.9%	80	120	7.38	7.91%	20.0	S	Q02

Sample ID 0008124-01AMS Batch ID 2505 Test Code SW6010A Units mg/Kg Prep Date 08/18/2000
Client ID Run ID ICP1_000818C SeqNo 60302 Analysis Date 08/18/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Arsenic	61.8	5.00	100	1.87	59.9%	80	120	0	0%	0	S	Q02
Barium	187	10.0	100	119	68.0%	80	120	0	0%	0	S	Q02
Cadmium	66.2	2.00	100	0	66.2%	80	120	0	0%	0	S	Q02
Chromium	152	5.00	100	85.5	66.8%	80	120	0	0%	0	S	Q02
Lead	191	20.0	100	54.3	137%	80	120	0	0%	0	S	Q02
Selenium	53.9	20.0	100	0	53.9%	80	120	0	0%	0	S	Q02
Silver	7.38	5.00	10.0	0	73.8%	80	120	0	0%	0	S	Q02

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Sample Matrix Spike Duplicate

Sample ID 0008087-02AMSD Batch ID 2485 Test Code SW8015M Units: mg/Kg Prep Date: 08/16/2000
Client ID NED-2 Run ID GC2B_000818A SeqNo: 60579 Analysis Date 08/19/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
TPH (Diesel)	66.5	25.0	33.3	18.2	145%	51	124	52.0	24.5%	50.0	S	Q29

Sample ID 0008087-02AMS Batch ID: 2485 Test Code SW8015M Units: mg/Kg Prep Date. 08/16/2000
Client ID NED-2 Run ID GC2B_000818A SeqNo 60577 Analysis Date 08/19/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
TPH (Diesel)	52.0	25.0	33.3	18.2	102%	51	124	0	0%	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID LCS-2502 Batch ID 2502 Test Code SW8081 Units: mg/Kg Prep Date: 08/18/2000
Client ID: Run ID GC1B_000822A SeqNo 60776 Analysis Date 08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
4,4'-DDT	0.00617	0.00330	0.00667	0	92.6%	40	140	0	0%	0		
Aldrin	0.00355	0.00170	0.00333	0	107%	40	140	0	0%	0		
Dieldrin	0.00627	0.00330	0.00667	0	94.1%	40	140	0	0%	0		
Endrin	0.00674	0.00330	0.00667	0	101%	40	140	0	0%	0		
gamma-BHC	0.00278	0.00170	0.00333	0	83.4%	40	140	0	0%	0		
Heptachlor	0.00325	0.00170	0.00333	0	97.5%	40	140	0	0%	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: LCS-2501 Batch ID 2501 Test Code: SW8082 Units: mg/Kg Prep Date: 08/17/2000
Client ID Run ID GC3A_000821A SeqNo: 60476 Analysis Date 08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Aroclor 1016	0.162	0.0333	0.167	0	97.0%	40	140	0	0%	0		
Aroclor 1260	0.156	0.0333	0.167	0	93.4%	40	140	0	0%	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID LCS-2540 Batch ID 2540 Test Code SW8270A Units: mg/Kg Prep Date: 08/25/2000
Client ID Run ID MSD3_000825A SeqNo. 61271 Analysis Date 08/25/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
1,2,4-Trichlorobenzene	0.766	0.330	0.833	0	91.9%	38	107	0	0%	25.0		
1,4-Dichlorobenzene	0.710	0.330	0.833	0	85.2%	28	104	0	0%	26.0		
2,4-Dinitrotoluene	0.682	0.330	0.833	0	81.9%	28	89	0	0%	31.0		
2-Chlorophenol	1.46	0.330	1.67	0	87.8%	25	102	0	0%	23.0		
4-Chloro-3-methylphenol	1.50	0.330	1.67	0	90.3%	26	103	0	0%	24.0		
4-Nitrophenol	1.34	1.70	1.67	0	80.1%	11	114	0	0%	40.0	J	
Acenaphthene	0.738	0.330	0.833	0	88.6%	31	137	0	0%	29.0		
N-Nitrosodi-n-propylamine	0.747	0.330	0.833	0	89.6%	41	126	0	0%	32.0		
Pentachlorophenol	1.33	1.70	1.67	0	79.6%	17	109	0	0%	43.0	J	
Phenol	1.45	0.330	1.67	0	86.8%	26	90	0	0%	20.0		
Pyrene	0.766	0.330	0.833	0	91.9%	35	142	0	0%	24.0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID LCS082100 BTEX Batch ID R6388 Test Code SW8020 Units: µg/L Prep Date 08/21/2000
Client ID Run ID GC4A_000821A SeqNo. 60530 Analysis Date 08/21/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Benzene	20.6	1.00	20.0	0	103%	70	130	0	0%	0		
Ethylbenzene	20.3	1.00	20.0	0	101%	70	130	0	0%	0		
m,p-Xylene	40.4	2.00	40.0	0	101%	70	130	0	0%	0		
Methyl-t-butyl Ether	106	5.00	100	0	105%	70	130	0	0%	0		
o-Xylene	20.5	1.00	20.0	0	102%	70	130	0	0%	0		
Toluene	20.4	1.00	20.0	0.000687	102%	70	130	0	0%	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: LCS081800 GAS Batch ID: R6355 Test Code: SW5030/8015M/802 Units: mg/Kg Prep Date: 08/18/2000
Client ID Run ID: GC4A_000818A SeqNo: 60187 Analysis Date: 08/18/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
TPH (Gasoline)	5.53	1.00	5.00	0	111%	70	130	0	0%	0		

Sample ID: LCS081800 BTEX Batch ID: R6355 Test Code: SW5030/8015M/802 Units: mg/Kg Prep Date: 08/18/2000
Client ID Run ID: GC4A_000818A SeqNo: 60186 Analysis Date: 08/18/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Benzene	0.204	0.0100	0.200	0	102%	70	130	0	0%	0		
Ethylbenzene	0.202	0.0100	0.200	0	101%	70	130	0	0%	0		
m,p-Xylene	0.399	0.0200	0.400	0	99.9%	70	130	0	0%	0		
Methyl-t butyl ether	1.07	0.00500	1.00	0	107%	70	130	0	0%	0		
o-Xylene	0.204	0.0100	0.200	0	102%	70	130	0	0%	0		
Toluene	0.200	0.0100	0.200	0.000312	100%	70	130	0	0%	0		

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
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Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: 0080421-DS1 Batch ID: 0080421 Test Code: SW7471 Units: mg/Kg Prep Date: 08/21/2000
Client ID Run ID: SUB_000822C SeqNo: 60991 Analysis Date: 08/22/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Mercury	0.123	0.200	0.121	0	102%	80	120	0	0%	20.0	J	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: LCS-2505 Batch ID: 2505 Test Code: SW6010A Units: mg/Kg Prep Date: 08/18/2000
Client ID Run ID: ICP1_000818C SeqNo: 60297 Analysis Date: 08/18/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
Arsenic	96.3	5.00	100	0	96.3%	80	120	0	0%	0		
Barium	99.3	10.0	100	0	99.3%	80	120	0	0%	0		
Cadmium	98.3	2.00	100	0	98.3%	80	120	0	0%	0		
Chromium	98.3	5.00	100	0	98.3%	80	120	0	0%	0		
Lead	94.7	20.0	100	0	94.7%	80	120	0	0%	0		
Selenium	92.9	20.0	100	0.629	92.3%	80	120	0	0%	0		
Silver	9.96	5.00	10.0	0	99.6%	80	120	0	0%	0		

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
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S - Spike Recovery outside accepted recovery limits
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Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: LCS-2485 Batch ID: 2485 Test Code: SW8015M Units: mg/Kg Prep Date: 08/16/2000
Client ID Run ID: GC2B_000816A SeqNo: 59818 Analysis Date: 08/16/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
TPH (Diesel)	34.1	5.00	33.3	0	102%	60	140	0	0%	50.0		

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
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Environmental Laboratory of the Pacific

930 Mapunapuna Street, Suite 100 Honolulu, Hawaii 96819
Telephone (808)831-5081 Fax (808)831-3095 E-mail ELPacific@aol.com

LABORATORY USE ONLY	
LAB JOB NO	0008087
LOCATION	
CONTAINERS	

Chain of Custody / Analysis Request Form

Report To: JANICE MARSTERS
Company Name: MFA
Address:
City: State: Zip:
Phone: 484-5366 Fax: 484-0007
Sampler: LYON # of Samples in Shipment: 10

Project Identification
Job Name: NANAKULI ELEMENTARY
Job Number:
P O Number:
Date of Sample Shipment: 8/10/00
Date Results Needed: 10 DAY TURN

Indicate Analysis Requested

Item No.	Client Sample I.D.	COMP	GRAB	Water	Soil	Wastewater	Drinking water	Sludge	Liquid	Solid	Oil	Other	Preservation Method	Sampling Date	Sampling Time	Number of Containers	FUEL SCAN (SW8015M)	PCBs/PESTICIDES (8080A)	RCRA TOTAL METALS (SW6010A)	SEMI VOLATILE ORGANICS w/PCP	(SW8270A)	TOTAL METALS					Laboratory No
1	NEO-1		X		X									8/10/00		2	X	X	X	X	·						0008087-01A
2	NEO-2		X		X																						-02A
3	NEO-3		X		X																						-03A
4	NEO-4		X		X																						-04A
5	NEO-5		X		X																						-05A
6	NEO-6		X		X																						-06A
7	NEO-7		X		X																						-07A
8	NEO-8		X		X																						-08A
9	NEO-9		X		X																						-09A
10	NEO-10		X		X																	X					-10A

Released by (Print/Signature)	Date / Time Released	Delivery Method	Received by (Print/Signature)	Company / Agency Affiliation	Date / Time Received	Condition Noted
BILL LYON	8/10/00 / 1535	HAND	A. SCOTT	ELP	8/10/00 / 13:35	INTACT 20°C
	/				/	
	/				/	

Comments

Please Check Box
☐ Dispose by Lab
☐ Return to Client
☐ Archive

Pink - Client

Page 1 of 1

Environmental Laboratory of the Pacific

Date: *Sep 15, 2000*

CLIENT: Masa Fujioka & Associates
Work Order: 0008087
Project: Nanakuli Elementary

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: LCS082100 GAS Batch ID: R6388 Test Code: SW8015M Units: µg/L Prep Date: 08/21/2000
Client ID: Run ID: GC4A_000821A SeqNo: 60531 Analysis Date: 08/21/2000

Analyte	Result	PQL	Spike Value	Spike Ref Val	%REC	Low Limit	High Limit	RPD Ref Val	RPD	RPD Limit	Qual	Note
TPH (Gasoline)	570	50.0	500	0	114%	60	140	0	0%	0		

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

Appendix G

Traffic Impact Report

TRAFFIC IMPACT REPORT

FOR THE

NANAKULI IV ELEMENTARY SCHOOL

Prepared for:

Kober/Hanssen/Mitchell Architects
Harbor Court
55 Merchant Street, Suite 1400
Honolulu, HI 96813

Prepared by:

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street
Honolulu, Hawaii 96826

December 1999

TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF APPENDICES

I. INTRODUCTION

A. Purpose of Study

The purpose of this study is to identify and assess the traffic impacts resulting from the proposed Nanakuli IV Elementary School, which will be located along Farrington Highway across from the existing Nanaikapono Elementary School in Nanakuli, Oahu.

B. Scope of Study

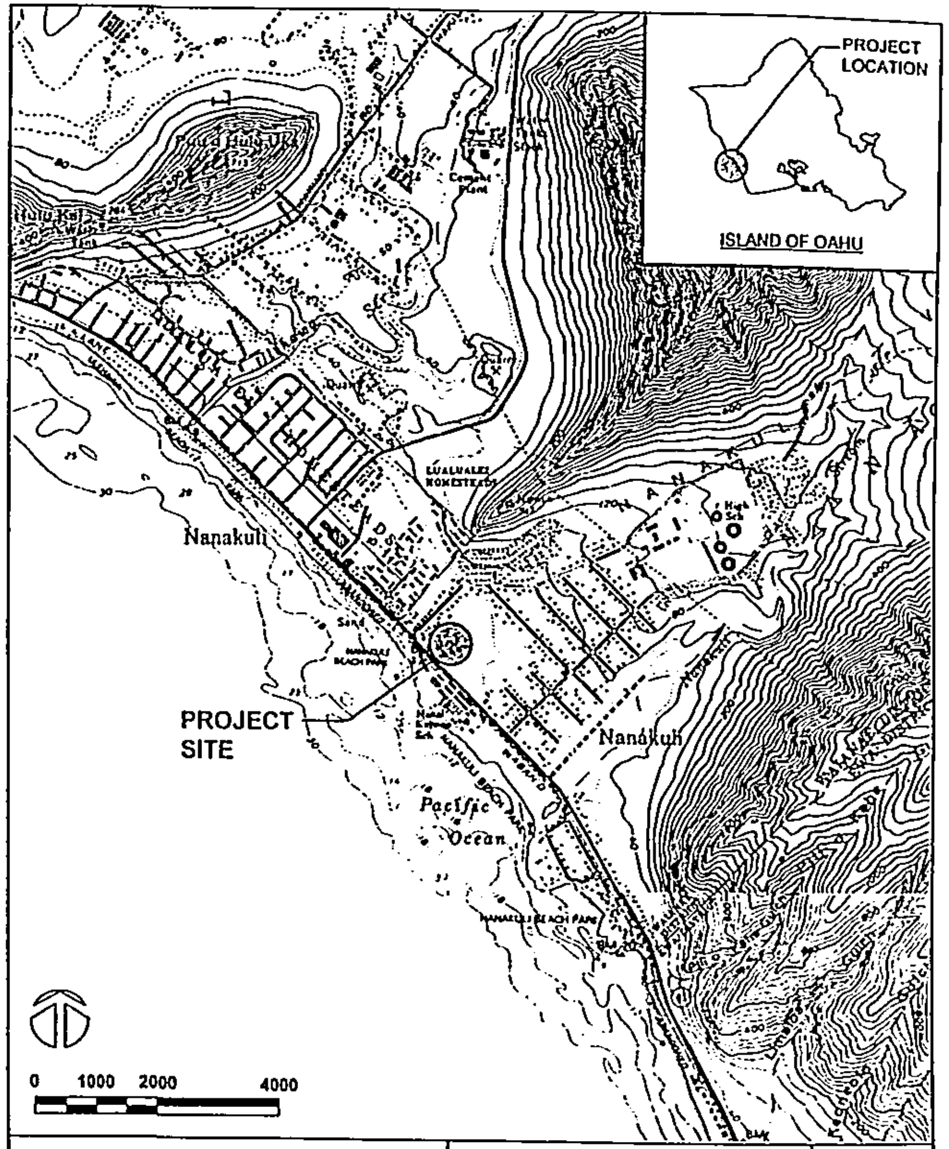
This report presents the findings and conclusions of the traffic study, the scope of which includes:

1. Description of the proposed project.
2. Evaluation of existing roadway and traffic operations in the vicinity.
3. Analysis of future roadway and traffic conditions without the proposed project.
4. Analysis and development of trip generation characteristics for the proposed project.
5. Superimposing site-generated traffic over future traffic conditions.
6. The identification and analysis of traffic impacts resulting from the proposed project.
7. Recommendations of improvements, if appropriate, that would mitigate the traffic impacts resulting from the proposed project.

II. PROJECT DESCRIPTION

A. Location

The project site is located off Farrington Highway in Nanakuli as shown on Exhibits 1 and 2. The project site is further identified as Tax Map Key 8-9-02: 65, 23. Bus access to the school will be via a single driveway on Farrington Highway located along the southwest edge of the project site, approximately 350 feet from the intersection of Farrington Highway and Haleakala Avenue. Buses will be restricted to right-turn-in and right-turn-out movements only. Other vehicular traffic will access



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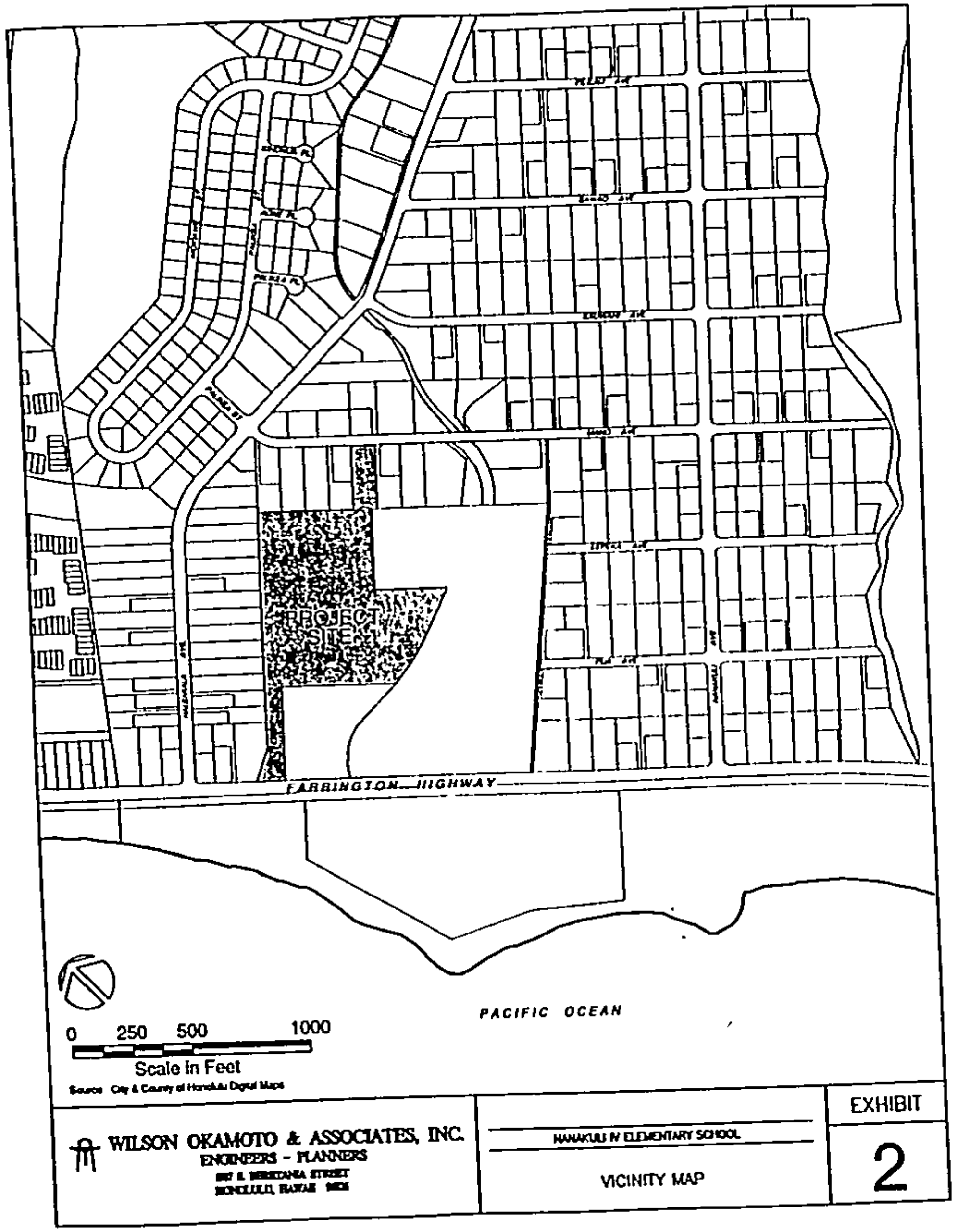
ENGINEERS - PLANNERS

NANAKULI IV ELEMENTARY SCHOOL

LOCATION MAP

EXHIBIT 1



the school via a single driveway off of Mano Avenue located along the northeast edge of the project site, approximately 500 feet southeast of the intersection of Mano Avenue with Haleakala Avenue and Palikea Street.

B. Project Characteristics

The proposed Nanakuli IV Elementary School will replace the existing Nanaikapono Elementary School located along Farrington Highway between Haleakala Avenue and Nanakuli Avenue which is currently operating at or near capacity. The new elementary school will be designed to accommodate 1,050 students and will consist of the following:

- Administrative and student services building
- Library
- Cafeteria
- Classrooms (40 total)
- Computer training/workroom/lounge
- Special education area
- Museum
- Bus loading/unloading/turnaround areas
- Playgrounds
- Parking areas

The project preliminary site plan is shown as Exhibit 3.

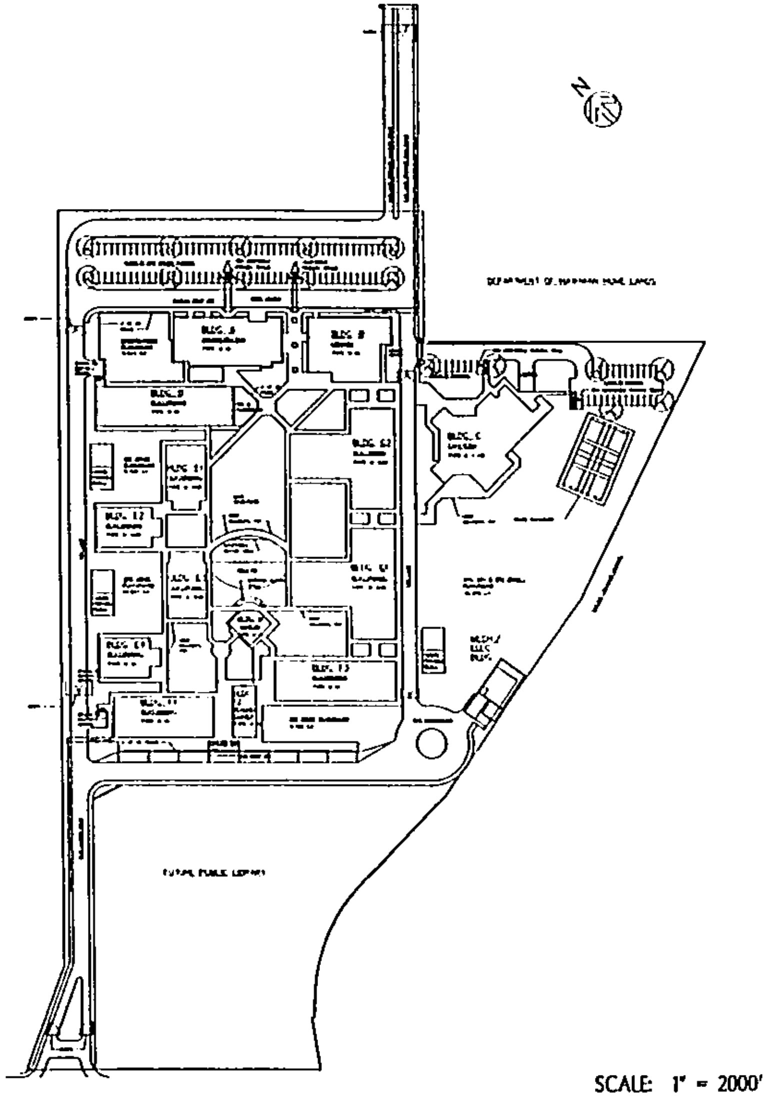
III. EXISTING CONDITIONS

A. General

The proposed project site is located adjacent to Farrington Highway between Haleakala Avenue and Nanakuli Avenue. Farrington Highway serves as the primary access road along the leeward coast and connects with the H-1 Freeway near Kapolei. In the project vicinity, Farrington Highway is generally linked to mauka-makai collector roads that serve the surrounding residences, agricultural lands, and military lands.

B. Area Roadway System

Located adjacent to the proposed project site, Farrington Highway is primarily a two-way, four-lane, undivided State highway with a posted speed limit of 35 mph.



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ENGINEERS - PLANNERS
[illegible] S. BERETANIA STREET
HONOLULU, HAWAII [illegible]

NANAKULI IV ELEMENTARY SCHOOL

PROJECT SITE PLAN

EXHIBIT
3

Approximately 350 feet west of the project site, the highway intersects with Haleakala Avenue, a two-way, two-lane, City and County of Honolulu roadway with a posted speed limit of 25 mph. At this signalized intersection, the westbound approach of Farrington Highway serves through and right-turn traffic movements and the eastbound approach serves through and left-turn traffic movements. The Haleakala Avenue approach serves left-turn and right-turn traffic movements.

Approximately 2,200 feet (0.42 miles) southeast of the intersection with Haleakala Avenue, Farrington Highway intersects with Nanakuli Avenue which is a two-way, two-lane, City and County of Honolulu roadway with a posted speed limit of 25 mph. At this signalized intersection, all approaches serve through, left-turn, and right-turn traffic movements.

Northeast from the intersection with Farrington Highway, approximately 1,400 feet (0.26 miles), Nanakuli Avenue intersects with Mano Avenue. Mano Avenue is a two-way, two-lane, City and County of Honolulu roadway with a posted speed limit of 25 mph. At this unsignalized intersection, all approaches serve through, left-turn, and right-turn traffic movements.

Approximately 1,950 feet (0.37 miles) northwest of the intersection with Nanakuli Avenue, Mano Avenue intersects with Haleakala Avenue and Palikea Street. Palikea Street is a two-way, two-lane, City and County of Honolulu roadway with a posted speed limit of 25 mph. At this unsignalized intersection, all approaches serve through, left-turn, and right-turn traffic movements.

C. Traffic Volumes and Conditions

1. General

a. Field Investigation

The field investigation was conducted on December 7 and 9, 1999 and consisted of a manual turning movement count survey. The traffic count survey was conducted between the morning peak hours of 6:30 AM and 8:30 AM, and the afternoon peak hours of 2:00 PM and

5:00 PM at the intersections of Farrington Highway with Haleakala Avenue, Nanakuli Avenue, and the existing Nanaikapono Elementary School driveway, and Mano Avenue at the intersections of Haleakala Avenue and Palikea Street, and Nanakuli Avenue. Appendix A includes the existing traffic count data.

b. **Capacity Analysis Methodology**

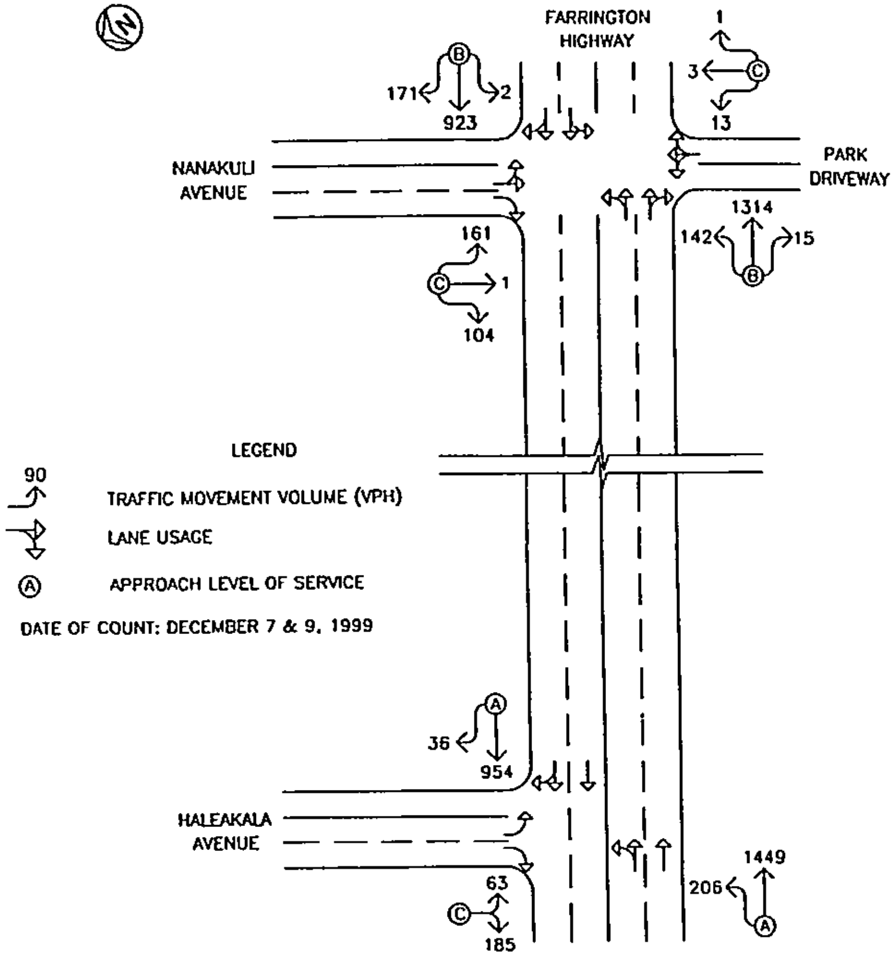
The highway capacity analysis performed in this study is based upon procedures presented in the "Highway Capacity Manual", Special Report 209, Transportation Research Board, Third Edition, 1994, and the "Highway Capacity Software", developed by the Federal Highway Administration. The analysis is based on the concept of Level of Service (LOS).

LOS is a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS "A" through "F"; LOS "A" representing an ideal or free-flow operating conditions and LOS "F" unacceptable operating conditions. The LOS definitions are included in Appendix B.

2. **Existing Peak Hour Traffic**

a. **General**

Exhibits 4 to 7 show the existing AM and PM peak hour traffic volumes and operating traffic conditions. The AM peak hour of traffic generally occurs between 7:00 AM and 8:00 AM along Farrington Highway in the proximity of the proposed project. In the afternoon, the PM peak hour of traffic generally occurs between the hours of 3:45 PM and 4:45 PM. The analysis is based on these peak hour time periods to identify the traffic impacts resulting from the proposed project. LOS calculations are included in Appendix C.



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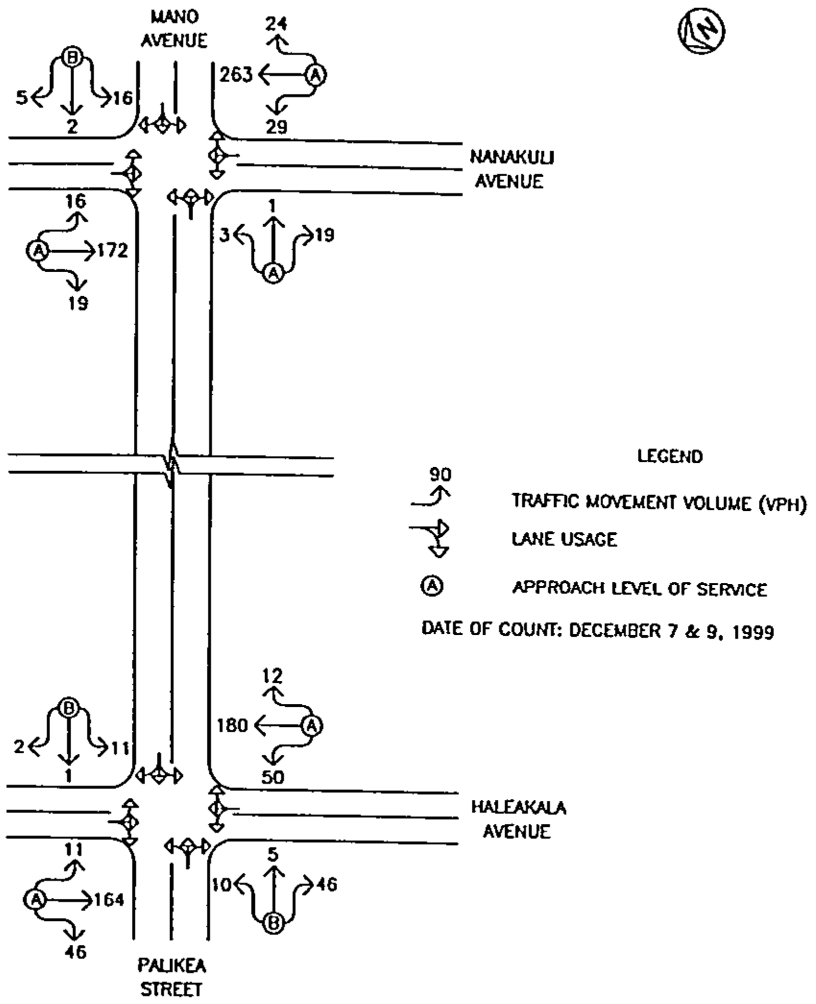
NANAKULI IV ELEMENTARY SCHOOL

EXISTING AM PEAK HOUR TRAFFIC
FARRINGTON HIGHWAY

EXHIBIT
4



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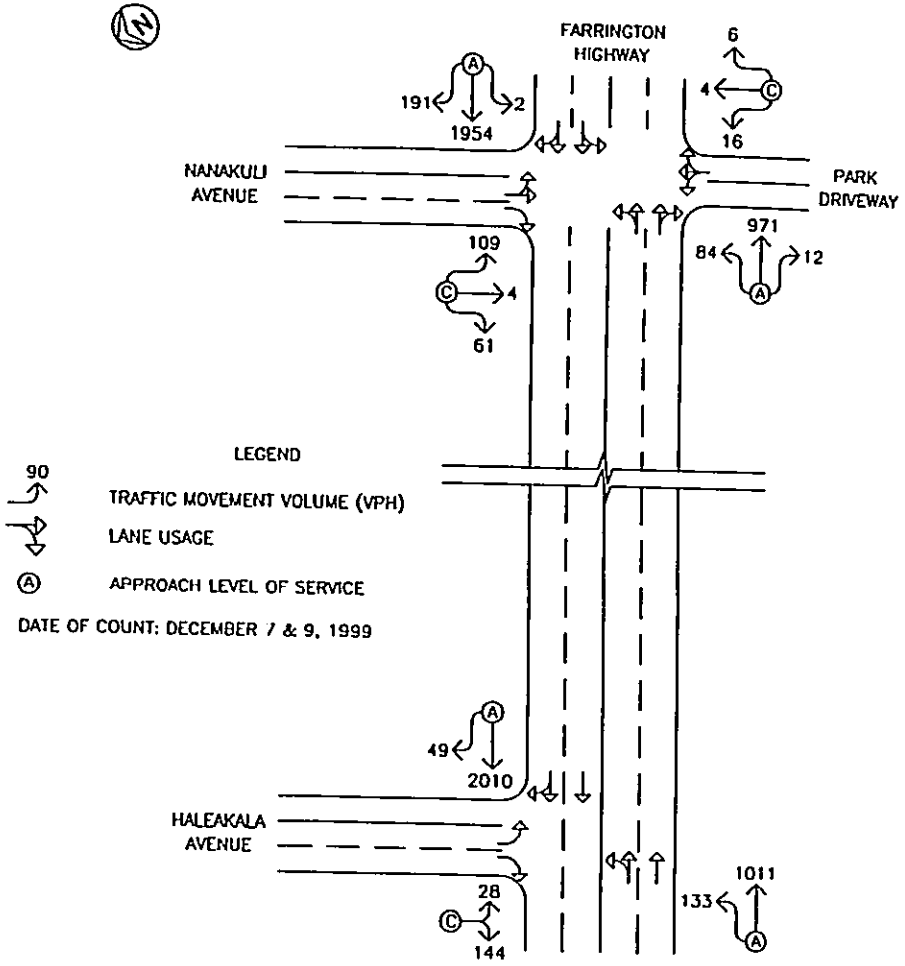
HONOLULU, HAWAII [illegible]

NANAKULI IV ELEMENTARY SCHOOL

EXISTING AM PEAK HOUR TRAFFIC
MANO AVENUE

EXHIBIT
5



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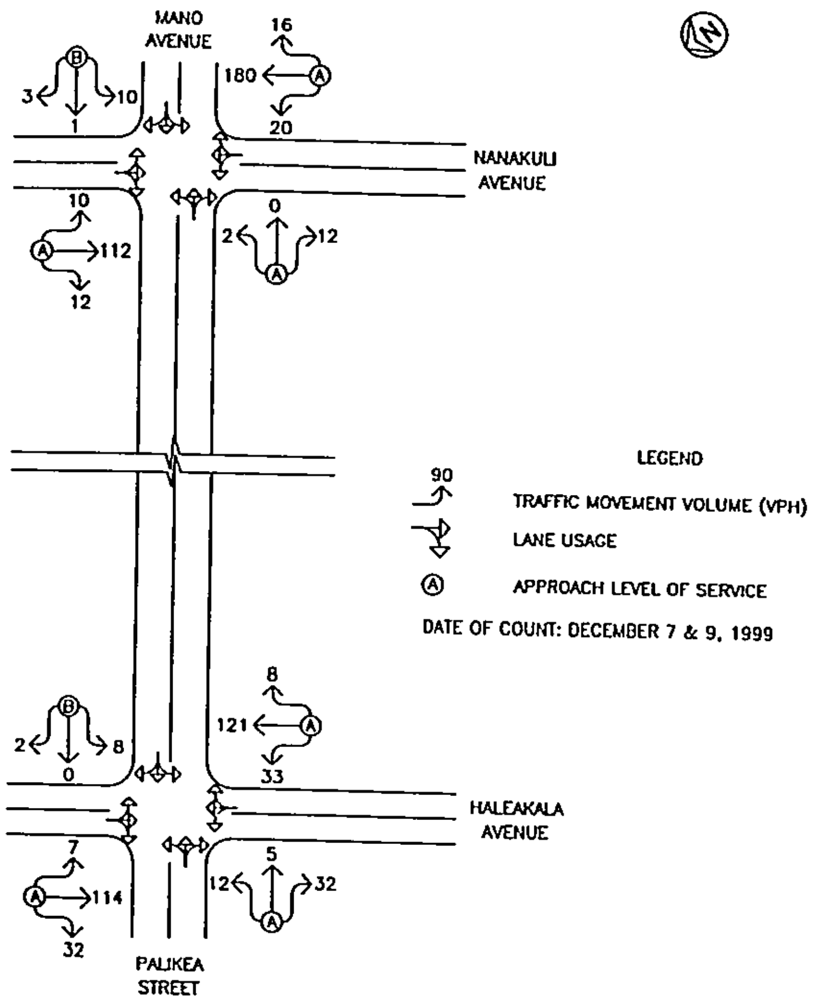
[illegible] BERETANIA STREET
HONOLULU, HAWAII [illegible]

NANAKULI IV ELEMENTARY SCHOOL

EXISTING PM PEAK HOUR TRAFFIC
FARRINGTON HIGHWAY

EXHIBIT
6



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS [illegible] S. BERETANIA STREET HONOLULU, HAWAII [illegible]	NANAKULI IV ELEMENTARY SCHOOL EXISTING PM PEAK HOUR TRAFFIC MANO AVENUE	EXHIBIT 7

b. Farrington Highway and Haleakala Avenue

At the intersection of Farrington Highway with Haleakala Avenue, both approaches of Farrington Highway operate at the free-flow condition of LOS "A" during the AM and PM peak hours. During the AM peak period, the highway carries 1,655 vehicles eastbound and 990 vehicles westbound. Traffic volumes during the PM peak hour are heavier with 1,144 vehicles travelling eastbound and 2,059 vehicles travelling westbound. Although traffic volumes are relatively heavy, the intersection approach volumes are controlled by upstream signalized intersections.

During the AM peak hour of traffic, Haleakala Avenue carries 248 vehicles southbound. Traffic volumes during the PM peak period are slightly less with 172 vehicles travelling southbound. During both peak periods, the approach operates satisfactorily at LOS "C."

c. Farrington Highway and Nanakuli Avenue

At the intersection of Farrington Highway with Nanakuli Avenue, both approaches of Farrington Highway operate satisfactorily at LOS "B" during the AM and PM peak hours. During the AM peak period, the highway carries 1,471 vehicles eastbound and 1,096 vehicles westbound. Traffic volumes during the PM peak hour are heavier with 1,067 vehicles travelling eastbound and 2,147 vehicles travelling westbound. Similar to the traffic operations at the Farrington Highway and Haleakala Avenue intersection, traffic approach volumes on Farrington Highway are controlled by upstream signalized intersections.

During the AM peak hour of traffic, Nanakuli Avenue carries 17 vehicles northbound and 266 vehicles southbound. Traffic volumes during the PM peak period are slightly less with 26 vehicles travelling northbound and 174 vehicles travelling southbound. During both peak periods, both approaches operate at LOS "C."

d. **Nanakuli Avenue and Mano Avenue**

At the intersection of Nanakuli Avenue with Mano Avenue, both approaches of Nanakuli Avenue operate at the free-flow condition of LOS "A" during the AM and PM peak periods. During the AM peak period, Nanakuli Avenue carries 316 vehicles northbound and 207 vehicles southbound. Traffic volumes during the PM peak hour are less with 216 vehicles travelling northbound and 134 vehicles travelling southbound.

During the AM peak hour of traffic, Mano Avenue carries 23 vehicles eastbound and 23 vehicles westbound. Traffic volumes during the PM peak period are slightly less with 14 vehicles travelling eastbound and 14 vehicles travelling westbound. During both peak periods, the eastbound approach operates at LOS "A" and the westbound approach operates at LOS "B."

e. **Haleakala Avenue and Mano Avenue**

At the intersection of Haleakala Avenue with Mano Avenue and Palikea Street, both approaches of Haleakala Avenue operate at the free-flow condition of LOS "A" during the AM and PM peak periods. During the AM peak period, Haleakala Avenue carries 242 vehicles northbound and 221 vehicles southbound. Traffic volumes during the PM peak hour are less with 162 vehicles travelling northbound and 153 vehicles travelling southbound.

During the AM peak hour of traffic, Mano Avenue/Palikea Street carries 61 vehicles eastbound and 14 vehicles westbound. Both approaches of Mano Avenue/Palikea Street operate satisfactorily at LOS "B." Traffic volumes during the PM peak period are slightly less

with 49 vehicles travelling eastbound and 10 vehicles travelling westbound. During this peak period, the eastbound approach operates at LOS "A" and the westbound approach operates at LOS "B."

IV. PROJECTED TRAFFIC CONDITIONS

A. Site-Generated Traffic

1. Trip Generation Methodology

The trip generation methodology used in this study is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 6th Edition," 1995. The projected vehicular trips generated by the proposed enrollment increase were determined by evaluating and correlating the existing trip generating characteristics associated with the existing elementary school. Table 1 summarizes the project site trip generation characteristics applied to the AM and PM peak hours of traffic to measure the impact resulting from the proposed Nanakuli IV Elementary School.

Table 1: Peak Hour Trip Generation

INDEPENDENT VARIABLE:		ENROLLMENT EXISTING: 972 STUDENTS PROJECTED: 1,050 STUDENTS		
		EXISTING		PROJECTED
		RATE	TRIP ENDS	TRIP ENDS
AM PEAK	ENTER	0.195	190	205
	EXIT	0.102	99	107
	TOTAL	0.297	289	312
PM PEAK	ENTER	0.031	30	32
	EXIT	0.088	86	93
	TOTAL	0.119	116	125

2. Trip Distribution

Access to the proposed school would be via the two driveways, one located off Farrington Highway for buses only and one located off Mano Avenue for all other vehicular traffic. The directional distribution of all site-generated vehicular trips at both driveways was assumed to remain the same as at the existing Nanaikapono Elementary School. At the study intersections, the directional distribution of site-generated traffic was the based upon the current residential housing density throughout Nanakuli Valley and the shortest travel times and distances to and from Farrington Highway. The population figures were obtained from the "State of Hawaii Data Book, 1997".

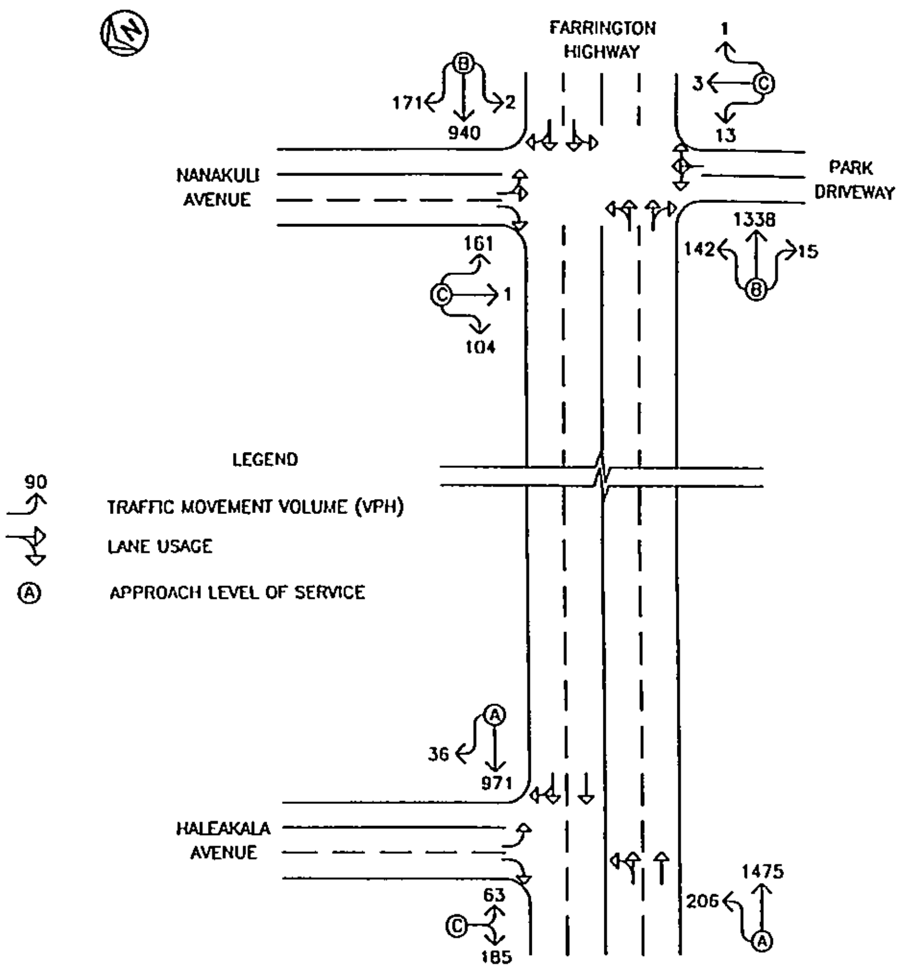
B. Through Traffic Forecasting Methodology

The travel forecast is based upon historical traffic count data obtained from the State Department of Transportation (DOT) at a survey station at the intersection of Farrington Highway and Lualualei Naval Road. The historical data were analyzed by linear regression techniques to obtain an average annual growth rate of approximately 0.60% on Farrington Highway, using 1999 as the Base Year. A growth factor of 1.018 was applied to the existing traffic demands to achieve the projected Year 2002 traffic demands.

C. Total Traffic Volumes Without Project

Exhibits 8 to 11 show the projected AM peak hour and PM peak hour traffic volumes and operating conditions along Farrington Highway without the development of the proposed school. A comparison of the existing and projected (without project) levels of service for all of the study intersections are included in Table 2. The calculations are included in Appendix D.

Traffic operations at the study intersections along Farrington Highway are anticipated to remain similar to existing conditions. Since there is no increase in traffic volumes along Haleakala Avenue, Palikea Street, Nanakuli Avenue, and Mano Avenue, the levels of service should remain the same.

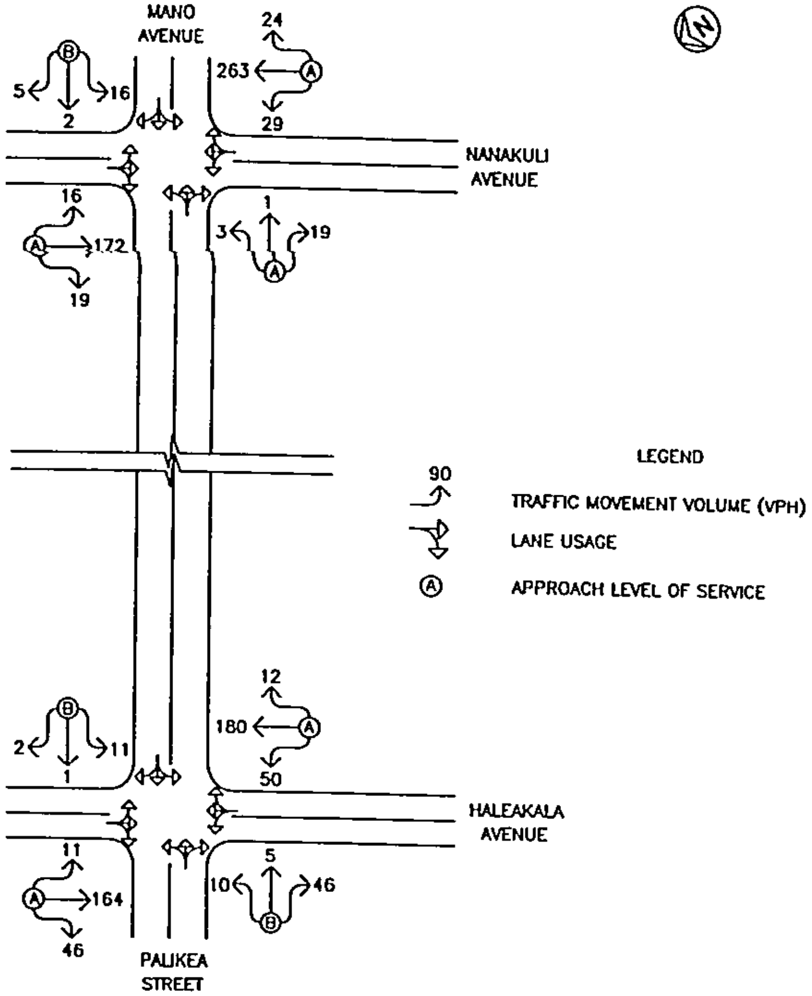


WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS - PLANNERS
[illegible] S. BERETANIA STREET
HONOLULU, HAWAII [illegible]

NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 AM PEAK HOUR
TRAFFIC WITHOUT PROJECT
FARRINGTON HIGHWAY

EXHIBIT
8



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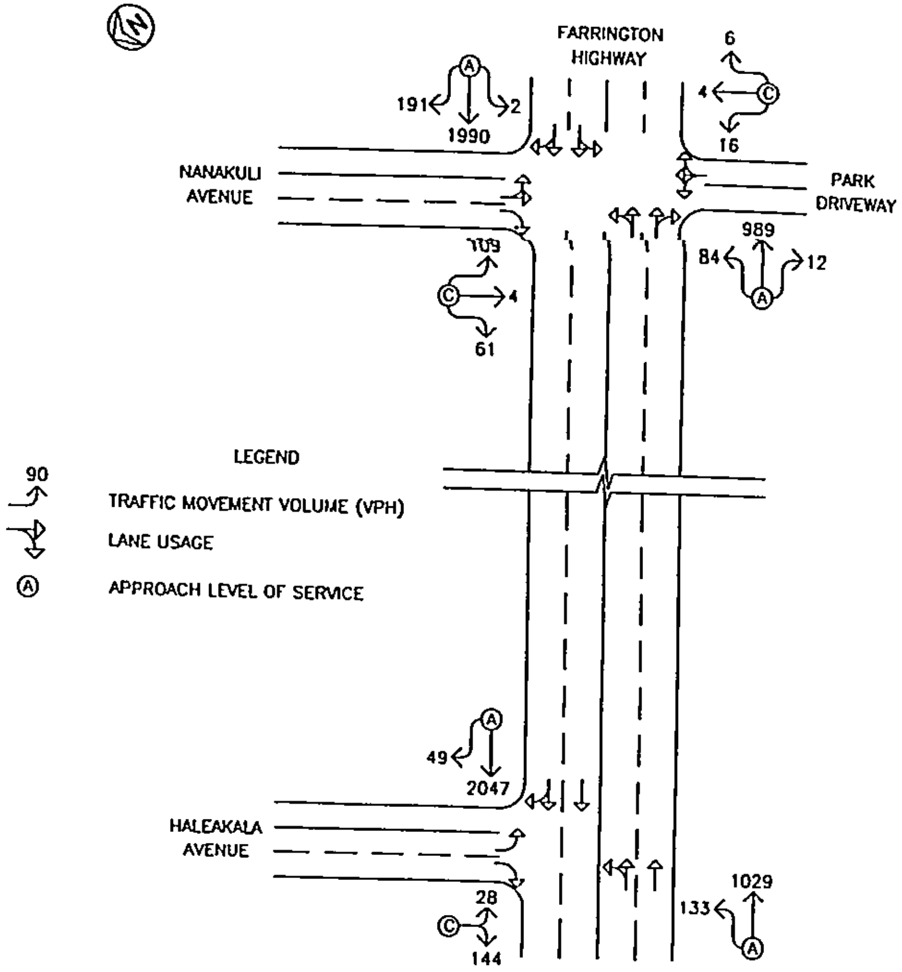
ENGINEERS - PLANNERS
[illegible] S. BERETANIA STREET
HONOLULU, HAWAII [illegible]

NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 AM PEAK HOUR
TRAFFIC WITHOUT PROJECT
MANO AVENUE

EXHIBIT
9



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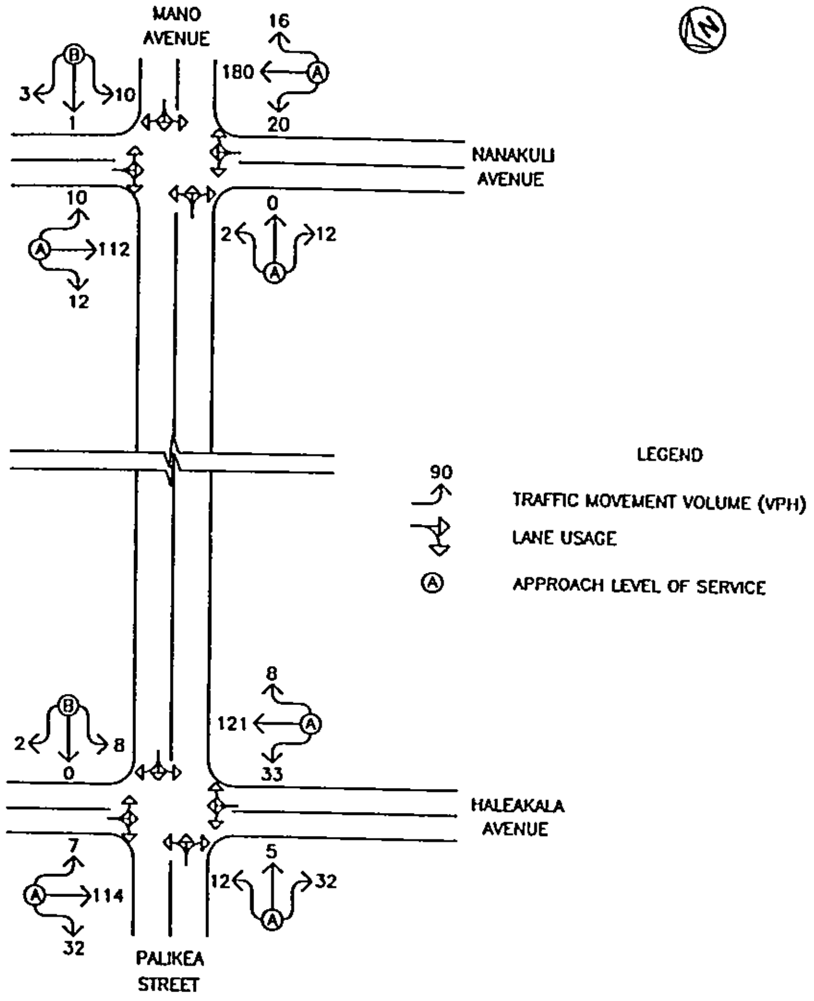
ENGINEERS - PLANNERS
[illegible] S. BERETANIA STREET
HONOLULU, HAWAII [illegible]

NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 PM PEAK HOUR
TRAFFIC WITHOUT PROJECT
FARRINGTON HIGHWAY

EXHIBIT
10



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ENGINEERS - PLANNERS

NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 PM PEAK HOUR
TRAFFIC WITHOUT PROJECT
MANO AVENUE

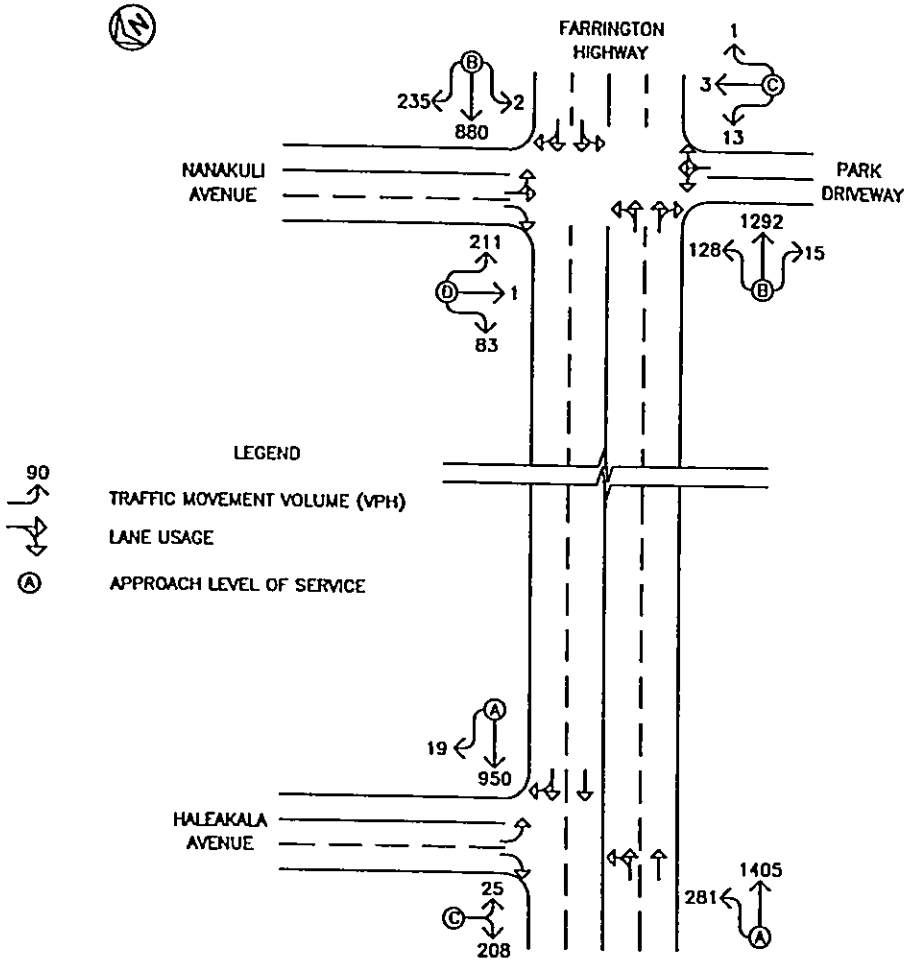
EXHIBIT
11

Table 2: Comparison of Existing and Projected (Without Project) Levels of Service

Intersection	Approach	AM		PM	
		Existing	Year 2002 w/out Project	Existing	Year 2002 w/out Project
Farrington Hwy./Haleakala Ave.	SB	C	C	C	C
	EB	A	A	A	A
	WB	A	A	A	A
Farrington Hwy./Nanakuli Ave.	NB	C	C	C	C
	SB	C	C	C	C
	EB	B	B	A	A
	WB	B	B	A	A
Mano Ave./Nanakuli Ave.	NB	A	A	A	A
	SB	A	A	A	A
	EB	A	A	A	A
	WB	B	B	B	B
Haleakala Ave./Mano Ave./Palikea St.	NB	A	A	A	A
	SB	A	A	A	A
	EB	B	B	A	A
	WB	B	B	B	B

D. Total Traffic Volumes With Project

Exhibits 12 to 15 show the cumulative AM and PM peak hour traffic conditions resulting from the projected external traffic and the development of the proposed Nanakuli IV Elementary School. The cumulative volumes consist of site-generated traffic superimposed over Year 2002 projected traffic demands. The traffic impacts resulting from the proposed project are addressed in the following section.



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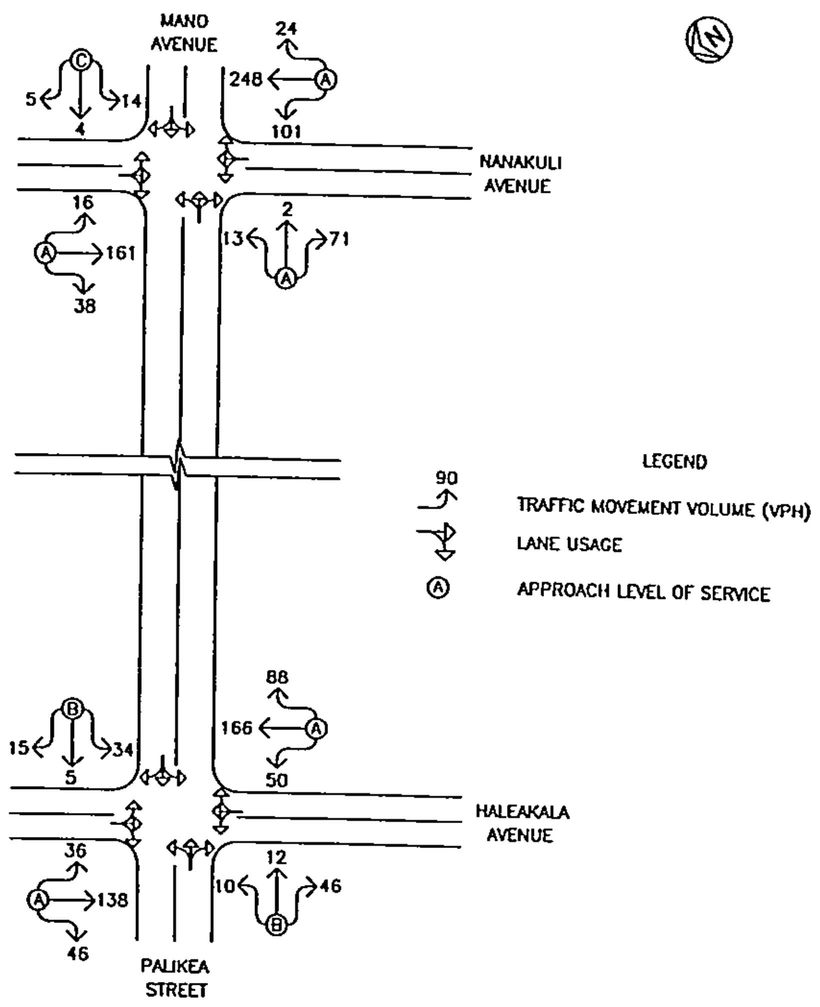
ENGINEERS - PLANNERS
[illegible]
[illegible]

NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 AM PEAK HOUR
TRAFFIC WITH PROJECT
FARRINGTON HIGHWAY

EXHIBIT
12

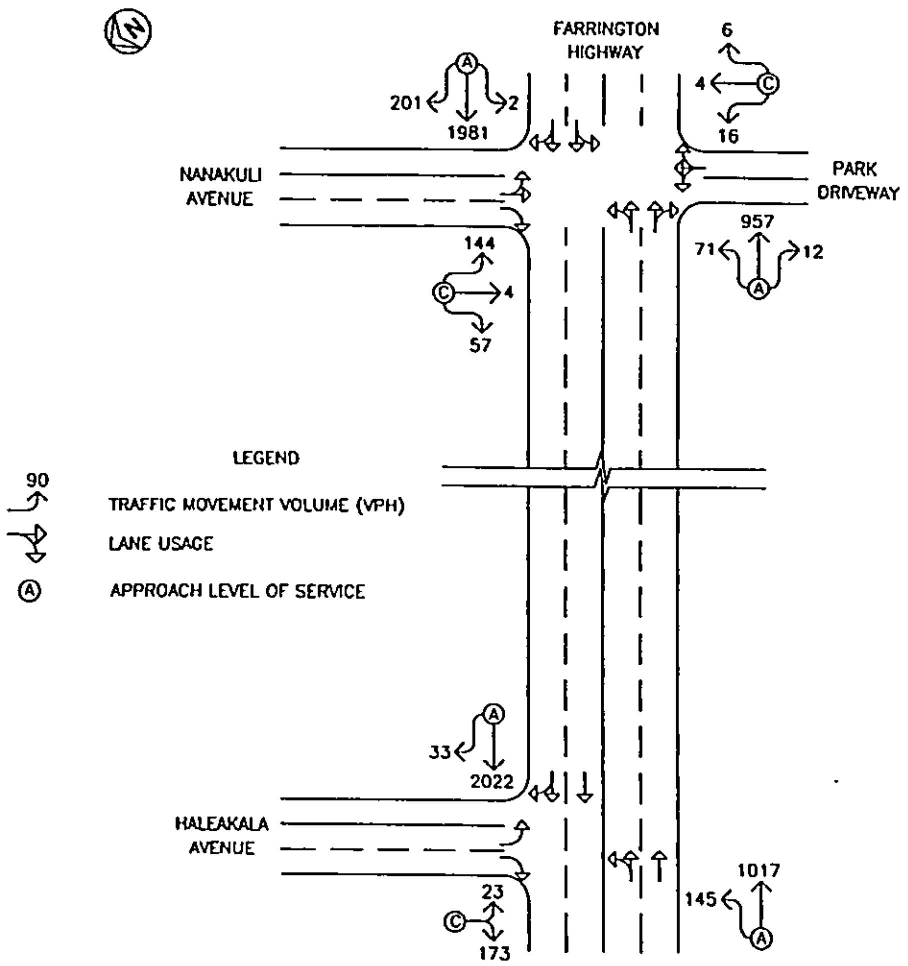


WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS - PLANNERS
[illegible]
[illegible]

NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 AM PEAK HOUR
TRAFFIC WITH PROJECT
MANO AVENUE

EXHIBIT
13



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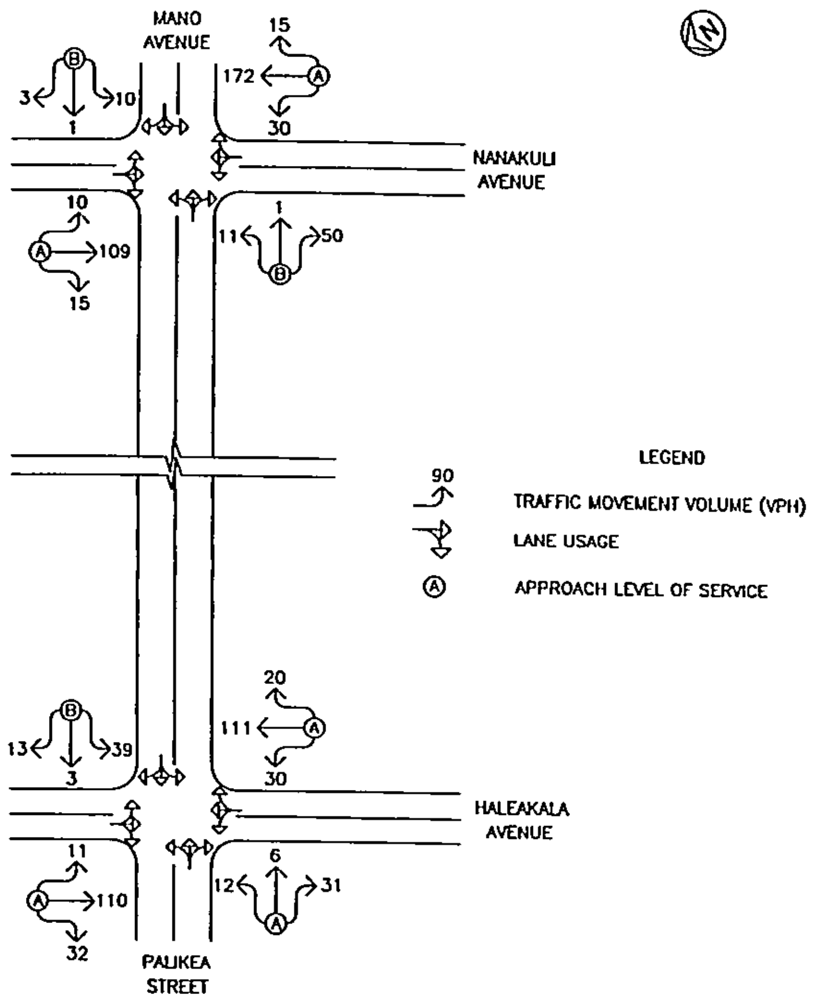
HONOLULU, HAWAII [illegible]

NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 PM PEAK HOUR
TRAFFIC WITH PROJECT
FARRINGTON HIGHWAY

EXHIBIT
14



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[illegible] S. BERETANIA STREET
HONOLULU, HAWAII [illegible]

NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 PM PEAK HOUR
TRAFFIC WITH PROJECT
MANO AVENUE

EXHIBIT
15

V. TRAFFIC IMPACT ANALYSIS

The Year 2002 cumulative AM and PM peak hour traffic conditions with the development of the Nanakuli IV Elementary School are summarized in Table 3. The existing and projected Year 2002 roadway operating conditions without the proposed project are provided for comparison in Table 3. LOS calculations are included in Appendices G and H.

Table 3: Comparison of Existing and Projected (With and Without Project) Levels of Service

Intersection	Approach	AM			PM		
		Existing	Year 2002		Existing	Year 2002	
			w/out Project	w/ Project		w/out Project	w/ Project
Farrington Hwy./ Haleakala Ave.	SB	C	C	C	C	C	C
	EB	A	A	A	A	A	A
	WB	A	A	A	A	A	A
Farrington Hwy./ Nanakuli Ave.	NB	C	C	C	C	C	C
	SB	C	C	D	C	C	C
	EB	B	B	B	A	A	A
	WB	B	B	B	A	A	A
Nanakuli Ave./ Mano Ave.	NB	A	A	A	A	A	A
	SB	A	A	A	A	A	A
	EB	A	A	A	A	A	A
	WB	B	B	C	B	B	B
Haleakala Ave./ Mano Ave./Palikea St.	NB	A	A	A	A	A	A
	SB	A	A	A	A	A	A
	EB	B	B	B	A	A	B
	WB	B	B	B	B	B	B

The traffic impact of the proposed school on Farrington Highway is relatively minimal during the projected morning and afternoon peak periods and represents a shift in traffic associated with the existing Nanaikapono Elementary School to the proposed school. Traffic volumes at the study intersections along Farrington Highway are expected to decrease slightly

due to the reassignment of site-related traffic volumes from the highway to Mano Avenue where the new school driveway will be located. The levels of service of the approaches at the Nanakuli Avenue and Haleakala Avenue intersections will remain predominantly unchanged during both peak hours. During the AM peak hour, the southbound approach of the Farrington Highway and Nanakuli Avenue intersection will experience slightly lower, but still acceptable levels of service.

The traffic operations on the approaches of the Nanakuli Avenue/Mano Avenue and Haleakala Avenue/Mano Avenue/Palikea Street will experience some changes in levels of service due to the shift in traffic volumes. However, all of the approaches of both intersections will still operate at acceptable levels of service.

VI. RECOMMENDATIONS

Based upon the analysis of the traffic data, the following are the recommendations of this study:

1. Maintain adequate sight distances for motorists to safely enter and exit the project access driveways.
2. Provide adequate on-site loading and unloading areas to prohibit off-site loading operations.
3. Provide adequate turn-around area for delivery and refuse vehicles to maneuver on the project property.
4. Provide sufficient driveway width to accommodate safe vehicle ingress and egress.
5. Restrict the school bus access driveway to right-turn-in and right-turn-out movements only. If possible, channelize the intersection to prohibit illegal traffic maneuvers. Provide adequate signage to prohibit use by other vehicles.
6. Provide sufficient bus staging area to prohibit queuing onto the highway.

VII. CONCLUSION

The proposed Nanakuli IV Elementary School would not have a significant impact on traffic in the vicinity of the project. Traffic volumes at the study intersections along Farrington Highway are expected to decrease slightly due to the shift in site-related traffic volumes from the highway to Mano Avenue where the new school driveway will be located. In addition, the intersections of Nanakuli Avenue/Mano Avenue and Haleakala Avenue/Mano Avenue/Palikea Street should continue to operate at acceptable levels of service.

Counter: D1-0526
Counted By: CK
Weather: Clear
Other:

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1907 S. Beretania St., Suite 400
Honolulu, HI 96826

File Name : farnana
Site Code : 00000003
Start Date : 12/09/1999
Page No : 1

Groups Printed- Unshifted

	Nanakuli Ave Southbound					Farrington Hwy Westbound					Park Dwy Northbound					Farrington Hwy Eastbound					
Start Time	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:30	50	0	7	0	57	0	0	12	0	12	0	2	1	0	3	3	415	0	0	418	490
06:45	35	1	7	0	43	0	0	29	0	29	3	0	1	0	4	9	390	1	0	400	476
Total	85	1	14	0	100	0	0	41	0	41	3	2	2	0	7	12	805	1	0	818	968
07:00	33	0	7	0	40	2	0	22	0	24	1	1	0	0	2	11	353	2	0	366	432
07:15	46	0	23	0	69	0	0	52	0	52	0	0	1	0	1	29	387	1	0	417	539
07:30	37	0	30	0	67	0	0	60	0	60	7	0	0	0	7	52	277	6	0	335	469
07:45	45	1	44	0	90	0	0	37	0	37	5	2	0	0	7	50	297	6	0	353	487
Total	161	1	104	0	266	2	0	171	0	173	13	3	1	0	17	142	1314	15	0	1471	1927
08:00	43	3	35	0	81	0	0	14	0	14	1	1	0	0	2	23	301	1	0	325	422
08:15	26	1	6	0	35	0	0	12	0	12	1	2	1	0	4	6	294	2	0	302	353
Grand Total	317	6	159	0	482	2	0	238	0	240	18	8	4	0	30	183	2714	19	0	2916	3668
Apprch %	65.8	1.2	33.0	0.0		0.8	0.0	99.2	0.0		60.0	26.7	13.3	0.0		6.3	93.1	0.7	0.0		
Total %	6.6	0.2	4.3	0.0	13.1	0.1	0.0	6.5	0.0	6.5	0.5	0.2	0.1	0.0	0.8	5.0	74.0	0.5	0.0	79.5	

	Nanakuli Ave Southbound					Farrington Hwy Westbound					Park Dwy Northbound					Farrington Hwy Eastbound					
Start Time	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	Int. Total
Peak Hour From 06:30 to 08:15 - Peak 1 of 1																					
Intersection	06:30																				
Volume	164	1	44	0	209	2	0	115	0	117	4	3	3	0	10	52	1545	4	0	1601	1937
Percent	78.5	0.5	21.1	0.0		1.7	0.0	98.3	0.0		40.0	30.0	30.0	0.0		3.2	96.5	0.2	0.0		
Volume	164	1	44	0	209	2	0	115	0	117	4	3	3	0	10	52	1545	4	0	1601	1937
Volume	46	0	23	0	69	0	0	52	0	52	0	0	1	0	1	29	387	1	0	417	539
Peak Factor																					0.898
High Int.	07:15					07:15					06:45					06:30					
Volume	46	0	23	0	69	0	0	52	0	52	3	0	1	0	4	3	415	0	0	418	
Peak Factor					0.757					0.563					0.625					0.958	

APPENDIX A

EXISTING TRAFFIC COUNT DATA

Wilson Okamoto & Associates
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Counter: D1-0526/D1-0528
Counted By: CK/KO
Weather: Clear
Other:

File Name : nandwya
Site Code : 00000001
Start Date : 12/07/1999
Page No : 1

Groups Printed- 1 - Unshifted

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Factor		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:30	0	2	0	0	0	2	1	0	1	0	2	0	0	3	0	3	7
06:45	0	13	0	0	0	13	3	0	2	0	5	0	0	6	0	6	24
Total	0	15	0	0	0	15	4	0	3	0	7	0	0	9	0	9	31
07:00	0	11	0	0	0	11	5	0	2	0	7	0	0	6	0	6	24
07:15	0	24	0	0	0	24	10	0	14	0	24	0	0	26	0	26	74
07:30	0	25	0	0	0	25	9	0	24	0	33	0	0	31	0	31	89
07:45	0	13	0	0	0	13	15	0	20	0	35	0	0	20	0	20	68
Total	0	73	0	0	0	73	39	0	60	0	99	0	0	83	0	83	255
08.00	0	2	0	0	0	2	15	0	4	0	19	0	0	8	0	8	29
08:15	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	1	3
Grand Total	0	92	0	0	0	92	58	0	67	0	125	0	0	101	0	101	318
Apprch %		100.0	0.0	0.0	0.0		46.4	0.0	53.6	0.0		0.0	0.0	100.0	0.0		
Total %	0.0	28.9	0.0	0.0	0.0	28.9	18.2	0.0	21.1	0.0	39.3	0.0	0.0	31.8	0.0	31.8	

		Farrington Hwy Westbound					Nanakapono Dwy Northbound					Farrington Hwy Eastbound					
Start Time	App. Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	Int. Total
Peak Hour From 06:30 to 08:15 - Peak 1 of 1																	
Intersection	07:15																
Volume	0	64	0	0	0	64	49	0	62	0	111	0	0	85	0	85	260
Percent		100.0	0.0	0.0	0.0		44.1	0.0	55.9	0.0		0.0	0.0	100.0	0.0		
Volume	0	64	0	0	0	64	49	0	62	0	111	0	0	85	0	85	260
Volume	0	25	0	0	0	25	9	0	24	0	33	0	0	31	0	31	89
Peak Factor																	0.730
High Int.	6:15:00 AM	07:30					07:45					07:30					
Volume	0	25	0	0	0	25	15	0	20	0	35	0	0	31	0	31	
Peak Factor						0.640					0.793					0.685	

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Counter: D1-0528
Counted By: RF
Weather: Clear
Other:

File Name : farhalp
Site Code : 00000003
Start Date : 12/09/1999
Page No : 1

Groups Printed- Unshifted

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Start Time	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	App. Total	LT	TH	RT	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0	1.0		
15:00	6	0	39	0	45	0	0	5	0	5	0	0	0	0	27	0	0	0	27	77
15:15	7	0	23	0	30	0	0	9	0	9	0	0	0	0	36	0	0	0	36	75
15:30	9	0	20	0	29	0	0	9	0	9	0	0	0	0	35	0	0	0	35	73
15:45	9	0	24	0	33	0	0	13	0	13	0	0	0	0	23	0	0	0	23	69
Total	31	0	106	0	137	0	0	36	0	36	0	0	0	0	121	0	0	0	121	294
16:00	6	0	35	0	41	0	0	9	0	9	0	0	0	0	35	0	0	0	35	85
16:15	7	0	45	0	52	0	0	12	0	12	0	0	0	0	36	0	0	0	36	100
16:30	6	0	40	0	46	0	0	15	0	15	0	0	0	0	39	0	0	0	39	100
16:45	6	0	41	0	47	0	0	12	0	12	0	0	0	0	44	0	0	0	44	103
Total	25	0	161	0	186	0	0	48	0	48	0	0	0	0	154	0	0	0	154	388
Grand Total	56	0	267	0	323	0	0	84	0	84	0	0	0	0	275	0	0	0	275	682
Apprch %	17.3	0.0	82.7	0.0		0.0	0.0	100.0	0.0		0.0	0.0	0.0		100.0	0.0	0.0	0.0		
Total %	8.2	0.0	39.1	0.0	47.4	0.0	0.0	12.3	0.0	12.3	0.0	0.0	0.0	0.0	40.3	0.0	0.0	0.0	40.3	

	Haleakala Ave Southbound					Farrington Hwy Westbound					Haleakala Ave Northbound				Farrington Hwy Eastbound					
Start Time	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	App. Total	LT	TH	RT	Peds	App. Total	Int. Total
Peak Hour From 15:00 to 16:45 - Peak 1 of 1																				
Intersection	16:00																			
Volume	25	0	161	0	186	0	0	48	0	48	0	0	0	0	154	0	0	0	154	388
Percent	13.4	0.0	86.6	0.0		0.0	0.0	100.0	0.0		0.0	0.0	0.0		100.0	0.0	0.0	0.0		
Volume	25	0	161	0	186	0	0	48	0	48	0	0	0	0	154	0	0	0	154	388
Volume	6	0	41	0	47	0	0	12	0	12	0	0	0	0	44	0	0	0	44	103
Peak Factor																				0.942
High Int.	16:15					16:30					2:45:00 PM				16:45					
Volume	7	0	45	0	52	0	0	15	0	15	0	0	0	0	44	0	0	0	44	
Peak Factor					0.894					0.800									0.875	

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Honolulu, HI 96826

Counter: D1-0526
Counted By: CK
Weather: Clear
Other:

File Name : farnanp
Site Code : 00000003
Start Date : 12/09/1999
Page No : 1

Groups Printed- Unshifted

	Nanakuli Ave Southbound					Farrington Hwy Westbound					Park Dwy Northbound					Farrington Hwy Eastbound					
Start Time	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
15:00	26	2	18	0	46	1	0	32	0	33	2	1	1	0	4	15	0	1	0	16	99
15:15	33	2	17	0	52	1	0	38	0	39	0	2	1	0	3	11	0	1	0	12	106
15:30	19	0	13	0	32	1	0	44	0	45	1	1	3	0	5	9	0	1	0	10	92
15:45	35	1	14	0	50	1	0	30	0	31	4	1	1	0	6	14	0	4	0	18	105
Total	113	5	62	0	180	4	0	144	0	148	7	5	6	0	18	49	0	7	0	56	402
16:00	27	1	16	0	44	0	0	41	0	41	6	1	1	0	8	17	0	3	0	20	113
16:15	25	2	17	0	44	1	0	56	0	57	5	1	2	0	8	19	0	3	0	22	131
16:30	22	0	14	0	36	0	0	64	0	64	1	1	2	0	4	16	0	2	0	18	122
16:45	28	0	12	0	40	1	0	46	0	47	2	1	2	0	5	23	0	3	0	26	118
Total	102	3	59	0	164	2	0	207	0	209	14	4	7	0	25	75	0	11	0	86	484
Grand Total	215	8	121	0	344	6	0	351	0	357	21	9	13	0	43	124	0	18	0	142	886
Apprch %	62.5	2.3	35.2	0.0		1.7	0.0	98.3	0.0		48.8	20.9	30.2	0.0		87.3	0.0	12.7	0.0		
Total %	24.3	0.9	13.7	0.0	38.8	0.7	0.0	39.6	0.0	40.3	2.4	1.0	1.5	0.0	4.9	14.0	0.0	2.0	0.0	16.0	

	Nanakuli Ave Southbound					Farrington Hwy Westbound					Park Dwy Northbound					Farrington Hwy Eastbound					
Start Time	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App Total	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	Int. Total
Peak Hour From 15:00 to 16:45 - Peak 1 of 1																					
Intersection	16:00																				
Volume	102	3	59	0	164	2	0	207	0	209	14	4	7	0	25	75	0	11	0	86	484
Percent	62.2	1.8	36.0	0.0		1.0	0.0	99.0	0.0		56.0	16.0	28.0	0.0		87.2	0.0	12.8	0.0		
Volume	102	3	59	0	164	2	0	207	0	209	14	4	7	0	25	75	0	11	0	86	484
Volume	25	2	17	0	44	1	0	56	0	57	5	1	2	0	8	19	0	3	0	22	131
Peak Factor																					0.924
High Int.	16:00					16:30					16:00					16:45					
Volume	27	1	16	0	44	0	0	64	0	64	6	1	1	0	8	23	0	3	0	26	
Peak Factor					0.932					0.816					0.781					0.827	

Wilson Okamoto & Associates
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Counter: D1-0526/D1-0528
Counteo By: CK/KO
Weather: Clear
Other:

File Name : nandwyp
Site Code : 00000001
Start Date : 12/07/1999
Page No : 1

Groups Printed- 1 - Unshifted

		Farrington Hwy Westbound					Nanaikapono Dwy Northbound					Farrington Hwy Eastbound					
Start Time	App. Total	LT	TH	RT	Peds	App Total	LT	TH	RT	Peds	App Total	LT	TH	RT	Peds	App. Total	Int. Total
Factor		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
14:00	0	11	268	0	0	279	31	0	32	0	63	0	240	17	0	257	599
14:15	0	5	308	0	0	313	6	0	7	0	13	0	251	3	0	254	580
14:30	0	1	294	0	0	295	2	0	13	0	15	0	274	2	0	276	586
14:45	0	1	283	0	0	284	1	0	8	0	9	0	301	4	0	305	598
Total	0	18	1153	0	0	1171	40	0	60	0	100	0	1066	26	0	1092	2363
15:00	0	1	314	0	0	315	3	0	3	0	6	0	276	1	0	277	598
15:15	0	1	375	0	0	376	1	0	2	0	3	0	264	0	0	264	643
15:30	0	0	413	0	0	413	1	0	9	0	10	0	268	4	0	272	695
15:45	0	4	475	0	0	479	8	0	9	0	17	0	261	8	0	269	765
Total	0	6	1577	0	0	1583	13	0	23	0	36	0	1069	13	0	1082	2701
16:00	0	6	365	0	0	371	12	0	11	0	23	0	264	7	0	271	665
16:15	0	2	447	0	0	449	1	0	5	0	6	0	248	1	0	249	704
16:30	0	1	431	0	0	432	4	0	2	0	6	0	267	1	0	268	706
16:45	0	4	435	0	0	439	0	0	3	0	3	0	266	3	0	269	711
Total	0	13	1678	0	0	1691	17	0	21	0	38	0	1045	12	0	1057	2786
Grand Total	0	37	4408	0	0	4445	70	0	104	0	174	0	3180	51	0	3231	7850
Apprch %		0.8	99.2	0.0	0.0		40.2	0.0	59.8	0.0		0.0	98.4	1.6	0.0		
Total %	0.0	0.5	56.2	0.0	0.0	56.6	0.9	0.0	1.3	0.0	2.2	0.0	40.5	0.6	0.0	41.2	

		Farrington Hwy Westbound					Nanaikapono Dwy Northbound					Farrington Hwy Eastbound					
Start Time	App. Total	LT	TH	RT	Peds	App Total	LT	TH	RT	Peds	App Total	LT	TH	RT	Peds	App. Total	Int. Total
Peak Hour From 14:00 to 16:45 - Peak 1 of 1																	
Intersection	15:45																
Volume	0	13	1718	0	0	1731	25	0	27	0	52	0	1040	17	0	1057	2840
Percent		0.8	99.2	0.0	0.0		48.1	0.0	51.9	0.0		0.0	98.4	1.6	0.0		
Volume	0	13	1718	0	0	1731	25	0	27	0	52	0	1040	17	0	1057	2840
Volume	0	4	475	0	0	479	8	0	9	0	17	0	261	8	0	269	765
Peak Factor																	0.928
High Int.	1:45:00 PM	15:45					16:00					16:00					
Volume	0	4	475	0	0	479	12	0	11	0	23	0	264	7	0	271	
Peak Factor						0.903					0.565					0.975	

APPENDIX B

LEVEL OF SERVICE DEFINITIONS

Wilson Okamoto & Associates
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Counter: D1-0528
Counted By: RF
Weather: Clear
Other:

File Name : farhala
Site Code : 00000002
Start Date : 12/09/1999
Page No : 1

Groups Printed- Unshifted

	Haleakala Ave Southbound					Farrington Hwy Westbound						Farrington Hwy Eastbound					
Start Time	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	App. Total	LT	TH	RT	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0			1.0	1.0	1.0	1.0		
06:30	10	0	25	0	35	0	162	4	0	166	0	20	0	0	0	20	221
06:45	11	0	21	0	32	0	183	5	0	188	0	34	0	0	0	34	254
Total	21	0	46	0	67	0	345	9	0	354	0	54	0	0	0	54	475
07:00	15	0	28	0	43	0	208	11	0	219	0	32	0	0	0	32	294
07:15	8	0	49	0	57	0	236	6	0	242	0	48	0	0	0	48	347
07:30	18	0	45	0	63	0	238	12	0	250	0	64	0	0	0	64	377
07:45	22	0	63	0	85	0	272	7	0	279	0	62	0	0	0	62	426
Total	63	0	185	0	248	0	954	36	0	990	0	206	0	0	0	206	1444
08:00	13	0	55	0	68	0	175	5	0	180	0	40	0	0	0	40	288
08:15	12	0	37	0	49	0	166	8	0	174	0	28	0	0	0	28	251
Grand Total	109	0	323	0	432	0	1640	58	0	1698	0	328	0	0	0	328	2458
Apprch %	25.2	0.0	74.8	0.0		0.0	96.6	3.4	0.0			100.0	0.0	0.0	0.0		
Total %	4.4	0.0	13.1	0.0	17.6	0.0	66.7	2.4	0.0	69.1	0.0	13.3	0.0	0.0	0.0	13.3	

	Haleakala Ave Southbound					Farrington Hwy Westbound						Farrington Hwy Eastbound					
Start Time	LT	TH	RT	Peds	App. Total	LT	TH	RT	Peds	App. Total	App. Total	LT	TH	RT	Peds	App. Total	Int. Total
Peak Hour From 06:30 to 08:15 - Peak 1 of 1																	
Intersection	07:00																
Volume	63	0	185	0	248	0	954	36	0	990	0	206	0	0	0	206	1444
Percent	25.4	0.0	74.6	0.0		0.0	96.4	3.6	0.0			100.0	0.0	0.0	0.0		
Volume	63	0	185	0	248	0	954	36	0	990	0	206	0	0	0	206	1444
Volume	22	0	63	0	85	0	272	7	0	279	0	62	0	0	0	62	426
Peak Factor																	0.847
High Int.	07:45					07:45					6:15:00 AM	07:30					
Volume	22	0	63	0	85	0	272	7	0	279	0	64	0	0	0	64	
Peak Factor					0.729					0.887						0.805	

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service (LOS) for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria are given in the following table.

Table 1: Level-of-Service Criteria for Signalized Intersections

Level of Service	Stopped Delay for Vehicle (SEC)
A	≤5.0
B	>5.0 and ≤15.0
C	>15.0 and ≤25.0
D	>25.0 and ≤40.0
E	>40.0 and ≤60.0
F	>60.0

Delay is a complex measure and is dependent upon a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

Level of Service A describes operations with very low delay, up to 5 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level of Service B describes operations with delay greater than 5 and up to 15 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than which LOS A, causing higher levels of average delay.

Level of Service C describes operations with delay greater than 15 and up to 25 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping.

Level of Service D describes operations with delay greater than 25 and up to 40 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

"Highway Capacity Manual," Special Report 209, Transportation Research Board, Third Edition, 1994.

Level of Service E describes operation with delay greater than 40 and up to 60 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level of Service F describes operations with delay in excess of 60 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

"Highway Capacity Manual," Special Report 209, Transportation Research Board, Third Edition, 1994.

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service (LOS) criteria are given in Table 1. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. In situations where the degree of saturation is greater than about 0.9, the amount of average total delay is also dependent on the length of the analysis period.

Table 1: Level-of-Service Criteria for
Unsignalized Intersections

Level of Service	Average Total Delay (Sec/Veh)
A	≤5.0
B	>5.0 and ≤1.0
C	>10.0 and ≤20.0
D	>20.0 and ≤30.0
E	>30.0 and ≤45.0
F	>45.0

"Highway Capacity Manual," Special Report 209, Transportation Research Board, Third Edition, 1994.

APPENDIX C

CAPACITY ANALYSIS CALCULATIONS
EXISTING PEAK HOUR TRAFFIC ANALYSIS

```
HCS-Signals 3.1b File:farhala.hcs                                    Page 1
                       HCS: Signals Release 3.1b
Inter:  Nanakuli Elementary School       City/St:
Analyst: CK                               Proj #: 6321-02
Date:    12/14/99                         Period: AM Peak
E/W St: Farrington Hwy                    N/S St: Haleakala Avenue

_________________________SIGNALIZED INTERSECTION SUMMARY_______________
            |  Eastbound    |  Westbound    |  Northbound   |  Southbound  |
            |  L    T    R  |  L    T    R  |  L    T    R  |  L    T    R |
            |---------------|---------------|---------------|--------------|
No. Lanes   |  0    2    0  |  0    2    0  |  0    0    0  |  1    0    1 |
LGConfig    |       LT      |       TR      |               |  L         R |
Volume      |206  1449      |      954  36  |               |63        185 |
Lane Width  |      12.0     |      12.0     |               |12.0     12.0 |
RTOR Vol    |               |           18  |               |           93 |
______________________________________________________________________
Duration     1.00       Area Type: All other areas
______________________________Signal Operations_______________________
Phase Combination 1     2     3     4 |              5     6     7     8
EB  Left          A     A             | NB  Left
    Thru          A     A             |     Thru
    Right                             |     Right
    Peds                              |     Peds
WB  Left                              | SB  Left    A
    Thru                A             |     Thru
    Right               A             |     Right   A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green           20.0  60.0                          30.0
Yellow           0.0   4.0                           4.0
All Red          0.0   1.0                           1.0
Cycle Length: 120.0   secs
_________________________Intersection Performance Summary_____________
Appr/   Lane       Adj Sat       Ratios      Lane Group    Approach
Lane    Group      Flow Rate   __________   ___________   __________
Grp     Capcity     (s)        v/c    g/C    Delay LOS     Delay LOS
______________________________________________________________________
Eastbound

LT       2123      3184       0.90   0.667   6.0   A       6.0   A

Westbound

TR       2035      4070       0.54   0.500   7.1   A       7.1   A

Northbound


Southbound
L        451       1805       0.19   0.250   27.8  C
                                                          28.5   C
R        404       1615       0.31   0.250   28.9  C
        Intersection Delay = 7.0   (sec/veh)   Intersection LOS = A
______________________________________________________________________
```

```
HCS-Signals 3.1b File:farnana.hcs *                                  Page 1
                       HCS: Signals Release 3.1b
Inter:
Analyst: CK                               City/St:
Date:    12/13/99                         Proj #: 6321-02
E/W St: Farrington Hwy                    Period: AM Peak
                                          N/S St: Nanakuli Avenue

_________________________SIGNALIZED INTERSECTION SUMMARY_______________
            |  Eastbound    |  Westbound    |  Northbound   |  Southbound  |
            |  L    T    R  |  L    T    R  |  L    T    R  |  L    T    R |
            |---------------|---------------|---------------|--------------|
No. Lanes   |  0    2    0  |  0    2    0  |  0    1    0  |  0    1    1 |
LGConfig    |      LTR      |      LTR      |      LTR      |      LT    R |
Volume      |142  1314  15  |2    923  171  |13    3    1   |161   1   104 |
Lane Width  |      12.0     |      12.0     |     12.0      |     12.0 12.0|
RTOR Vol    |            8  |           86  |           0   |           52 |
______________________________________________________________________
Duration     1.00       Area Type: All other areas
______________________________Signal Operations_______________________
Phase Combination 1     2     3     4 |              5     6     7     8
EB  Left          A     A             | NB  Left    A
    Thru          A     A             |     Thru    A
    Right         A     A             |     Right   A
    Peds                              |     Peds
WB  Left                A             | SB  Left    A
    Thru                A             |     Thru    A
    Right               A             |     Right   A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green           20.0  55.0                          35.0
Yellow           0.0   4.0                           4.0
All Red          0.0   1.0                           1.0
Cycle Length: 120.0   secs
_________________________Intersection Performance Summary_____________
Appr/   Lane       Adj Sat       Ratios      Lane Group    Approach
Lane    Group      Flow Rate   __________   ___________   __________
Grp     Capcity     (s)        v/c    g/C    Delay LOS     Delay LOS
______________________________________________________________________
Eastbound

LTR      1773      2836       0.94   0.625   12.4  B       12.4  B

Westbound

LTR      1756      3831       0.78   0.458   14.2  B       14.2  B

Northbound

LTR      383       1312       0.05   0.292   22.2  C       22.2  C

Southbound

LT       388       1332       0.69   0.292   32.4  C       30.2  C
R        462       1583       0.18   0.292   23.3  C
        Intersection Delay = 14.8  (sec/veh)   Intersection LOS = B
______________________________________________________________________
```

```
                HCS: Unsignalized Intersections Release 3.1b

_________________TWO-WAY STOP CONTROL(TWSC) ANALYSIS_______________________

Analyst: CK
Intersection: Mano Avenue/Manatuli Avenue
Count Date:
Time Period: AM Peak

Intersection Orientation: North-South Major St.

Vehicle Volume Data:

Movements:        1     2     3     4     5     6     7     8     9    10    11    12
---------------------------------------------------------------------------------------
Volume:          29   263    24    16   172    19    16     2     5     3     1    19
HFR:             29   263    24    16   172    19    16     2     5     3     1    19
PHF:           1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHV:           0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02
---------------------------------------------------------------------------------------


Pedestrian Volume Data:


Movements:
---------------------------------------------------------------------------------------
Flow:
Lane width:
Walk speed:
% Blockage:

Median Type:     None
# of vehicles:  0

Flared approach Movements:

# of vehicles: Eastbound       0
# of vehicles: Westbound       0


Lane usage for movements 1,2&3 approach:
            Lane 1                Lane 2                Lane 3
      L     T     R     L     T     R     L     T     R
---------------------------------------------------------------------------------------
      Y     Y     Y     N     N     N     N     N     N

Channelized:      N
Grade:          0.00


Lane usage for movements 4,5&6 approach:
            Lane 1                Lane 2                Lane 3
      L     T     R     L     T     R     L     T     R
---------------------------------------------------------------------------------------
      Y     Y     Y     N     N     N     N     N     N

Channelized:      N
Grade:          0.00


Lane usage for movements 7,8&9 approach:
            Lane 1                Lane 2                Lane 3
      L     T     R     L     T     R     L     T     R
---------------------------------------------------------------------------------------
      Y     Y     Y     N     N     N     N     N     N

Channelized:      N
Grade:          0.00
```

```
Lane usage for movements 10,11&12 approach:
            Lane 1                Lane 2                Lane 3
      L     T     R     L     T     R     L     T     R
---------------------------------------------------------------------------------------
      N     Y     Y     N     N     N     N     N     N

Channelized:      N
Grade:          0.00


Data for Computing Effect of Delay to Major Street Vehicles:
---------------------------------------------------------------------------------------
                                             Northbound            Southbound
Shared ln volume, major th vehicles:            263                   172
Shared ln volume, major rt vehicles:             24                    19
Sat flow rate, major th vehicles:              1700                  1700
Sat flow rate, major rt vehicles:              1700                  1700
Number of major street through lanes:             1                     1


Length of study period, hrs:     1.00

---------------------------------------------------------------------------------------

Worksheet 4  Critical Gap and Follow-up time calculation.

Critical Gap Calculations:
Movement            1       4       7       8       9      10      11      12
---------------------------------------------------------------------------------------
t c,base          4.1     4.1     7.1     6.5     6.2     7.1     6.5     6.2
t  c,hv           1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0
P hv             0.02    0.02    0.02    0.02    0.02    0.02    0.02    0.02
t  c,g                            0.2     0.2     0.1     0.2     0.2     0.1
G                0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
t  3,lt           0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
t  c,T:
 1 stage         0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

t c
 1 stage          4.1     4.1     7.1     6.5     6.2     7.1     6.5     6.2

Follow Up Time Calculations:
Movement            1       4       7       8       9      10      11      12
---------------------------------------------------------------------------------------
t  f,base         2.2     2.2     3.5     4.0     3.3     3.5     4.0     3.3
t  f,HV           0.9     0.9     0.9     0.9     0.9     0.9     0.9     0.9
P hv             0.02    0.02    0.02    0.02    0.02    0.02    0.02    0.02
t f               2.2     2.2     3.5     4.0     3.3     3.5     4.0     3.3
---------------------------------------------------------------------------------------

Worksheet 6 Impedance and capacity equations

Step 1: RT from Minor St.                          9             12
---------------------------------------------------------------------------------------
Conflicting Flows                                275            182
Potential Capacity                               764            861
Pedestrian Impedance Factor                     1.00           1.00
Movement Capacity                                764            861
Probability of Queue free St.                   0.99           0.98
---------------------------------------------------------------------------------------

Step 2: LT from Major St.                          4              1
---------------------------------------------------------------------------------------
Conflicting Flows                                287            191
Potential Capacity                              1275           1383
Pedestrian Impedance Factor                     1.00           1.00
Movement Capacity                               1275           1383
Probability of Queue free St.                   0.99           0.98
Maj. L Shared ln. Prob. Queue Free St.          0.99           0.97
---------------------------------------------------------------------------------------
```

```
Step 3: TH from Minor St.                        8          11
--------------------------------------------------------------------------
Conflicting Flows                               556         559
Potential Capacity                              439         438
Pedestrian Impedance Factor                     1.00        1.00
Cap. Adj. factor due to Impeding mvmnt          0.96        0.96
Movement Capacity                               422         421
Probability of Queue free St.                   1.00        1.00
--------------------------------------------------------------------------

Step 4: LT from Minor St.                        7          10
--------------------------------------------------------------------------
Conflicting Flows                               557         550
Potential Capacity                              441         446
Pedestrian Impedance Factor                     1.00        1.00
Maj. L, Min T Impedance factor                  0.96        0.96
Maj. L, Min T Adj. Imp Factor.                  0.97        0.97
Cap. Adj. factor due to Impeding mvmnt          0.95        0.96
Movement Capacity                               418         428
--------------------------------------------------------------------------


Worksheet 8 Shared Lane Calculations

Shared Lane Calculations
Movement                                7     8     9    10    11    12
--------------------------------------------------------------------------
                                       |------------||    ----------|
                                       |            ||              |
                                       |            ||              |
v(vph)                                 16     2     5     3     1    19
Movement Capacity                     418   422   764   428   421   861
Shared Lane Capacity                  464               818
--------------------------------------------------------------------------

Worksheet 10 delay,queue length, and LOS

Movement                  1     4     7     8     9    10    11    12
--------------------------------------------------------------------------
                                     |------------||    ----------|
                                     |            ||              |
                                     |            ||              |
v(vph)                   29    16    23                20
C m(vph)               1303  1275   464               818
v/c                    0.02  0.01  0.05              0.02
95% queue length
Control Delay           7.7   7.9  13.2               9.5
LOS                       A     A     B                 A
Approach Delay                         13.2                  9.5
Approach LOS                              B                    A
--------------------------------------------------------------------------


Worksheet 11  Shared Major LT Impedance and Delay

Rank 1 Delay Calculations
Movement                                    2      5
--------------------------------------------------------------------------
P oj                                     0.98   0.99
V i1                                      263    172
V i2                                       24     19
S i1                                     1700   1700
S i2                                     1700   1700
P* 0j                                    0.97   0.99
D maj left                                7.7    7.9
N number major st lanes                     1      1
Delay, rank 1 mvmts                       0.2    0.1
--------------------------------------------------------------------------
```

```
                  HCS: Unsignalized Intersections Release 3.1b

________________TWO-WAY STOP CONTROL(TWSC) ANALYSIS____________________

Analyst: CK
Intersection: Haleakala Avenue/Hano Avenue
Count Date:
Time Period: AM Peak

Intersection Orientation: North-South Major St.

Vehicle Volume Data:

Movements:     1     2     3     4     5     6     7     8     9    10    11    12
-----------------------------------------------------------------------------------
Volume:       50   180    12    11   164    46    11     1     2    10     5    46
HFR:          50   180    12    11   164    46    11     1     2    10     5    46
PHF:        1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHV:        0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02
-----------------------------------------------------------------------------------

Pedestrian Volume Data:


Movements:
-----------------------------------------------------------------------------------
Flow:
Lane width:
Walk speed:
% Blockage:

Median Type:    None
# of vehicles:  0

Flared approach Movements:

# of vehicles: Eastbound      0
# of vehicles: Westbound      0

Lane usage for movements 1,2&3 approach:
                Lane 1                 Lane 2                 Lane 3
        L       T       R       L       T       R       L       T       R
-----------------------------------------------------------------------------------
        Y       Y       Y       N       N       N       N       N       N

Channelized:      N
Grade:          0.00


Lane usage for movements 4,5&6 approach:
                Lane 1                 Lane 2                 Lane 3
        L       T       R       L       T       R       L       T       R
-----------------------------------------------------------------------------------
        Y       Y       Y       N       N       N       N       N       N

Channelized:      N
Grade:          0.00


Lane usage for movements 7,8&9 approach:
                Lane 1                 Lane 2                 Lane 3
        L       T       R       L       T       R       L       T       R
-----------------------------------------------------------------------------------
        Y       Y       Y       N       N       N       N       N       N

Channelized:      N
Grade:          0.00
```

```
Lane usage for movements 10,11&12 approach:
            Lane 1              Lane 2              Lane 3
      L       T       R       L       T       R       L       T       R
------------------------------------------------------------------------------
      Y       Y       Y       N       N       N       N       N       N

Channelized:      N
Grade:          0.00


Data for Computing Effect of Delay to Major Street Vehicles:
------------------------------------------------------------------------------
                                             Northbound       Southbound
Shared In volume, major th vehicles:            180              164
Shared In volume, major rt vehicles:             12               46
Sat flow rate, major th vehicles:              1700             1700
Sat flow rate, major rt vehicles:              1700             1700
Number of major street through lanes:             1                1


Length of study period, hrs:     1.00

------------------------------------------------------------------------------

Worksheet 4  Critical Gap and Follow-up time calculation.

Critical Gap Calculations:
Movement            1      4      7      8      9     10     11     12
------------------------------------------------------------------------------
t c,base          4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2
t  c,hv           1.0    1.0    1.0    1.0    1.0    1.0    1.0    1.0
P hv             0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t  c,g                          0.2    0.2    0.1    0.2    0.2    0.1
G                0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
t  3,lt           0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
t  c,T:
 1 stage         0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00

t c
 1 stage          4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2

Follow Up Time Calculations:
Movement            1      4      7      8      9     10     11     12
------------------------------------------------------------------------------
t  f,base         2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
t  f,HV           0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9
P hv             0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t f               2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
------------------------------------------------------------------------------

Worksheet 6 Impedance and capacity equations

Step 1: RT from Minor St.                        9             12
------------------------------------------------------------------------------
Conflicting Flows                               196            187
Potential Capacity                              856            855
Pedestrian Impedance Factor                    1.00           1.00
Movement Capacity                               856            855
Probability of Queue free St.                  1.00           0.95
------------------------------------------------------------------------------

Step 2: LT from Major St.                        4              1
------------------------------------------------------------------------------
Conflicting Flows                               192            210
Potential Capacity                             1391           1361
Pedestrian Impedance Factor                    1.00           1.00
Movement Capacity                              1391           1361
Probability of Queue free St.                  0.99           0.96
Maj. L Shared ln. Prob. Queue Free St.         0.99           0.96
------------------------------------------------------------------------------

Step 3: TH from Minor St.                        8             11
------------------------------------------------------------------------------
Conflicting Flows                               518            501
Potential Capacity                              462            472
Pedestrian Impedance Factor                    1.00           1.00
Cap. Adj. factor due to Impeding mvmnt         0.95           0.95
Movement Capacity                               439            448
Probability of Queue free St.                  1.00           0.99
------------------------------------------------------------------------------

Step 4: LT from Minor St.                        7             10
------------------------------------------------------------------------------
Conflicting Flows                               521            497
Potential Capacity                              466            484
Pedestrian Impedance Factor                    1.00           1.00
Maj. L, Min T Impedance factor                 0.94           0.95
Maj. L, Min T Adj. Imp Factor.                 0.95           0.96
Cap. Adj. factor due to Impeding mvmnt         0.90           0.96
Movement Capacity                               421            463
------------------------------------------------------------------------------


Worksheet 8 Shared Lane Calculations

Shared Lane Calculations
Movement                            7      8      9     10     11     12
------------------------------------------------------------------------------
                                 |-------------------||-------------------|
                                 |                   ||                   |
                                 |                   ||                   |
v(vph)                             11      1      2     10      5     46
Movement Capacity                 421    439    856    463    448    855
Shared Lane Capacity              455                  705
------------------------------------------------------------------------------

Worksheet 10 delay,queue length, and LOS

Movement              1      4      7      8      9     10     11     12
------------------------------------------------------------------------------
                                 |-------------------||-------------------|
                                 |                   ||                   |
                                 |                   ||                   |
v(vph)               50     11     11                   61
C m(vph)           1361   1391    455                  705
v/c                0.04   0.01   0.03                 0.09
95% queue length
Control Delay       7.7    7.6   13.2                 10.6
LOS                   A      A      B                    B
Approach Delay                          13.2                 10.5
Approach LOS                               B                    B
------------------------------------------------------------------------------


Worksheet 11  Shared Major LT Impedance and Delay

Rank 1 Delay Calculations
Movement                             2      5
------------------------------------------------------------------------------
P oj                              0.96   0.99
V i1                               180    164
V i2                                12     46
S i1                              1700   1700
S i2                              1700   1700
P* 0j                             0.96   0.99
D maj left                         7.7    7.6
N number major st lanes              1      1
Delay, rank 1 mvmts                0.3    0.1
------------------------------------------------------------------------------
```

```
HCS-Signals 3.1b File:farnanp.hcs                                   Page 1
                        HCS: Signals Release 3.1b
Inter:  Nanakuli Elementary School       City/St:
Analyst: CK                               Proj #: 6321-02
Date:    12/13/99                         Period: PM Peak
E/W St: Farrington Hwy                    N/S St: Nanakuli Avenue

____________________SIGNALIZED INTERSECTION SUMMARY_____________________
            |  Eastbound   |  Westbound   |  Northbound  |  Southbound  |
            |  L   T   R   |  L   T   R   |  L   T   R   |  L   T   R   |
            |______________|______________|______________|______________|
No. Lanes   |  0   2   0   |  0   2   0   |  0   1   0   |  0   1   1   |
LGConfig    |     LTR      |     LTR      |     LTR      |     LT   R   |
Volume      |84   971  12  |2    1954 191 |16   4    6   |109  4    61  |
Lane Width  |     12.0     |     12.0     |     12.0     |     12.0 12.0|
RTOR Vol    |          6   |          96  |          3   |          31  |
_____________________________________________________________________________
Duration     1.00       Area Type: All other areas
___________________________________Signal Operations_________________________
Phase Combination 1     2     3     4 |               5     6     7     8
EB  Left          A     A             | NB  Left      A
    Thru          A     A             |     Thru      A
    Right         A     A             |     Right     A
    Peds                              |     Peds
WB  Left                A             | SB  Left      A
    Thru                A             |     Thru      A
    Right               A             |     Right     A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            5.0   75.0                          30.0
Yellow           0.0   4.0                           4.0
All Red          0.0   1.0                           1.0
Cycle Length: 120.0    secs
_____________________Intersection Performance Summary_______________________
Appr/   Lane      Adj Sat    Ratios      Lane Group    Approach
Lane    Group     Flow Rate  ________    __________    __________
Grp     Capcity    (s)       v/c   g/C   Delay LOS     Delay LOS
____________________________________________________________________________
Eastbound

LTR      1999      2999      0.55  0.667  0.3   A       0.3   A

Westbound

LTR      2418      3868      0.90  0.625  5.7   A       5.7   A

Northbound

LTR      335       1338      0.09  0.250  26.9  C       26.9  C

Southbound

LT       332       1328      0.39  0.250  29.9  C       29.3  C
R        396       1583      0.09  0.250  26.9  C
         Intersection Delay = 5.1  (sec/veh)   Intersection LOS = A
____________________________________________________________________________
```

```
HCS-Signals 3.1b File:farhalp.hcs *                                 Page 1
                        HCS: Signals Release 3.1b
Inter:                                   City/St:
Analyst: CK                               Proj #: 6321-01
Date:    12/14/99                         Period: PM Peak
E/W St: Farrington Hwy                    N/S St: Haleakala Avenue

____________________SIGNALIZED INTERSECTION SUMMARY_____________________
            |  Eastbound   |  Westbound   |  Northbound  |  Southbound  |
            |  L   T   R   |  L   T   R   |  L   T   R   |  L   T   R   |
            |______________|______________|______________|______________|
No. Lanes   |  0   2   0   |  0   2   0   |  0   0   0   |  1   0   1   |
LGConfig    |   DefL   T   |          TR  |              |      L       |
Volume      |133  1011     |     2010 49  |              |28        144 |
Lane Width  |12.0 12.0     |     12.0     |              |12.0      12.0|
RTOR Vol    |              |          25  |              |          72  |
_____________________________________________________________________________
Duration     1.00       Area Type: All other areas
___________________________________Signal Operations_________________________
Phase Combination 1     2     3     4 |               5     6     7     8
EB  Left          A     A             | NB  Left
    Thru          A     A             |     Thru
    Right                             |     Right
    Peds                              |     Peds
WB  Left                              | SB  Left      A
    Thru                A             |     Thru
    Right               A             |     Right     A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            10.0  72.0                          28.0
Yellow           0.0   4.0                           4.0
All Red          0.0   1.0                           1.0
Cycle Length: 120.0    secs
_____________________Intersection Performance Summary_______________________
Appr/   Lane      Adj Sat    Ratios      Lane Group    Approach
Lane    Group     Flow Rate  ________    __________    __________
Grp     Capcity    (s)       v/c   g/C   Delay LOS     Delay LOS
____________________________________________________________________________
Eastbound
DefL     151                 0.91  0.683  70.2  E
T        1474      2157      0.71  0.683  1.6   A       9.6   A
Westbound

TR       2444      4074      0.92  0.600  7.6   A       7.6   A
Northbound


Southbound
L        413       1770      0.08  0.233  28.7  C
                                                        29.7  C
R        369       1583      0.24  0.233  30.1  C
         Intersection Delay = 8.5  (sec/veh)   Intersection LOS = A
____________________________________________________________________________
```

```
                HCS: Unsignalized Intersections Release 3.1b

________________TWO-WAY STOP CONTROL(TWSC) ANALYSIS_________________

Analyst: CK
Intersection: Mano Avenue/Manakuli Avenue
Count Date:
Time Period: PM Peak

Intersection Orientation: North-South Major St.

Vehicle Volume Data:

Movements:        1     2     3     4     5     6     7     8     9    10    11    12
-------------------------------------------------------------------------------------
Volume:          20   180    16    10   112    12    10     1     3     2     0    12
HFR:             20   180    16    10   112    12    10     1     3     2     0    12
PHF:           1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHV:           0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02
-------------------------------------------------------------------------------------

Pedestrian Volume Data:


Movements:
-------------------------------------------------------------------------------------
Flow:
Lane width:
Walk speed:
% Blockage:

Median Type:    None
# of vehicles:  0

Flared approach Movements:

# of vehicles: Eastbound       0
# of vehicles: Westbound       0

Lane usage for movements 1,2&3 approach:
            Lane 1                Lane 2                Lane 3
      L     T     R       L     T     R       L     T     R
-------------------------------------------------------------------------------------
      Y     Y     Y       N     N     N       N     N     N

Channelized:     N
Grade:        0.00


Lane usage for movements 4,5&6 approach:
            Lane 1                Lane 2                Lane 3
      L     T     R       L     T     R       L     T     R
-------------------------------------------------------------------------------------
      Y     Y     Y       N     N     N       N     N     N

Channelized:     N
Grade:        0.00


Lane usage for movements 7,8&9 approach:
            Lane 1                Lane 2                Lane 3
      L     T     R       L     T     R       L     T     R
-------------------------------------------------------------------------------------
      Y     Y     Y       N     N     N       N     N     N

Channelized:     N
Grade:        0.00
```

```
Lane usage for movements 10,11&12 approach:
            Lane 1                Lane 2                Lane 3
      L     T     R       L     T     R       L     T     R
-------------------------------------------------------------------------------------
      N     Y     Y       N     N     N       N     N     N

Channelized:     N
Grade:        0.00


Data for Computing Effect of Delay to Major Street Vehicles:
-------------------------------------------------------------------------------------
                                           Northbound          Southbound
Shared ln volume, major th vehicles:          180                 112
Shared ln volume, major rt vehicles:           16                  12
Sat flow rate, major th vehicles:            1700                1700
Sat flow rate, major rt vehicles:            1700                1700
Number of major street through lanes:           1                   1

Length of study period, hrs:     1.00

-------------------------------------------------------------------------------------

Worksheet 4  Critical Gap and Follow-up time calculation.

Critical Gap Calculations:
Movement           1      4      7      8      9     10     11     12
-------------------------------------------------------------------------------------
t c,base          4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2
t  c,hv           1.0    1.0    1.0    1.0    1.0    1.0    1.0    1.0
P hv             0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t  c,g                          0.2    0.2    0.1    0.2    0.2    0.1
G                0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
t  3,lt           0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
t  c,T:
 1 stage         0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00

t c
 1 stage          4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2

Follow Up Time Calculations:
Movement           1      4      7      8      9     10     11     12
-------------------------------------------------------------------------------------
t  f,base         2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
t  f,HV           0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9
P hv             0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t f               2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
-------------------------------------------------------------------------------------

Worksheet 6 Impedance and capacity equations

Step 1: RT from Minor St.                           9              12
-------------------------------------------------------------------------------------
Conflicting Flows                                 188             118
Potential Capacity                                854             934
Pedestrian Impedance Factor                      1.00            1.00
Movement Capacity                                 854             934
Probability of Queue free St.                    1.00            0.99
-------------------------------------------------------------------------------------

Step 2: LT from Major St.                           4               1
-------------------------------------------------------------------------------------
Conflicting Flows                                 196             124
Potential Capacity                               1377            1463
Pedestrian Impedance Factor                      1.00            1.00
Movement Capacity                                1377            1463
Probability of Queue free St.                    0.99            0.99
Maj. L Shared ln. Prob. Queue Free St.           0.99            0.98
-------------------------------------------------------------------------------------
```

```
Step 3: TH from Minor St.                             8           11
-------------------------------------------------------------------------------
Conflicting Flows
Potential Capacity                                  372          374
Pedestrian Impedance Factor                         558          557
Cap. Adj. factor due to Impeding mvmnt             1.00         1.00
Movement Capacity                                  0.98         0.98
Probability of Queue free St.                       545          544
                                                   1.00         1.00
-------------------------------------------------------------------------------

Step 4: LT from Minor St.                             7           10
-------------------------------------------------------------------------------
Conflicting Flows
Potential Capacity                                  372          368
Pedestrian Impedance Factor                         585          588
Maj. L, Min T Impedance factor                     1.00         1.00
Maj. L, Min T Adj. Imp Factor.                     0.98         0.98
Cap. Adj. factor due to Impeding mvmnt             0.98         0.98
Movement Capacity                                  0.97         0.98
                                                    567          575
-------------------------------------------------------------------------------

Worksheet 8 Shared Lane Calculations

Shared Lane Calculations
Movement
                                 7      8      9     10     11     12
-------------------------------------------------------------------------------
                              |-------------------||     ------------|
                              |                   ||                 |
v(vph)                        |                   ||                 |
Movement Capacity               10      1      3      2      0     12
Shared Lane Capacity           567    545    854    575    544    934
                               609                  934
-------------------------------------------------------------------------------

Worksheet 10 delay,queue length, and LOS

Movement               1      4      7      8      9     10     11     12
-------------------------------------------------------------------------------
                              |-------------------||     ------------|
                              |                   ||                 |
v(vph)                 20     10     14           ||                 |
C m(vph)             1463   1377    609                  12
v/c                  0.01   0.01   0.02                 934
95% queue length                                        0.01
Control Delay         7.5    7.6   11.0
LOS                    A      A      B                  8.9
Approach Delay                                           A
Approach LOS                            11.0                  8.9
                                          B                    A
-------------------------------------------------------------------------------


Worksheet 11  Shared Major LT Impedance and Delay

Rank 1 Delay Calculations
Movement
                                    2      5
-------------------------------------------------------------------------------
P oj                              0.99   0.99
V i1                               180    112
V i2                                16     12
S i1                              1700   1700
S i2                              1700   1700
P* oj                             0.98   0.99
D maj left                         7.5    7.6
N number major st lanes              1      1
Delay, rank 1 mvmts                0.1    0.1
-------------------------------------------------------------------------------
```

```
                    HCS: Unsignalized Intersections Release 3.1b

___________________TWO-WAY STOP CONTROL(TWSC) ANALYSIS__________________________
Analyst: CK
Intersection: Haleakala Avenue/Mano Avenue
Count Date:
Time Period: PM Peak

Intersection Orientation: North-South Major St.

Vehicle Volume Data:

Movements:      1      2      3      4      5      6      7      8      9     10     11     12
-------------------------------------------------------------------------------------------------
Volume:        33    121      8      7    114     32      8      0      2     12      5     32
HFR:           33    121      8      7    114     32      8      0      2     12      5     32
PHF:         1.00   1.00   1.00   1.00   1.00   1.00   1.00   1.00   1.00   1.00   1.00   1.00
PHV:         0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
-------------------------------------------------------------------------------------------------

Pedestrian Volume Data:


Movements:
-------------------------------------------------------------------------------
Flow:
Lane width:
Walk speed:
% Blockage:

Median Type:     None
# of vehicles:   0

Flared approach Movements:

# of vehicles: Eastbound        0
# of vehicles: Westbound        0

Lane usage for movements 1,2&3 approach:
                Lane 1                   Lane 2                   Lane 3
         L        T        R        L        T        R        L        T        R
-------------------------------------------------------------------------------
         Y        Y        Y        N        N        N        N        N        N

Channelized:       N
Grade:          0.00

Lane usage for movements 4,5&6 approach:
                Lane 1                   Lane 2                   Lane 3
         L        T        R        L        T        R        L        T        R
-------------------------------------------------------------------------------
         Y        Y        Y        N        N        N        N        N        N

Channelized:       N
Grade:          0.00

Lane usage for movements 7,8&9 approach:
                Lane 1                   Lane 2                   Lane 3
         L        T        R        L        T        R        L        T        R
-------------------------------------------------------------------------------
         Y        Y        Y        N        N        N        N        N        N

Channelized:       N
Grade:          0.00
```

```
Lane usage for movements 10,11&12 approach:
                  Lane 1                 Lane 2                 Lane 3
          L         T         R         L         T         R         L         T         R
----------------------------------------------------------------------------------------------
          Y         Y         Y         N         N         N         N         N         N

Channelized:         N
Grade:             0.00


Data for Computing Effect of Delay to Major Street Vehicles:
----------------------------------------------------------------------------------------------
                                              Northbound                Southbound
Shared ln volume, major th vehicles:             121                       114
Shared ln volume, major rt vehicles:               8                        32
Sat flow rate, major th vehicles:               1700                      1700
Sat flow rate, major rt vehicles:               1700                      1700
Number of major street through lanes:              1                         1


Length of study period, hrs:       1.00
----------------------------------------------------------------------------------------------

Worksheet 4  Critical Gap and Follow-up time calculation.

Critical Gap Calculations:
Movement                 1        4        7        8        9       10       11       12
----------------------------------------------------------------------------------------------
t c,base               4.1      4.1      7.1      6.5      6.2      7.1      6.5      6.2
t  c,hv                1.0      1.0      1.0      1.0      1.0      1.0      1.0      1.0
P hv                  0.02     0.02     0.02     0.02     0.02     0.02     0.02     0.02
t  c,g                                   0.2      0.2      0.1      0.2      0.2      0.1
G                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
t  3,lt                0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
t  c,T:
 1 stage              0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

t c
 1 stage               4.1      4.1      7.1      6.5      6.2      7.1      6.5      6.2

Follow Up Time Calculations:
Movement                 1        4        7        8        9       10       11       12
----------------------------------------------------------------------------------------------
t  f,base              2.2      2.2      3.5      4.0      3.3      3.5      4.0      3.3
t  f,HV                0.9      0.9      0.9      0.9      0.9      0.9      0.9      0.9
P hv                  0.02     0.02     0.02     0.02     0.02     0.02     0.02     0.02
t f                    2.2      2.2      3.5      4.0      3.3      3.5      4.0      3.3
----------------------------------------------------------------------------------------------

Worksheet 6 Impedance and capacity equations

Step 1: RT from Minor St.                          9                 12
----------------------------------------------------------------------------------------------
Conflicting Flows                                125                130
Potential Capacity                               926                920
Pedestrian Impedance Factor                     1.00               1.00
Movement Capacity                                926                920
Probability of Queue free St.                   1.00               0.97
----------------------------------------------------------------------------------------------

Step 2: LT from Major St.                          4                  1
----------------------------------------------------------------------------------------------
Conflicting Flows                                129                146
Potential Capacity                              1457               1436
Pedestrian Impedance Factor                     1.00               1.00
Movement Capacity                               1457               1436
Probability of Queue free St.                   1.00               0.98
Maj. L Shared ln. Prob. Queue Free St.          0.99               0.98
----------------------------------------------------------------------------------------------

Step 3: TH from Minor St.                          8                 11
----------------------------------------------------------------------------------------------
Conflicting Flows                                351                339
Potential Capacity                               573                582
Pedestrian Impedance Factor                     1.00               1.00
Cap. Adj. factor due to Impeding mvmnt          0.97               0.97
Movement Capacity                                556                565
Probability of Queue free St.                   1.00               0.99
----------------------------------------------------------------------------------------------

Step 4: LT from Minor St.                          7                 10
----------------------------------------------------------------------------------------------
Conflicting Flows                                354                336
Potential Capacity                               601                618
Pedestrian Impedance Factor                     1.00               1.00
Maj. L, Min T Impedance factor                  0.96               0.97
Maj. L, Min T Adj. Imp Factor.                  0.97               0.98
Cap. Adj. factor due to Impeding mvmnt          0.94               0.97
Movement Capacity                                563                602
----------------------------------------------------------------------------------------------


Worksheet 8 Shared Lane Calculations

Shared Lane Calculations
Movement                            7        8        9       10       11       12
----------------------------------------------------------------------------------------------
                                 |--------------------||--------------------|
                                 |                    ||                    |
                                 |                    ||                    |
v(vph)                              8        0        2       12        5       32
Movement Capacity                 563      556      926      602      565      920
Shared Lane Capacity              611                        771
----------------------------------------------------------------------------------------------

Worksheet 10 delay,queue length, and LOS

Movement              1        4        7        8        9       10       11       12
----------------------------------------------------------------------------------------------
                                 |--------------------||--------------------|
                                 |                    ||                    |
                                 |                    ||
v(vph)               33        7       10                         49
C m(vph)           1436     1457      611                        771
v/c                0.02     0.00     0.02                       0.06
95% queue length
Control Delay       7.6      7.5     11.0                       10.0
LOS                   A        A        B                          A
Approach Delay                               11.0                          10.0
Approach LOS                                    B                             A
----------------------------------------------------------------------------------------------


Worksheet 11  Shared Major LT Impedance and Delay

Rank 1 Delay Calculations
Movement                                  2        5
----------------------------------------------------------------------------------------------
P oj                                   0.98     1.00
V i1                                    121      114
V i2                                      8       32
S i1                                   1700     1700
S i2                                   1700     1700
P* 0j                                  0.98     0.99
D maj left                              7.6      7.5
N number major st lanes                   1        1
Delay, rank 1 mvmts                     0.2      0.0
----------------------------------------------------------------------------------------------
```

APPENDIX D

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2002 PEAK HOUR TRAFFIC
ANALYSIS WITHOUT PROJECT

```
HCS-Signals 3.1b File:farnanaP.hcs *                                Page 1
                          HCS: Signals Release 3.1b

Inter:  Nanakuli Elementary School        City/St:
Analyst: CK                                Proj #: 6321-02
Date:   12/13/99                           Period: Year 2002 AM Peak w/o Project
E/W St: Farrington Hwy                     N/S St: Nanakuli Avenue

                     SIGNALIZED INTERSECTION SUMMARY
            |  Eastbound   |  Westbound  |  Northbound  |  Southbound  |
            |  L   T    R  |  L   T   R  |  L   T    R  |  L   T    R  |
No. Lanes   |  0   2    0  |  0   2   0  |  0   1    0  |  0   1    1  |
LGConfig    |     LTR      |     LTR     |     LTR      |     LT   R   |
Volume      |142 1338  15  |2   940  171 |13  3     1  |161  1   104  |
Lane Width  |     12.0     |     12.0    |     12.0     |     12.0 12.0|
RTOR Vol    |           8  |          86 |          0   |          52  |

Duration    1.00       Area Type: All other areas
                              Signal Operations
Phase Combination 1     2     3     4  |         5     6     7     8
EB  Left          A     A              | NB  Left   A
    Thru          A     A              |     Thru   A
    Right         A     A              |     Right  A
    Peds                               |     Peds
WB  Left                A              | SB  Left   A
    Thru                A              |     Thru   A
    Right               A              |     Right  A
    Peds                               |     Peds
NB  Right                              | EB  Right
SB  Right                              | WB  Right
Green           20.0  55.0                          35.0
Yellow           0.0   4.0                           4.0
All Red          0.0   1.0                           1.0
Cycle Length: 120.0    secs
                        Intersection Performance Summary
Appr/   Lane      Adj Sat      Ratios      Lane Group   Approach
Lane    Group     Flow Rate
Grp     Capcity     (s)      v/c    g/C    Delay LOS    Delay LOS
Eastbound

LTR     1781       2850      0.95   0.625  14.7   B     14.7   B
Westbound

LTR     1756       3831      0.79   0.458  14.6   B     14.6   B
Northbound

LTR     383        1312      0.05   0.292  22.2   C     22.2   C
Southbound

LT      388        1332      0.69   0.292  32.4   C     30.2   C
R       462        1583      0.18   0.292  23.3   C
        Intersection Delay = 16.1  (sec/veh)   Intersection LOS = B
```

```
HCS-Signals 3.1b File:farhalap.hcs *                          Page 1
                         HCS: Signals Release 3.1b

Inter:  Nanakuli Elementary School     City/St:
Analyst: CK                            Proj #: 6321-02
Date:    12/14/99                      Period: Year 2002 AM Peak w/o Project
E/W St: Farrington Hwy                 N/S St: Haleakala Avenue

                     SIGNALIZED INTERSECTION SUMMARY
          |  Eastbound   |  Westbound   |  Northbound  |  Southbound  |
          | L    T    R  | L    T    R  | L    T    R  | L    T    R  |
          |--------------|--------------|--------------|--------------|
No. Lanes |  0   2    0  |  0   2    0  |  0   0    0  |  1   0    1  |
LGConfig  |      LT      |      TR      |              |  L        R  |
Volume    |206 1475      |     971  36  |              |63       185  |
Lane Width|     12.0     |     12.0     |              |12.0     12.0 |
RTOR Vol  |              |          18  |              |          93  |

Duration     1.00       Area Type: All other areas
                              Signal Operations
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left          A     A             | NB  Left
    Thru          A     A             |     Thru
    Right                             |     Right
    Peds                              |     Peds
WB  Left                              | SB  Left A
    Thru                A             |     Thru
    Right               A             |     Right A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            20.0  60.0                     30.0
Yellow            0.0   4.0                      4.0
All Red           0.0   1.0                      1.0
Cycle Length: 120.0    secs
                     Intersection Performance Summary
Appr/   Lane      Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  _____________ __________   ___________
Grp     Capcity     (s)      v/c     g/C   Delay LOS    Delay LOS
_______________________________________________________________________
Eastbound

LT      2094      3141      0.92   0.667   8.5    A     8.5    A

Westbound

TR      2036      4071      0.55   0.500   7.2    A     7.2    A

Northbound


Southbound
L       443       1770      0.19   0.250   27.8   C
                                                        28.5   C
R       396       1583      0.32   0.250   29.0   C
        Intersection Delay = 8.6   (sec/veh)   Intersection LOS = A
```

```
HCS-Signals 3.1b File:farnanpp.hcs *                          Page 1
                         HCS: Signals Release 3.1b

Inter:  Nanakuli Elementary School     City/St:
Analyst: CK                            Proj #: 6321-02
Date:    12/13/99                      Period: Year 2002 PM Peak w/o Project
E/W St: Farrington Hwy                 N/S St: Nanakuli Avenue

                     SIGNALIZED INTERSECTION SUMMARY
          |  Eastbound   |  Westbound   |  Northbound  |  Southbound  |
          | L    T    R  | L    T    R  | L    T    R  | L    T    R  |
          |--------------|--------------|--------------|--------------|
No. Lanes |  0   2    0  |  0   2    0  |  0   1    0  |  0   1    1  |
LGConfig  |     LTR      |     LTR      |     LTR      |      LT   R  |
Volume    |84   989  12  |2    1990 191 |16    4    6  |109   4    61 |
Lane Width|     12.0     |     12.0     |     12.0     |     12.0 12.0|
RTOR Vol  |           6  |          96  |           3  |          31  |

Duration     1.00       Area Type: All other areas
                              Signal Operations
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left          A     A             | NB  Left A
    Thru          A     A             |     Thru A
    Right         A     A             |     Right A
    Peds                              |     Peds
WB  Left                A             | SB  Left A
    Thru                A             |     Thru A
    Right               A             |     Right A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green             5.0  75.0                     30.0
Yellow            0.0   4.0                      4.0
All Red           0.0   1.0                      1.0
Cycle Length: 120.0    secs
                     Intersection Performance Summary
Appr/   Lane      Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  _____________ __________   ___________
Grp     Capcity     (s)      v/c     g/C   Delay LOS    Delay LOS
_______________________________________________________________________
Eastbound

LTR     2009      3013      0.55   0.667   0.3    A     0.3    A

Westbound

LTR     2418      3868      0.92   0.625   7.0    A     7.0    A

Northbound

LTR     335       1338      0.09   0.250   26.9   C     26.9   C

Southbound

LT      332       1328      0.39   0.250   29.9   C     29.3   C
R       396       1583      0.09   0.250   26.9   C
        Intersection Delay = 5.9   (sec/veh)   Intersection LOS = A
```

```
HCS-Signals 3.1b File:farhalpp.hcs                                    Page 1
                           HCS: Signals Release 3.1b

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                              Proj #: 6321-01
Date:    12/14/99                        Period: Year 2002 PM Peak w/o Project
E/W St: Farrington Hwy                   N/S St: Haleakala Avenue

                      SIGNALIZED INTERSECTION SUMMARY
              |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
              |  L   T   R    |  L   T   R    |  L   T   R    |  L   T   R    |
              |---------------|---------------|---------------|---------------|
No. Lanes     |  0   2   0    |  0   2   0    |  0   0   0    |  1   0   1    |
LGConfig      |    DefL  T    |          TR   |               |      L        |
Volume        |133  1029      |     2047 49   |               |28        144  |
Lane Width    |12.0 12.0      |     12.0      |               |12.0      12.0 |
RTOR Vol      |               |          25   |               |          72   |

Duration     1.00       Area Type: All other areas
                               Signal Operations
Phase Combination 1     2     3     4  |            5     6     7     8
EB  Left          A     A              | NB  Left
    Thru          A     A              |     Thru
    Right                              |     Right
    Peds                               |     Peds
WB  Left                               | SB  Left   A
    Thru                A              |     Thru
    Right               A              |     Right  A
    Peds                               |     Peds
NB  Right                              | EB  Right
SB  Right                              | WB  Right
Green            10.0  73.0                         27.0
Yellow            0.0   4.0                          4.0
All Red           0.0   1.0                          1.0
Cycle Length: 120.0    secs
                         Intersection Performance Summary
Appr/    Lane       Adj Sat     Ratios          Lane Group    Approach
Lane     Group      Flow Rate
Grp      Capcity     (s)      v/c     g/C      Delay  LOS    Delay  LOS

Eastbound
DefL      151                 0.91    0.692    70.2   E
T         1492      2157      0.71    0.692    1.6    A      9.5    A

Westbound

TR        2478      4074      0.93    0.608    7.9    A      7.9    A

Northbound


Southbound
L         398       1770      0.09    0.225    29.7   C
                                                              30.7   C
R         356       1583      0.24    0.225    31.1   C
          Intersection Delay = 8.6    (sec/veh)    Intersection LOS = A
```

APPENDIX E

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2002 PEAK HOUR TRAFFIC
ANALYSIS WITH PROJECT

```
HCS-Signals 3.1b File:farnanaw.hcs *                                  Page 1

                        HCS: Signals Release 3.1b

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                              Proj #: 6321-02
Date:    12/13/99                        Period: Year 2002 AM Peak w/ Project
E/W St: Farrington Hwy                   N/S St: Nanakuli Avenue

                  SIGNALIZED INTERSECTION SUMMARY
          |   Eastbound    |   Westbound    |   Northbound   |   Southbound   |
          |  L    T    R   |  L    T    R   |  L    T    R   |  L    T    R   |
          |                |                |                |                |
No. Lanes |   0    2    0  |   0    2    0  |   0    1    0  |   0    1    1  |
LGConfig  |       LTR      |       LTR      |       LTR      |       LT   R   |
Volume    |128  1292 15    |2      880  235 |13    3    1    |211  1     83   |
Lane Width|       12.0     |       12.0     |       12.0     |      12.0 12.0 |
RTOR Vol  |            8   |            118 |            0   |            42  |

Duration      1.00       Area Type: All other areas
                             Signal Operations
Phase Combination 1    2    3    4  |               5    6    7    8
EB  Left          A    A            |  NB  Left     A
    Thru          A    A            |      Thru     A
    Right         A    A            |      Right    A
    Peds                            |      Peds
WB  Left               A            |  SB  Left     A
    Thru               A            |      Thru     A
    Right              A            |      Right    A
    Peds                            |      Peds
NB  Right                           |  EB  Right
SB  Right                           |  WB  Right
Green            20.0 52.5                          37.5
Yellow           0.0  4.0                           4.0
All Red          0.0  1.0                           1.0
Cycle Length: 120.0   secs
                     Intersection Performance Summary
Appr/    Lane      Adj Sat     Ratios        Lane Group   Approach
Lane     Group     Flow Rate  ___________   ___________  ___________
Grp      Capcity     (s)      v/c    g/C    Delay LOS    Delay LOS

Eastbound

LTR      1754      2903       0.92   0.604  10.3   B     10.3   B

Westbound

LTR      1668      3812       0.81   0.438  17.3   B     17.3   B

Northbound

LTR      400       1280       0.05   0.313  20.1   C     20.1   C

Southbound

LT       416       1331       0.84   0.313  42.4   D     38.9   D
R        495       1583       0.14   0.313  20.8   C
         Intersection Delay = 16.5  (sec/veh)   Intersection LOS = B
```

```
HCS-Signals 3.1b File:farhalaw.hcs *                                  Page 1

                        HCS: Signals Release 3.1b

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                              Proj #: 6321-02
Date:    12/14/99                        Period: Year 2002 AM Peak w/ Project
E/W St: Farrington Hwy                   N/S St: Haleakala Avenue

                  SIGNALIZED INTERSECTION SUMMARY
          |   Eastbound    |   Westbound    |   Northbound   |   Southbound   |
          |  L    T    R   |  L    T    R   |  L    T    R   |  L    T    R   |
          |                |                |                |                |
No. Lanes |   0    2    0  |   0    2    0  |   0    0    0  |   1    0    1  |
LGConfig  |       LT       |       TR       |                |   L         R  |
Volume    |281  1405       |      950  19   |                |25          208 |
Lane Width|     12.0       |      12.0      |                |12.0        12.0|
RTOR Vol  |                |           10   |                |            104 |

Duration      1.00       Area Type: All other areas
                             Signal Operations
Phase Combination 1    2    3    4  |               5    6    7    8
EB  Left          A    A            |  NB  Left
    Thru          A    A            |      Thru
    Right                           |      Right
    Peds                            |      Peds
WB  Left                            |  SB  Left     A
    Thru               A            |      Thru
    Right              A            |      Right    A
    Peds                            |      Peds
NB  Right                           |  EB  Right
SB  Right                           |  WB  Right
Green            25.0 60.0                          25.0
Yellow           0.0  4.0                           4.0
All Red          0.0  1.0                           1.0
Cycle Length: 120.0   secs
                     Intersection Performance Summary
Appr/    Lane      Adj Sat     Ratios        Lane Group   Approach
Lane     Group     Flow Rate  ___________   ___________  ___________
Grp      Capcity     (s)      v/c    g/C    Delay LOS    Delay LOS

Eastbound

LT       2130      3007       0.91   0.708  7.0    A     7.0    A

Westbound

TR       2038      4076       0.53   0.500  7.1    A     7.1    A

Northbound


Southbound
L        369       1770       0.09   0.208  31.7   C
                                                         34.3   C
R        330       1583       0.43   0.208  35.0-  C
         Intersection Delay = 7.3   (sec/veh)   Intersection LOS = A
```

```
              HCS: Unsignalized Intersections Release 3.1b

_______________TWO-WAY STOP CONTROL(TWSC) ANALYSIS_______________________

Analyst: CK
Intersection: Nano Avenue/Nanakuli Avenue
Count Date: Year 2002 w/ project
Time Period: AM Peak

Intersection Orientation: North-South Major St.

Vehicle Volume Data:

Movements:         1     2     3     4     5     6     7     8     9    10    11    12
-------------------------------------------------------------------------------------
Volume:          101   248    24    16   161    38    14     4     5    13     2    71
HFR:             101   248    24    16   161    38    14     4     5    13     2    71
PHF:            1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHV:            0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02
-------------------------------------------------------------------------------------


Pedestrian Volume Data:


Movements:
-------------------------------------------------------------------------------------
Flow:
Lane width:
Walk speed:
% Blockage:

Median Type:     None
# of vehicles:   0

Flared approach Movements:

# of vehicles: Eastbound      0
# of vehicles: Westbound      0


Lane usage for movements 1,2&3 approach:
                 Lane 1                  Lane 2                  Lane 3
         L       T       R       L       T       R       L       T       R
-------------------------------------------------------------------------------------
         Y       Y       Y       N       N       N       N       N       N

Channelized:       N
Grade:           0.00


Lane usage for movements 4,5&6 approach:
                 Lane 1                  Lane 2                  Lane 3
         L       T       R       L       T       R       L       T       R
-------------------------------------------------------------------------------------
         Y       Y       Y       N       N       N       N       N       N

Channelized:       N
Grade:           0.00


Lane usage for movements 7,8&9 approach:
                 Lane 1                  Lane 2                  Lane 3
         L       T       R       L       T       R       L       T       R
-------------------------------------------------------------------------------------
         Y       Y       Y       N       N       N       N       N       N

Channelized:       N
Grade:           0.00
```

```
Lane usage for movements 10,11&12 approach:
                 Lane 1                  Lane 2                  Lane 3
         L       T       R       L       T       R       L       T       R
-------------------------------------------------------------------------------------
         N       Y       Y       N       N       N       N       N       N

Channelized:       N
Grade:           0.00


Data for Computing Effect of Delay to Major Street Vehicles:
-------------------------------------------------------------------------------------
                                              Northbound            Southbound
Shared ln volume, major th vehicles:             248                   161
Shared ln volume, major rt vehicles:              24                    38
Sat flow rate, major th vehicles:               1700                  1700
Sat flow rate, major rt vehicles:               1700                  1700
Number of major street through lanes:              1                     1

Length of study period, hrs:     1.00

-------------------------------------------------------------------------------------

Worksheet 4  Critical Gap and Follow-up time calculation.

Critical Gap Calculations:
Movement              1      4      7      8      9     10     11     12
-------------------------------------------------------------------------------------
t c,base            4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2
t  c,hv             1.0    1.0    1.0    1.0    1.0    1.0    1.0    1.0
P hv               0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t  c,g                           0.2    0.2    0.1    0.2    0.2    0.1
G                  0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
t  3,lt             0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
t  c,T:
 1 stage           0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00

t c
 1 stage            4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2

Follow Up Time Calculations:
Movement              1      4      7      8      9     10     11     12
-------------------------------------------------------------------------------------
t  f,base           2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
t  f,HV             0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9
P hv               0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t f                 2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
-------------------------------------------------------------------------------------

Worksheet 6 Impedance and capacity equations

Step 1: RT from Minor St.                            9               12
-------------------------------------------------------------------------------------
Conflicting Flows                                  260              180
Potential Capacity                                 779              863
Pedestrian Impedance Factor                       1.00             1.00
Movement Capacity                                  779              863
Probability of Queue free St.                     0.99             0.92
-------------------------------------------------------------------------------------

Step 2: LT from Major St.                            4                1
-------------------------------------------------------------------------------------
Conflicting Flows                                  272              199
Potential Capacity                                1291             1373
Pedestrian Impedance Factor                       1.00             1.00
Movement Capacity                                 1291             1373
Probability of Queue free St.                     0.99             0.93
Maj. L Shared ln. Prob. Queue Free St.            0.99             0.91
-------------------------------------------------------------------------------------
```

```
Step 3: TH from Minor St.                      8              11
-------------------------------------------------------------------------
Conflicting Flows                             693             686
Potential Capacity                            367             310
Pedestrian Impedance Factor                   1.00            1.00
Cap. Adj. factor due to Impeding mvmnt        0.90            0.90
Movement Capacity                             330             333
Probability of Queue free St.                 0.99            0.99
-------------------------------------------------------------------------

Step 4: LT from Minor St.                      7              10
-------------------------------------------------------------------------
Conflicting Flows                             711             679
Potential Capacity                            348             366
Pedestrian Impedance Factor                   1.00            1.00
Maj. L, Min T Impedance factor                0.89            0.89
Maj. L, Min T Adj. Imp Factor.                0.92            0.91
Cap. Adj. factor due to Impeding mvmnt        0.84            0.91
Movement Capacity                             294             332
-------------------------------------------------------------------------


Worksheet 8 Shared Lane Calculations

Shared Lane Calculations
Movement                                  7     8     9    10    11    12
-------------------------------------------------------------------------
                                         |-----------------||   ---------|
                                         |                 ||            |
                                         |                 ||            |
v(vph)                                    14    4     5    13     2    71
Movement Capacity                        291   330   779   332   333   863
Shared Lane Capacity                     317               827
-------------------------------------------------------------------------

Worksheet 10 delay,queue length, and LOS

Movement                        1     4     7     8     9    10    11    12
-------------------------------------------------------------------------
                                         |-----------------||   ---------|
                                         |                 ||            |
                                         |                 ||            |
v(vph)                         101    16    23                73
C m(vph)                      1373  1291   317               827
v/c                           0.07  0.01  0.07              0.09
95% queue length
Control Delay                  7.9   7.8  16.1               9.8
LOS                              A     A     C                 A
Approach Delay                            16.1                     9.8
Approach LOS                                 C                       A
-------------------------------------------------------------------------


Worksheet 11  Shared Major LT Impedance and Delay

Rank 1 Delay Calculations
Movement                                     2      5
-------------------------------------------------------------------------
P oj                                      0.93   0.99
V 11                                       248    161
V 12                                        24     38
S 11                                      1700   1700
S 12                                      1700   1700
P* Oj                                     0.91   0.99
D maj left                                 7.8    7.8
N number major st lanes                      1      1
Delay, rank 1 mvmts                        0.7    0.1
-------------------------------------------------------------------------
```

```
                 HCS: Unsignalized Intersections Release 3.1b

______________TWO-WAY STOP CONTROL(TWSC) ANALYSIS___________________
Analyst: CK
Intersection: Haleakala Avenue/Mano Avenue
Count Date: Year 2002 w/ project
Time Period: AM Peak

Intersection Orientation: North-South Major St.

Vehicle Volume Data:

Movements:      1     2     3     4     5     6     7     8     9    10    11    12
-------------------------------------------------------------------------------------
Volume:        50   166    88    36   138    46    34     5    15    10    12    46
HFR:           50   166    88    36   138    46    34     5    15    10    12    46
PHF:         1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHV:         0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02
-------------------------------------------------------------------------------------


Pedestrian Volume Data:


Movements:
-------------------------------------------------------------------------------------
Flow:
Lane width:
Walk speed:
% Blockage:

Median Type:    None
# of vehicles:  0

Flared approach Movements:

# of vehicles: Eastbound        0
# of vehicles: Westbound        0

Lane usage for movements 1,2&3 approach:
               Lane 1                   Lane 2                   Lane 3
         L     T     R        L        T       R        L      T       R
-------------------------------------------------------------------------------------
         Y     Y     Y        N        N       N        N      N       N

Channelized:    N
Grade:       0.00

Lane usage for movements 4,5&6 approach:
               Lane 1                   Lane 2                   Lane 3
         L     T     R        L        T       R        L      T       R
-------------------------------------------------------------------------------------
         Y     Y     Y        N        N       N        N      N       N

Channelized:    N
Grade:       0.00

Lane usage for movements 7,8&9 approach:
               Lane 1                   Lane 2                   Lane 3
         L     T     R        L        T       R        L      T       R
-------------------------------------------------------------------------------------
         Y     Y     Y        N        N       N        N      N       N

Channelized:    N
Grade:       0.00
```

```
Lane usage for movements 10,11&12 approach:
            Lane 1                 Lane 2                Lane 3
      L       T       R       L       T       R       L       T       R
-------------------------------------------------------------------------------
      Y       Y       Y       N       N       N       N       N       N

Channelized:      N
Grade:          0.00


Data for Computing Effect of Delay to Major Street Vehicles:
-------------------------------------------------------------------------------
                                              Northbound        Southbound
Shared ln volume, major th vehicles:             166               138
Shared ln volume, major rt vehicles:              88                46
Sat flow rate, major th vehicles:               1700              1700
Sat flow rate, major rt vehicles:               1700              1700
Number of major street through lanes:              1                 1


Length of study period, hrs:     1.00

-------------------------------------------------------------------------------

Worksheet 4  Critical Gap and Follow-up time calculation.

Critical Gap Calculations:
Movement             1      4      7      8      9     10     11     12
-------------------------------------------------------------------------------
t c,base            4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2
t  c,hv             1.0    1.0    1.0    1.0    1.0    1.0    1.0    1.0
P hv               0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t  c,g                           0.2    0.2    0.1    0.2    0.2    0.1
G                  0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
t  3,lt             0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
t  c,T:
 1 stage           0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00

t c
 1 stage            4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2

Follow Up Time Calculations:
Movement             1      4      7      8      9     10     11     12
-------------------------------------------------------------------------------
t  f,base           2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
t  f,HV             0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9
P hv               0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t f                 2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
-------------------------------------------------------------------------------

Worksheet 6 Impedance and capacity equations

Step 1: RT from Minor St.                              9             12
-------------------------------------------------------------------------------
Conflicting Flows                                    210            161
Potential Capacity                                   830            884
Pedestrian Impedance Factor                         1.00           1.00
Movement Capacity                                    830            884
Probability of Queue free St.                       0.98           0.95
-------------------------------------------------------------------------------

Step 2: LT from Major St.                              4              1
-------------------------------------------------------------------------------
Conflicting Flows                                    254            184
Potential Capacity                                  1311           1391
Pedestrian Impedance Factor                         1.00           1.00
Movement Capacity                                   1311           1391
Probability of Queue free St.                       0.93           0.96
Maj. L Shared ln. Prob. Queue Free St.              0.93           0.96
-------------------------------------------------------------------------------
```

```
Step 3: TH from Minor St.                              8             11
-------------------------------------------------------------------------------
Conflicting Flows                                    566            587
Potential Capacity                                   434            422
Pedestrian Impedance Factor                         1.00           1.00
Cap. Adj. factor due to Impeding mvmnt              0.93           0.93
Movement Capacity                                    402            392
Probability of Queue free St.                       0.99           0.97
-------------------------------------------------------------------------------

Step 4: LT from Minor St.                              7             10
-------------------------------------------------------------------------------
Conflicting Flows                                    572            553
Potential Capacity                                   431            444
Pedestrian Impedance Factor                         1.00           1.00
Maj. L, Min T Impedance factor                      0.90           0.92
Maj. L, Min T Adj. Imp Factor.                      0.92           0.94
Cap. Adj. factor due to Impeding mvmnt              0.88           0.92
Movement Capacity                                    377            408
-------------------------------------------------------------------------------


Worksheet 8 Shared Lane Calculations

Shared Lane Calculations
Movement                            7      8      9     10     11     12
-------------------------------------------------------------------------------
                                 |--------------------||--------------------|
                                 |                    ||                    |
v(vph)                           |                    ||                    |
Movement Capacity                  31      5     15     10     12     46
Shared Lane Capacity              377    402    830    409    392    884
                                  449                  631
-------------------------------------------------------------------------------

Worksheet 10 delay,queue length, and LOS

Movement               1      4      7      8      9     10     11     12
-------------------------------------------------------------------------------
                                 |--------------------||--------------------|
                                 |                    ||                    |
v(vph)                           |                    ||                    |
C m(vph)              50     36     54                   69
v/c                 1391   1311    449                  631
95% queue length    0.04   0.03   0.12                 0.11
Control Delay
LOS                  7.7    7.6   14.1                 11.4
Approach Delay         A      A      B                    C
Approach LOS                            14.1                  11.4
                                           B                     B
-------------------------------------------------------------------------------


Worksheet 11  Shared Major LT Impedance and Delay

Rank 1 Delay Calculations
Movement                                     2      5
-------------------------------------------------------------------------------
P oj                                      0.96   0.93
V i1                                       166    138
V i2                                        88     46
S i1                                      1700   1700
S i2                                      1700   1700
P* 0j                                     0.96   0.93
D maj left                                 7.7    7.8
N number major st lanes                      1      1
Delay, rank 1 mvmts                        0.3    0.2
-------------------------------------------------------------------------------
```

```
HCS-Signals 3.1b File:farnanpw.hcs *                                  Page 1

                            HCS: Signals Release 3.1b

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                               Proj #: 6321-02
Date:    12/13/99                         Period: Year 2002 PM Peak w/ Project
E/W St: Farrington Hwy                    N/S St: Nanakuli Avenue

__________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           |  L    T    R   |  L    T    R   |  L    T    R   |  L    T    R   |
           | _____________  | _____________  | _____________  | _____________  |
No. Lanes  |    0   2   0   |    0   2   0   |    0   1   0   |    0   1   1   |
LGConfig   |      LTR       |      LTR       |      LTR       |       LT   R   |
Volume     |71   957  12    |2    1981 201   |16   4    6     |144  4    57    |
Lane Width |     12.0       |     12.0       |     12.0       |     12.0 12.0  |
RTOR Vol   |          6     |          101   |          3     |          29    |
________________________________________________________________________________
Duration    1.00      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4  |             5     6     7     8
EB   Left         A     A              |  NB   Left  A
     Thru         A     A              |       Thru  A
     Right        A     A              |       Right A
     Peds                              |       Peds
WB   Left               A              |  SB   Left  A
     Thru               A              |       Thru  A
     Right              A              |       Right A
     Peds                              |       Peds
NB   Right                             |  EB   Right
SB   Right                             |  WB   Right
Green            5.0   75.0                        30.0
Yellow           0.0   4.0                         4.0
All Red          0.0   1.0                         1.0
Cycle Length: 120.0    secs
____________________Intersection Performance Summary____________________________
Appr/   Lane       Adj Sat    Ratios        Lane Group   Approach
Lane    Group      Flow Rate  ___________   ___________  ___________
Grp     Capcity      (s)      v/c    g/C    Delay LOS    Delay LOS
________________________________________________________________________________
Eastbound

LTR     2075       3113       0.51   0.667  0.2    A     0.2    A

Westbound

LTR     2417       3867       0.92   0.625  6.8    A     6.8    A

Northbound

LTR     328        1312       0.09   0.250  27.0   C     27.0   C

Southbound

LT      331        1325       0.52   0.250  31.6   C     30.8   C
R       396        1583       0.08   0.250  26.9   C
        Intersection Delay = 6.2  (sec/veh)   Intersection LOS = A
________________________________________________________________________________
```

```
HCS-Signals 3.1b File:farhalpw.hcs *                                   Page 1

                            HCS: Signals Release 3.1b

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                               Proj #: 6321-01
Date:    12/14/99                         Period: Year 2002 PM Peak w/ Project
E/W St: Farrington Hwy                    N/S St: Haleakala Avenue

__________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           |  L    T    R   |  L    T    R   |  L    T    R   |  L    T    R   |
           | _____________  | _____________  | _____________  | _____________  |
No. Lanes  |    0   2   0   |    0   2   0   |    0   0   0   |    1   0   1   |
LGConfig   |    DefL    T   |           TR   |                |        L       |
Volume     |145  1017       |     2022 33    |                |23         173  |
Lane Width |12.0 12.0       |     12.0       |                |12.0       12.0 |
RTOR Vol   |                |          17    |                |           87   |
________________________________________________________________________________
Duration    1.00      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4  |             5     6     7     8
EB   Left         A     A              |  NB   Left
     Thru         A     A              |       Thru
     Right                             |       Right
     Peds                              |       Peds
WB   Left                              |  SB   Left  A
     Thru               A              |       Thru
     Right              A              |       Right A
     Peds                              |       Peds
NB   Right                             |  EB   Right
SB   Right                             |  WB   Right
Green            11.0  72.0                        27.0
Yellow           0.0   4.0                         4.0
All Red          0.0   1.0                         1.0
Cycle Length: 120.0    secs
____________________Intersection Performance Summary____________________________
Appr/   Lane       Adj Sat    Ratios        Lane Group   Approach
Lane    Group      Flow Rate  ___________   ___________  ___________
Grp     Capcity      (s)      v/c    g/C    Delay LOS    Delay LOS
________________________________________________________________________________
Eastbound
DefL    165                   0.90   0.692  63.3   E
T       1492       2157       0.70   0.692  1.5    A     9.2    A

Westbound

TR      2446       4077       0.93   0.600  7.7    A     7.7    A

Northbound


Southbound
L       398        1770       0.07   0.225  29.6   C
                                                         31.2   C
R       356        1583       0.29   0.225  31.6   C
        Intersection Delay = 8.4  (sec/veh)   Intersection LOS = A
________________________________________________________________________________
```

```
                HCS: Unsignalized Intersections Release 3.1b
__________________TWO-WAY STOP CONTROL(TWSC) ANALYSIS____________________
Analyst: CK
Intersection: Hano Avenue/Nanakuli Avenue
Count Date: Year 2002 w/ project
Time Period: PM Peak

Intersection Orientation: North-South Major St.

Vehicle Volume Data:

Movements:     1     2     3     4     5     6     7     8     9    10    11    12
----------------------------------------------------------------------------------
Volume:       30   172    15    10   109    15    10     1     3    11     1    50
HFR:          30   172    15    10   109    15    10     1     3    11     1    50
PHF:        1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHV:        0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02
----------------------------------------------------------------------------------

Pedestrian Volume Data:


Movements:
----------------------------------------------------------------------------------
Flow:
Lane width:
Walk speed:
% Blockage:

Median Type:     None
# of vehicles:  0

Flared approach Movements:

# of vehicles: Eastbound       0
# of vehicles: Westbound       0

Lane usage for movements 1,2&3 approach:
               Lane 1                Lane 2                Lane 3
       L       T       R       L       T       R       L       T       R
----------------------------------------------------------------------------------
       Y       Y       Y       N       N       N       N       N       N

Channelized:     N
Grade:         0.00


Lane usage for movements 4,5&6 approach:
               Lane 1                Lane 2                Lane 3
       L       T       R       L       T       R       L       T       R
----------------------------------------------------------------------------------
       Y       Y       Y       N       N       N       N       N       N

Channelized:     N
Grade:         0.00


Lane usage for movements 7,8&9 approach:
               Lane 1                Lane 2                Lane 3
       L       T       R       L       T       R       L       T       R
----------------------------------------------------------------------------------
       Y       Y       Y       N       N       N       N       N       N

Channelized:     N
Grade:         0.00
```

```
Lane usage for movements 10,11&12 approach:
               Lane 1                Lane 2                Lane 3
       L       T       R       L       T       R       L       T       R
----------------------------------------------------------------------------------
       N       Y       Y       N       N       N       N       N       N

Channelized:     N
Grade:         0.00


Data for Computing Effect of Delay to Major Street Vehicles:
----------------------------------------------------------------------------------

Shared ln volume, major th vehicles:         Northbound          Southbound
Shared ln volume, major rt vehicles:           172                 109
Sat flow rate, major th vehicles:              15                  15
Sat flow rate, major rt vehicles:             1700                1700
Number of major street through lanes:         1700                1700
                                                1                   1

Length of study period, hrs:     1.00

----------------------------------------------------------------------------------

Worksheet 4  Critical Gap and Follow-up time calculation.

Critical Gap Calculations:
Movement            1      4      7      8      9     10     11     12
----------------------------------------------------------------------------------
t c,base          4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2
t  c,hv           1.0    1.0    1.0    1.0    1.0    1.0    1.0    1.0
P hv             0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t  c,g                          0.2    0.2    0.1    0.2    0.2    0.1
G                0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
t  3,lt           0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
t  c,T:
 1 stage         0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00

t c
 1 stage          4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2
Follow Up Time Calculations:
Movement            1      4      7      8      9     10     11     12
----------------------------------------------------------------------------------
t  f,base         2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
t  f,HV           0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9
P hv             0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t f               2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
----------------------------------------------------------------------------------

Worksheet 6 Impedance and capacity equations

Step 1: RT from Minor St.                          9              12
----------------------------------------------------------------------------------
Conflicting Flows                                180             117
Potential Capacity                               863             936
Pedestrian Impedance Factor                     1.00            1.00
Movement Capacity                                863             936
Probability of Queue free St.                   1.00            0.95
----------------------------------------------------------------------------------

Step 2: LT from Major St.                          4               1
----------------------------------------------------------------------------------
Conflicting Flows                                187             124
Potential Capacity                              1397            1463
Pedestrian Impedance Factor                     1.00            1.00
Movement Capacity                               1397            1463
Probability of Queue free St.                   0.99            0.98
Maj. L Shared ln. Prob. Queue Free St.          0.99            0.98
----------------------------------------------------------------------------------
```

```
Step 3: TH from Minor St.                        8              11
--------------------------------------------------------------------------------
Conflicting Flows                               384            384
Potential Capacity                              550            550
Pedestrian Impedance Factor                    1.00           1.00
Cap. Adj. factor due to Impeding mvmnt         0.97           0.97
Movement Capacity                               533            533
Probability of Queue free St.                  1.00           1.00
--------------------------------------------------------------------------------

Step 4: LT from Minor St.                        7              10
--------------------------------------------------------------------------------
Conflicting Flows                               402            378
Potential Capacity                              559            580
Pedestrian Impedance Factor                    1.00           1.00
Maj. L, Min T Impedance factor                 0.97           0.97
Maj. L, Min T Adj. Imp Factor.                 0.98           0.98
Cap. Adj. factor due to Impeding mvmnt         0.92           0.97
Movement Capacity                               516            563
--------------------------------------------------------------------------------


Worksheet 8 Shared Lane Calculations

Shared Lane Calculations
Movement                              7      8      9     10     11     12
--------------------------------------------------------------------------------
                                   |-------------------||     ------------|
                                   |                   ||                 |
                                   |                   ||                 |
v(vph)                               10      1      3     11      1     50
Movement Capacity                   516    533    863    563    533    936
Shared Lane Capacity                566                  922
--------------------------------------------------------------------------------

Worksheet 10 delay,queue length, and LOS

Movement                1      4      7      8      9     10     11     12
--------------------------------------------------------------------------------
                                   |-------------------||     ------------|
                                   |                   ||                 |
                                   |                   ||                 |
v(vph)                 30     10     14                   51
C m(vph)             1463   1357    566                  922
v/c                  0.02   0.01   0.02                 0.06
95% queue length
Control Delay         7.5    7.6   11.5                  9.1
LOS                     A      A      B                    A
Approach Delay                            11.5                  9.1
Approach LOS                                 B                    A
--------------------------------------------------------------------------------


Worksheet 11  Shared Major LT Impedance and Delay

Rank 1 Delay Calculations
Movement                                      2      5
--------------------------------------------------------------------------------
P oj                                       0.98   0.99
V 11                                        172    109
V 12                                         15     15
S 11                                       1700   1700
S 12                                       1700   1700
P* oj                                      0.98   0.99
D maj left                                  7.5    7.6
N number major st lines                       1      1
Delay, rank 1 mvmts                         0.2    0.1
--------------------------------------------------------------------------------
```

```
                HCS: Unsignalized Intersections Release 3.1b

________________TWO-WAY STOP CONTROL(TWSC) ANALYSIS______________________

Analyst: CK
Intersection: Haleakala Avenue/Hano Avenue
Count Date: Year 2002 w/ project
Time Period: PM Peak

Intersection Orientation: North-South Major St.

Vehicle Volume Data:

Movements:        1     2     3     4     5     6     7     8     9    10    11    12
--------------------------------------------------------------------------------------
Volume:          30   111    20    11   110    32    39     3    13    12     6    31
HFR:             30   111    20    11   110    32    39     3    13    12     6    31
PHF:           1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00
PHV:           0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02
--------------------------------------------------------------------------------------


Pedestrian Volume Data:


Movements:
--------------------------------------------------------------------------------------
Flow:
Lane width:
Walk speed:
% Blockage:

Median Type:    None
# of vehicles:  0

Flared approach Movements:

# of vehicles: Eastbound       0
# of vehicles: Westbound       0


Lane usage for movements 1,2&3 approach:
               Lane 1                 Lane 2                 Lane 3
        L       T       R       L       T       R       L       T       R
--------------------------------------------------------------------------------------
        Y       Y       Y       N       N       N       N       N       N

Channelized:     N
Grade:         0.00


Lane usage for movements 4,5&6 approach:
               Lane 1                 Lane 2                 Lane 3
        L       T       R       L       T       R       L       T       R
--------------------------------------------------------------------------------------
        Y       Y       Y       N       N       N       N       N       N

Channelized:     N
Grade:         0.00


Lane usage for movements 7,8&9 approach:
               Lane 1                 Lane 2                 Lane 3
        L       T       R       L       T       R       L       T       R
--------------------------------------------------------------------------------------
        Y       Y       Y       N       N       N       N       N       N

Channelized:     N
Grade:         0.00
```

```
Lane usage for movements 10,11&12 approach:
              Lane 1                  Lane 2                  Lane 3
       L        T        R        L        T        R        L        T        R
----------------------------------------------------------------------------------
       Y        Y        Y        N        N        N        N        N        N

Channelized:     N
Grade:         0.00


Data for Computing Effect of Delay to Major Street Vehicles:
----------------------------------------------------------------------------------
                                                Northbound         Southbound
Shared ln volume, major th vehicles:               111                110
Shared ln volume, major rt vehicles:                20                 32
Sat flow rate, major th vehicles:                 1700               1700
Sat flow rate, major rt vehicles:                 1700               1700
Number of major street through lanes:                1                  1

Length of study period, hrs:      1.00

----------------------------------------------------------------------------------

Worksheet 4  Critical Gap and Follow-up time calculation.

Critical Gap Calculations:
Movement              1      4      7      8      9     10     11     12
----------------------------------------------------------------------------------
t c,base             4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2
t  c,hv              1.0    1.0    1.0    1.0    1.0    1.0    1.0    1.0
P hv                0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t  c,G                             0.2    0.2    0.1    0.2    0.2    0.1
G                   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
t  3,lt              0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
t  c,T:
 1 stage            0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00

t c
 1 stage             4.1    4.1    7.1    6.5    6.2    7.1    6.5    6.2

Follow Up Time Calculations:
Movement              1      4      7      8      9     10     11     12
----------------------------------------------------------------------------------
t  f,base            2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
t  f,HV              0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9
P hv                0.02   0.02   0.02   0.02   0.02   0.02   0.02   0.02
t f                  2.2    2.2    3.5    4.0    3.3    3.5    4.0    3.3
----------------------------------------------------------------------------------

Worksheet 6 Impedance and capacity equations

Step 1: RT from Minor St.                                 9             12
----------------------------------------------------------------------------------
Conflicting Flows                                        121            126
Potential Capacity                                       930            924
Pedestrian Impedance Factor                             1.00           1.00
Movement Capacity                                        930            924
Probability of Queue free St.                           0.99           0.97
----------------------------------------------------------------------------------

Step 2: LT from Major St.                                 4              1
----------------------------------------------------------------------------------
Conflicting Flows                                        131            142
Potential Capacity                                      1454           1441
Pedestrian Impedance Factor                             1.00           1.00
Movement Capacity                                       1454           1441
Probability of Queue free St.                           0.99           0.98
Maj. L Shared ln. Prob. Queue Free St.                  0.99           0.98
----------------------------------------------------------------------------------
```

```
Step 3: TH from Minor St.                                 8             11
----------------------------------------------------------------------------------
Conflicting Flows                                        345            339
Potential Capacity                                       578            582
Pedestrian Impedance Factor                             1.00           1.00
Cap. Adj. factor due to Impeding mvmnt                  0.97           0.97
Movement Capacity                                        560            565
Probability of Queue free St.                           0.99           0.99
----------------------------------------------------------------------------------

Step 4: LT from Minor St.                                 7             10
----------------------------------------------------------------------------------
Conflicting Flows                                        318            337
Potential Capacity                                       607            617
Pedestrian Impedance Factor                             1.00           1.00
Maj. L, Min T Impedance factor                          0.96           0.96
Maj. L, Min T Adj. Imp Factor.                          0.97           0.97
Cap. Adj. factor due to Impeding mvmnt                  0.94           0.96
Movement Capacity                                        569            591
----------------------------------------------------------------------------------


Worksheet 8 Shared Lane Calculations

Shared Lane Calculations
Movement                                   7      8      9     10     11     12
----------------------------------------------------------------------------------
                                       |------------------||------------------|
                                       |                  ||                  |
v(vph)                                 |  39      3     13 || 12      6     31 |
Movement Capacity                        569    560    930   591    565    924
Shared Lane Capacity                     625                 760
----------------------------------------------------------------------------------

Worksheet 10 delay,queue length, and LOS

Movement                     1      4      7      8      9     10     11     12
----------------------------------------------------------------------------------
                                       |------------------||------------------|
                                       |                  ||                  |
v(vph)                      30     11  |  55               || 49               |
C m(vph)                  1441   1454    625                 760
v/c                       0.02   0.01   0.09                0.06
95% queue length
Control Delay              7.6    7.5   11.3                10.1
LOS                          A      A      B                   B
Approach Delay                                11.3                10.1
Approach LOS                                     B                   B
----------------------------------------------------------------------------------


Worksheet 11  Shared Major LT Impedance and Delay

Rank 1 Delay Calculations
Movement                                  7      5
----------------------------------------------------------------------------------
P oj                                    0.98   0.99
V i1                                     111    110
V i2                                      20     32
S i1                                    1700   1700
S i2                                    1700   1700
P* 0j                                   0.99   0.99
D maj left                               7.6    7.5
N number major st lanes                    1      1
Delay, rank 1 mvmts                      0.2    0.1
----------------------------------------------------------------------------------
```

Appendix H

Traffic Impact Report-Supplement

SUPPLEMENTAL TRAFFIC IMPACT REPORT

FOR THE

NANAKULI IV ELEMENTARY SCHOOL

Prepared for:

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Prepared by:

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1907 South Beretania Street
Honolulu, Hawaii 96826

August 2000

TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF APPENDICES

I. INTRODUCTION

This report supplements the document titled "Traffic Impact Report for the Nanakuli IV Elementary School," dated December 1999. The purpose of this report is to assess the projected traffic operating conditions with the relocation of the Leeward Headstart Program facility and the construction of the Nanakuli Public Library adjacent to the proposed Nanakuli IV Elementary School.

II. PROJECT DESCRIPTION

The Leeward Headstart Program facility is currently located along the mauka side of Farrington Highway between Haleakala Avenue and Nanakuli Avenue, northeast of the existing Nanaikapono Elementary School. The State Department of Education (DOE) and Department of Accounting and General Services (DAGS) plan to relocate the existing facility to a new facility to be constructed on southeast corner of the proposed Nanakuli IV Elementary School project site in Year 2002. The new facility would accommodate an expected enrollment increase from 20 to 40 students. Access to the facility would be via the proposed school bus driveway off Farrington Highway.

In addition to the Leeward Headstart Program facility, the DOE and DAGS propose to construct the new Nanakuli Public Library at Nanakuli IV Elementary School project site The library is expected to be completed and occupied by Year 2008 and would consist of a 15,000 square-foot building and a paved parking area. Access to the library would also be via the proposed school bus driveway off Farrington Highway.

III. PROJECTED TRAFFIC CONDITIONS

A. Capacity Analysis Methodology

The highway capacity analysis performed in this study is based upon procedures presented in the "Highway Capacity Manual", Special Report 209, Transportation Research Board, Third Edition, 1994, and the "Highway Capacity Software", developed by the Federal Highway Administration The analysis is based on the concept of Level of Service (LOS).

of Service are defined by LOS "A" through "F"; LOS "A" representing an ideal or free-flow operating conditions and LOS "F" unacceptable operating conditions. The LOS definitions are included in Appendix A.

B. Site-Generated Traffic

1. General

The trip generation and trip distribution methodology for the proposed Nanakuli IV Elementary School is described in the "Traffic Impact Report for the Nanakuli IV Elementary School," dated December 1999. Since the projected enrollment for the school in Year 2002 was based upon the assumption that the school would be operating at capacity, the enrollment is not expected to change between Year 2002 and Year 2008. Therefore, no additional trip generation calculations for the school are required for this supplemental report.

2. Trip Generation Methodology

a. Leeward Headstart Program

The trip generation methodology used for the Leeward Headstart Program facility is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 6th Edition," 1995. The projected vehicular trips generated by the estimated enrollment increase were determined by correlating the total number of vehicle trips to the number of students. Table 1 summarizes the project site trip generation characteristics applied to the AM and PM peak hours of traffic to measure the impact resulting from the enrollment increase associated with the relocation of the Leeward Headstart Program facility. Since the projected enrollment for the facility in Year 2002 is based upon the assumption that the school would be operating at capacity, the enrollment is not expected to change between Year 2002 and Year 2008.

Table 1: Peak Hour Trip Generation

INDEPENDENT VARIABLE:		ENROLLMENT EXISTING: 20 STUDENTS PROJECTED: 40 STUDENTS
		PROJECTED TRIP ENDS
AM PEAK	ENTER	21
	EXIT	19
	TOTAL	40
PM PEAK	ENTER	19
	EXIT	21
	TOTAL	40

b. Nanakuli Public Library

The trip generation methodology used for the Nanakuli Public Library is also based upon ITE procedures. The projected vehicular trips generated by the proposed library were determined by correlating the vehicle trip generation data with land use characteristics such as the total number of vehicle trips generated per 1,000 square feet of development. Table 2 summarizes the project site trip generation characteristics applied to the AM and PM peak hours of traffic to measure the impact resulting from the development of the proposed Nanakuli Public Library.

Table 2: Peak Hour Trip Generation

INDEPENDENT VARIABLE: PROJECTED FLOOR AREA:		1,000 Square Feet Floor Area 15,000 Sq. Ft.
		PROJECTED TRIP ENDS
AM PEAK	ENTER	10
	EXIT	4
	TOTAL	14
PM PEAK	ENTER	49
	EXIT	54
	TOTAL	103

3. **Trip Distribution**

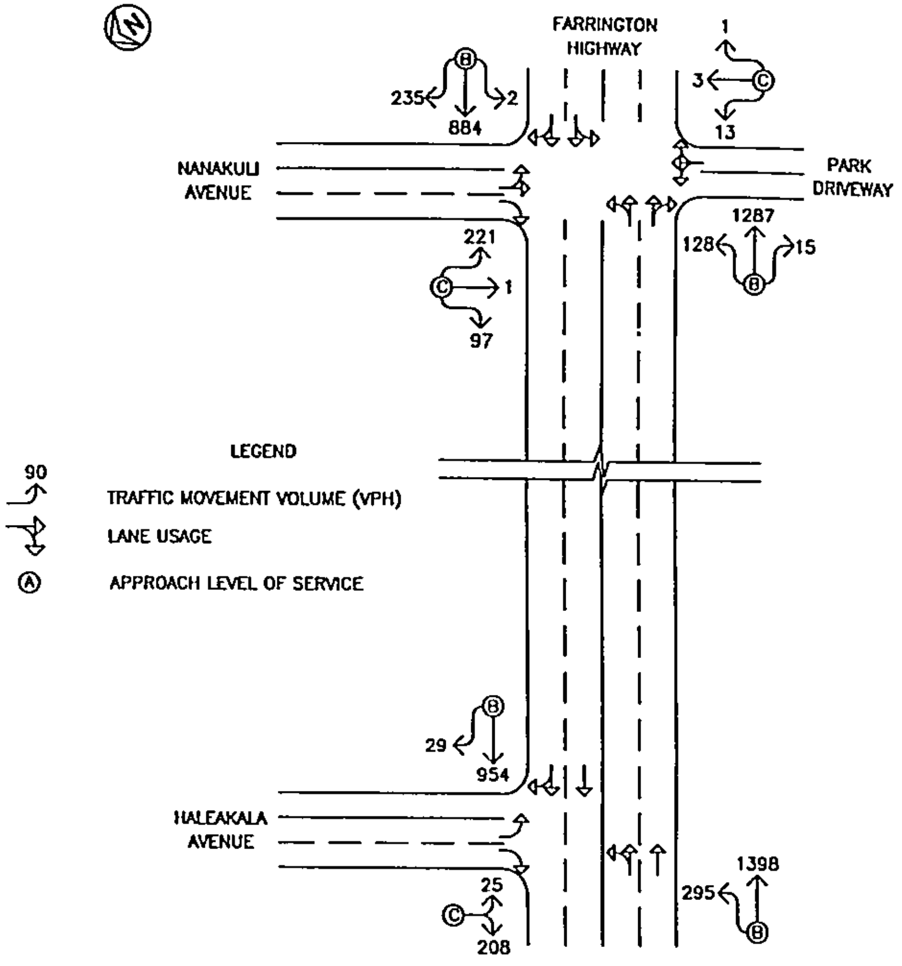
Access to the relocated Leeward Headstart Program facility and the proposed Nanakuli Public Library would be via a driveway off Farrington Highway. The directional distribution of all site-generated vehicular trips at the driveway was based upon the directional distribution of existing traffic along Farrington Highway. At the study intersections, the directional distribution of site-generated traffic was assumed to remain the same as existing conditions.

C. **Through Traffic Forecasting Methodology**

The travel forecast is based upon historical traffic count data obtained from the State Department of Transportation (DOT) at a survey station located at the intersection of Farrington Highway and Lualualei Naval Road. The historical data were analyzed by linear regression techniques to obtain an average annual growth rate of approximately 0.60% on Farrington Highway, using 1999 as the Base Year. A growth factor of 1.018 and 1.056 was applied to the existing traffic demands to achieve the projected Year 2002 and Year 2008 traffic demands, respectively.

D. **Cumulative Traffic Volumes With School and Headstart Program**

Exhibits 1 to 4 show the cumulative projected AM peak hour and PM peak hour traffic volumes and operating conditions along Farrington Highway with the development of the proposed Nanakuli IV Elementary School and the relocation of the Leeward Headstart Program facility. The cumulative volumes consist of traffic generated by the Headstart facility superimposed over Year 2002 projected (with School) traffic demands. The LOS calculations are included in Appendix B and shown on Table 3.



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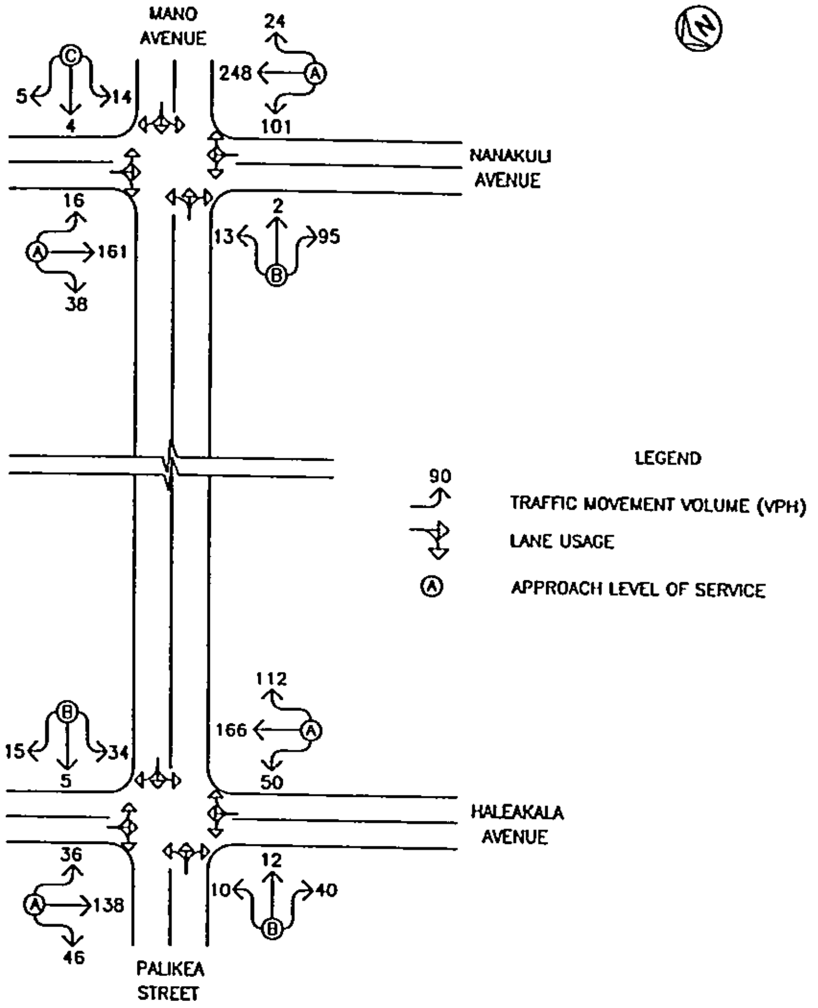
NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 AM PEAK HOUR TRAFFIC
WITH SCHOOL & HEADSTART PROGRAM
FARRINGTON HIGHWAY

EXHIBIT
1



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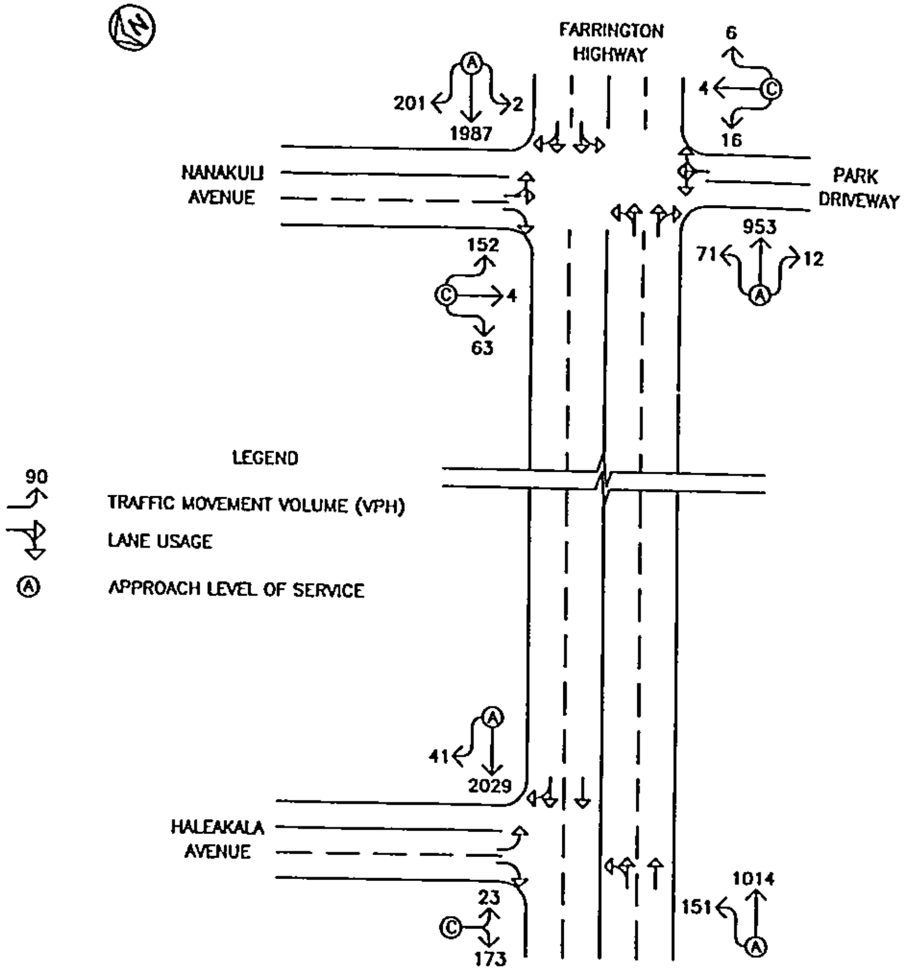
NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 AM PEAK HOUR TRAFFIC
WITH SCHOOL & HEADSTART PROGRAM
MANO AVENUE

EXHIBIT
2



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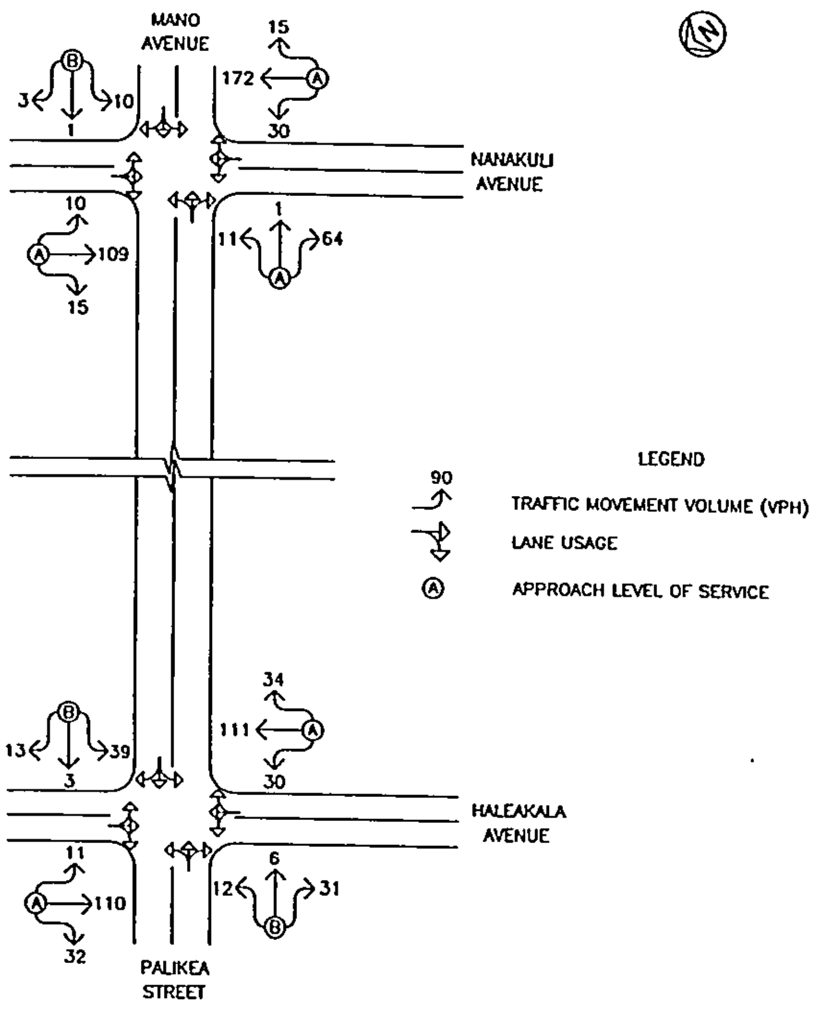
NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 PM PEAK HOUR TRAFFIC
WITH SCHOOL & HEADSTART PROGRAM
FARRINGTON HIGHWAY

EXHIBIT
3



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NANAKULI IV ELEMENTARY SCHOOL

YEAR 2002 PM PEAK HOUR TRAFFIC
WITH SCHOOL & HEADSTART PROGRAM
MANO AVENUE

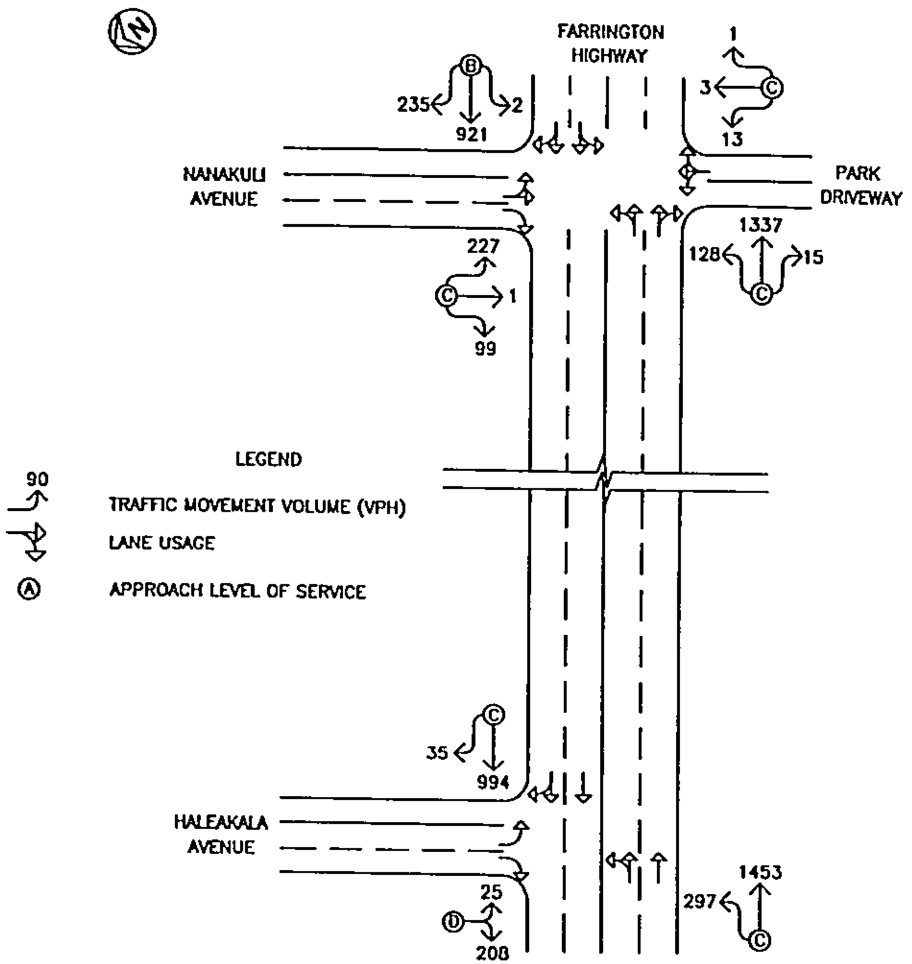
EXHIBIT
4

Table 3: Projected Levels of Service With School and Headstart Program

Intersection	Approach	AM Peak	PM Peak
Farrington Hwy./Haleakala Ave.	SB	C	C
	EB	B	A
	WB	B	A
Farrington Hwy./Nanakuli Ave.	NB	C	C
	SB	C	C
	EB	B	A
	WB	B	A
Mano Ave./Nanakuli Ave.	NB	A	A
	SB	A	A
	EB	B	A
	WB	C	B
Haleakala Ave./Mano Ave./Palikea St.	NB	A	A
	SB	A	A
	EB	B	B
	WB	B	B

E. Cumulative Traffic Volumes With School, Headstart Program, and Library

Exhibits 5 to 8 show the cumulative projected AM peak hour and PM peak hour traffic volumes and operating conditions along Farrington Highway with the development of the proposed Nanakuli IV Elementary School, relocation of the Leeward Headstart Program facility, and construction of the Nanakuli Public Library. The cumulative volumes consist of traffic generated by the library superimposed over Year 2008 projected (with School and Headstart Program) traffic demands. The LOS calculations are included in Appendix C and shown on Table 4.



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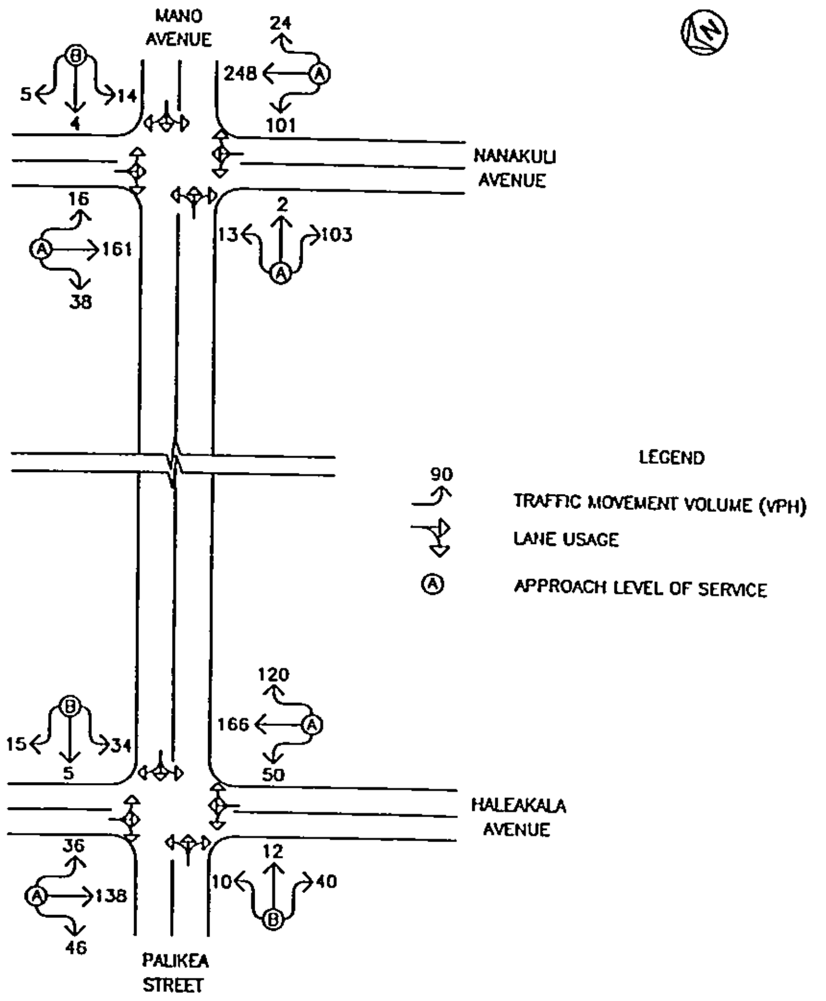
NANAKULI IV ELEMENTARY SCHOOL

YEAR 2008 AM PEAK HOUR TRAFFIC
WITH SCHOOL, HEADSTART
PROGRAM, & LIBRARY
FARRINGTON HIGHWAY

EXHIBIT
5



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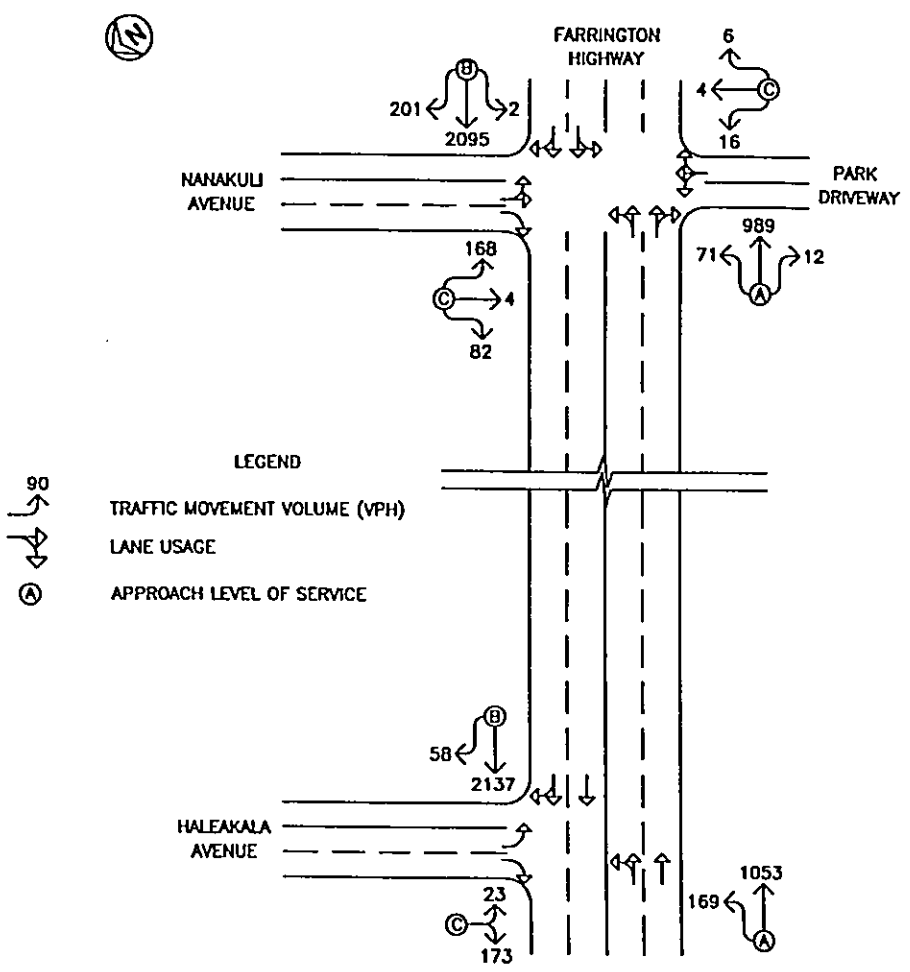
NANAKULI IV ELEMENTARY SCHOOL

YEAR 2008 AM PEAK HOUR TRAFFIC
WITH SCHOOL, HEADSTART
PROGRAM, & LIBRARY
MANO AVENUE

EXHIBIT
6



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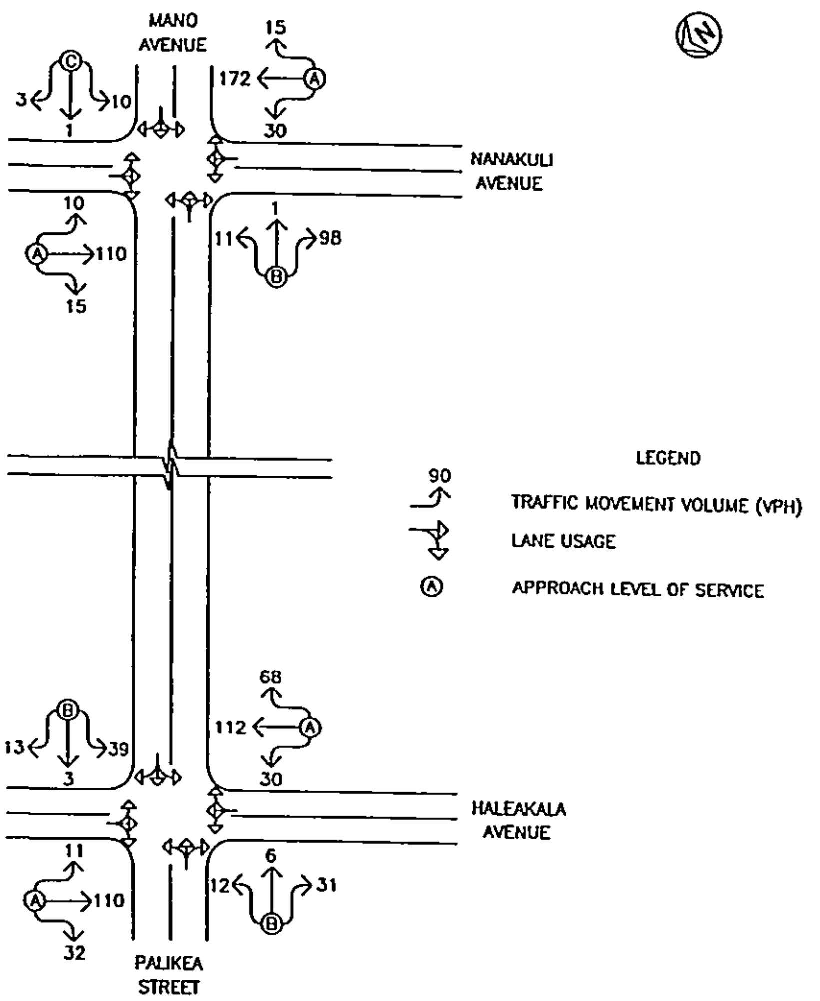
NANAKULI IV ELEMENTARY SCHOOL

YEAR 2008 PM PEAK HOUR TRAFFIC
WITH SCHOOL, HEADSTART
PROGRAM, & LIBRARY
FARRINGTON HIGHWAY

EXHIBIT
7



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NANAKULI IV ELEMENTARY SCHOOL

YEAR 2008 PM PEAK HOUR TRAFFIC
WITH SCHOOL, HEADSTART
PROGRAM, & LIBRARY
MANO AVENUE

EXHIBIT
8

Table 4: Projected Levels of Service With School, Headstart Program, and Library

Intersection	Approach	AM Peak	PM Peak
Farrington Hwy./Haleakala Ave.	SB	D	C
	EB	C	A
	WB	C	B
Farrington Hwy./Nanakuli Ave.	NB	C	C
	SB	C	C
	EB	C	A
	WB	B	B
Mano Ave./Nanakuli Ave.	NB	A	A
	SB	A	A
	EB	B	A
	WB	C	B
Haleakala Ave./Mano Ave./Palikea St.	NB	A	A
	SB	A	A
	EB	B	B
	WB	B	B

VII. CONCLUSION

In Year 2002, the Headstart Program's new facility is expected to generate 40 vehicles during the AM and PM peak hours. These additional vehicles represent an increase of less than 1% along Farrington Highway above the Year 2002 (with School) traffic conditions and should not significantly affect the projected traffic operations in the vicinity of the proposed Nanakuli IV Elementary School project site. The four study intersections are expected to operate satisfactorily at LOS "C" or better under the Year 2002 (with School and Headstart Program) traffic conditions.

In Year 2008, the proposed Nanakuli Public Library is expected to generate 14 and 103 vehicles during the AM and PM peak hours, respectively. These site-generated vehicles represent an increase of less than 2% along Farrington Highway above the Year 2008 (with

School and Headstart Program) traffic conditions and should not significantly affect the projected traffic operations in the vicinity of the proposed Nanakuli IV Elementary School project site. The four study intersections are expected to operate adequately at LOS "D" or better under the Year 2008 (with School, Headstart Program, and Library) traffic conditions.

APPENDIX A

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service (LOS) criteria are given in Table 1. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. In situations where the degree of saturation is greater than about 0.9, the amount of average total delay is also dependent on the length of the analysis period.

Table 1: Level-of-Service Criteria for
Unsignalized Intersections

Level of Service	Average Total Delay (Sec/Veh)
A	≤5.0
B	>5.0 and ≤1.0
C	>10.0 and ≤20.0
D	>20.0 and ≤30.0
E	>30.0 and ≤45.0
F	>45.0

"Highway Capacity Manual," Special Report 209, Transportation Research Board, Third Edition, 1994

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service (LOS) for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria are given in the following table.

Table 1: Level-of-Service Criteria for Signalized Intersections

Level of Service	Stopped Delay for Vehicle (SEC)
A	≤5.0
B	>5.0 and ≤15.0
C	>15.0 and ≤25.0
D	>25.0 and ≤40.0
E	>40.0 and ≤60.0
F	>60.0

Delay is a complex measure and is dependent upon a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

Level of Service A describes operations with very low delay, up to 5 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level of Service B describes operations with delay greater than 5 and up to 15 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both More vehicles stop than which LOS A, causing higher levels of average delay.

Level of Service C describes operations with delay greater than 15 and up to 25 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping

Level of Service D describes operations with delay greater than 25 and up to 40 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

"Highway Capacity Manual," Special Report 209, Transportation Research Board, Third Edition, 1994.

Level of Service E describes operation with delay greater than 40 and up to 60 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level of Service F describes operations with delay in excess of 60 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

"Highway Capacity Manual," Special Report 209, Transportation Research Board, Third Edition, 1994

APPENDIX B

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2002 PEAK HOUR TRAFFIC
ANALYSIS WITH SCHOOL & HEADSTART PROGRAM

```
                 HCS: Signalized Intersections Release 3.2
Inter:  Nanakuli Elementary School     City/St:
Analyst: CK                             Proj #: 6321-02
Date:    12/14/99                       Period: 2002 AM w/ Project & HS
E/W St: Farrington Hwy                  N/S St: Haleakala Avenue

________________________SIGNALIZED INTERSECTION SUMMARY________________________
            |  Eastbound       |  Westbound       |  Northbound      |  Southbound      |
            | L     T     R    | L     T     R    | L     T     R    | L     T     R    |
            |__________________|__________________|__________________|__________________|
No. Lanes   |  0     2     0   |  0     2     0   |  0     0     0   |  1     0     1   |
LGConfig    |       LT         |       TR         |                  |  L           R   |
Volume      |295   1398        |      954   29    |                  |25          208   |
Lane Width  |      12.0        |      12.0        |                  |12.0        12.0  |
RTOR Vol    |                  |             15   |                  |            104   |
_______________________________________________________________________________
Duration     1.00        Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4 |               5      6      7      8
EB   Left         A     A             | NB   Left
     Thru         A     A             |      Thru
     Right                            |      Right
     Peds                             |      Peds
WB   Left                             | SB   Left    A
     Thru               A             |      Thru
     Right              A             |      Right   A
     Peds                             |      Peds
NB   Right                            | EB   Right
SB   Right                            | WB   Right
Green            30.0  55.0                          25.0
Yellow            0.0   4.0                           4.0
All Red           0.0   1.0                           1.0
Cycle Length: 120.0    secs
_____________________Intersection Performance Summary__________________________
Appr/   Lane      Adj Sat       Ratios        Lane Group    Approach
Lane    Group     Flow Rate   ___________    ___________   ___________
Grp     Capacity    (s)       v/c     g/C    Delay LOS     Delay LOS
Eastbound______________________________________________________________________

LT      2080       2937       0.94    0.708  10.4   B      10.4   B
Westbound

TR      1867       4073       0.58    0.458  10.9   B      10.9   B
Northbound


Southbound
L       369        1770       0.09    0.208  31.7   C
R       330        1583       0.43    0.208  35.0-  C      34.3   C
        Intersection Delay = 11.9  (sec/veh)   Intersection LOS = B
_______________________________________________________________________________
```

```
                   HCS: Signalized Intersections Release 3.2
Inter:  Nanakuli Elementary School           City/St:
Analyst: CK                                  Proj #: 6321-02
Date:   12/13/99                             Period: 2002 AM w/ Project & HS
E/W St: Farrington Hwy                       N/S St: Nanakuli Avenue

_____________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound       |  Westbound      |  Northbound     |  Southbound     |
           | L     T     R    | L     T     R   | L     T     R   | L     T     R   |
           |__________________|_________________|_________________|_________________|
No. Lanes  |  0    2     0    |  0    2     0   |  0    1     0   |  0    1     1   |
LGConfig   |      LTR         |      LTR        |      LTR        |      LT    R    |
Volume     |128  1287  15     |2     884   235  |13    3     1    |221   1     97   |
Lane Width |      12.0        |      12.0       |      12.0       |      12.0  12.0 |
RTOR Vol   |             8    |            118  |            0    |            49   |
____________________________________________________________________________________
Duration      1.00        Area Type: All other areas
_______________________________Signal Operations____________________________________
Phase Combination 1     2     3     4 |                 5     6     7     8
EB  Left          A     A             |  NB  Left             A
    Thru          A     A             |      Thru             A
    Right         A     A             |      Right            A
    Peds                              |      Peds
WB  Left                A             |  SB  Left       A     A
    Thru                A             |      Thru       A     A
    Right               A             |      Right      A     A
    Peds                              |      Peds
NB  Right                             |  EB  Right
SB  Right                             |  WB  Right
Green            15.0  55.0                             5.0   35.0
Yellow           0.0   4.0                              0.0   4.0
All Red          0.0   1.0                              0.0   1.0
Cycle Length: 120.0    secs
_______________________Intersection Performance Summary_____________________________
Appr/  Lane      Adj Sat      Ratios          Lane Group    Approach
Lane   Group     Flow Rate  ___________       ___________   __________
Grp    Capacity    (s)      v/c     g/C       Delay LOS     Delay LOS
____________________________________________________________________________________
Eastbound

LTR    1692      2901       0.96    0.583     18.9   B      18.9   B

Westbound

LTR    1748      3813       0.78    0.458     14.2   B      14.2   B

Northbound

LTR    367       1257       0.05    0.292     22.2   C      22.2   C

Southbound

LT     529       1586       0.69    0.333     26.9   C      25.5   C
R      528       1583       0.15    0.333     18.8   B
       Intersection Delay = 17.9  (sec/veh)   Intersection LOS = B
____________________________________________________________________________________
```

```
                   HCS: Unsignalized Intersections Release 3.2
______________________________TWO-WAY STOP CONTROL SUMMARY____________________________
Intersection:              Haleakala Avenue/Mano Avenue
Analyst:                   CK
Project No.:               6321-02
Date:                      Year 2002 AM w/ project & HS
East/West Street:          Mano Avenue
North/South Street:        Haleakala Avenue
Intersection Orientation: NS
                                                     Study period (hrs):  1.00
_________________________Vehicle Volumes and Adjustments______________________________
Major Street:   Approach         Northbound                    Southbound
                Movement     1        2        3      |  4        5         6
                             L        T        R      |  L        T         R
______________________________________________________________________________________
Volume                       50       166                36       138
Hourly Flow Rate, HFR        50       166                36       138
Percent Heavy Vehicles       2        --       --        2        --        --
Median Type               Undivided
RT Channelized?
Lanes                           0    1                      0    1
Configuration                     LTR                        LTR
Upstream Signal?                     No                          No
______________________________________________________________________________________
Minor Street:   Approach         Westbound                     Eastbound
                Movement     7        8        9      |  10       11        12
                             L        T        R      |  L        T         R
______________________________________________________________________________________
Volume                       34       5        15        10       12        40
Hourly Flow Rate, HFR        34       5        15        10       12        40
Percent Heavy Vehicles       2        2        2         2        2         2
Percent Grade (%)                     0                           0
Median Storage     1
Flared Approach:   Exists?            No                          No
                   Storage
RT Channelized?
Lanes
Configuration                0        1        0         0        1         0
                                      LTR                         LTR
______________________________________________________________________________________

________________________Delay, Queue Length, and Level of Service_____________________
Approach            NB       SB            Westbound                Eastbound
Movement            1        4     |  7        8        9     |  10       11        12
Lane Config         LTR      LTR   |           LTR            |           LTR
______________________________________________________________________________________
v (vph)             50       36                54                         62
C(m) (vph)          1391     1285              443                        608
v/c                 0.04     0.03              0.12                       0.10
95% queue length    0.00     0.00              0.41                       0.31
Control Delay       7.7      7.9               14.3                       11.6
LOS                 A        A                 B                          B
Approach Delay                                 14.3                       11.6
Approach LOS                                   B                          B
______________________________________________________________________________________
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                 HCS: Unsignalized Intersections Release 3.2

________________________TWO-WAY STOP CONTROL SUMMARY_____________________
Intersection:            Hano Avenue/Nanakuli Avenue
Analyst:                 CK
Project No.:             6321-02
Date:                    Year 2002 AM w/ project & HS
East/West Street:        Hano Avenue
North/South Street:      Nanakuli Avenue
Intersection Orientation: NS                 Study period (hrs):  1.00

_______________________Vehicle Volumes and Adjustments___________________
Major Street:  Approach       Northbound                 Southbound
               Movement      1        2        3     |  4        5        6
    .                        L        T        R     |  L        T        R
_________________________________________________________________________
Volume                       101      248                16       161
Hourly Flow Rate, HFR        101      248                16       161
Percent Heavy Vehicles       2        --       --        2        --       --
Median Type              Undivided
RT Channelized?
Lanes                           0   1                       0   1
Configuration                    LTR                         LTR
Upstream Signal?                     No                          No
_________________________________________________________________________
Minor Street:  Approach       Westbound                  Eastbound
               Movement      7        8        9     |  10       11       12
                             L        T        R     |  L        T        R
_________________________________________________________________________
Volume                       14       4        5         13       2        95
Hourly Flow Rate, HFR        14       4        5         13       2        95
Percent Heavy Vehicles       2        2        2         2        2        2
Percent Grade (%)                     0                           0
Median Storage         1
Flared Approach:   Exists?            No                          No
                   Storage
RT Channelized?
Lanes                           0   1     0                 0   1     0
Configuration                       LTR                         LTR
_________________________________________________________________________

___________________Delay, Queue Length, and Level of Service______________
Approach           NB       SB          Westbound                Eastbound
Movement           1        4   |  7       8        9    |  10       11       12
Lane Config        LTR      LTR |          LTR           |           LTR
_________________________________________________________________________
v (vph)            101      16             23                        110
C(m) (vph)         1373     1291           336                       709
v/c                0.07     0.01           0.07                      0.16
95% queue length   0.15     0.00           0.11                      0.60
Control Delay      7.8      7.8            16.5                      11.0
LOS                 A        A              C                         B
Approach Delay                             16.5                      11.0
Approach LOS                                C                         B
_________________________________________________________________________
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                 HCS: Signalized Intersections Release 3.2

Inter:  Hanakuli Elementary School     City/St:
Analyst: CK                             Proj #: 6321-01
Date:   12/14/99                        Period: 2002 PM w/ Project & HS
E/W St: Farrington Hwy                  N/S St: Haleakala Avenue

__________________________SIGNALIZED INTERSECTION SUMMARY___________________
            |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
            |  L   T    R   |  L   T    R   |  L   T    R   |  L   T    R   |
            |_______________|_______________|_______________|_______________|
No. Lanes   |   0   2   0   |   0   2   0   |   0   0   0   |   1   0   1   |
LGConfig    |      LT       |      TR       |               |   L       R   |
Volume      |151  1014      |     2029 41   |               |23        173  |
Lane Width  |     12.0      |     12.0      |               |12.0      12.0 |
RTOR Vol    |               |          21   |               |          87   |
____________________________________________________________________________
Duration     1.00       Area Type: All other areas
______________________________Signal Operations______________________________
Phase Combination 1      2      3      4  |              5      6      7      8
EB   Left         A      A                | NB   Left
     Thru         A      A                |      Thru
     Right                                |      Right
     Peds                                 |      Peds
WB   Left                                 | SB   Left    A
     Thru                A                |      Thru
     Right               A                |      Right   A
     Peds                                 |      Peds
NB   Right                                | EB   Right
SB   Right                                | WB   Right
Green            12.0   72.0                          26.0
Yellow           0.0    4.0                           4.0
All Red          0.0    1.0                           1.0
Cycle Length: 120.0   secs
___________________Intersection Performance Summary__________________________
Appr/    Lane       Adj Sat     Ratios          Lane Group   Approach
Lane     Group      Flow Rate  ____________    __________   __________
Grp      Capacity    (s)        v/c    g/C      Delay LOS    Delay LOS
____________________________________________________________________________
Eastbound

LT       1807       2581        0.66   0.700    0.9    A     0.9    A

Westbound

TR       2446       4076        0.93   0.600    8.2    A     8.2    A

Northbound


Southbound
L        384        1770        0.07   0.217    30.6   C
                                                             32.2   C
R        343        1583        0.30   0.217    32.6   C
         Intersection Delay = 6.7   (sec/veh)   Intersection LOS = A
____________________________________________________________________________
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                 HCS: Signalized Intersections Release 3.2

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                              Proj #: 6321-02
Date:    12/13/99                        Period: 2002 PM w/ Project & HS
E/W St: Farrington Hwy                   N/S St: Nanakuli Avenue

_____________________SIGNALIZED INTERSECTION SUMMARY_______________________
            | Eastbound      | Westbound     | Northbound    | Southbound    |
            | L    T    R    | L    T    R   | L    T    R   | L    T    R   |
            |________________|_______________|_______________|_______________|
No. Lanes   |  0    2    0   |  0    2    0  |  0    1    0  |  0    1    1  |
LGConfig    |      LTR       |      LTR      |      LTR      |      LT   R   |
Volume      |71   953   12   |2    1987 201  |16    4    6   |152   4    63  |
Lane Width  |     12.0       |     12.0      |     12.0      |     12.0 12.0 |
RTOR Vol    |            6   |          101  |           3   |          32   |
___________________________________________________________________________
Duration    1.00       Area Type: All other areas
_______________________________Signal Operations___________________________
Phase Combination 1     2     3     4 |              5     6     7     8
EB  Left          A     A             | NB  Left     A
    Thru          A     A             |     Thru     A
    Right         A     A             |     Right    A
    Peds                              |     Peds
WB  Left                A             | SB  Left     A
    Thru                A             |     Thru     A
    Right               A             |     Right    A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            5.0   75.0                          30.0
Yellow           0.0   4.0                           4.0
All Red          0.0   1.0                           1.0
Cycle Length: 120.0    secs
______________________Intersection Performance Summary_____________________
Appr/   Lane      Adj Sat     Ratios        Lane Group    Approach
Lane    Group     Flow Rate  __________    ___________   ___________
Grp     Capacity    (s)      v/c    g/C     Delay LOS     Delay LOS
___________________________________________________________________________
Eastbound

LTR     2073      3110       0.51   0.667   0.2    A      0.2    A

Westbound

LTR     2417      3867       0.92   0.625   7.1    A      7.1    A

Northbound

LTR     326       1305       0.09   0.250   27.0   C      27.0   C

Southbound

LT      331       1324       0.54   0.250   32.2   C      31.4   C
R       396       1583       0.09   0.250   27.0   C
        Intersection Delay = 6.7    (sec/veh)   Intersection LOS = A
___________________________________________________________________________
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                HCS: Unsignalized Intersections Release 3.2

______________________TWO-WAY STOP CONTROL SUMMARY_________________________
Intersection:             Haleakala Avenue/Mano Avenue
Analyst:                  CK
Project No.:              6321-02
Date:                     Year 2002 PM w/ project & HS
East/West Street:         Mano Avenue
North/South Street:       Haleakala Avenue
Intersection Orientation: NS                  Study period (hrs):  1.00

______________________Vehicle Volumes and Adjustments______________________
Major Street:  Approach        Northbound                Southbound
               Movement     1       2       3     |  4       5       6
                            L       T       R     |  L       T       R
___________________________________________________________________________
Volume                      30      111              11      110
Hourly Flow Rate, HFR       30      111              11      110
Percent Heavy Vehicles      2       --      --       2       --      --
Median Type               Undivided
RT Channelized?
Lanes                          0    1                    0    1
Configuration                   LTR                       LTR
Upstream Signal?                    No                        No

___________________________________________________________________________
Minor Street:  Approach        Westbound                 Eastbound
               Movement     7       8       9     |  10      11      12
                            L       T       R     |  L       T       R
___________________________________________________________________________
Volume                      39      3       13       12      6       31
Hourly Flow Rate, HFR       39      3       13       12      6       31
Percent Heavy Vehicles      2       2       2        2       2       2
Percent Grade (%)                   0                        0
Median Storage        1
Flared Approach:  Exists?           No                       No
                  Storage
RT Channelized?
Lanes                          0    1    0              0    1    0
Configuration                       LTR                      LTR
___________________________________________________________________________

_________________Delay, Queue Length, and Level of Service__________________
Approach          NB      SB             Westbound               Eastbound
Movement          1       4     |  7       8       9    |  10      11      12
Lane Config       LTR     LTR   |          LTR          |          LTR
___________________________________________________________________________
v (vph)           30      11               55                      49
C(m) (vph)        1441    1437             619                     755
v/c               0.02    0.01             0.09                    0.06
95% queue length  0.00    0.00             0.23                    0.09
Control Delay     7.6     7.5              11.4                    10.1
LOS               A       A                B                       B
Approach Delay                             11.4                    10.1
Approach LOS                               B                       B
___________________________________________________________________________
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                  HCS: Unsignalized Intersections Release 3.2

______________________TWO-WAY STOP CONTROL SUMMARY_____________________
Intersection:          Mano Avenue/Nanakuli Avenue
Analyst:               CK
Project No.:           6321-02
Date:                  Year 2002 PM w/ project & HS
East/West Street:      Mano Avenue
North/South Street:    Nanakuli Avenue
Intersection Orientation: NS                 Study period (hrs):  1.00

_____________________Vehicle Volumes and Adjustments____________________
Major Street:  Approach       Northbound               Southbound
               Movement     1       2       3    |  4       5       6
                            L       T       R    |  L       T       R
_______________________________________________________________________
Volume                      30      172             10      109
Hourly Flow Rate, HFR       30      172             10      109
Percent Heavy Vehicles      2       --      --      2       --      --
Median Type              Undivided
RT Channelized?
Lanes                          0    1                  0    1
Configuration                   LTR                     LTR
Upstream Signal?                    No                      No

Minor Street:  Approach       Westbound                Eastbound
               Movement     7       8       9    |  10      11      12
                            L       T       R    |  L       T       R
_______________________________________________________________________
Volume                      10      1       3       11      1       64
Hourly Flow Rate, HFR       10      1       3       11      1       64
Percent Heavy Vehicles      2       2       2       2       2       2
Percent Grade (%)                   0                       0
Median Storage     1
Flared Approach:   Exists?          No                      No
                   Storage
RT Channelized?
Lanes                           0   1       0           0   1       0
Configuration                       LTR                     LTR
_______________________________________________________________________

_______________Delay, Queue Length, and Level of Service________________
Approach         NB     SB          Westbound            Eastbound
Movement         1      4    |  7       8       9    |  10      11      12
Lane Config      LTR    LTR  |          LTR          |          LTR
_______________________________________________________________________
v (vph)          30     10              14                      76
C(m) (vph)       1463   1387            554                     847
v/c              0.02   0.01            0.03                    0.09
95% queue length 0.00   0.00            0.00                    0.24
Control Delay    7.5    7.6             11.7                    9.7
LOS              A      A               B                       A
Approach Delay                          11.7                    9.7
Approach LOS                            B                       A
_______________________________________________________________________
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APPENDIX C

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2008 PEAK HOUR TRAFFIC
ANALYSIS WITH SCHOOL, HEADSTART PROGRAM, & LIBRARY

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                HCS: Signalized Intersections Release 3.2

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                              Proj #: 6321-02
Date:    12/14/99                        Period: 2008 AM w/ Project,HS,Library
E/W St: Farrington Hwy                   N/S St: Haleakala Avenue

_____________________SIGNALIZED INTERSECTION SUMMARY________________________
             |  Eastbound      |  Westbound     |  Northbound   |  Southbound    |
             | L    T     R    | L    T     R   | L    T    R   | L    T    R    |
             |                 |                |               |                |
No. Lanes    |   0    2    0   |   0   2    0   |  0    0    0  |   1    0    1  |
LGConfig     |       LT        |      TR        |               |   L         R  |
Volume       |297  1453        |      994   35  |               |25         208  |
Lane Width   |      12.0       |      12.0      |               |12.0       12.0 |
RTOR Vol     |                 |            18  |               |           104  |

Duration     1.00       Area Type: All other areas
_________________________________Signal Operations___________________________
Phase Combination 1    2      3     4 |
EB  Left          A    A              | NB  Left       5      6      7      8
    Thru          A    A              |     Thru
    Right                             |     Right
    Peds                              |     Peds
WB  Left                              | SB  Left   A
    Thru               A              |     Thru
    Right              A              |     Right  A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            48.0  40.0                        22.0
Yellow            0.0   4.0                         4.0
All Red           0.0   1.0                         1.0
Cycle Length: 120.0    secs
_________________Intersection Performance Summary___________________________
Appr/   Lane     Adj Sat    Ratios        Lane Group    Approach
Lane    Group    Flow Rate
Grp     Capacity   (s)     v/c    g/C     Delay LOS     Delay LOS
Eastbound

LT      2047     2791      0.98   0.733   26.2   C      26.2   C
Westbound

TR      1357     4071      0.84   0.333   29.7   C      29.7   C
Northbound


Southbound
L       325      1770      0.10   0.183   34.8   C
                                                        37.9   D
R       290      1583      0.49   0.183   38.7   D
        Intersection Delay = 28.0  (sec/veh)   Intersection LOS = C
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                HCS: Signalized Intersections Release 3.2

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                              Proj #: 6321-02
Date:    12/13/99                        Period: 2008 AM w/ Proj, HS, Library
E/W St: Farrington Hwy                   N/S St: Nanakuli Avenue

_____________________SIGNALIZED INTERSECTION SUMMARY________________________
             |  Eastbound      |  Westbound     |  Northbound   |  Southbound    |
             | L    T     R    | L    T     R   | L    T    R   | L    T    R    |
             |                 |                |               |                |
No. Lanes    |   0    2    0   |   0   2    0   |  0    1    0  |   0    1    1  |
LGConfig     |       LTR       |      LTR       |      LTR      |       LT   R   |
Volume       |128  1337 15     |2     921  235  |13    3    1   |227    1    99  |
Lane Width   |      12.0       |      12.0      |      12.0     |      12.0 12.0 |
RTOR Vol     |            8    |           118  |           0   |            50  |

Duration     1.00       Area Type: All other areas
_________________________________Signal Operations___________________________
Phase Combination 1    2      3     4 |
EB  Left          A    A              |              5      6      7      8
    Thru          A    A              | NB  Left            A
    Right         A    A              |     Thru            A
    Peds                              |     Right           A
WB  Left               A              |     Peds
    Thru               A              | SB  Left   A        A
    Right              A              |     Thru   A        A
    Peds                              |     Right  A        A
NB  Right                             |     Peds
SB  Right                             | EB  Right
Green            15.0  55.0           | WB  Right
Yellow            0.0   4.0                         5.0    35.0
All Red           0.0   1.0                         0.0     4.0
Cycle Length: 120.0    secs                         0.0     1.0
_________________Intersection Performance Summary___________________________
Appr/   Lane     Adj Sat    Ratios        Lane Group    Approach
Lane    Group    Flow Rate
Grp     Capacity   (s)     v/c    g/C     Delay LOS     Delay LOS
Eastbound

LTR     1709     2929      0.98   0.583   28.7   C      28.7   C
Westbound

LTR     1749     3815      0.80   0.458   15.1   B      15.1   B
Northbound

LTR     365      1252      0.05   0.292   22.2   C      22.2   C
Southbound

LT      529      1586      0.71   0.333   27.7   C      26.1   C
R       528      1583      0.15   0.333   18.9   B
        Intersection Delay = 23.0  (sec/veh)   Intersection LOS = C
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                 HCS: Unsignalized Intersections Release 3.2

_______________________TWO-WAY STOP CONTROL SUMMARY_____________________
Intersection:            Haleakala Avenue/Hano Avenue
Analyst:                 CK
Project No.:             6321-02
Date:                    2008 w/ AM proj,HS,library
East/West Street:        Hano Avenue
North/South Street:      Haleakala Avenue
Intersection Orientation: NS                 Study period (hrs):  1.00

_______________________Vehicle Volumes and Adjustments__________________
Major Street:  Approach         Northbound              Southbound
               Movement      1       2       3     |  4       5       6
                             L       T       R     |  L       T       R
________________________________________________________________________
Volume                       50      166              36      138
Hourly Flow Rate, HFR        50      166              36      138
Percent Heavy Vehicles       2       --      --       2       --      --
Median Type              Undivided
RT Channelized?
Lanes                          0   1                    0   1
Configuration                   LTR                      LTR
Upstream Signal?                    No                       No
________________________________________________________________________
Minor Street:  Approach         Westbound               Eastbound
               Movement      7       8       9     |  10      11      12
                             L       T       R     |  L       T       R
________________________________________________________________________
Volume                       34      5       15       10      12      40
Hourly Flow Rate, HFR        34      5       15       10      12      40
Percent Heavy Vehicles       2       2       2        2       2       2
Percent Grade (%)                    0                        0
Median Storage        1
Flared Approach:      Exists?        No                       No
                      Storage
RT Channelized?
Lanes                          0   1   0                0   1   0
Configuration                      LTR                      LTR
________________________________________________________________________

____________________Delay, Queue Length, and Level of Service___________
Approach              NB     SB          Westbound              Eastbound
Movement              1      4     |  7      8      9     |  10     11     12
Lane Config           LTR    LTR   |         LTR          |         LTR
________________________________________________________________________
v (vph)               50     36             54                     62
C(m) (vph)            1391   1276           440                    605
v/c                   0.04   0.03           0.12                   0.10
95% queue length      0.00   0.00           0.42                   0.31
Control Delay         7.7    7.9            14.3                   11.6
LOS                    A      A              B                      B
Approach Delay                              14.3                   11.6
Approach LOS                                 B                      B
________________________________________________________________________
```

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                 HCS: Unsignalized Intersections Release 3.2

_______________________TWO-WAY STOP CONTROL SUMMARY_____________________
Intersection:            Hano Avenue/Nanakuli Avenue
Analyst:                 CK
Project No.:             6321-02
Date:                    2008 AM w/ proj,HS,library
East/West Street:        Hano Avenue
North/South Street:      Nanakuli Avenue
Intersection Orientation: NS                 Study period (hrs):  1.00

_______________________Vehicle Volumes and Adjustments__________________
Major Street:  Approach         Northbound              Southbound
               Movement      1       2       3     |  4       5       6
                             L       T       R     |  L       T       R
________________________________________________________________________
Volume                       101     248              16      161
Hourly Flow Rate, HFR        101     248              16      161
Percent Heavy Vehicles       2       --      --       2       --      --
Median Type              Undivided
RT Channelized?
Lanes                          0   1                    0   1
Configuration                   LTR                      LTR
Upstream Signal?                    No                       No
________________________________________________________________________
Minor Street:  Approach         Westbound               Eastbound
               Movement      7       8       9     |  10      11      12
                             L       T       R     |  L       T       R
________________________________________________________________________
Volume                       14      4       5        13      2       103
Hourly Flow Rate, HFR        14      4       5        13      2       103
Percent Heavy Vehicles       2       2       2        2       2       2
Percent Grade (%)                    0                        0
Median Storage        1
Flared Approach:      Exists?        No                       No
                      Storage
RT Channelized?
Lanes                          0   1   0                0   1   0
Configuration                      LTR                      LTR
________________________________________________________________________

____________________Delay, Queue Length, and Level of Service___________
Approach              NB     SB          Westbound              Eastbound
Movement              1      4     |  7      8      9     |  10     11     12
Lane Config           LTR    LTR   |         LTR          |         LTR
________________________________________________________________________
v (vph)               101    16             23                     118
C(m) (vph)            1373   1291           331                    718
v/c                   0.07   0.01           0.07                   0.16
95% queue length      0.15   0.00           0.12                   0.65
Control Delay         7.8    7.8            16.7                   11.0
LOS                    A      A              C                      B
Approach Delay                              16.7                   11.0
Approach LOS                                 C                      B
________________________________________________________________________
```

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                   HCS: Signalized Intersections Release 3.2

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                              Proj #: 6321-01
Date:    12/14/99                        Period: 2008 PM w/ Proj,HS,Library
E/W St: Farrington Hwy                   N/S St: Haleakala Avenue

_________________________SIGNALIZED INTERSECTION SUMMARY______________________
            |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
            | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
            |_______________|_______________|_______________|_______________|
No. Lanes   |  0    2    0  |  0    2    0  |  0    0    0  |  1    0    1  |
LGConfig    |      LT       |      TR       |               |  L         R  |
Volume      |169  1053      |     2137 58   |               |23        173  |
Lane Width  |     12.0      |     12.0      |               |12.0      12.0 |
RTOR Vol    |               |           29  |               |           87  |
_____________________________________________________________________________
Duration     1.00      Area Type: All other areas
_______________________________Signal Operations_____________________________
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left          A     A             | NB  Left
    Thru          A     A             |     Thru
    Right                             |     Right
    Peds                              |     Peds
WB  Left                              | SB  Left   A
    Thru                A             |     Thru
    Right               A             |     Right  A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            5.0   75.0                      30.0
Yellow           0.0   4.0                       4.0
All Red          0.0   1.0                       1.0
Cycle Length: 120.0    secs
_________________________Intersection Performance Summary_____________________
Appr/    Lane       Adj Sat     Ratios        Lane Group    Approach
Lane     Group      Flow Rate  ___________   ___________   ___________
Grp      Capacity     (s)      v/c    g/C    Delay LOS     Delay LOS
_____________________________________________________________________________
Eastbound

LT       1681       2522       0.75   0.667  1.9    A      1.9    A

Westbound

TR       2546       4074       0.95   0.625  10.1   B      10.1   B

Northbound


Southbound
L        443        1770       0.06   0.250  26.7   C
                                                           28.1   C
R        396        1583       0.26   0.250  28.5   C
         Intersection Delay = 8.0   (sec/veh)   Intersection LOS = A
_____________________________________________________________________________
```

```
                   HCS: Signalized Intersections Release 3.2

Inter:  Nanakuli Elementary School      City/St:
Analyst: CK                              Proj #: 6321-02
Date:    12/13/99                        Period: 2008 PM w/ Project,HS,Library
E/W St: Farrington Hwy                   N/S St: Nanakuli Avenue

_________________________SIGNALIZED INTERSECTION SUMMARY______________________
            |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
            | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
            |_______________|_______________|_______________|_______________|
No. Lanes   |  0    2    0  |  0    2    0  |  0    1    0  |  0    1    1  |
LGConfig    |      LTR      |      LTR      |      LTR      |      LT   R   |
Volume      |71   989  12   |2    2095 201  |16   4    6    |168  4    82   |
Lane Width  |     12.0      |     12.0      |     12.0      |     12.0 12.0 |
RTOR Vol    |           6   |          101  |          3    |          41   |
_____________________________________________________________________________
Duration     1.00      Area Type: All other areas
_______________________________Signal Operations_____________________________
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left          A     A             | NB  Left   A
    Thru          A     A             |     Thru   A
    Right         A     A             |     Right  A
    Peds                              |     Peds
WB  Left                A             | SB  Left   A
    Thru                A             |     Thru   A
    Right               A             |     Right  A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            5.0   75.0                      30.0
Yellow           0.0   4.0                       4.0
All Red          0.0   1.0                       1.0
Cycle Length: 120.0    secs
_________________________Intersection Performance Summary_____________________
Appr/    Lane       Adj Sat     Ratios        Lane Group    Approach
Lane     Group      Flow Rate  ___________   ___________   ___________
Grp      Capacity     (s)      v/c    g/C    Delay LOS     Delay LOS
_____________________________________________________________________________
Eastbound

LTR      2091       3136       0.53   0.667  0.2    A      0.2    A

Westbound

LTR      2418       3869       0.97   0.625  16.1   B      16.1   B

Northbound

LTR      324        1294       0.09   0.250  27.0   C      27.0   C

Southbound

LT       331        1323       0.60   0.250  33.9   C      32.6   C
R        396        1583       0.12   0.250  27.2   C
         Intersection Delay = 12.6  (sec/veh)   Intersection LOS = B
_____________________________________________________________________________
```

```
                    HCS: Unsignalized Intersections Release 3.2

_______________________TWO-WAY STOP CONTROL SUMMARY______________________________
Intersection:            Haleakala Avenue/Mano Avenue
Analyst:                 CK
Project No.:             6321-02
Date:                    2008 PM w/ proj,HS,library
East/West Street:        Mano Avenue
North/South Street:      Haleakala Avenue
Intersection Orientation: NS          .        Study period (hrs):  1.00

______________________Vehicle Volumes and Adjustments_____________________________
Major Street:  Approach       Northbound                  Southbound
               Movement    1       2       3      |  4       5       6
                           L       T       R      |  L       T       R
__________________________________________________________________________________
Volume                     30      112                11      110
Hourly Flow Rate, HFR      30      112                11      110
Percent Heavy Vehicles     2       --      --         2       --      --
Median Type             Undivided
RT Channelized?
Lanes                         0   1                  0   1
Configuration                  LTR                    LTR
Upstream Signal?                 No                     No
__________________________________________________________________________________
Minor Street:  Approach       Westbound                   Eastbound
               Movement    7       8       9      |  10      11      12
                           L       T       R      |  L       T       R
__________________________________________________________________________________
Volume                     39      3       13         12      6       31
Hourly Flow Rate, HFR      39      3       13         12      6       31
Percent Heavy Vehicles     2       2       2          2       2       2
Percent Grade (%)                  0                          0
Median Storage        1
Flared Approach:      Exists?      No                         No
                      Storage
RT Channelized?
Lanes                         0    1     0              0     1     0
Configuration                      LTR                        LTR
__________________________________________________________________________________

_________________Delay, Queue Length, and Level of Service_________________________
Approach               NB      SB           Westbound               Eastbound  .
Movement               1       4     |  7      8       9     |  10      11      12
Lane Config            LTR     LTR   |         LTR           |          LTR
__________________________________________________________________________________
v (vph)                30      11              55                       49
C(m) (vph)             1441    1396            603                      743
v/c                    0.02    0.01            0.09                     0.07
95% queue length       0.00    0.00            0.25                     0.10
Control Delay          7.6     7.6             11.6                     10.2
LOS                     A       A               B                        B
Approach Delay                                 11.6                     10.2
Approach LOS                                    B                        B
__________________________________________________________________________________
```

```
                    HCS: Unsignalized Intersections Release 3.2

_______________________TWO-WAY STOP CONTROL SUMMARY______________________________
Intersection:            Mano Avenue/Nanakuli Avenue
Analyst:                 CK
Project No.:             6321-02
Date:                    2008 PM w/ proj,HS,library
East/West Street:        Mano Avenue
North/South Street:      Nanakuli Avenue
Intersection Orientation: NS                   Study period (hrs):  1.00

______________________Vehicle Volumes and Adjustments_____________________________
Major Street:  Approach       Northbound                  Southbound
               Movement    1       2       3      |  4       5       6
                           L       T       R      |  L       T       R
__________________________________________________________________________________
Volume                     30      172                10      110
Hourly Flow Rate, HFR      30      172                10      110
Percent Heavy Vehicles     2       --      --         2       --      --
Median Type             Undivided
RT Channelized?
Lanes                         0   1                  0   1
Configuration                  LTR                    LTR
Upstream Signal?                 No                     No
__________________________________________________________________________________
Minor Street:  Approach       Westbound                   Eastbound
               Movement    7       8       9      |  10      11      12
                           L       T       R      |  L       T       R
__________________________________________________________________________________
Volume                     10      1       3          11      1       98
Hourly Flow Rate, HFR      10      1       3          11      1       98
Percent Heavy Vehicles     2       2       2          2       2       2
Percent Grade (%)                  0                          0
Median Storage        1
Flared Approach:      Exists?      No                         No
                      Storage
RT Channelized?
Lanes                         0    1     0              0     1     0
Configuration                      LTR                        LTR
__________________________________________________________________________________

_________________Delay, Queue Length, and Level of Service_________________________
Approach               NB      SB           Westbound               Eastbound
Movement               1       4     |  7      8       9     |  10      11      12
Lane Config            LTR     LTR   |         LTR           |          LTR
__________________________________________________________________________________
v (vph)                30      10              14                       110
C(m) (vph)             1462    1387            526                      870
v/c                    0.02    0.01            0.03                     0.13
95% queue length       0.00    0.00            0.00                     0.44
Control Delay          7.5     7.6             12.0                     9.7
LOS                     A       A               B                        A
Approach Delay                                 12.0                     9.7
Approach LOS                                    B                        A
__________________________________________________________________________________
```

Appendix I

Environmental Noise Assessment Study

D. L. ADAMS ASSOCIATES, LTD.
ACOUSTICAL CONSULTANTS

Project No. 99-41D

ENVIRONMENTAL NOISE ASSESSMENT STUDY
NANAKULI IV ELEMENTARY SCHOOL
NANAKULI, OAHU, HAWAII

October 4, 2000

Prepared for
Wilson Okamoto & Associates, Inc.
Honolulu, Hawaii

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1.0 SUMMARY

1.1 The proposed Nanakuli IV Elementary School Master Plan involves the construction of an elementary school and two access driveways in Nanakuli, Oahu, Hawaii. Planned future development involves a headstart facility and a state public library. Both of these facilities and the subject project will be completed by 2008.

1.2 The project area is currently exposed to daytime ambient noise levels of 49.1 to 68.2 dBA with the dominant noise sources being traffic, wind, and occasional distant aircraft flybys.

1.3 Existing noise sensitive areas include residential areas, schools, and churches on the roadways surrounding the project site.

1.4 The dominant noise sources during project construction will probably be earth moving equipment, such as bulldozers and diesel powered trucks unless pile driving is necessary. The noise from construction and demolition activities could impact nearby residences. Noise from construction activities should be short term and must comply with State Department of Health noise regulations.

1.5 The main noise source following the completion of the project will be due to vehicular traffic entering and exiting the elementary school. The noise emanating from these vehicles could impact nearby noise sensitive areas along the surrounding roadways. However, these noise levels will not exceed state or federal noise guidelines.

1.6 Predicted noise levels show that Nanakuli IV Elementary School will not be exposed to noise levels in excess of the Board of Education (BOE) Policy 6700 design exterior noise guideline of L_{10}=65 dBA.

2.0 PROJECT DESCRIPTION

The Nanakuli IV Elementary School project site is bounded by a drainage canal on the south, Farrington Highway on the southwest, and by residences on the northwest and northeast as shown in Figure 1.

The proposed elementary school involves construction of single story buildings, vehicle access driveway, student dropoff and parking lot, a bus driveway, a bus turnaround, , center courtyard, and playgrounds. The main vehicle access to the school will be from the Mano Avenue with the bus access provided from Farrington Highway.

3.0 NOISE STANDARDS

Various local and federal agencies have established guidelines and standards for assessing environmental noise impacts and set noise limits as a function of land use. A brief description of common acoustic terminology used in these guidelines and standards is presented in Appendix A.

3.1 State Department of Health (DOH)

The DOH defines three classes of zoning districts and specifies corresponding maximum permissible sound levels due to stationary noise sources such as air-conditioning units, exhaust systems, generators, compressors, pumps, etc., and equipment related to agricultural, construction, and industrial activities [Reference 1]. These levels are enforced for any location at or beyond the property line and shall not be exceeded for more than 10% of the time during any 20-minute period. A-weighted sound pressure levels are used in all measurements. The specified noise limits which apply are a function of the zoning and time of day as shown in Figure 2. With respect to mixed zoning districts, DOH specifies the primary land use designation shall be used to determine the applicable zoning district class and the maximum permissible sound level.

The DOH defines a heavy vehicle as a vehicle which has a manufacturer's gross vehicular weight rating of ten thousand pounds or greater. Such vehicles shall not be operated on any trafficway in such a manner that it emits noise in excess of the limits specified in Reference 2. If these limits will be exceeded, a permit from the DOH director is required.

3.2 City and County of Honolulu Land Use Ordinances (LUO)

The City and County of Honolulu LUO [Reference 3] noise regulations differ from the DOH noise regulations in that maximum permissible octave band sound pressure levels are specified instead of A-weighted sound pressure levels. Also, there is no specified period of time associated with the exceedence of these levels. The LUO noise regulations which are presented in Figure 3, are the LUO noise regulations theoretically enforced by the Building Department, however, since they do not have noise measurement capabilities, noise complaints are usually handled by the DOH.

3.3 U.S. Environmental Protection Agency (EPA)

The U.S. EPA has identified a range of yearly day-night equivalent sound levels, L_{dn}, sufficient to protect public health and welfare from the effects of environmental noise [Reference 4]. The EPA has established a goal to reduce exterior environmental noise to an L_{dn} not exceeding 65 dBA and a future goal to further reduce exterior environmental noise to an L_{dn} not exceeding 55 dBA. Additionally, the EPA states that these goals are not intended as regulations as it has no authority to regulate noise levels, but rather they are intended to be viewed as levels below which the general population will not be at risk from any of the identified effects of noise.

3.4 U.S. Federal Highway Administration (FHWA)

The FHWA defines four land use categories and assigns corresponding maximum hourly equivalent sound levels, L_{eq}, for traffic noise exposure [Reference 5]. For example, Category B, defined as picnic and recreation areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals, has a corresponding maximum exterior L_{eq} of 67dBA and a maximum interior L_{eq} of 52 dBA. These limits are viewed as design goals, and all projects meeting these limits are deemed in conformance with FHWA noise standards.

3.5 Hawaii Department of Transportation (HDOT)

The State HDOT has adopted FHWA's design goals for traffic noise exposure in its noise analysis and abatement policy [Reference 6]. According to the policy, a traffic noise impact occurs when the predicted traffic noise levels "approach" or exceed FHWA's design goals or when the predicted traffic noise levels "substantially exceed the existing noise levels." The policy also states that "approach" means at least 1 dB less than FHWA's design goals and "substantially exceed the existing noise levels" means an increase of at least 15dB.

3.6 U.S. Department of Housing and Urban Development (HUD)

HUD's environmental noise criteria and standards in 24 CFR 51 [Reference 7] were established for determining housing project site acceptability. These standards are based on day-night equivalent sound levels, L_{dn}, and are not limited to traffic noise exposure. However, for project sites in the vicinity of highways, the L_{dn} may be estimated to be equal to the design hour $L_{eq(h)}$, provided "heavy trucks (vehicles with three or more axles) do not exceed 10 percent of the total traffic flow in vehicles per 24 hours and the traffic flow between 10:00 pm and 7:00 am does not exceed 15 percent of the average daily traffic flow in vehicles per 24 hours." For these same conditions, L_{dn}, may also be estimated as 3 dB less than the design hour L_{10}

HUD site acceptability criteria rank sites as Acceptable, Normally Unacceptable, or Unacceptable. "Acceptable" sites are those where exterior noise levels do not exceed an L_{dn} of 65 dBA. Proposed housing projects on "Acceptable" sites do not require additional noise attenuation other than that provided by customary building techniques. "Normally Unacceptable" sites are those where the L_{dn} is

above 65 dBA, but does not exceed 75 dBA. Housing on "Normally Unacceptable" sites requires some form of noise abatement, either at the property line or in the building construction, to ensure the interior noise levels are acceptable. "Unacceptable" sites are those where the L_{dn} is 75 dBA or higher. The term "Unacceptable" does not necessarily mean that housing cannot be built on those sites. It means that more sophisticated sound attenuation will likely be needed.

3.7 Board of Education (BOE)

BOE policy 6700 [Reference 8] sets four classroom noise level requirements as follows..

1. "Soundproofing" design shall be used to reduce the noise level whenever the internal noise level exceeds 50 dBA.
2. Noise control shall be provided for all school facilities which generate exterior noise levels at the property line exceeding DOH standards.
3. Noise control measures shall be installed in classrooms and administration/staff facilities (excluding shop classrooms) whenever 50 percent of the intruding noise level measurements inside the classroom with windows and doors open and the room empty exceeds 55 dBA.
4. Air conditioning shall be provided to facilities exposed to exterior noise levels greater than L_{10}=65dBA.

4.0 EXISTING ACOUSTICAL ENVIRONMENT

Noise level measurements were conducted on December 28, 1999 to assess the existing acoustical environment in and around the project site. The measurements were obtained at Locations 1 through 5 as shown in Figure 4, using a Larson-Davis Laboratories, Model 800B Sound Level Meter. The following results, expressed in terms of equivalent sound levels, L_{eq}, and in units of A-weighted decibels, were obtained.

Measurement Location	Date/Time of Measurement	Duration of Measurement	Sound Pressure Levels (dBA)
1	12/28/99 9:51 AM	15 min	68.2
2	12/28/99 10:40 AM	15 min	60.9
3	12/28/99 9:28 AM	15 min	57.3
4	12/28/99 10:16AM	15 min	59.9
5	12/28/99 9:10 AM	15 min	49.1

The dominant noise sources observed during these measurements were traffic, wind, and occasional distant aircraft flybys. Traffic volumes and vehicle mix were also recorded during the measurements at locations 1 through 4 and were used to calibrate the FHWA's Traffic Noise Prediction Model.

5.0 POTENTIAL NOISE IMPACT DUE TO THE PROJECT AND NOISE MITIGATION

5.1 Project Construction Noise

Development of the Nanakuli IV Elementary School will involve excavation, grading, and construction of new buildings and infrastructure. The various construction phases of the project may generate significant amounts of noise, which may impact nearby residential areas. The actual noise levels produced will be a function of the methods employed during each stage of the construction process. Typical ranges of construction equipment noise are shown in Figure 5. Earthmoving equipment, e.g., bulldozers and diesel-powered trucks, will probably be the loudest equipment used during construction, assuming that pile driving will not be required.

In cases where construction noise exceeds, or is expected to exceed the DOH's "maximum permissible" property line noise levels [Reference 1], a permit must be obtained from the DOH to allow the operation of vehicles, construction equipment, power tools, etc., which emit noise levels in excess of "maximum permissible" levels. Specific permit restrictions for construction activities are:

> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels...before 7:00 a.m. and after 6:00 p.m. of the same day, Monday through Friday."
>
> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels...before 9:00 a.m. and after 6:00 p.m. on Saturday."
>
> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays."

In addition, construction equipment and on-site vehicles or devices whose operations involve the exhausting of gas or air, excluding pile hammers and pneumatic hand tools weighing less than 15 pounds, must be equipped with mufflers, and construction vehicles using trafficways must satisfy the DOH's vehicular noise requirements [Reference 2].

5.2 Project Generated Traffic Noise

Measured traffic noise levels along with the traffic volume and vehicle mix counts obtained during the measurements were used to calibrate the FHWA's Traffic Noise Prediction Model [Reference 9]. The noise model together with the traffic data [Reference 10] was then used to calculate the peak hour traffic noise levels with and without the project. The results are presented in Table 1.

From the results of Table 1, traffic noise level increases, with and without the project, were calculated and are presented in Table 2. As can be seen, the predicted maximum traffic noise level increase along the assessed roadways due to the project is 6.6 dB along Mano Avenue. The minimal change in noise levels perceptible to the average listener is generally taken to be 3 dB, therefore, the increases along Mano Avenue will be perceptible to most people. A significant increase in noise level is considered to be 5dB. Although the increase in traffic noise levels may be significant, the resulting noise levels will not exceed FHWA, state DOT, EPA, or LUO design goals and guidelines.

5.3 Project Generated Noise

Noise produced by students voices during outdoor activities at the school may impact nearby residences. These activities will be during daytime hours and can be reduced through administrative control by school officials, if necessary.

6.0 POTENTIAL NOISE IMPACT ON THE PROJECT AND NOISE MITIGATION

The only existing roadway which may significantly impact the planned elementary school is Farrington Highway. BOE Policy 6700 requires that air-conditioning be installed for schools exposed to an exterior noise level greater than L_{10}=65dBA. The Nanakuli IV Elementary School should not experience an L_{10} greater than 65dBA.

REFERENCES:

1. Chapter 46, *Community Noise Control*, Department of Health, State of Hawaii, Administrative Rules, Title 11, September 23, 1996.
2. Chapter 42, *Vehicular Noise Control for Oahu*, Department of Health, State of Hawaii, Administrative Rules, Title 11, November 6, 1981.
3. *Section 3.11 Noise Regulations*, Land Use Ordinance, City and County of Honolulu, Oahu, October 22, 1986.
4. *Toward a National Strategy for Noise Control*, U.S. Environmental Protection Agency, April 1977.
5. *Department of Transportation, Federal highway Administration Procedures for Abatement of Highway traffic Noise*, Title 23, CFR, Chapter 1, Subchapter J, Part 772, 38 FR 15953, June 19, 1973; Revised at 47 FR 29654, July 8, 1982.
6. *Noise Analysis and Abatement Policy*, Department of Transportation, Highways Division, State of Hawaii, June 1997.
7. *Department of Housing and Urban Development Environmental Criteria and Standards*, Title 24, CFR, Part 51, 44 FR 40860, July 12, 1979; Amended by 49 FR 880, January 6, 1984.
8. *Policies and Standards for School Facilities Design*, Board of Education, Policy 6700, Appendix A, Acoustical and Environmental Control, March 1995.
9. *FHWA Highway Traffic Noise Prediction Model*, FHWA-RD-77-108; U.S. Department of Transportation, December 1978.
10. Traffic Data Received from Wilson Okamoto & Associates, Inc., December 28, 1999.

MAR 8 2001

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2001-03-08-OA-FEA-

Final Environmental Assessment and Finding of No Significant Impact

Nanakuli IV Elementary School

Nanakuli, Hawaii

DAGS Job No. 12-16-2285

Prepared for:

State of Hawaii
Department of Accounting and General Services
and
Department of Education

Prepared by:

Wilson Okamoto & Associates, Inc.
and
Kober Hanssen Mitchell Architects

February 2001

Final Environmental Assessment
Finding of No Significant Impact

Nanakuli IV Elementary School

Nanakuli, Oahu, Hawaii

DAGS Job No. 12-16-2285

Responsible Officer: Raymond H Sato Date: 2/23/01
Raymond H. Sato, Comptroller
Department of Accounting and General Services

Prepared For:

State of Hawaii
Department of Accounting and General Services
and
Department of Education

Prepared By:

Wilson Okamoto & Associates, Inc.
and
Kober/Hanssen/Mitchell Architects, Inc.

February 2001

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PREFACE

This Final Environmental Assessment (EA) was prepared pursuant to Chapter 343, Hawaii Revised Statutes, and Title 11, Chapter 200, Hawaii Administrative Rules, Department of Health. The State of Hawaii, Department of Accounting and General Services (DAGS) and Department of Education (DOE) propose to construct Nanakuli IV Elementary School in Nanakuli, Oahu. Subsequent phases of development at the project site will include Nanakuli Public Library and Leeward Head Start facility. These two facilities will be developed by their respective owners and their funding and timing are separate from the proposed elementary school.

The proposed elementary school is referred to as Nanakuli IV Elementary School based on the name assigned to the project. Initially, it was planned as the fourth elementary school in the Nanakuli School Complex. Presently, there are two elementary schools in the complex, including Nanakuli Elementary and Nanaikapono Elementary. A planned Nanakuli III Elementary School was to have preceded the proposed school but a site for that school has yet to be determined. The proposed Nanakuli IV Elementary School will provide facilities into which the existing Nanaikapono Elementary School will be relocated.

This Final EA has been processed as a Finding of No Significant Impact (FONSI) by the Department of Accounting and General Services (DAGS), determining that preparation of an environmental impact statement (EIS) is not required pursuant to Chapter 343, HRS. The Draft EA was filed with the Office of Environmental Quality Control (OEQC) on November 13, 2000, and notice of its availability for public review and comment was published in the Environmental Notice of November 23, 2000.

This Final EA incorporates responses to comments received on the Draft EA.

SUMMARY

PROPOSING AGENCY:	State of Hawaii Department of Accounting and General Services 1151 Punchbowl Street, Room 430 Honolulu, HI 96813
ACCEPTING AUTHORITY:	State of Hawaii Department of Accounting and General Services
PROJECT LOCATION:	89-153 Mano Street Nanakuli, Hawaii 96792
TAX MAP KEY:	8-9-02:65, 23 and portion of 1
AREA:	15.58 acres
EXISTING USE:	Vacant- Former U.S. Army Recreation Facility known as Camp Andrews.
STATE LAND USE DESIGNATION:	Urban
CITY & COUNTY OF HONOLULU WAIANAE SUSTAINABLE COMMUNITIES PUBLIC FACILITIES DESIGNATION:	Planned Elementary School
ZONING DESIGNATION:	Residential (R-5)
PROPOSED ACTION:	Construct Nanakuli IV Elementary School; Nanakuli Public Library; and Leeward Head Start Facility
IMPACTS:	No significant impacts are anticipated from the construction or operation of the proposed Nanakuli IV Elementary School. Potential impacts related to historic and archaeological resources, including the anticipated presence of Native Hawaiian burials will be mitigated

prior to and during construction in consultation with the State Historic Preservation Division and the Oahu Burial Council. Known soil contaminants at the project site will be remediated prior to construction and mitigation plans to address suspected hazardous materials at the project site will be prepared and implemented in consultation with the State Department of Health.

ANTICIPATED DETERMINATION:

Finding of No Significant Impact (FONSI)

PARTIES CONSULTED DURING PRE-ASSESSMENT:

Federal

U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Navy

State

Department of Accounting and General Services
Department of Business, Economic Development, and Tourism
Department of Hawaiian Home Lands
Department of Health (DOH)
DOH, Office of Environmental Quality Control
Department of Education
Department of Land and Natural Resources (DLNR), Historic Preservation Division
DLNR, Land Division
Department of Transportation, Highways Division
Office of Hawaiian Affairs
University of Hawaii, Environmental Center

County

Board of Water Supply
Department of Planning and Permitting
Department of Transportation Services
Fire Department
Police Department

Others

Representative Michael P. Kahikina
Senator Colleen Hanabusa
Waianae Neighborhood Board
Nanakuli Homestead Association
Nanakuli Neighborhood Housing

PARTIES CONSULTED DURING DRAFT EA:

Federal

U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Navy

State

Department of Accounting and General Services
Department of Business, Economic Development, and Tourism
Department of Hawaiian Home Lands
Department of Health (DOH)
DOH, Office of Environmental Quality Control
Department of Education
DLNR, Historic Preservation Division
DLNR, Land Division
Department of Transportation, Highways Division
Office of Hawaiian Affairs
University of Hawaii, Environmental Center

County

Board of Water Supply
Department of Design and Construction
Department of Planning and Permitting
Department of Transportation Services
Fire Department
Police Department

Others

Representative Michael P. Kahikina
Senator Colleen Hanabusa
Councilmember John DeSoto

Waianae Neighborhood Board
Nanakuli Homestead Association
Nanakuli Neighborhood Housing

1. SETTING AND PROJECT DESCRIPTION

1.1 Project Site

The State of Hawaii, Department of Accounting and General Services (DAGS) and the State Department of Education (DOE), propose to construct Nanakuli IV Elementary School on an approximately 15-acre portion of state-owned land known as Camp Andrews in Nanakuli, Oahu, Hawaii (Figure 1-1). In addition, a 26,486 square foot parcel of land was acquired through an easement to provide vehicular access from Mano Street for the elementary school. Subsequent phases of development by other agencies will include the Nanakuli Public Library and Leeward Head Start facility. Thus, the total size of the project site is approximately 15.58 acres.

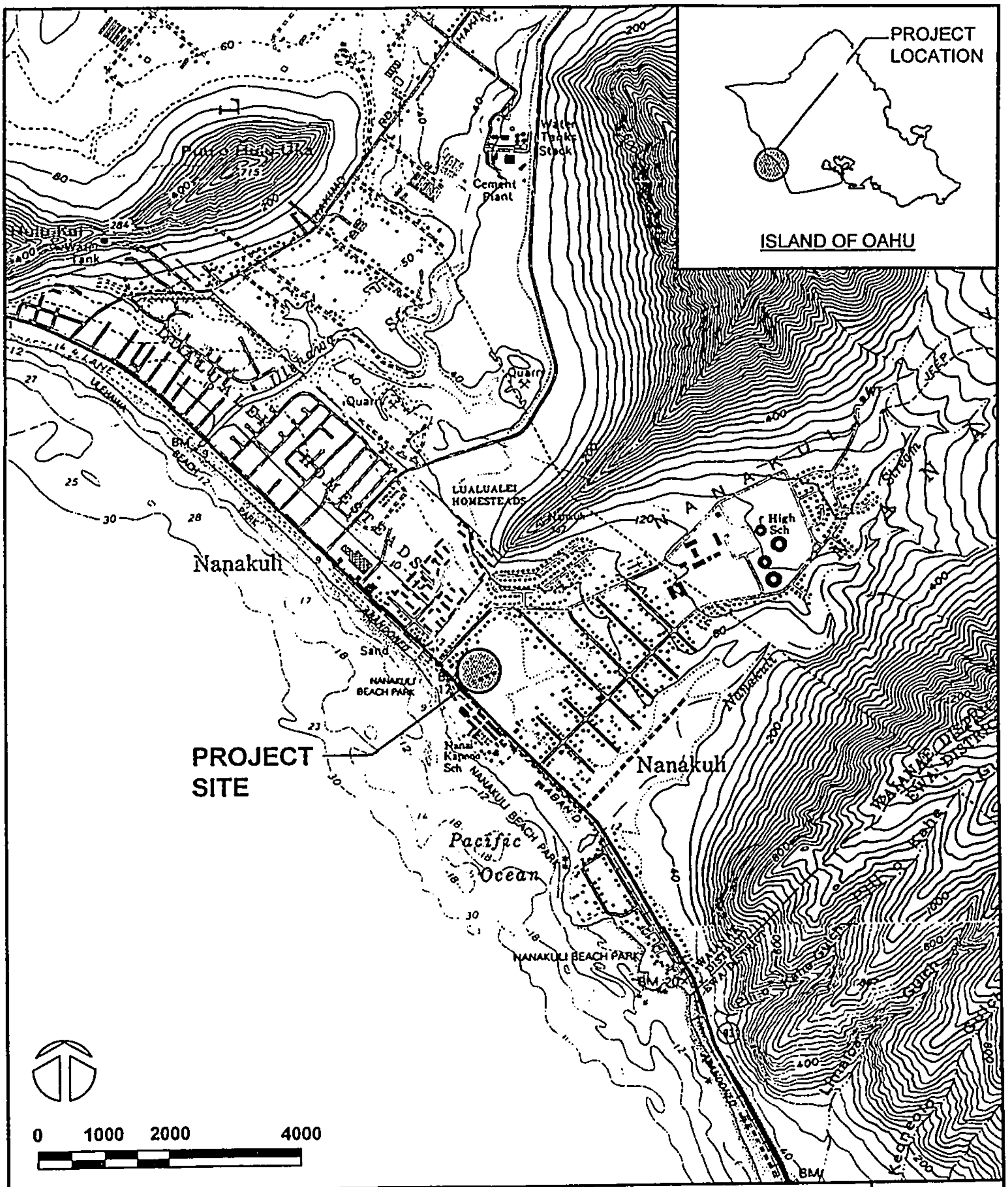
The vacant Camp Andrews parcel encompasses approximately 30 acres. The area was once used as a recreation facility for military personnel. The site was turned over to the State in the 1952 and has remained undeveloped since then. The Camp Andrews site was subdivided among the Department of Hawaiian Home Lands (DHHL), DOE, and the City and County of Honolulu. The proposed project site encompasses 14.98 acres of the 30 acre site, located on the Makaha side of the drainage channel and is further identified as Tax Map Key (TMK) 8-9-02:65, 23, and portion of 1 (see Figure 1-2). The proposed elementary school will encompass approximately 12 acres of the project site. The proposed Nanakuli Public Library and the Leeward Head Start facility will use the remaining 2.98 acres. The parcel acquired for access from Mano Street is identified as TMK 8-9-02: 23 and is vacant. Should a lot become available along Haleakala Avenue, DOE would have first consideration to develop a third access point to the school.

The project site is bordered by a drainage channel on the southeast, Farrington Highway on the southwest, and abuts single-family residences to the northeast and west (see Figure 1-3). Nanaikapono Elementary School and Nanakuli Beach Park are located on the makai side of Farrington Highway to the southwest. Southeast of the project site on the mauka side of Farrington Highway are the Leeward Head Start facility and a satellite office of the Waianae Comprehensive Health Center.

1.2 Project Need

1.2.1 Elementary School

The Nanakuli community is served by two elementary schools (Grades K-6), Nanakuli Elementary and Nanaikapono Elementary, as well as Nanakuli High and Intermediate School (Grades 7-12). These three schools currently make up the Nanakuli School Complex.



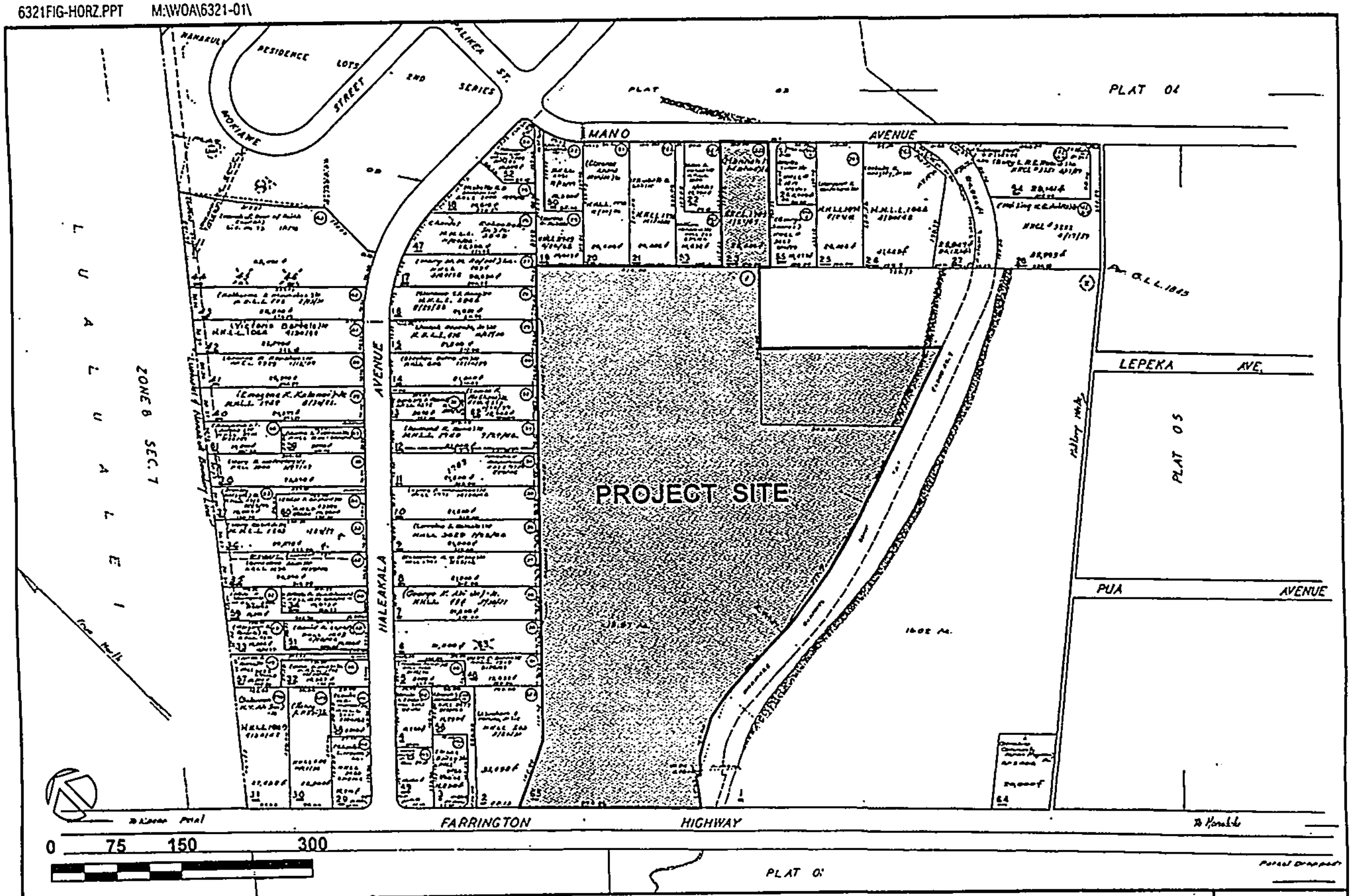
WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS - PLANNERS

NANAKULI IV ELEMENTARY SCHOOL

LOCATION MAP

FIGURE 1-1

6321FIG-HORZ.PPT M:\WOA\6321-01\



NANAKULI IV ELEMENTARY SCHOOL

TAX MAP KEY 8-9-02: 65, 23, por. 1

FIGURE
1-2

WILSON OKAMOTO
& ASSOCIATES, INC.
ENGINEERS - PLANNERS

6321FIG-HORZ.PPT M:\WOA\6321-01\

WILSON OKAMOTO
& ASSOCIATES, INC.
ENGINEERS · PLANNERS

NANAKULI IV ELEMENTARY SCHOOL

SURROUNDING LAND USES (12-28-99)

FIGURE 1-3

According to the Flood Insurance Rate Map, Community Panel Number 150001 0100C (revised September 28, 1990), prepared by the Federal Emergency Management Agency (FEMA), Nanaikapono Elementary School is within a designated flood zone (see Figure 1-4). In addition, the DOE's current lease with DHHL for the Nanaikapono Elementary School site expires in October 2002 and, if extended through renegotiation, would be subject to further renegotiation five years thereafter. The project site is available to DOE at no cost. Based on these considerations, DOE has decided to pursue construction of a new elementary school into which Nanaikapono Elementary School would be relocated. The proposed project is currently referred to as Nanakuli IV Elementary School, as it would have been the fourth elementary school to be constructed in the Nanakuli School Complex. Nanakuli III Elementary School was to have preceded Nanakuli IV Elementary School as the third elementary school in Nanakuli, but has been put on hold due to the absence of an acceptable site. The proposed Nanakuli IV Elementary School would be serving the same areas currently being served by Nanaikapono Elementary School (see Table 1-1 and Figure 1-5).

Table 1-1: Service Areas for NanaikaponoElementary School

Street Name	Street Name
Akowai Road	Kipalale Place
Aulani Place	Kipaoa Place
Auyong Homestead Road	Kipapani Place
87-2152	Kuualoha Road
Garden Grove Subdivision	Laumania Avenue
Farrington Highway	Lepeka Avenue
87-2152 to 87-1200	Lualei Place
Hakimo Road	Lualualei Naval Road
87-899 and below	Maaloa Street
Haleakala Avenue	Maia Street
89-299 and below	Mano Avenue
Helelua Place/Street	Mikana Street
Holomalia Place/Street	Mohihi Place/Street
Holopono Place/Street	Nanakuli Avenue
Huikala	89-399 and below
Kahau Street	Pikaiolena Street
Kanahale Road	Piliokahi Avenue
Kapiki Road	Pohakunui Avenue
Kaukai Road	Pohakupalena Street
Keaulana Avenue	Pua Avenue
Kipahele Place/Street	Ulehawa Road
Kipahulu Place/Street	Waiea Place
Kipaipai Place	

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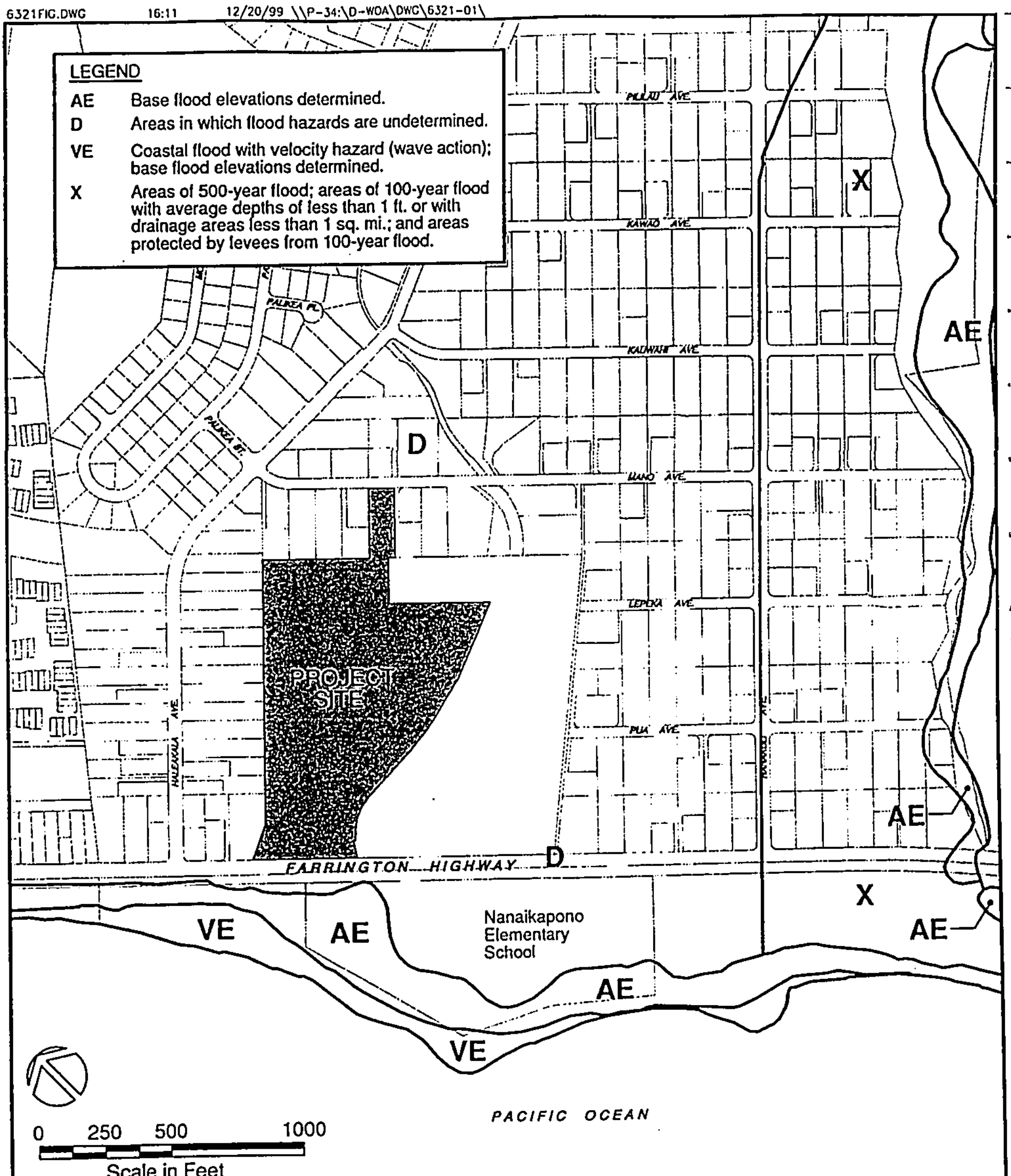

Source: City & County of Honolulu Digital Maps

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NANAKULI IV ELEMENTARY SCHOOL

FLOOD ZONES

FIGURE 1-4

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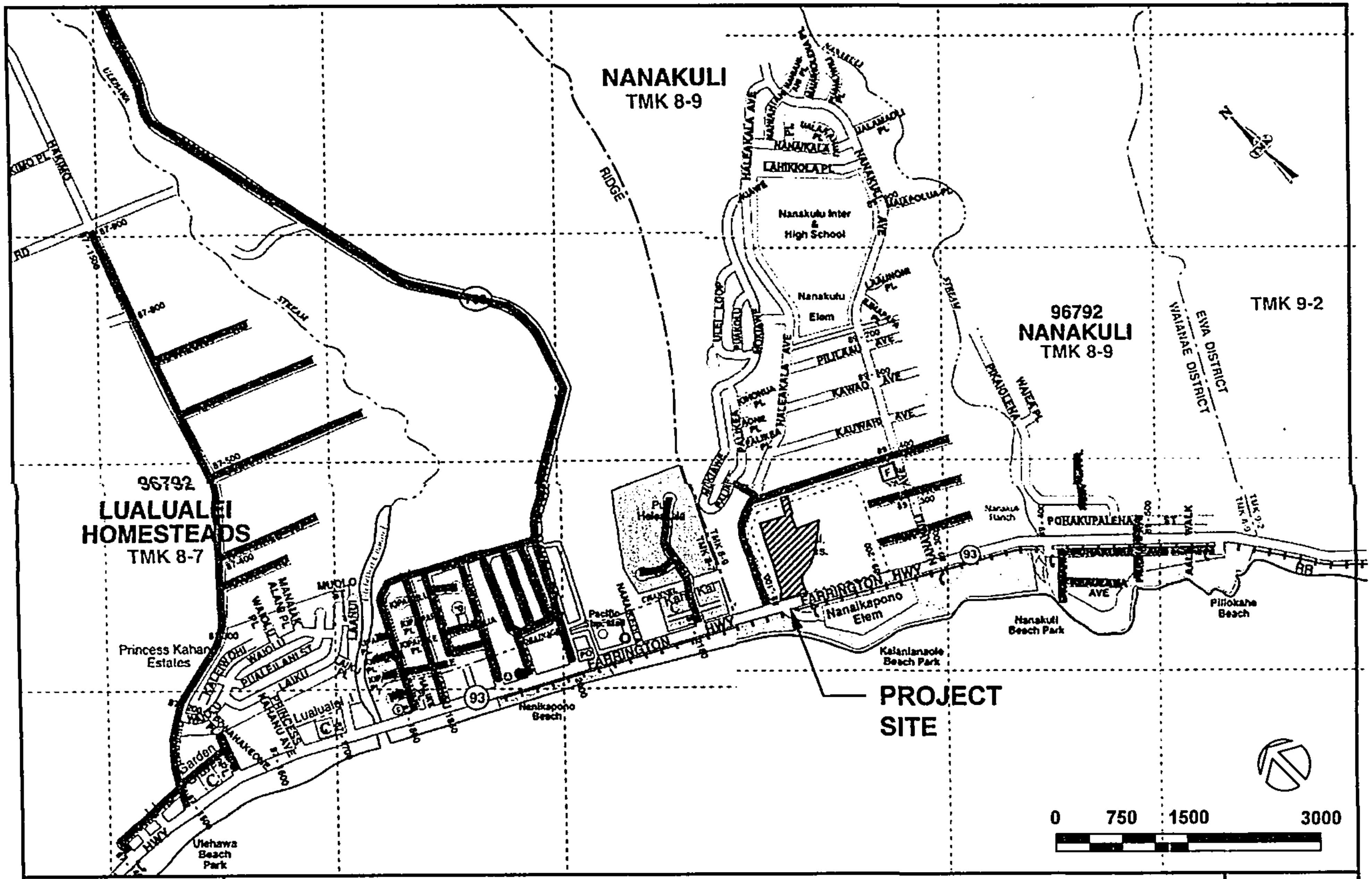

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NANAKULI IV ELEMENTARY SCHOOL

SERVICE AREA FOR
NANAIKAPONO ELEMENTARY SCHOOL

FIGURE
1-5

1.2.2 Nanakuli Public Library

The population of the Waianae region (Nanakuli, Maili, Makaha, and Waianae) increased 18.8 percent from 1980 to 1990, nearly double the population growth of 9.7 percent for the entire island. The 1980 population for the district was 31,487 and 37,411 in 1990. Recent growth has added greater emphasis to the communities' library needs.

The Hawaii State Public Library System (HSPLS) is made up of the Hawaii State Library and five library districts: East Oahu, West Oahu, Hawaii, Kauai, and Maui. It also operates the Library for the Blind and Physically Handicapped.

The West Oahu Library District has nine libraries, located in Pearl City, Aiea, Salt Lake/Moanalua, Mililani, Wahiawa, Waialua, Waipahu, Ewa Beach, and Waianae. New libraries are planned for Kapolei and Nanakuli.

The Nanakuli and Maili communities are currently serviced by the Waianae Library located on Farrington Highway across from Waianae Intermediate School, about two miles northwest of the project site. The next closest library is the Ewa Beach public and school library in Ewa Beach, about 13 miles (driving distance) east of the project site.

Presently, the Oahu Bookmobile services the Leeward area on Tuesdays, Wednesdays and Saturdays. The Nanakuli-Maili area is served on Wednesdays, between 2:00 PM and 3:00 PM at Puu Hale O Nanakuli, and on Saturdays, between 2:00 PM and 3:00 PM at Pacific Shopping Mall.

1.2.3 Leeward Head Start Facility

The Leeward Head Start facility is part of the Honolulu Community Action Program, Inc. (HCAP). HCAP and its services are federally funded. There are six Head Start facilities located in Aiea, Kalihi-Palama, Palolo, Kaneohe, Kapalama, and Kunia, respectively. Head Start provides preschool age children of low-income families with a comprehensive program, classroom-based or home-based, to meet their emotional, social, health, nutritional, and psychological needs.

The existing Leeward Head Start facility is located at 85-555 Farrington Highway. The Head Start facility lies on the DHHL's portion of the former Camp Andrews site. DHHL proposes to use their 15 acres for community programs, however the Head Start facility will be relocated to DOE's project site.

1.3 Project Description

1.3.1 Elementary School

The proposed elementary school will be comprised of single-story buildings, including administrative and student services building; library; cafeteria; forty-three classrooms for pre-school, kindergarten through sixth grade and special education; computer training/workroom/lounge; museum; various supporting utilities; and, covered bus loading area (see Figure 1-6). Table 1-2 shows the proposed floor area allocation for the proposed elementary school. Classrooms and office spaces will be air conditioned, while the cafeteria will be naturally ventilated and oriented to take advantage of the prevailing winds in the area. The main entrance to the school will be on Mano Avenue with school bus access provided from Farrington Highway. Since Farrington Highway is a limited access roadway, left-turns into and out of the proposed bus driveway would not be permitted. Therefore, south-bound buses going to the school on Farrington Highway would turn left onto Haleakala Avenue, right on Mano Avenue, right onto Nanakuli Avenue, and right onto the north-bound lane of Farrington Highway to turn right into the bus driveway. Should a lot become available along Haleakala Avenue, DOE would have first consideration to develop a third access point to the school. The design enrollment for the school is 1,050 students. The cost of construction is approximately $19 million. The estimated construction start date is mid-2001. The school is scheduled to open in September 2003.

The existing Nanikapono Elementary School buildings will not be demolished, but returned to DHHL for their use. The long term use of the school buildings and the school site are unknown at this time.

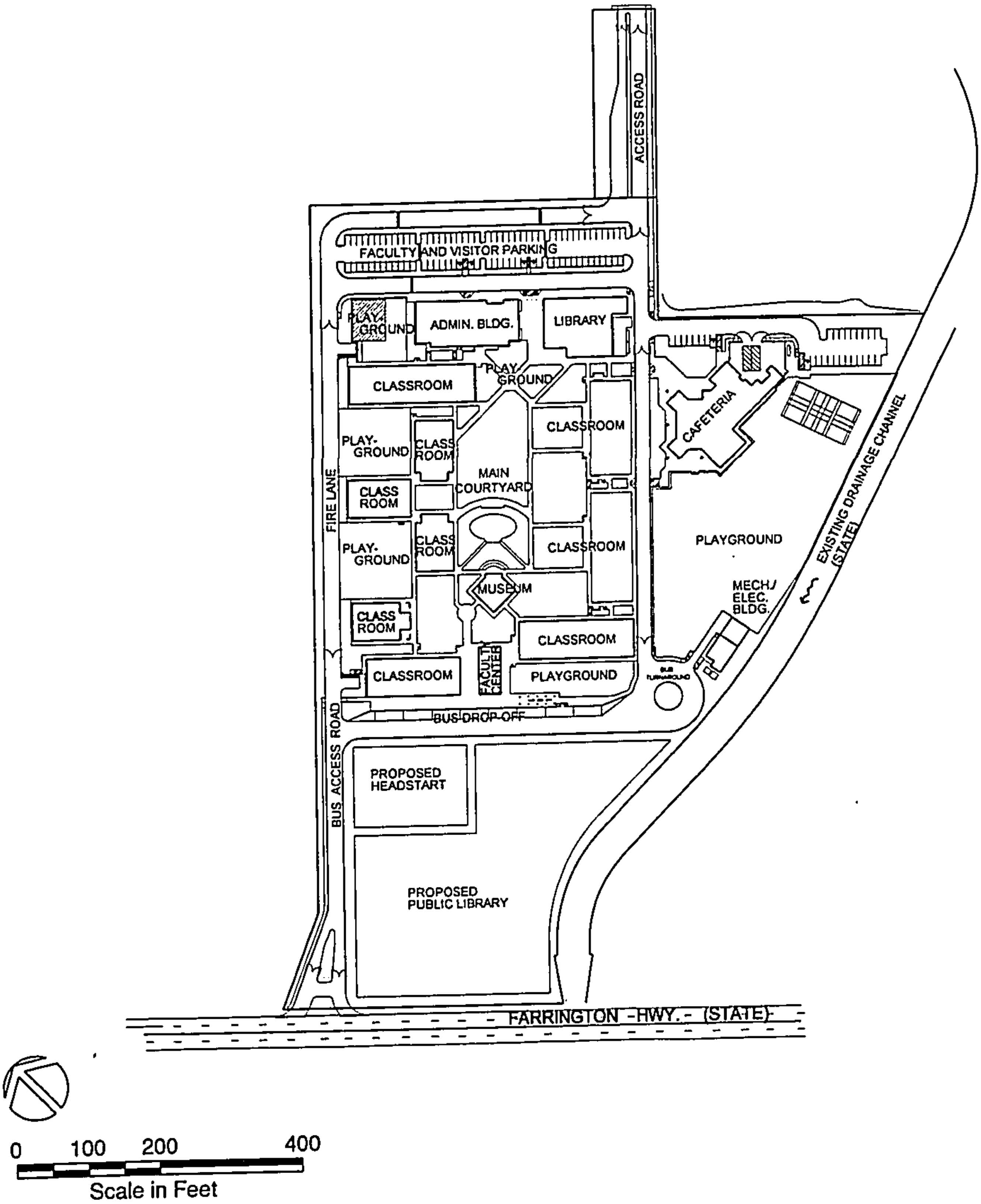
Table 1-2: Floor Area

Facilities	**Area (Square Foot)**
Administrative Services	4,708
Student Services	2,125
Library/Media Center	6,257
Cafeteria/Kitchen	9,546
Classrooms	53,502
Computer Center	880
Custodial	387
Museum	1,524
Faculty Center	3,303
Accessory/Non-Program Space	9,876

Source: Kober/Hanssen/Mitchell Architects, *Pre-Final Nanakuli IV Elementary School Master Plan Report,* March 2000.

1.3.2 Nanakuli Public Library

The proposed Nanakuli Public Library will include library building, driveway or access road from existing road to parking area; paved parking area; utilities to provide water, electricity, sewer, and telephone services, on-site drainage improvements; and landscaping. The library building will contain all library uses on a single level, and will provide space for a lobby, large group room, librarian's



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NANAKULI IV ELEMENTARY SCHOOL

PROJECT SITE PLAN

FIGURE 1-6

office, staff workroom, storage stack area, and storeroom. Additional areas include a staff lounge and restroom, public toilets, mechanical/electrical room, and a grounds maintenance room. The library is planned to be developed on a portion of the remaining 2.98 acres, along Farrington Highway (see Figure 1-6).

The Nanakuli Public Library will emphasize Hawaiiana in its resource and program development, as well as in the architectural and landscape design. A unique aspect of the Nanakuli Public Library will be a Hawaiiana cultural feature. While not fully developed at this time, the Hawaiiana cultural feature will serve to personalize the library to the community it serves. Some preliminary concepts include working with Bishop Museum to display Hawaiian artifacts from or reflective of the area's past. The construction of the library will follow the construction of the elementary school and Head Start facility. The earliest estimated date of completion is 2008.

1.3.3 Leeward Head Start Facility

The proposed Leeward Head Start facility will include two modular classrooms (28 feet by 32 feet), restrooms, storage, and open space facility encompassing 2,000 square feet. The new facility will serve 40 children, ages 0 to 5. The Head Start facility will be placed between the proposed elementary school and public library, on a portion of the remaining 2.98 acres.

If funding for the new facility cannot be secured in the short-term, the existing 800 square foot portable will be relocated to the project site and serve its current enrollment of 20 children, ages 3 to 5 until the new facility can be constructed. The earliest estimated date of completion is 2003.

2. DESCRIPTION OF THE EXISTING ENVIRONMENT, PROJECT IMPACTS AND MITIGATION MEASURES

The following is a description of the existing environment, assessment of potential impacts and proposed measures to mitigate potential adverse impacts resulting from the proposed project.

2.1 Climate

The Waianae coast is one of Hawaii's driest localities, receiving an average annual rainfall of 20 inches. The majority of the rainfall occurs during the winter months between November and April. The mean maximum temperature is in the mid-eighties (degrees Fahrenheit) and the mean minimum temperature is in the high sixties.

Impacts and Mitigation Measures

The proposed facilities will not affect regional climate; however, replacing the relatively dense vegetation on the project site with buildings, walkways, roadways, parking areas, and landscaped lawns will alter the microclimate of the site. Changes in wind patterns at ground level, shading by buildings and increased evapo-transpiration by irrigated landscaping will change patterns of heating and cooling and humidity near ground level within the project site.

2.2 Geology and Topography

The island of Oahu is a volcanic doublet formed by the Waianae range to the west and the younger Koolau Range on the east. Both are the remnants of great shield volcanoes, but the term "range" indicates that they have lost most of the original shield outlines and are now long narrow ridges shaped largely by erosion. The project site is located on the leeward coastal plain at the foot of the Waianae Range. The coastal plain is underlain by elevated coral reef formed when the sea level was higher than it currently is. The ancient reef is partially covered by alluvium carried out from the Waianae Range.

The project site and surrounding areas slope gently toward the sea with the drainage channel adjacent to the project site being the only significant topographic feature. The elevation of the project site is 12 to 20 feet above mean sea level (msl). Within the project site, the surface topography is characterized by unpaved roadways, remnant concrete building foundations, low coral outcroppings and filled coral sink formations.

Impacts and Mitigation Measures

No significant impact on the geology or overall topography of the project site is anticipated during the construction of the proposed facilities.

Construction of the proposed facilities will require grading activities and excavation for building foundations, utilities and roadbeds. Graded and excavated areas will be built over, paved over, or backfilled and landscaped. To achieve required elevations for proper drainage, grading within the project site will slightly alter the existing topography.

2.3 Soils

The predominant soils within the coastal area belong to the Lualualei and Mamala series, and Coral Outcrop (see Figure 2-1). In Nanakuli, Mamala clay loam is shallow and stony, and the areas of Coral Outcrop consist of 80 to 90 percent coral with minimal soil. The following is a description of the soils found in the in the project area (1972, U.S. Department of Agriculture):

> Coral outcrop (CR) consists of coral or cemented calcareous sand. The coral reefs formed in shallow ocean water during the time the ocean stand was at a higher level. This is the predominant soil type at the project site.
>
> Mamala stony silty clay loam (MnC) consists of stones, mostly coral rock fragments, are common in the surface layer and in the profile. The soil is underlain by coral limestone and consolidated calcareous sand.

A preliminary soil assessment conducted by Ernest K. Hirata & Associates, Inc. (see Appendix A) identified coral outcrops as the predominant soil in the project area. The assessment involved sampling of five exploratory borings throughout the project site. The top layer consisted of reddish brown silty clay or silty gravel with sand varying in thickness from 6 inches to 24 inches. Underlying the top layer is tan coral that extends to depths of 11.5 feet to 17 feet. The condition of tan coral is medium hard.

The Detailed Land Classification- Island of Oahu published by the Land Study Bureau evaluates the quality or productive capacity of certain lands on Oahu for selected crops and overall suitability in agricultural use. The project site is not classified as productive agricultural lands.

The Agricultural Lands of Importance in the State of Hawaii (ALISH) Map, prepared by the State Department of Agriculture, classifies agricultural lands into three categories: 1) prime agricultural land, 2) unique agricultural land, and 3) other important agricultural land. The project site is not classified as productive agricultural lands.

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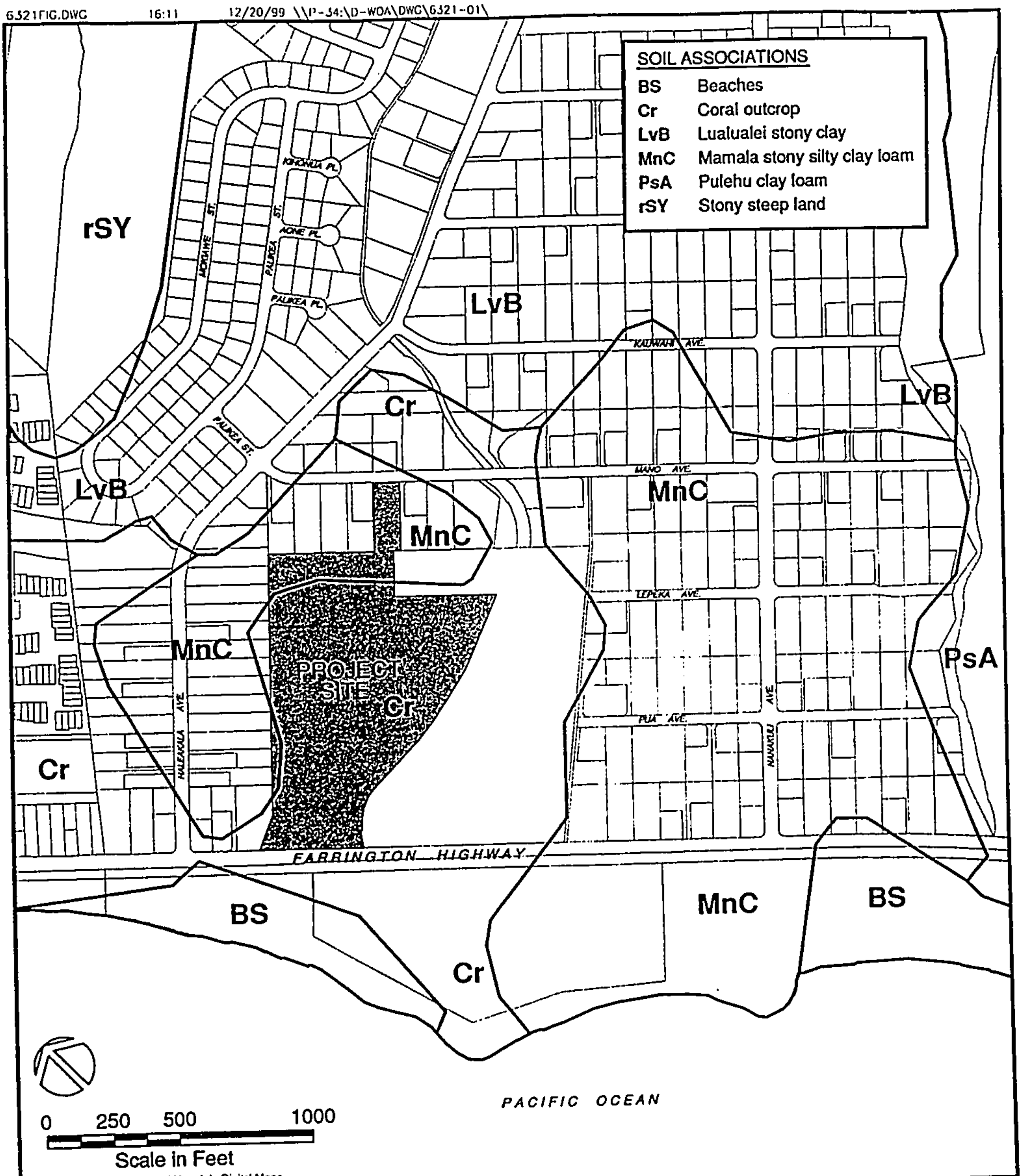

Source: City & County of Honolulu Digital Maps

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NANAKULI IV ELEMENTARY SCHOOL

SOILS MAP

FIGURE 2-1

Impacts and Mitigation Measures

No significant impacts on soils at the project site are anticipated with the construction and operation of the proposed project. Excavation and grading activities associated with construction of the proposed project will be regulated by the City and County's grading ordinance and the National Pollutant Discharge Elimination System (NPDES) permit requirement administered by the DOH.

A NPDES General Permit for Storm Water Associated with Construction will be required for construction of the proposed project as the area of soil disturbance from activities such as clearing and grubbing, grading and stockpiling will be in excess of five acres. The permit requires compliance with a Best Management Practices (BMP) plan which, in turn requires compliance with City ordinances pertaining to grading, grubbing, stockpiling, soil erosion and sedimentation. Site specific erosion and sediment control measures of the BMP plan may include construction of berms to detain run-off and installation of silt fences to filter silt from run-off.

Following construction, exposed soils will be built over, paved over, or backfilled and landscaped. Soils may be imported for landscaping if required.

2.4 Hydrology

2.4.1 Groundwater

Nanakuli Valley overlies the Waianae Aquifer, which extends through Lualualei, Waianae and Makaha. Groundwater movement within the reservoir is partly controlled by dikes and breccia. For some distance inland, a brackish to fresh basal lens exists in the dike compartment. The quality of water is generally good, except in near shore areas and areas abutting landward edges of the coralline aquifer, where the major contaminant is seawater. The project site is located makai of the Board of Water Supply "no-pass" zone", indicating that it does not overlie potable groundwater.

Impacts and Mitigation Measures

No significant impacts to groundwater underlying the project site are anticipated during construction of the proposed facilities. Construction activities are not likely to introduce to, nor release from the soil any materials which could adversely affect groundwater, including groundwater sources for domestic use.

Construction material wastes will be appropriately disposed of and prevented from leaching into receiving bodies of water. Dewatering is not anticipated for this project.

2.4.2 Surface Water

The gentle slope throughout the valley accounts for the poorly defined surface drainage pattern. Two intermittent streams flow through Nanakuli Valley: Nanakuli Stream and Ulehawa Stream. The latter stream has been channelized near its outlet at the ocean. Nanakuli Stream is located half a mile south and Ulehawa Stream located 1.5 miles north of the project site. Man-made channels within the area also direct surface runoff to the existing stream channels.

The project site is bordered on the southeast by a concrete drainage channel that crosses underneath Farrington Highway, to an outlet at Nanakuli Beach Park, emptying into the Pacific Ocean. The total length of the drainage channel along the south boundary of the project site is 1,140 feet.

Impacts and Mitigation Measures

No significant impacts to streams or drainage systems at the project site are anticipated with the construction and operation of the proposed project. Excavation and grading activities associated with construction of the proposed project will be regulated by the City and County's grading ordinance and the NPDES permit requirement administered by the DOH, as discussed previously in Section 2.3.

Construction materials wastes will be appropriately disposed of and must also be prevented from leaching into receiving bodies of water. Dewatering is not anticipated for this project.

2.4.3 Coastal Waters

Coastal waters from Ko Olina along the northwest coast part of the project site to Kahe Point, are classified as "A" marine waters by State DOH Administrative Rules, Title 11, Chapter 54, "Water Quality Standards". Class A marine waters are recognized by DOH with the objective that "their use for recreational purposes and aesthetic enjoyment be protected." This classification allows other uses that are compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters.

Located across Farrington Highway from the project site are Kalanianaole and Nanakuli Beach Parks.

Impacts and Mitigation Measures

No significant impacts on coastal waters are anticipated as a result of the proposed project.

During construction, storm runoff has the potential to carry increased amounts of sediment into storm drain systems and streams due to erosion of exposed soils. This runoff could potentially impact the water quality of nearshore coastal waters in the area. Excavation and grading activities associated with construction of the proposed project will be regulated by the City and County's grading ordinance and NPDES permit requirement administered by the DOH, as discussed previously in Section 2.3.

Construction materials wastes will be appropriately disposed of and must also be prevented from leaching into receiving bodies of water. Dewatering is not anticipated for this project.

2.5 Flood/Tsunami Hazard

According to the Flood Insurance Rate Map, Community Panel Number 150001 0100C, (revised September 28, 1990) prepared by the Federal Emergency Management Agency (FEMA), the project site is within Zone D, "areas in which flood hazards are undetermined" as shown in Figure 1-4. Based on an investigation of the project site, it was determined that the risk of flooding associated with drainage from mauka areas is negligible. Across Farrington Highway from the project site, Nanaikapono Elementary School is currently located in Zone AE, special flood hazards areas that may be inundated by 100-year flood, where base flood elevations associated with tsunami are shown as 14 feet. Nanaikapono Elementary School has an elevation of 8 to 10 feet.

As indicated in the Tsunami Evacuation Map (Figure 2-2), the project site is located within the State Tsunami Evacuation Zone.

Impacts and Mitigation Measures

The proposed elementary school is intended to relocate Nanaikapono Elementary School out of the flood zone. The proposed relocation, however, would not move the school out of the State's Tsunami Evacuation Zone, which is a more conservative delineation to ensure public safety in an emergency. In the event of a tsunami warning, the occupants of Nanakuli IV Elementary School, Nanakuli Public Library, and Leeward Head Start facility will be evacuated to a safer location.

Due to the undeveloped nature of the project site, development of the proposed project will increase the impervious area of the site. The proposed drainage improvements described in Section 2.15 will mitigate any potential flood hazard.

2.6 Flora and Fauna

Botanical Consultants, Inc., conducted a flora and fauna survey of the project site on December 7, 1999. The existing vegetation consists primarily of non-native species, including landscape plants that have apparently survived since the previous use of the site as a military recreation facility. The most common species are kiawe, koa haole, and dry, scrubland grasses and shrubs. No

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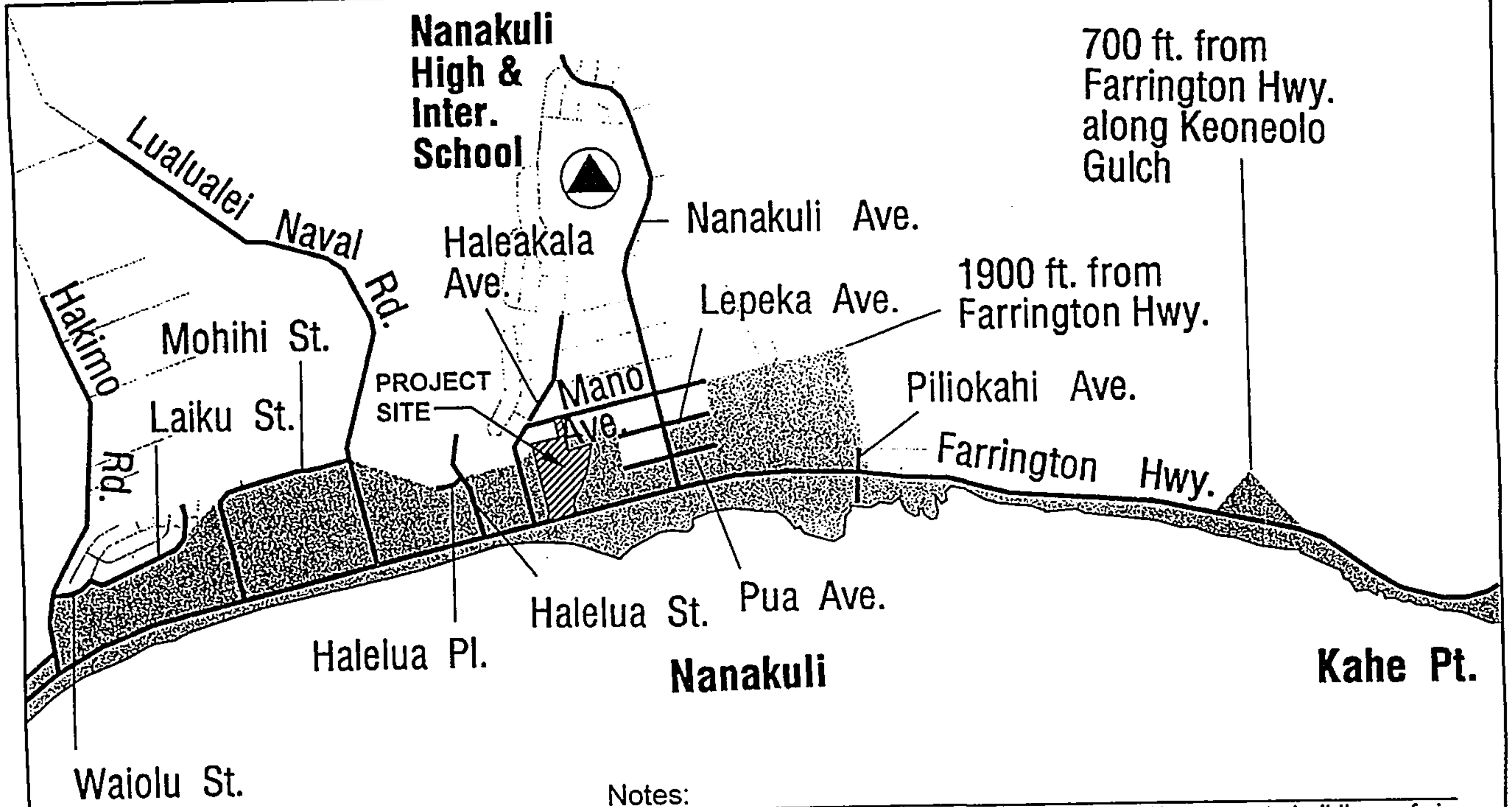

Notes:

When evacuation boundaries are drawn along streets and roadways, they are considered to be safe from wave action.

Steel and/or concrete buildings of six or more stories in height should provide adequate protection if people move to the third floor or above.

Source: City & County DPP GIS

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TSUNAMI EVACUATION MAP

FIGURE
2-2

candidate, proposed, or listed threatened or endangered species were encountered during the survey. A complete listing of plant species recorded is contained in the Flora/Fauna Survey Report for the Proposed Nanakuli IV Elementary School Site included herein, as Appendix B.

Domestic pets, feral animals, livestock and rodents are assumed to comprise the majority of mammalian species inhabiting the area. Birds associated with the kiawe and lowland vegetation type in the area include the waxbills, sparrows, bulbuls, pigeons, and doves. All bird species observed are introduced species. No candidate, proposed, or listed threatened or endangered species were encountered during the survey.

Impacts and Mitigation Measures

Since the project site does not provide a unique habitat in the area, no significant impacts on floral and faunal species are anticipated. No candidate, proposed, or listed threatened or endangered species will be disturbed. The incorporation of landscaping following construction will re-attract birds such as those presently found on the site.

Prior to clearing the project site, a Form VC-12 will be submitted to the State DOH Vector Control Branch notifying them of eradication measures.

2.7 Historic and Archaeological Resources

Cultural Surveys Hawaii, Inc. conducted a historical and archaeological survey in December 1999, to evaluate the presence of potential cultural resources within the project site. The survey included a background research of previous archeological work within the area, historical literature review, and field inspections. The survey report in its entirety is included herein as Appendix C.

Prior to construction of Camp Andrews, the project site was used for agriculture. Camp Andrews was constructed prior to 1942 and used as a U.S. military recreational facility until 1952. Camp Andrews consisted of cabins, cook houses, a canteen, septic systems, a barber shop, armory, etc. The U.S. Navy acquired the property from the U.S. Army in 1952. All structures on the property were demolished by the U.S. Army prior to transfer to the U.S. Navy and the site has remained vacant since then. The U.S. Navy transferred the property to the State of Hawaii in 1962.

During the field inspection, no surface Hawaiian archaeological remains were identified. The only intact construction associated with the former military use of the site were concrete bunkers, and two coral block pillars marking the former entrance to Camp Andrews. Other remnants of the former use include concrete foundations and an unpaved roadway. Numerous limestone sink formations were also observed in the project site. Most of the sinks were filled with limestone boulders and cobbles at some time in the past. Such sinkholes have been known to contain paleontological remains of pre-historic animal life, primarily birds, and have also been associated with native Hawaiian burials.

Based on the findings of the survey, the State Historic Preservation Division (SHPD) was consulted to determine requirements for further investigation. As recommended by the SHPD, an archaeological inventory survey of the project site will be conducted. Toward determining the scope of the inventory survey, additional fieldwork was conducted by CSH between July 19, 2000 and July 28, 2000. At least seventeen sink features were identified. The two largest and deepest sinkholes were excavated. The results are included herein as Appendix D.

Sink 1 contained historic and modern trash, cultural deposits related to prehistoric/traditional Hawaiian habitation, charcoal, as well as remains of extinct prehistoric bird species.

Sink 2 contained cultural deposits related to prehistoric/traditional Hawaiian habitation and one prehistoric or early historic Native Hawaiian burial. The finding of the human bones prevented further excavating of Sink 2.

Impacts and Mitigation Measures

The proposed construction of the Nanakuli IV Elementary School, Head Start facility, and public library has the potential to impact the sink features and any burials located within the project area. Based on the findings of the initial archaeological survey, subsequent additional fieldwork and consultation with SHPD, the following mitigation measures will be implemented:

1. Camp Andrews, including the project site will be assigned a state site number by the SHPD recognizing it as a historic property eligible for listing in the State and National Register of Historic Places.

2. Discussion with the Oahu Island Burial Council will be initiated regarding mitigation of the burial found in Sink 2.

3. The Oahu Burial Council will be notified of the proposed project and the potential for finding additional burials. Potential mitigation measures, such as preservation in place or temporary removal with re-interment on site in a burial preserve area, will be discussed.

4. An archaeological inventory survey of the project site will be conducted prior to commencing construction. The inventory survey findings and recommendations will be submitted for review by the SHPD pursuant

to Chapter 6E, Hawaii Revised Statutes (HRS). Compliance with Chapter 6E, HRS is required prior to commencing construction activities at the project site, including the implementation of any mitigation measures, such as data recovery and re-interment of burials, that may be required by SHPD. The inventory survey will include the following:

- Further historical and archival research to gather additional information about Camp Andrews. Research may include the gathering of oral histories from former military personnel and Nanakuli residents.
- Preparation of an inventory of the sink features on the project site and testing an adequate sampling of the sinks for cultural and paleontological deposits.
- Radiocarbon dating of selected species/bone samples of paleontological deposits.

5. Based upon the findings of the archaeological inventory survey, and in consultation with the Oahu Island Burial Council, a detailed burial treatment plan will be prepared.

2.8 Cultural Resources

A cultural impact assessment for the project site was conducted by Cultural Surveys Hawaii, Inc. and is included in its entirety as Appendix E. In addressing Hawaiian customary and traditional rights and their applicability to the project area, the following scope of work was followed:

1. Examination of historical documents, Land Commission Awards, historic maps, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal and other resources or agricultural pursuits as may be indicated in the historic record.
2. A review of the existing archaeological information pertaining to the sites on the property toward understanding traditional land use activities and to identify and describe the cultural resources, practices and beliefs associated with the site, and to identify present uses, if any.
3. Conduct oral interviews with knowledgeable persons about the historic and traditional practices in the project area and region.

The specific areas studied included sink features, burials, access to Hawaiian trails, native Hawaiian hunting and gathering practices, religious sites and other archaeological and historical concerns such as historic properties. No Hawaiian trails were identified within the Camp Andrews area. Although no specific hunting/gathering practices were identified, the discovery of extinct faunal remains suggest a possible association of past hunting and gathering practices within the project area.

Of primary concern is the many sink features found within the Camp Andrews area. Beside the faunal remains, a human burial was identified in one of the two sinkholes that were tested (refer to Section 2.7). The many sink features may be valuable for interpreting past history, past life and environmental patterns.

No *heiau* (religious shrines) or other surface sites were found or identified within or near the project site.

Within the project site, four types of plants used for medicinal and cultural purposes were identified. Two are native Hawaiian plants, the *'ilima* (*Sida spp.*) and the *'uhaloa* (*Waltheria indica*) and two are introduced plants *honohono (Commelina benghalensis)* and *aheahea (Chenopodium murale)*. These plants were used traditionally in Hawaiian culture and they continue to be used today by cultural practitioners *la'au lapa'au* (healing with medicinal plants and herbs).

During the *Māhele*, there were no *kuleana* (commoner) claims awarded within the *ahupua'a* of Nanakuli which encompasses the project site. The single unawarded claim from the *Māhele* indicated a pond, a cultivated *kula* (open field or pasture) and a valley planted in *wauke*. Early mid-19th century tax records from 1855 indicate at least eight people were living in Nanakuli at the time. This record suggests that Hawaiian cultural activity was taking place, even if only on a limited bases.

The proposed Camp Andrews site is in an area that has been utilized for ranching activity for many decades. In early 20th century, the present project area was designated as an U.S. military reservation by Presidential Executive Order. In 1940, the U.S. Navy constructed and opened a recreation camp for enlisted men. The camp continued in operation during World War II. Following the war, the camp was phased out and many of its buildings dispersed throughout the community for use by a church and by Nanaikapono School. In 1962, the camp parcel was returned to the State of Hawaii and has since remained undeveloped. Currently, the only visible remnants of Camp Andrews are a concrete bunker, two coral block pillars at the former entrance to the camp, miscellaneous concrete foundations, and an unpaved roadway through the project site.

Impacts and Mitigation Measures

None of the plants identified are of cultural concern and none are listed on the endangered or threatened species. All of the plants mentioned above are common and locally abundant and can be found in similar dry, lowland environments. The interviewees and community members did not indicate that any type of gathering activity took place or was likely to take place within the proposed project site. Based on the above, it is unlikely that Hawaiian practices and traditions in relation to plant gathering will be impacted within the project site.

The proposed construction of the Nanakuli IV Elementary School, Head Start facility, and public library has the potential to impact the sink features and any burials located within the project area.

With regard to the sink features, burial, potential burial and Camp Andrews, the mitigation measures described in Section 2.7 Historic and Archaeological Resources will be implemented.

2.9 Hazardous and Toxic Materials

Masa Fujioka & Associates (MFA) conducted a Phase I Environmental Site Assessment in December 1999 and August 2000 to evaluate the project site for hazardous and toxic waste substances. This assessment is included as Appendix F and is summarized below.

The purpose of the assessment was to investigate past and present land uses of the property and surrounding areas to determine if the potential for hazardous materials contamination exists. The assessment included the following:

- Review of site history
- Review of regulatory records
- Review of site geology and hydrogeology
- Site reconnaissance
- Data evaluation and report preparation

Site history indicated prior agriculture use, and the possibility of associated pesticide residue.

During the site reconnaissance surveys on-going use of the project site for solid waste disposal was evident. Among the debris, the following potentially hazardous substances or wastes were observed:

- 1- and 5-gallon cans, potentially containing lead-based paints;
- 55-gallon drums, apparently empty, former contents unknown;

- high pressure cylinders, with unknown contents;
- potential asbestos-containing roofing shingles;
- potential asbestos-containing transite-like pipes;
- used car batteries;
- abandoned cars;
- used household appliances (televisions, computer monitors, reach-in freezer, refrigerator, and air conditioning equipment) that may contain potentially hazardous materials;
- used tires;
- empty propane tanks; and
- metal piping (either septic and/or water line).

Based on the findings of the site history and site reconnaissance survey, soil sampling was conducted beneath piles of drums located along the northwest site boundary. Soil samples were analyzed for total petroleum hydrocarbon (TPH), polychlorinated biphenyls (PCBs), pesticides; eight total metals, and semivolatile organic compounds (SVOCs). Nine samples were collected from potentially contaminated areas and analyzed. Sampling results did not indicate significant contamination of soil from release of drum contents (if released occurred). Total arsenic, total lead, and the pesticide 4,4'-DDE were reported at concentrations exceeding DOH Soil Action Levels (SAL) or Preliminary Remediation Goal (PRG) in one area (the northwest side of the project site). Approximately 15 cubic feet of soil is affected.

Impacts and Mitigation Measures

A mitigation plan will be developed in consultation with DOH to address potential impacts associated with identified soil contamination and suspected hazardous materials prior to and doing the construction including:

- Prior to construction, surface soils from areas where soil contamination was identified will be excavated and placed in 55-gallon drums for further testing and appropriate disposal.

- During earthwork activities, procedures for testing, handling and disposal of potentially hazardous materials encountered will be coordinated with an environmental consultant.

2.10 Scenic Characteristics

The dominant scenic feature in the vicinity of the project site is the panoramic ocean view. Mauka views include the distant slopes of the Waianae Mountain range with ridges extending toward the sea. According to the City's Coastal View Study (1987), the project site lies within the Nanakuli Viewshed. Farrington

Highway, the coastal road through the region, provides "continuous" or "intermittent coastal views" in some areas. The view study does not identify any significant stationary viewpoints along the Nanakuli coastline.

Impacts and Mitigation Measures

The proposed project will not impact makai views from Farrington Highway since the project site is located on the mauka side of the highway. Mauka views from the highway would be gradually altered by the development of presently vacant land and removal of dense vegetation that presently obscures views of the project site from the highway. The proposed elementary school, which will be developed first, will alter mauka views by adding a new driveway for buses on Farrington Highway. The single-story school buildings, however, will be set back approximately 400 feet from the highway, reducing the perception of visual mass. Existing vegetation on the future library and Head Start facility site adjacent to the highway will also help to obscure views of the school buildings. Subsequent development of the single-story library and Head Start facility in the site adjacent to the highway will progressively intensify the urban character along the mauka side of the highway.

2.11 Traffic

Wilson Okamoto & Associates, Inc. (WOA) prepared traffic impact assessments. The traffic impact assessment reports are included as Appendix G & H. The associated traffic surveys were was conducted on December 7 and 9, 1999 between AM peak hours of 6:30 AM and 8:30 AM and the PM peak hours of 2:00 PM and 5:00 PM, during the normal school session. The following intersections were assessed to determine the relative impact of the proposed project (see Figure 2-3):

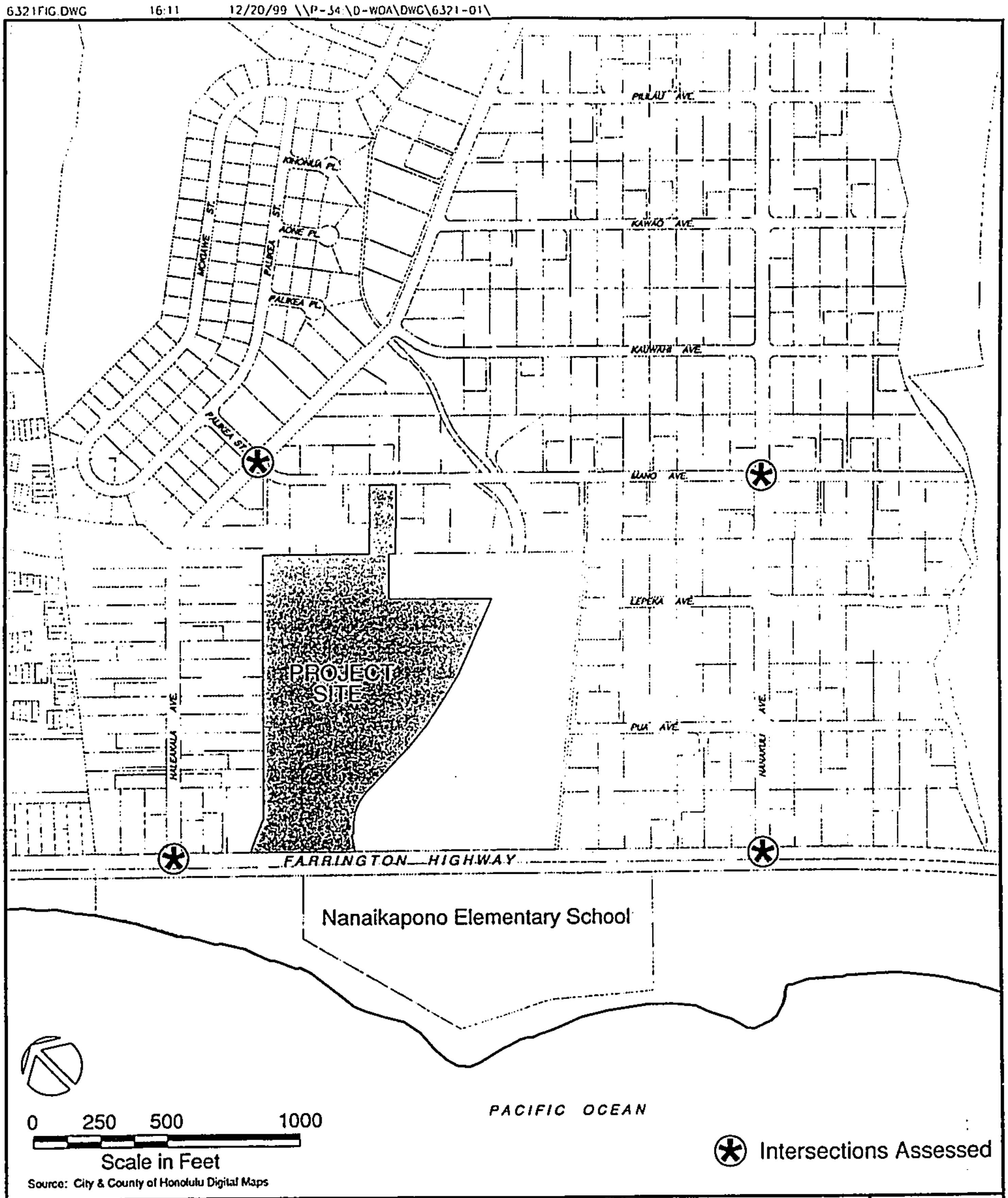
- Intersection of Farrington Highway and Nanakuli Avenue
- Intersection of Farrington Highway and Haleakala Avenue
- Intersection of Nanakuli Avenue and Mano Avenue
- Intersection of Haleakala Avenue, Mano Avenue and Palikea Street

The intersections were assessed using the methodologies from the Transportation Research Board *Highway Capacity Manual* (Special Report 209, Third Edition 1994) and the Highway Capacity Software developed by the Federal Highway Administration.

Operating conditions at these intersections are described in terms of their level-of-service (LOS). LOS is defined by LOS A (best) to LOS F (worst).

The peak hours of traffic in the vicinity of the project site generally occur between 7:00 AM and 8:00 AM and between 3:45 PM and 4:45 PM on weekdays.

6321FIG.DWG 16:11 12/20/99 \\P-34\D-WOA\DWG\6321-01\



Source: City & County of Honolulu Digital Maps

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NANAKULI IV ELEMENTARY SCHOOL

ROADWAY NETWORK

FIGURE 2-3

Farrington Highway serves as the primary access road along the leeward coast and connects with the H-1 Freeway near Kapolei. In the project vicinity, Farrington Highway intersects mauka-makai collector roads into Nanakuli Valley.

Fronting the project site, Farrington Highway is a two-way, four-lane, undivided State Highway with a posted speed limit of 35 miles per hour (mph). Approximately 350 feet west of the project site, the highway intersects with Haleakala Avenue, a two-way, two-lane, City and County of Honolulu roadway with a posted speed limit of 25 mph. At this signalized intersection, the westbound approach of Farrington Highway serves through and right-turn traffic movements and the eastbound approach serves through and left-turn movements. The Haleakala Avenue approach serves left-turn and right-turn movements. At this intersection, both approaches of Farrington Highway operate at the free-flow condition of LOS "A" during the AM and PM peak hours. Although traffic volumes are relatively heavy, the intersection approach volumes are controlled by upstream signalized intersections. During the AM and PM peak hours, Haleakala Avenue operates at LOS "C".

Approximately 2,200 feet (0.42 miles) southeast of the project site, Farrington Highway intersects with Nanakuli Avenue, which is a two-way, two-lane, City and County of Honolulu roadway with a posted speed limit of 25 mph. At this signalized intersection, all approaches serve through, left-turn and right-turn traffic movements. At this intersection, both approaches of Farrington Highway operate at LOS "B" during the AM and PM peak hours. Although traffic volumes are relatively heavy, the intersection approach volumes are controlled by upstream signalized intersections. During the AM and PM peak hours of traffic, Nanakuli Avenue operates satisfactorily at LOS "C".

Approximately 1,400 feet (0.26 miles) mauka of Farrington Highway, Nanakuli Avenue intersects with Mano Avenue. Mano Avenue is a two-way, two-lane, City and County of Honolulu roadway with a posted speed limit of 25 mph. At this unsignalized intersection, all approaches serve through, left-turn and right-turn traffic movements. Presently, both approaches of Nanakuli Avenue operate at the free-flow condition of LOS "A", during the AM and PM peak hours, while Mano Avenue operates at LOS"A" on the eastbound approach and operates at LOS "B" on the westbound approach.

Approximately 1,950 feet (0.37 miles) mauka of Farrington Highway, Haleakala Avenue intersects Mano Avenue and Palikea Street. Palikea Street is a two-way, two-lane, City and County of Honolulu roadway with a posted speed limit of 25 mph. At this unsignalized intersection, all approaches serve through, left-turn and right-turn traffic movements. At this intersection, both approaches of Haleakala Avenue operate at a free-flow condition of LOS "A" during the AM and PM peak hours. Both approaches of Mano Avenue operate at LOS "B" during the AM peak hour. During the PM peak period, Mano Avenue operates at LOS "A" on the eastbound approach and operates at LOS "B" westbound approach.

Impacts and Mitigation Measures

No significant impacts on traffic are anticipated during the construction and operation of the proposed facilities.

The traffic impact assessment forecasts traffic volume and conditions for 2002 with the elementary school alone; 2002 with elementary school and Head Start facility; and 2008 with the elementary school, Head Start facility, and the addition of the public library.

Future traffic was forecast at the intersections by adding the following:

- Existing traffic volumes at the intersections.
- Increases in traffic volume by the growth rate derived from future population projections.
- Traffic generated by the project.

The Year 2002 cumulative AM and PM peak hour traffic conditions with and without the proposed elementary school are summarized in Table 2-1. Traffic volumes at the study intersection along Farrington Highway are expected to decrease slightly due to the shift in site-related traffic volumes from Farrington Highway to Mano Avenue where the new school driveway will be located. In addition, the intersections of Nanakuli Avenue/Mano Avenue and Haleakala Avenue/Mano Avenue/Palikea Street should continue to operate at acceptable levels of service.

Table 2-2 shows the LOS calculations for the proposed elementary school and relocation of the Head Start facility, based on cumulative volumes of traffic generated in the Year 2002. In the Year 2002, the traffic conditions should not significantly affect the projected traffic operations in the vicinity of the proposed project site. The four study intersections are expected to operate satisfactorily at LOS "C" or better under the Year 2002 traffic conditions.

Table 2-3 shows the LOS calculations for the proposed elementary school, relocation of the Head Start facility, and the proposed Nanakuli Public Library, based on cumulative volumes of traffic generated in the Year 2008. In the Year 2008, the traffic conditions should not significantly affect the projected traffic operations in the vicinity of the project site. The four study intersections are expected to operate adequately at LOS "D" or better under Year 2008 traffic conditions.

Table 2-1
Comparison of Existing and Projected
(With and Without Project) Levels of Service (LOS)

Intersection	**Approach**	**AM**			**PM**		
		Existing	Year 2002		Existing	Year 2002	
			w/out Project	w/ Project		w/out Project	w/ Project
Farrington Hwy./Haleakala Ave.	SB	C	C	C	C	C	C
	EB	A	A	A	A	A	A
	WB	A	A	A	A	A	A
Farrington Hwy./ Nanakuli Ave.	NB	C	C	C	C	C	C
	SB	C	C	D	C	C	C
	EB	B	B	B	A	A	A
	WB	B	B	B	A	A	A
Nanakuli Ave./ Mano Ave.	NB	A	A	A	A	A	A
	SB	A	A	A	A	A	A
	EB	A	A	A	A	A	A
	WB	B	B	C	B	B	B
Haleakala Ave./ Mano Ave./ Palikea St.	NB	A	A	A	A	A	A
	SB	A	A	A	A	A	A
	EB	B	B	B	A	A	B
	WB	B	B	B	B	B	B

NB- Northbound SB- Southbound
EB- Eastbound WB- Westbound

Table 2-2
Projected Levels of Service (LOS)
with Elementary School and Head Start Facility
2002

Intersection	Approach	AM Peak	PM Peak
Farrington Hwy./Haleakala Ave.	SB	C	C
	EB	B	A
	WB	B	A
Farrington Hwy./ Nanakuli Ave.	NB	C	C
	SB	C	C
	EB	B	A
	WB	B	A
Nanakuli Ave./ Mano Ave.	NB	A	A
	SB	A	A
	EB	B	A
	WB	C	B
Haleakala Ave./ Mano Ave./ Palikea St.	NB	A	A
	SB	A	A
	EB	B	B
	WB	B	B

NB- Northbound SB- Southbound
EB- Eastbound WB- Westbound

Table 2-3
Projected Levels of Service (LOS) with Elementary School, Head Start Facility, and Public Library
2008

Intersection	Approach	AM	PM
Farrington Hwy./Haleakala Ave.	SB	D	C
	EB	C	A
	WB	C	B
Farrington Hwy./ Nanakuli Ave.	NB	C	C
	SB	C	C
	EB	C	A
	WB	B	B
Nanakuli Ave./ Mano Ave.	NB	A	A
	SB	A	A
	EB	B	A
	WB	C	B
Haleakala Ave./ Mano Ave./ Palikea St.	NB	A	A
	SB	A	A
	EB	B	B
	WB	B	B

NB- Northbound SB- Southbound
EB- Eastbound WB- Westbound

No significant impacts on traffic flow are anticipated during the construction and operation of the proposed project. During the construction phase, trucks, heavy equipment, and other vehicles will use existing roads to import and export materials and to access construction areas. The increased traffic from construction-related vehicles should not be significant, but may cause some minor inconveniences to residents in the vicinity. Construction of water and sewer connections to lines in roadways may also cause temporary inconvenience. Coordinating work hours to avoid peak traffic hours will mitigate short-term traffic impacts.

Construction vehicles will park within the project site and, thus will not affect traffic flow along adjoining roadways except while travelling to and from the site.

As appropriate, construction contractor(s) will be required to mitigate potential vehicular and pedestrian traffic impacts through appropriate traffic control measures and safety devices. Examples of measures that may be employed include:

- Publishing newspaper notices to alert the public of construction projects;
- Providing signage and other warnings to alert approaching motorists and pedestrians to construction activities ahead;
- Providing barriers, cones, signage, lighting, non-skid covering over trenches, adequate and safe sidewalk widths, adequate intersection visibility and other provisions to promote safe passage of vehicles and pedestrians through construction zones;
- Restricting transport of construction vehicles during the peak traffic hours. To the extent possible, require construction vehicles to use available main routes/roads as alternate routes to the project sites rather than local streets, to minimize the impacts on area residents;
- Providing flaggers and/or police officers, when necessary, to control traffic and pedestrian flow;
- Notifying providers of emergency services (fire, ambulance and police) prior to implementation of any required detours or street closures;
- Notifying of the City Department of Transportation Services to the City to alert Oahu Transit Services of the detours or street closures; and
- Providing appropriate barriers as necessary to deter the public from unauthorized entry into restricted or hazardous construction zones during working and non-working hours.

Relocating Nanaikapono Elementary School to the mauka side of Farrington Highway will provide safer transportation and pedestrian access for students. To accommodate the change in pattern of vehicular and pedestrian access, improvements such as signs, crosswalks, and barriers will be incorporated in the design of the school.

The drop-off / pick-up areas for students arriving by car is located along the sidewalk area fronting the playground, administration building and library, as shown in Figure 1-6. The drop-off / pick-up area is located along a loop driveway from Mano Avenue that circumscribes the faculty / visitor parking lot. Located entirely within the campus, the driveway and drop-off / pick-up area are designed to operate efficiently, thereby deterring drop-off and pick-up along surrounding streets.

2.12 Noise

D.L. Adams Associates, Ltd. conducted noise level measurements on December 28, 1999 to assess the existing acoustical environment in and around the project site (Appendix I). Acoustical measurements were obtained from five locations around the project area (see Figure 2-4). The project site is currently exposed to daytime ambient noise levels ranging from 49.1 dBA (A-weighted decibels) to 68.2 dBA. The dominant noise sources during these measurements were traffic, wind, and occasional distant aircraft flybys. Existing noise sensitive areas include residences along the surrounding areas.

Impacts and Mitigation Measures

Traffic: By using the U.S. Federal Highway Administration's (FHWA) Traffic Noise Prediction Model, peak hour traffic noise levels with and without the project were calculated by using the noise model and the traffic data (Appendix H-Traffic Study). No significant noise impacts from traffic are anticipated. Ambient noise levels in the immediate vicinity of the project site may increase slightly due to the presence of students and the associated increase in traffic. Periodic increases in noise levels during school hours can be anticipated during recesses, lunch, outdoor activities, and drop-off and pick-up. Table 2-5 shows the existing and projected peak hour traffic noise levels. As shown in Table 2-6, the predicted maximum traffic noise level increase along the assessed roadways due to the project is 6.6 dB along Mano Avenue. The minimal change in noise levels perceptible to the average listener is generally taken to be 3 dB, therefore the increases along Mano Avenue will be perceptible to most people. Although the increase in traffic noise levels may be perceptible, the resulting noise levels will not exceed FHWA, State DOT, EPA, or LUO design goals and guidelines.

The main noise source following the completion of the facilities will be due to traffic entering and exiting the facilities. The noise emanating from these vehicles could impact nearby residences along the surrounding areas.

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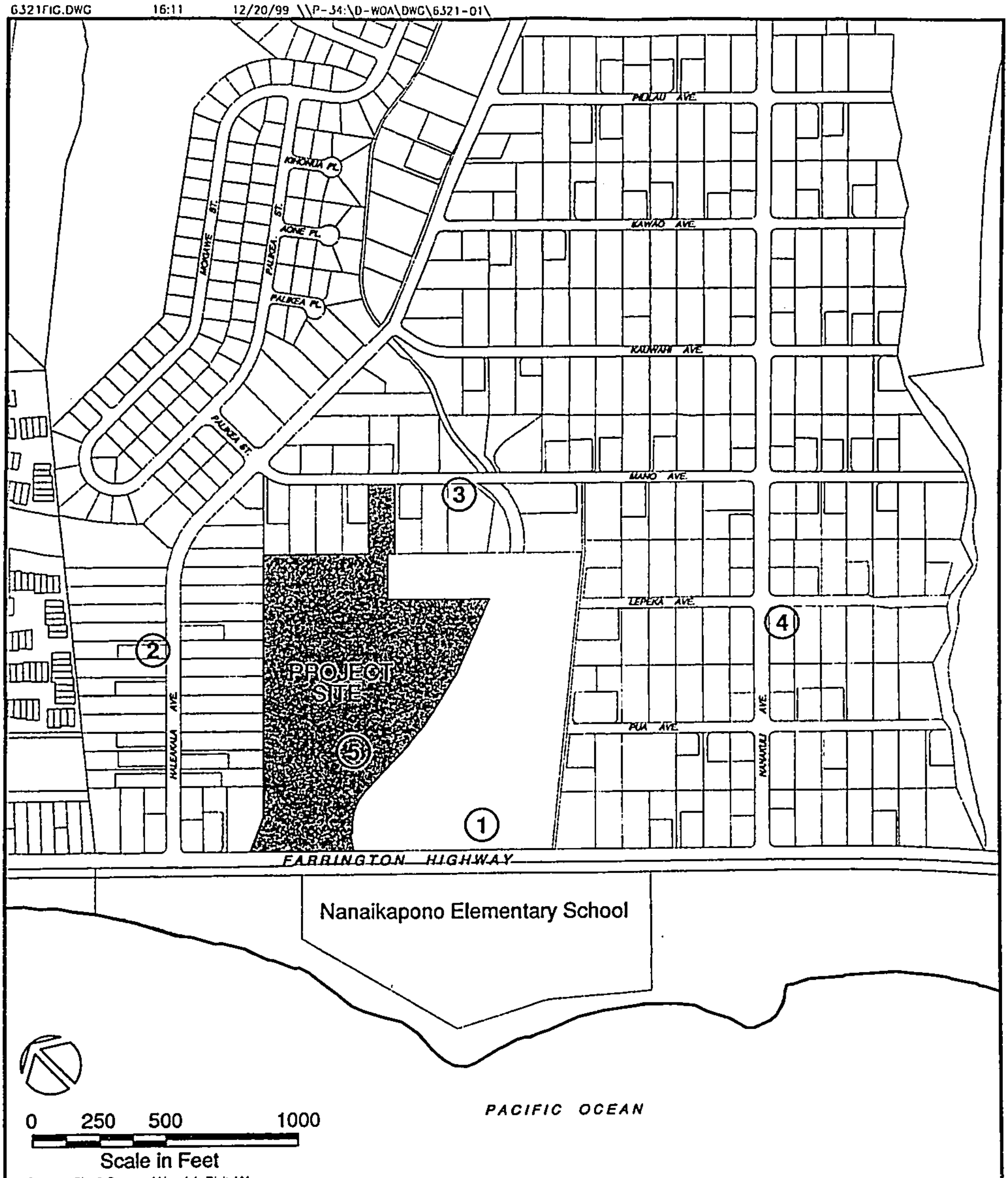

Source: City & County of Honolulu Digital Maps

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LOCATIONS OF NOISE MEASUREMENTS

FIGURE 2-4

Table 2-4
Existing and Projected Future Peak Hour Traffic Noise Levels(L_{eq} in dBA)

	Location 1		Location 2		Location 3		Location 4	
	AM	PM	AM	PM	AM	PM	AM	PM
Existing Level (Calculated)	69.9	71.5	65.5	64.1	57.7	56.7	65.0	64.0
Future Without Project (2002)	70.1	71.6	65.5	64.1	57.7	56.1	65.0	64.0
Future With Project (School, Head Start) (2002)	69.9	71.4	65.9	64.5	64.3	59.6	65.7	64.3
Future With Project (School, Head Start, Library) (2008)	70.1	71.6	65.9	64.5	64.5	61.0	65.7	64.5

Table 2-5
Projected Future Peak Hour Traffic Level Increases (L_{eq} in dBA)

	Location 1		Location 2		Location 3		Location 4	
	AM	PM	AM	PM	AM	PM	AM	PM
Future Increase Without Project (2002)	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Future Increase With Project (2002)	0.2	0.0	0.2	0.3	6.6	3.5	0.7	0.3
Increase Due to the Project (2002)	-0.2	-0.2	0.4	0.4	6.6	3.5	0.7	0.3

Equipment: Through facility design, sound levels emanating from stationary equipment such as air conditioning systems, exhaust fans, refrigeration compressors or generators will be attenuated to comply with the provisions of the Administrative Rules, Title 11, Chapter 46, "Community Noise Control".

Construction: Noise from construction activities will likely be unavoidable during the entire construction period. Development of the facilities will involve excavation, grading, and construction of new buildings and infrastructure. The various construction phases of the project may generate significant amounts of noise, which may impact nearby residents, businesses, and occupants of public facilities. The increase in noise level will vary according to the particular phase of construction. The noisiest periods will occur during site preparation, when large earth-moving equipment is operated. Typical ranges of construction equipment noise are from 70 – 105 dBA at 50 feet.

Construction noise impacts will be partially mitigated somewhat by compliance with provisions of the State DOH Administrative Rules, Title 11, Chapter 46, "Community Noise Control" noise control regulations. Activities will comply with the following:

a) The contractor will obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the rules as stated in Section 11-46-6(a).

b) Construction equipment and on-site vehicles requiring an exhaust of gas or air will be equipped with mufflers as stated in Section 11-46-6(b)(1)(A).

c) The contractor will comply with the requirements pertaining to construction activities as specified in the rules and the conditions issued with any required noise permit as stated in Section 11-46-7(d)(4).

2.13 Air Quality

There are no point sources of airborne emissions in the immediate vicinity of the project site. The air quality in this area is considered good with the primary non-point source of emissions from vehicles traveling along Farrington Highway and other roadways. While there is no air quality monitoring station in the vicinity of the project site, air quality is assumed to be in compliance with State and Federal standards due to the rural character of the area. The State DOH's nearest air quality monitoring station is located about eight miles away at Barbers Point, where compliance with State and Federal standards is achieved adjacent to Campbell Industrial Park.

Air sampling conducted in 1991 for the Lualualei Golf Course project found carbon monoxide (CO) levels in the 1 to 4 milligrams per cubic meter (mg/m^3) range at the Farrington Highway/Hakimo Road intersection during the morning and afternoon peak traffic hours under light-to-moderate wind conditions (Kabushiko Kaisha Oban, 1991). The State one-hour standard is 10 mg/m^3, and the Federal Standard is 40 mg/m^3.

Under certain wind conditions, ambient air quality in the vicinity of the project site is occasionally affected by odors emanating from agricultural operations, particularly animal rearing operations in Lualualei Valley. The Nanakuli Landfill on Lualualei Naval Road is also a source of dust and exhaust emissions.

Impacts and Mitigation Measures

No significant impacts on ambient air quality are anticipated during construction and operation of the proposed facilities.

During construction, activities such as clearing, grubbing, grading and excavation at the project site will generate dust while vehicles and equipment will produce exhaust emissions. Dust control measures stipulated by Department of Health Administrative Rules, Title 11, Chapter 60, "Air Pollution Control" regulations will be employed during the construction period. These measures include, but are not limited to:

a) Planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b) Providing an adequate water source at the site prior to start-up of construction activities;

c) Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d) Controlling of dust from shoulders, and access roads;

e) Providing adequate dust control measure during weekends, after hours, and prior to daily start-up of construction activities; and

f) Controlling of dust from debris being hauled away from project site.

Nevertheless, the properties which are anticipated to be most affected by air quality impacts during construction are the residences and businesses located in the immediate vicinity of the proposed project site.

Emissions from construction equipment, trucks and commuting construction workers are not anticipated to significantly impact ambient air quality due to the relatively low level of vehicular activity in comparison to existing traffic conditions. Slow-moving construction vehicles, however, can disrupt peak-hour traffic, increasing congestion and resulting vehicular emissions. Traffic congestion and resulting emissions will be mitigated by transporting slower construction equipment during off-peak traffic hours. The properties which are anticipated to be most affected by air quality impacts during construction are the residences and businesses located adjacent to and along the proposed facilities.

Nitrogen oxide emissions from diesel engines can be relatively high compared to gasoline-powered equipment emissions, but the standard for nitrogen oxide is set on an annual basis and is not likely to be violated by short-term construction equipment emissions. Carbon monoxide emissions from diesel engines, on the other hand, are very low and should be relatively insignificant compared to normal vehicular emissions from nearby roads.

In the long-term, operation of the proposed facilities will have no significant impact on air quality in the vicinity of the project site. Vehicular emissions from traffic associated with the proposed facilities will be negligible as traffic is anticipated to operate generally well along Farrington Highway and nearby roadways.

The library, cafeteria, classrooms, administrative and student service buildings, lounge, and museum will be air-conditioned. Air conditioning in buildings will mitigate occasional odor and noise nuisance to students and employees.

2.14 Socioeconomic Characteristics

2.14.1 Population

Nanakuli is a rural, single family residential community approximately 50 miles west of downtown Honolulu on the leeward side of Oahu. The population of the Waianae region (Nanakuli, Maili, Makaha, and Waianae) increased 18.8 percent between 1980 to 1990, nearly double the population growth of 9.7 percent for the island of Oahu (1990 Census). The population of Nanakuli was 9,575 in 1990 (Hawaii Data Book, 1997)

Impacts and Mitigation Measures

Construction activities associated with the proposed project will create some adverse impacts such as temporary disruption of traffic and on-street parking, unavoidable noise impacts in the vicinity of the project sites, and air pollution emissions from soil excavation and construction vehicles and equipment. The properties which are anticipated to be most affected by construction activity impacts are those residences and businesses located in the immediate vicinity of the project site. Construction contractor(s) will be required to mitigate potential vehicular and pedestrian traffic impacts through appropriate traffic control measures and safety devices. Unavoidable construction noise impacts on nearby land uses in the vicinity of the proposed project will be mitigated to some degree by compliance with the provisions of the State DOH Administrative

Rules, Title 11, Chapter 46, Community Noise Control (see Section 2.11). Potential air quality impacts during construction of the proposed facilities will be mitigated by compliance with the State DOH Administrative Rules, Title 11, Chapter 60, Air Pollution Control (see Section 2.12).

2.14.2 Employment and Income

In comparison to Oahu as a whole, the Nanakuli area has fewer eligible people in the labor force, a higher unemployment rate, fewer high school and college graduates, and a larger percentage of the population living below the poverty line, as shown in the Table 2-7.

Impacts and Mitigation Measures

In the short-term, the proposed project will confer some positive benefits to the local economy. Direct economic benefits will result from construction expenditures both through the purchase of materials from local suppliers and through the employment of local labor, thereby stimulating that sector of the economy. During construction, local retail businesses will benefit from the increased presence of workers.

In the long-term, employment opportunities would be created after the existing Nanaikapono is relocated into the new school and the present school facilities are used for other purposed by DHHL.

2.14.3 Housing

The majority of Nanakuli Valley is owned by the Department of Hawaiian Home Lands (DHHL), which provides homesteads to people of Hawaiian ancestry.

According to the *School Status and Improvement Report (Fall 1998)*, students attending schools within the Nanakuli Educational Complex are predominantly of Hawaiian ancestry.

Impacts and Mitigation Measures

Once operational, the proposed facilities will provide a new, modern elementary school facility designed to support DOE's elementary school programs. The new school will also relocate the existing Nanaikapono Elementary School out of the flood zone and relieve the DOE of its dependence on occupying land leased from the DHHL.

The direct beneficiaries of the proposed facilities will be the DHHL homesteaders in the Nanakuli-Lualualei area. The DHHL would also benefit from the future use of the current Nanaikapono Elementary School facilities, which will be turned over to the DHHL and used for community programs.

Table 2-6
Employment and Income Comparison

	NANAKULI	OAHU
% Persons 16 years & and over in Labor Force	61%	71%
% Civilian Labor Force Unemployed	7%	4%
% High School Graduates	67%	81%
% Bachelors Degree or Higher	4%	25%
Median Household Income	$34,400	$40,600
% Below Poverty Line	20%	8%

Source: Hawaii Department of Business, Economic Development and Tourism. Hawaii Data Book, 1997

2.14.4 Public Services

Police protection for the project site is provided by the Waianae Police Station, which is located four miles northwest from the project site on Farrington Highway in Waianae. The next closest stations are Barbers Point Substation and Kapolei Police Station. Nanakuli Fire Station, on the corner of Nanakuli Avenue and Mano Avenue, and the Waianae Fire Station, on Farrington Highway near Waianae Intermediate and High School, provide fire protection.

The Waianae Coast Comprehensive Health Center located near the Waianae Police Station provides ambulance and emergency care services for the Nanakuli area. The next closest facility is St. Francis West Hospital in Kapolei, approximately 20 minutes from Nanakuli.

Impacts and Mitigation Measures

In the short-term, construction activities at the project site may increase potential demand for police services due to construction-related traffic, security of the construction site and the presence of more people associated with construction. The potential need for fire protection services would increase due to the presence of construction materials and equipment on the project site. The presence of construction workers and others at the project site would also increase the potential demand for emergency care services. These impacts, however, would be relatively insignificant within the overall context of the areas served by the respective public services.

In the long-term term, operation of the proposed facilities will have negligible community impact on police, fire and emergency services, since the project involves relocating an existing elementary school and Head Start facility into a modern facility designed to current fire code and with security considerations.

2.15 Infrastructure

2.15.1 Water

Water for the Nanakuli area is drawn from the Ewa and Waianae Wells by the City and County Board of Water Supply (BWS) and conveyed to communities through a network of distribution lines. The project site will be served by the 1.5 million gallon Lualualei 242 Reservoir. The existing water system in the vicinity of the project area consists of a 24-inch, 12-inch and 6-inch water transmission line located along Farrington Highway and an 8-inch line along Mano Avenue.

The BWS proposes to construct Nanakuli 242 Reservoir beginning in 2003.

Impacts and Mitigation Measures

No significant impacts are anticipated on the existing water system as a result of constructing the proposed facilities. During design and construction, close coordination will be maintained with BWS to ensure that the water system will not be adversely impacted and to minimize interruption of water service to adjacent areas.

Domestic water for the proposed school will be supplied through a new water lateral connecting to the existing 8-inch water line at Mano Avenue. Water for fire protection will be supplied through a new 12-inch line from the existing 24-inch line along Farrington Highway.

2.15.2 Wastewater

The existing municipal sewer system serving the vicinity of the project site includes several gravity lines along Farrington Highway, including a 30-inch interceptor, a 24-inch line, an 18-inch line and an 8-inch line. Wastewater collected by these lines is conveyed to the Waianae Wastewater Treatment Plant for treatment and disposal through an ocean outfall.

Impacts and Mitigation Measures

No significant impacts are anticipated on the existing wastewater system as a result of constructing of the proposed facilities. During design and construction, coordination will be maintained to ensure that the wastewater system will not be adversely impacted and to minimize the potential for interrupting wastewater service to adjacent areas.

A new gravity sewer system consisting of pipelines, manholes and cleanouts will convey wastewater from the proposed school to the existing 24-inch sewer line on the makai side of Farrington Highway near the existing railroad tracks.

2.15.3 Electrical/Communication

Hawaiian Electric Company (HECO) provides electrical service in the project area through a network of underground ductlines and aerial power lines.

Verizon Hawaii (formerly GTE Hawaiian Telephone Company) provides telephone service. Existing underground and aerial telephone lines are located throughout the project area, serving private, residential and commercial properties.

Oceanic Cable provides cable communication service in the project area. Existing underground and aerial cable lines are located throughout the project area, serving private, residential and commercial properties.

Impacts and Mitigation Measures

No significant impacts are anticipated on the existing electrical and communications system as a result of the construction and operation of the proposed facilities. Electrical, telephone and cable communication service to the proposed facility will be provided through overhead lines from Farrington Highway. Consultation will be initiated with HECO, Verizon Hawaii and Oceanic Cable, respectively, to determine the adequacy of utility services for the proposed project. Required hook-ups to these systems will be coordinated with the respective utility companies to minimize any potential conflicts with services to adjacent areas.

2.15.4 Gas

The Gas Company has an existing underground line along Farrington Highway between Helelua Street and Auyong Homestead Road.

No gas service connection will be obtained for the project site.

Impacts and Mitigation Measures

No significant impacts are anticipated on the existing gas system as a result of the construction of the proposed facilities. During design and construction of the proposed facilities close coordination will be maintained with The Gas Company to ensure that the gas lines will not be adversely impacted and service will not be interrupted.

2.15.5 Drainage

Sheet flow run-off from the project site is generally directed by topography toward Farrington Highway and the existing concrete drainage channel on the southeast border of the project site.

The total length of the drainage channel along the project's southeast boundary is 1,140 feet. The drainage channel crosses underneath Farrington Highway, before emptying into the ocean. The drainage channel is trapezoidal shaped and has a width of 25.8 feet to 48.11 feet and a depth of 7.3 feet.

A portion (40 feet) of the drainage channel will be repaired according to City and County standards and may subsequently be dedicated to the City.

Impacts and Mitigation Measures

No significant impacts to drainage patterns in the vicinity of the project site are anticipated during construction and operation of the proposed facility. During construction activities, potential surface run-off will be handled in accordance with the City and County's grading ordinance and the NPDES permit requirement administered by the DOH (refer to Section 2.3).

Development of the proposed project will increase the impervious area of the project site. The drainage pattern of the improved site is anticipated to generally follow the existing pattern. Long-term water quality will not be affected by the proposed facilities. The project site will be graded to drain the runoff towards the makai side of the site. A drainage system consisting of pipelines, manholes, drain inlets and outlet structures will be provided to discharge the runoff into the existing concrete trapezoidal channel along the southeast side of the site. Following construction, exposed soils will have been built over, paved over, or landscaped to control erosion.

2.15.6 Waste Disposal

The City and County of Honolulu, Department of Environmental Services Refuse Collection and Disposal Division collect solid waste in the vicinity of the project site.

Solid waste from residential and commercial properties within the project area is disposed of at the Waimanalo Gulch Sanitary Landfill. Construction waste is disposed of at the Nanakuli Landfill, also known as Lualualei Landfill, located on Lualualei Naval Road.

Impacts and Mitigation Measures

No significant impacts to the municipal solid waste collection and disposal system are anticipated during construction of the proposed facilities.

Construction of the proposed facilities will require grading and excavation activities, which may result in excess soil. It will be the responsibility of the construction contractor(s) to dispose of any excess soil removed during construction. Depending upon its quality and usefulness, the excess soil could be used as fill at other projects or locations or disposed of in a landfill. There may be short-term environmental impacts caused by construction materials wastes. A permit may be required from the City and County Department of Public Works for grading, grubbing or stockpiling soils, which may require a Temporary Erosion Control Plan and soils report.

Mitigation of potential impacts associated with identified soil contamination and suspected hazardous materials would be conducted prior to and doing the construction including:

- Prior to construction, surface soils from areas where soil contamination was identified will be excavated and placed in 55-gallon drums for further testing and appropriately disposed of.
- During earthwork activities, procedures for testing, handling and disposal of potentially hazardous materials encountered will be coordinated with an environmental consultant.

3. PLANS, POLICIES AND CONTROLS

The plans and policies relating to the proposed facilities range from broad program guidance to land use controls governing the project site. Construction of the proposed facilities is in consonance with the various plans, policies and regulatory controls, as discussed below.

3.1 State of Hawaii

3.1.1 Hawaii State Plan

The Hawaii State Plan (Chapter 226, Hawaii Revised Statutes, as amended) provides the overall theme, goals, objectives, polices and priority guidelines for statewide planning. The Hawaii State Plan also directs the appropriate State agencies to prepare functional plans for their respective program areas. The proposed project supports and is consistent with the following State Plan objectives:

> *Facility systems- in general.*
>
> *(b)(1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.*
>
> *(b)(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.*
>
> *Socio-cultural advancement- education.*
>
> *(b)(1) Support educational programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.*
>
> *(b)(2) Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.*
>
> *(b)(3) Provide appropriate educational opportunities for groups with special needs.*
>
> *(b)(7) Promote programs and activities that facilitate the acquisition of basic skills, such as reading, writing, computing, listening, speaking, and reasoning.*
>
> *(b)(8) Emphasize quality educational programs in Hawaii's institutions to promote academic excellence.*

Policies of the Hawaii State Plan that the proposed Nanakuli IV Elementary School, Nanakuli Public Library, and Leeward Head Start Facility will help to implement through its services and special programs include:

Physical environment- land, air, and water quality.
(a)(2) Greater public awareness and appreciation of Hawaii's environmental resources.

(b)(1) Foster educational activities that promote a better understanding of Hawaii's limited environmental resources.

(b)(2) Foster educational activities that promote a better understanding of Hawaii's limited environmental resources.

Socio-cultural Advancement-Education
(b)(2) Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.

(b)(3) Provide appropriate educational opportunities for groups with special needs.

(b)(4) Promote educational programs which enhance understanding of Hawaii's cultural heritage.

Socio-cultural advancement- health
(b)(4) Foster an awareness of the need for personal health maintenance and preventive health care through education and other measures.

Socio-cultural advancement- leisure
(b)(1) Foster and preserve Hawaii's multi-cultural heritage though supportive cultural, artistic, recreational, and humanities-oriented programs and activities.

(b)(2) Provide a wide range of activities and facilities to fulfill the cultural, artistic, recreational needs of all diverse and special groups effectively and efficiently.

Socio-cultural advancement- culture
(b)(1) Foster increased knowledge and understanding of Hawaii's ethnic and cultural heritages and the history of Hawaii.

(b)(2) Support activities and conditions that promote cultural values, customs, and arts that enrich the lifestyles of Hawaii's people and which are sensitive and responsive to family and communities.

(b)(3) Encourage increased awareness of the effects of proposed public and private actions on the integrity and quality of cultural and community lifestyles in Hawaii.

Priority guidelines- quality education
(1) Pursue effective programs that reflect the varied districts, school, and student needs to strengthen basic skills achievement.

(8) Explore alternatives for funding and delivery of educational services to improve the overall quality of education.

(9) Strengthen and expand educational programs and services for students with special needs.

3.1.2 State Functional Plans

State Functional Plans serve as the primary implementing vehicle for the goals, objectives and policies of the Hawaii State Plan. The functional plans guide implementation of State and County actions in the following areas: agriculture, transportation, conservation lands, education, tourism, water resources, energy, recreation, historic and preservation, health, housing, higher education, employment, and human services. The following are related objectives and policies applicable to the proposed project:

State Education Functional Plan:

Objective A (4), Services and Facilities
Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.

Objective B(4), Personal Development
Support education programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.

Objective B(5), Students with Special Needs
Provide appropriate educational opportunities for groups with special needs.

Objective C(1), Early Childhood Education
Develop resources and programs for early childhood education.

Objective C(2), Hawaii's Cultural Heritage
Promote educational programs which enhance understanding of Hawaii's cultural heritage.

3.1.3 State and Land Use Designation

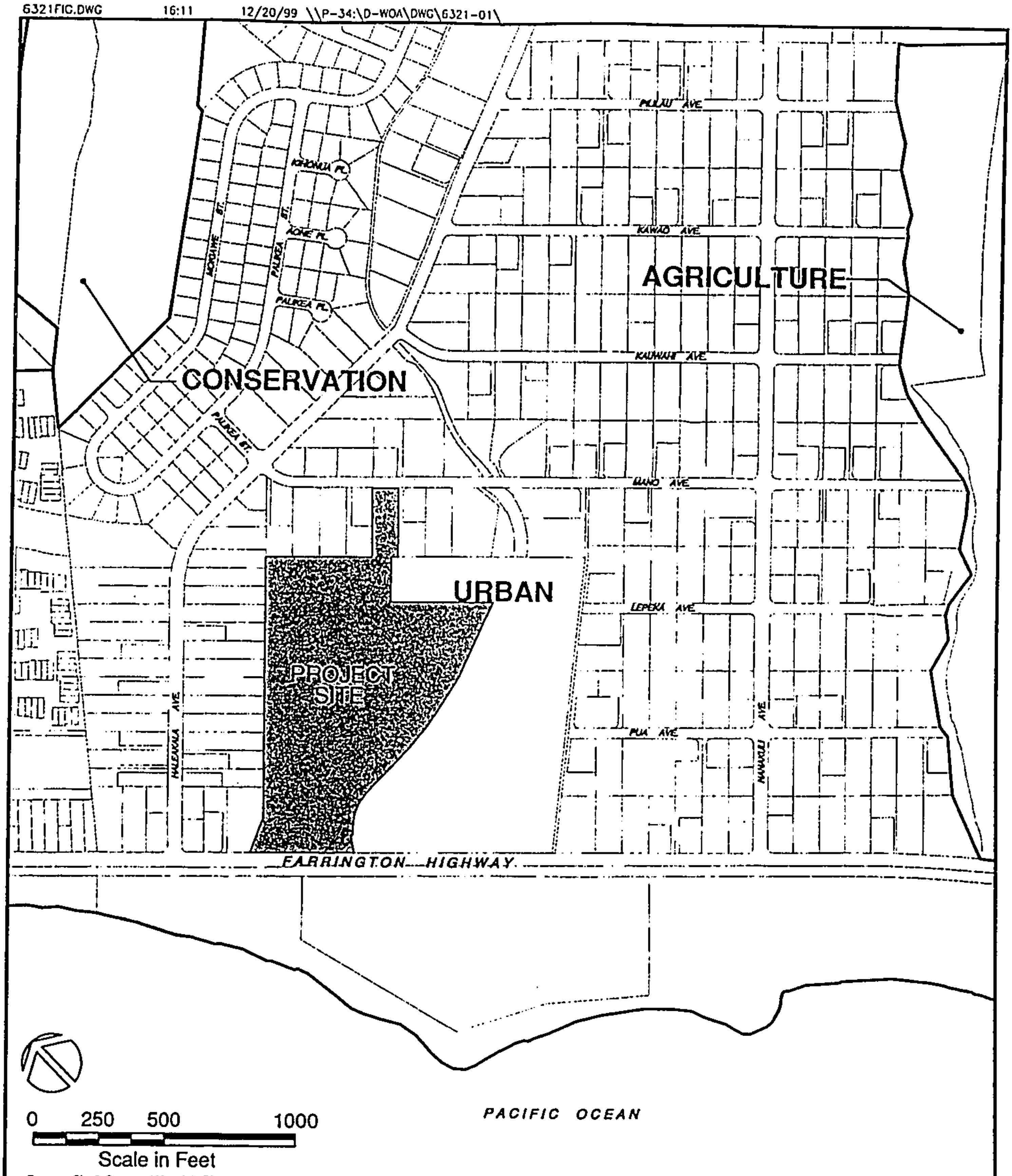
The State Land Use Law is intended to preserve, protect, and encourage the development of lands in the State for uses which are best suited to the public health and welfare of Hawaii's people. The Hawaii Land Use Law in Chapter 205, Hawaii Revised Statutes (HRS), classifies all land in the State into four land use districts: Urban, Agricultural, Conservation, and Rural. The project site lies within the Urban District, which includes *"lands characterized by city-like concentrations of people, structures, streets, urban level of services and other related land uses."* (see Figure 3-1). The proposed project is consistent with the Urban classification.

3.2 City and County of Honolulu

3.2.1 General Plan

The General Plan for the City and County of Honolulu (adopted 1977) was amended by the City Council in 1992. The Plan is a statement of the long-range social, economic, environmental and design objectives for the general welfare and prosperity of the people of Oahu. The Plan is also a statement of broad policies that facilitate the attainment of the objectives of the Plan. Eleven subject areas provide the framework for the City's expression of public policy concerning the needs of the people and functions of government. These areas include population; economic activity; the natural environment; housing; transportation and utilities; energy; physical development and urban design; public safety, health and education; culture and recreation; and government operations and fiscal management. As presented in Chapter 1 and assessed in Chapter 2 of this environmental assessment, the proposed project is in consonance with the following objectives and policies of the General Plan:

> *Natural Environment, Objective B: To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.*
>
> *Policy 3: Locate roads, highways, and other public facilities and utilities in areas where they will least obstruct important views of the mountains and the sea.*
>
> *Physical Development and Urban Design, Objective A: To coordinate changes in the physical environment of Oahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located.*



Source: City & County of Honolulu Digital Maps

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NANAKULI IV ELEMENTARY SCHOOL

STATE LAND USE CLASIFICATION MAP

FIGURE 3-1

Policy 2: Coordinate the location and timing of new development with the availability of adequate water supply, sewage treatment, drainage, transportation, and public safety facilities.

Policy 8: Locate community facilities on sites that will be convenient to the people they are intended to serve

Physical Development and Urban Design, Objective E: To create and maintain attractive, meaningful, and stimulating environments throughout Oahu.

Policy 5: Require new developments in stable, established communities and rural areas to be compatible with the existing communities and areas.

Policy 9: Design public structures to meet high aesthetic and functional standards and to complement the physical character of the communities they will serve.

Public Safety, Objective B: To protect the people of Oahu and their property against natural disasters and other emergencies, traffic and fire hazards, and unsafe conditions.

Policy 9: Design safe and secure public buildings.

Health and Education, Objective B: To provide a wide range of educational opportunities for the people of Oahu.

Policy 4: Encourage the construction of school facilities that are designed for flexibility and high levels of use.

Policy 5: Facilitate the appropriate location of learning institutions from the preschool through the university levels.

Policies of the City and County General Plan that the services and programs provided by the proposed project will help the City and County to implement includes:

Natural Environment, Objective A
Policy 10: Increase public awareness and appreciation of Oahu's land, air, and water resources.

Health and Education, Objective B
Policy 1: Support education programs that encourage the development of enjoyable skills.

Policy 2: Encourage the provision of informal educational programs for people of all age groups.

Culture and Recreation, Objective A
Policy 1: Encourage the preservation and enhancement of Hawaii's diverse cultures.

Policy 2: Encourage greater public awareness, understanding, and appreciation of cultural heritage and contributions to Hawaii made by the City's various ethnic groups.

Policy 3: Encourage opportunities for better interaction among people with different ethnic, social, and cultural backgrounds.

Policy 4: Encourage the protection of ethnic identities of the older communities of Oahu.

Culture and Recreation, Objective B
Policy 1: Encourage the restoration and preservation of early Hawaiian structures, artifacts, and landmarks.

Policy 4: Promote the interpretive and educational use of cultural, historic, architectural, and archaeological sites, buildings, and artifacts.

Cultural and Recreation, Objective C
Policy 1: Encourage and support programs and activities for the visual and performing arts.

3.2.2 Waianae Sustainable Communities Plan

The Waianae Sustainable Communities Plan (SCP) is one of eight community-oriented plans intended to help guide public policy, investment, and decision-making over the next 20 years. Each of these plans addresses one of eight planning regions of Oahu, responding to specific conditions and community values of each region.

The proposed project site is located within the Waianae SCP area that extends from the Ewa-Waianae district boundary north of Kahe Power Plant, to Kaena Point, and mauka to the ridgeline of the Waianae Mountain Range.

The Waianae SCP's vision statement and supporting provisions are oriented to maintaining and enhancing the region's ability to sustain its unique character, current population, growing families, rural lifestyle, and economic livelihood, all of which contribute to the region's vitality and future potential.

The proposed project is consistent with *Sections 4.7.2.2 and 4.7.3.1 Selection of Sites for New Schools and General Design Standards* in the *Waianae Sustainable Communities Plan*. The proposed project site is located in a Rural Community area and mauka of Farrington Highway. The proposed project is designed to be both functionally efficient and aesthetically pleasing.

3.2.2.1 Waianae SCP Land Use Map

The Waianae SCP Land Use Map illustrates both existing land uses within the Waianae District as well as the desired long-range future land use pattern that is in concert with the vision and policies for the Waianae Coast. The proposed project site is designated as Rural Residential. The Land Use Map also identifies an area near the proposed project site for a Rural Community Commercial Center.

3.2.2.2 Waianae SCP Public Facilities Map

The Waianae SCP *Public Facilities* map illustrates major existing and future public facilities and privately owned facilities for public use. Its purpose is to display the public resources available in the region. A planned elementary school symbol overlies the project site (Figure 3-2).

3.2.3 Public Infrastructure Map

Public Infrastructure Maps (PIM) have been developed for each of the revised Development / Sustainable Communities Plans. The Public Infrastructure Maps focus on and display facilities eligible for City Capital Improvement Program Funding. The Waianae PIM identifies a future Nanakuli Community Park (PIM Symbol No. 11) on the makai side of Farrington Highway.

3.2.4 Land Use Ordinance (LUO) and Zoning

The City and County of Honolulu Land Use Ordinance (LUO) regulates land use in accordance with adopted land use policies, including the General Plan, Development Plans / Sustainable Community Plans. The provisions are also referred to as the zoning ordinance. Zoning designations are shown on the zoning maps for the City.

The project site is zoned Residential District (R-5) (see Figure 3-3). The intent of this district is to provide areas for urban residential development. Public elementary schools are permitted in the R-5 zone. The Leeward Head Start facility will be developed by the HCAP, which is a 501 (c)(3) nonprofit, human service agency, serving low-income populations on Oahu. Since it would not meet the definition of a public use, the Head Start facility would require a Conditional Use Permit – minor (CUP-m) for a "Day-care facility".

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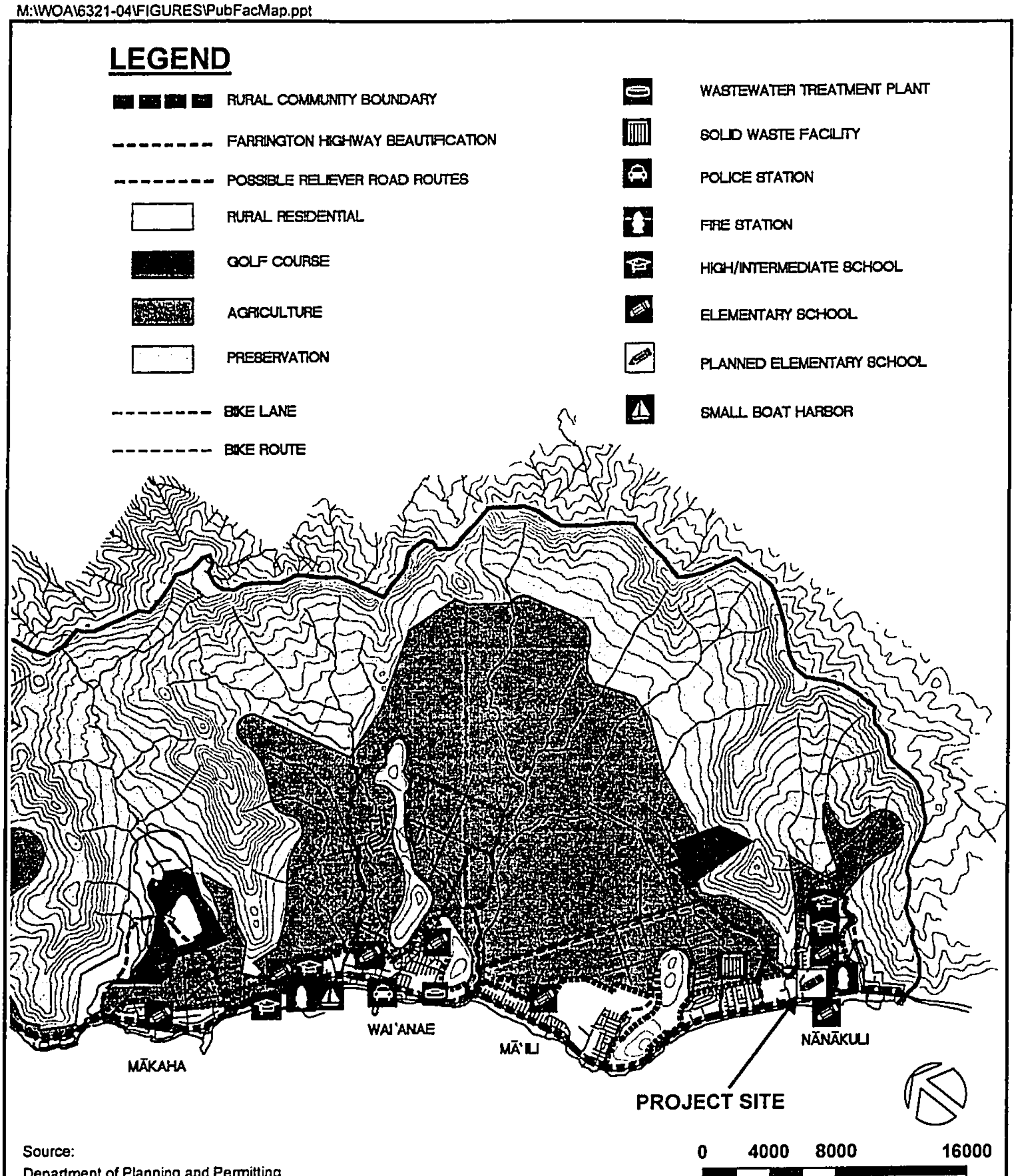

Source:
Department of Planning and Permitting
City & County of Honolulu
April 1999

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& ASSOCIATES, INC.
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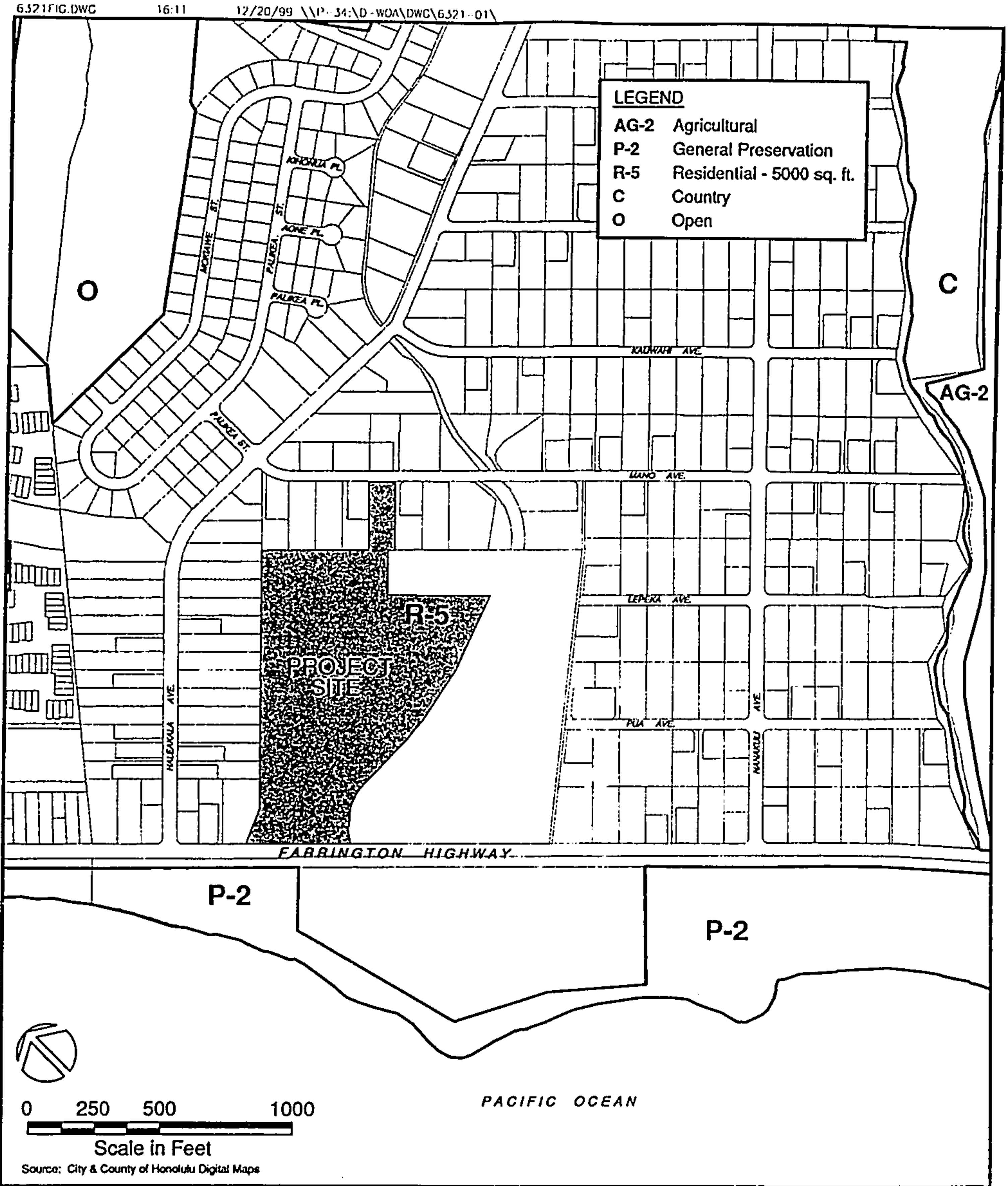
NANAKULI IV ELEMENTARY SCHOOL

PUBLIC FACILITIES MAP

FIGURE
3-2



Source: City & County of Honolulu Digital Maps

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NANAKULI IV ELEMENTARY SCHOOL

CITY & COUNTY OF HONOLULU ZONING CLASSIFICATIONS

FIGURE 3-3

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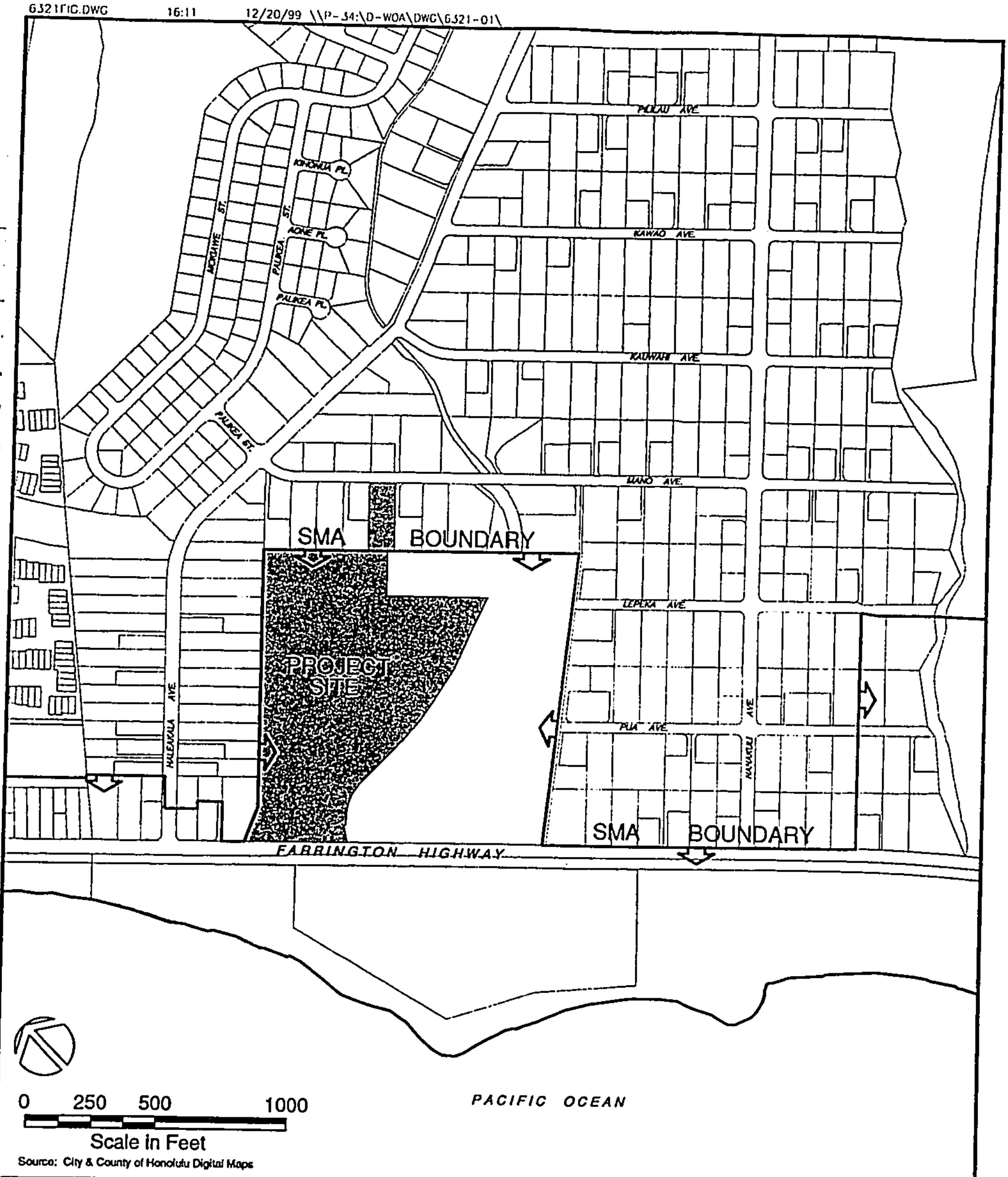

Source: City & County of Honolulu Digital Maps

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NANAKULI IV ELEMENTARY SCHOOL

SPECIAL MANAGEMENT AREA MAP (SMA)

FIGURE 3-4

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

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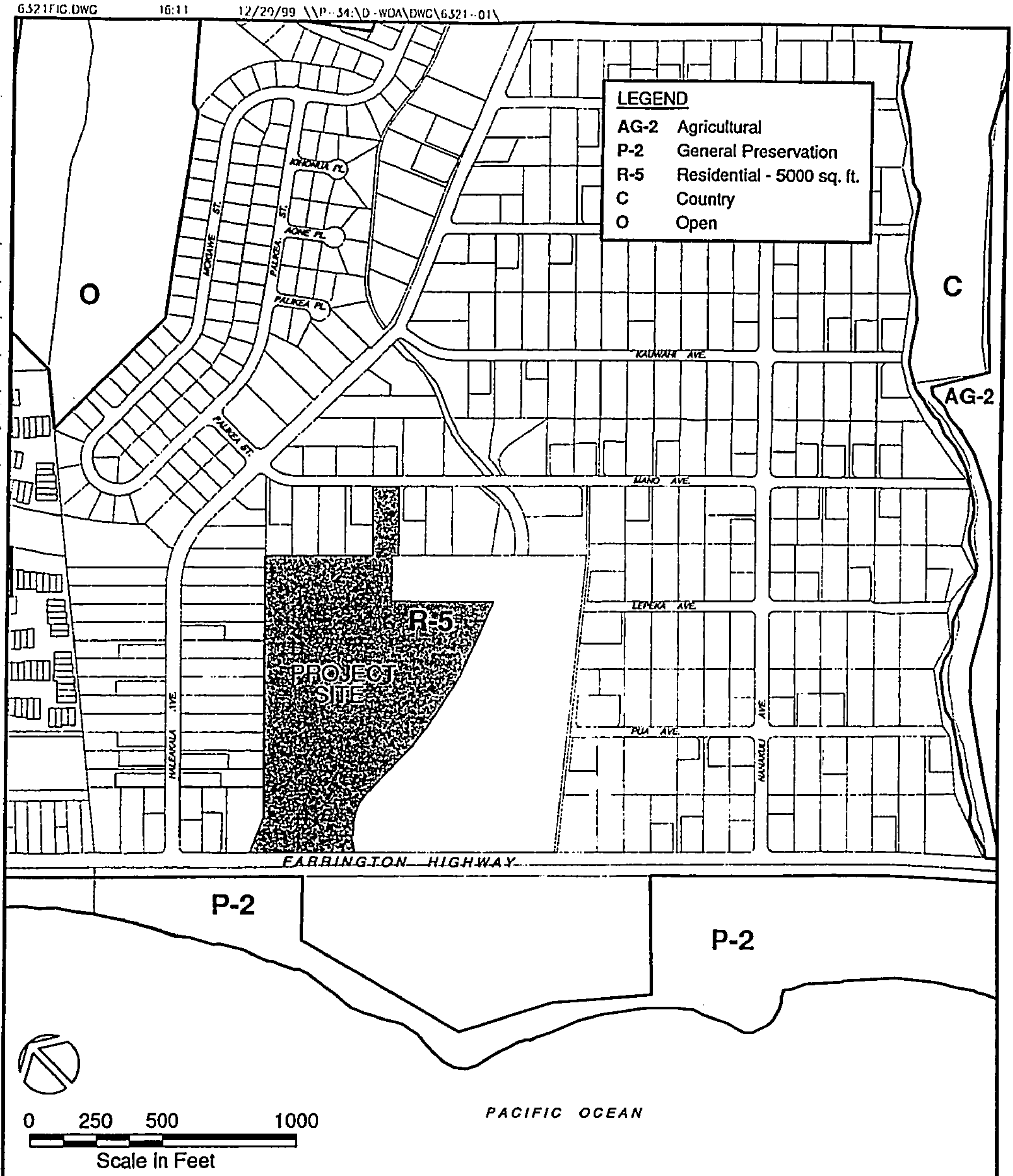

Source: City & County of Honolulu Digital Maps

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NANAKULI IV ELEMENTARY SCHOOL

CITY & COUNTY OF HONOLULU
ZONING CLASSIFICATIONS

FIGURE 3-3

3.2.5 Special Management Area

Pursuant to the Hawaii Coastal Zone Management Act (Chapter 205A, Hawaii Revised Statutes) all counties have enacted ordinances establishing Special Management Areas (SMA). Any development within the SMA, including development proposed by the State, requires a SMA Use Permit. On Oahu, the SMA permit is administered by the City Department of Planning and Permitting (DPP) and acted upon by the City Council pursuant to Ordinance No. 84-4.

The project site is located within the boundaries of the City's SMA (see Figure 3-4) and, therefore, will require approval of a SMA permit. The proposed project is in consonance with the following applicable objectives, policies and guidelines for the issuance of the SMA permit:

Recreational Resources

Objective: Provide coastal recreational opportunities accessible to the public.

Comment: The project is not anticipated to adversely impact accessibility to nearby coastal recreational resources. Located across Farrington Highway from the project site are Kalanianaole and Nanakuli Beach Parks.

Historic Resources

Objective: Protect, preserve, and where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

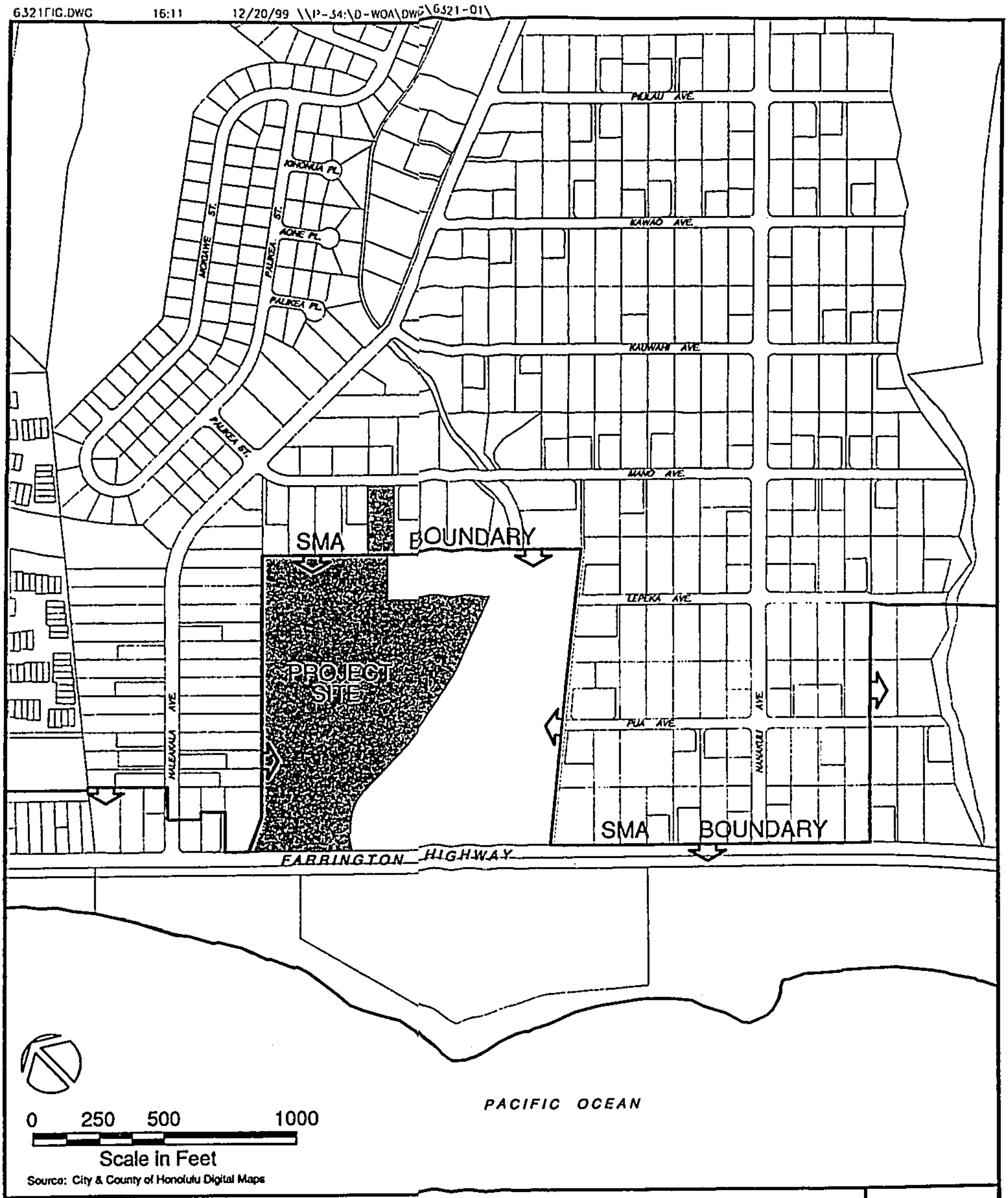
Policy A: Identity and analyze significant archaeological resources,

Policy B: Maximize information retention through preservation or remains and artifacts or salvage operations; and

Policy C: Support state goals for protection, restoration, interpretation, and display of historic resources.

Comment: The only intact construction associated with the former military use of the site were concrete bunkers, and two coral block pillars marking the former entrance to Camp Andrews. Other remnants of the former use include concrete foundations and unpaved roadways. Numerous limestone sink formations were also

6321FIG.DWG 16:11 12/20/99 \\P-34:\D-WOA\DWG\6321-01\



Source: City & County of Honolulu Digital Maps

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NANAKULI IV ELEMENTARY SCHOOL

SPECIAL MANAGEMENT
AREA MAP (SMA)

FIGURE
3-4

observed in the project area. Most of the sink features were filled with limestone boulders and cobbles at some time in the past.

Between July 19, 2000 and July 28, 2000 fieldwork was conducted by CSH. At least seventeen sink features were identified. The two largest and deepest sinkholes were excavated. The results are included herein as Appendix D.

Sink 1 contained historic and modern trash, charcoal, as well as remains of extinct prehistoric bird species.

Sink 2 contained cultural deposits related to prehistoric/traditional Hawaiian habitation and one prehistoric or early historic Native Hawaiian burial. The finding of the bones prevented further excavating of Sink 2.

Based on the findings of the initial archaeological survey and subsequent additional fieldwork and consultation with SHPD, the following mitigation measures will be implemented:

1. Camp Andrews, including the project site will be assigned a state site number by the SHPD recognizing it as a historic property eligible for listing in the State and National Register of Historic Places.

2. Discussion with the Oahu Island Burial Council will be initiated regarding mitigation of the burial found in Sink 2.

3. The Oahu Burial Council will be notified of the proposed project and the potential for finding additional burials. Potential mitigation measures, such as preservation in place or temporary removal with re-interment on site in a burial preserve area, will be discussed.

4. An archaeological inventory survey of the project site will be conducted prior to commencing construction. The inventory survey findings and recommendations will be submitted for review by the SHPD pursuant to Chapter 6E, Hawaii Revised Statutes (HRS). Compliance with Chapter 6E, HRS is required prior to commending construction activities at the project site, including the implementation of any mitigation measures, such as data recovery and re-interment of burials, that may be required by SHPD. The inventory survey will include the following:

- Further historical and archival research to gather additional information about Camp Andrews. Research may include the gathering of oral histories from former military personnel and Nanakuli residents.

- Preparation of an inventory of the sink features on the project site and testing an adequate sampling of the sinks for cultural and paleontological deposits.

- Radiocarbon dating of selected species/bone samples of paleontological deposits.

5. Based upon the findings of the archaeological inventory survey, and in consultation with the Oahu Island Burial Council, prepare a detailed burial treatment plan.

Scenic and Open Space Resources

Objective: Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.

Policy A: Identify valued scenic resources in the coastal zone management area;

Policy B: Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and exiting public views to and along the shoreline;

Policy C: Preserve, maintain, and where desirable, improve and restore shoreline open space and scenic resources; and

Policy D: Encourage those developments which are not coastal dependent to locate in inland areas.

Comment: The proposed project will not significantly impact makai views from Farrington Highway since the project site is located on the mauka side of the highway. Mauka views from the highway would be gradually altered by the development of presently vacant land and removal of dense vegetation that presently obscures views of the project site from the highway. The proposed elementary school, which will be developed first, will alter mauka views by adding a new driveway for buses on Farrington

Highway. The single-story school buildings, however, will be set back approximately 400 feet from the highway, reducing the perception of visual mass. Existing vegetation on the future library and Head Start facility site adjacent to the highway will also help to obscure views of the school buildings. Subsequent development of the single-story library and Head Start facility in the site adjacent to the highway will progressively intensify the urban character along the mauka side of the highway.

Coastal Ecosystems

Objective: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policy C: Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

Policy D: Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

Comment: Excavation and grading activities associated with construction of the proposed project facilities will be regulated by the City and County of Honolulu's grading ordinance and the NPDES permit requirements administered by DOH. The grading ordinance includes provisions related to reducing and minimizing the discharge of pollutants associated with soil disturbing activities including grading, grubbing, and stockpiling. A NPDES General Permit for Storm Water Associated with Construction Activity will be required to control storm water discharges should the area of soil disturbance from activities such as clearing and grubbing, grading and stockpiling be in excess of five acres. The permit requires compliance with a BMP plan, which, in turn, requires compliance with City ordinances pertaining to grading, grubbing, stockpiling, soil erosion and sedimentation. The BMP plan typically includes appropriate structural or non-structural mitigative methods such as containment berms and filtration/detention ponds that would control the discharge of storm water runoff resulting from construction activities. Other erosion and sediment control mitigative measures may include appropriately stockpiling materials on-site to prevent runoff, covering or stabilizing topsoil stockpiles, use of sediment basins and sediment traps, and establishing revegetation or landscaping as early as possible on completed areas.

Economic Uses

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Comments: The proposed project will have no adverse effects on the economy of Nanakuli. The proposed project would provide short-term economic benefits in the form of construction jobs. The proposed project will move the existing Nanaikapono Elementary School out of FEMA's designated flood zone.

Coastal Hazards

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

Policy B: Control development in areas subject to storm wave, tsunami, flood, erosion, subsidence, and point and non-point source pollution hazards;

Policy C: Ensure that developments comply with requirements of the Federal Flood Insurance Program.

Comment: According to the Flood Insurance Rate Map, Community Panel Number 150001 0100C, (revised September 28, 1990) prepared by the Federal Emergency Management Agency (FEMA), the project site is within Zone D, "areas in which flood hazards are undetermined" as shown in Figure 1-4. Based on an investigation of the project site, it was determined that the risk of flooding associated with drainage from mauka areas is negligible.

As indicated in the Tsunami Evacuation Map (Figure 2-2), the project site is located within the State Tsunami Evacuation Zone. In the event of a tsunami warning, the students and faculty of Nanakuli IV Elementary School, Nanakuli Public Library, and the Leeward Head Start facility will be evacuated to a safer location.

Managing Development

Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policy B: Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit requirements.

Policy C: Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Comment: In compliance with the Special Management Area Rules and Regulations of the City and County of Honolulu, required documentation will be filed with the City's Department of Planning and Permitting in conjunction with the SMA permit application which will be subject to a public hearing and decision by the Honolulu City Council.

Public Participation

Objective: Stimulate public awareness, education, and participation in coastal management.

Policy B: Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities.

Comment: The public will be afforded an opportunity to review and comment on the EA pursuant to the requirements of Chapter 343 Hawaii Revised Statutes and Section 11-200 of Title 11 Department of Health Administrative Rules. In addition, the public participation objective will be addressed during the processing of the SMA Permit which will include public notification, as well as a public hearing.

Beach Protection

Objective: *Protect beaches for public use and recreation.*

Comment: The project is not anticipated to adversely impact any beaches or shoreline resources.

4. ALTERNATIVES

4.1 Elementary School

4.1.1 No Action Alternative

The no-action alternative would not relocate Nanaikapono Elementary School out of the tsunami flood zone. Thus the school would continue to be exposed to the threat of potential damage in the event of a tsunami. With regard to the existing Nanaikapono Elementary School property, the DOE would continue its current lease with DHHL through 2002. Thereafter, the DOE would be subject to terms of a renegotiated lease. Without the proposed project, the students of Nanaikapono Elementary School would not benefit from the use of a modern facility designed to current school standards and building codes.

4.1.2 *Alternative Site*

In February 1995, the *Final Environmental Impact Statement and Site Selection for Nanakuli III Elementary School* was published. Although the numerical reference at that time was to a third elementary school in the Nanakuli School Complex (in addition to Nanakuli Elementary and Nanaikapono Elementary) it addressed generally the same project as the current proposal. The Site Selection Study examined various alternative sites for the school, including ten "possible sites" that were reduced to three "candidate sites." The current project site was not among the sites considered because it did not meet the minimum criterion for location within the service area of the Nanakuli III Elementary School. The current project site was subsequently selected, however, because the site was available to DOE at no cost. This would end DOE's dependence on a leased site without associated land acquisition costs, except for the vehicular access driveway from Mano Avenue. Aside from the tsunami evacuation zone criterion, the project site would otherwise have scored favorably in the site selection evaluation.

4.2 Nanakuli Public Library

4.2.1 No Action

The "No Action" alternative would mean that the existing limited bookmobile service would remain in operation. For more complete library service, the residents of Maili and Nanakuli would continue using the Waianae or Ewa Beach libraries, both of which have space deficiencies and are inconveniently located in relation to the Maili and Nanakuli communities. The "no action " alternative is unacceptable to the community since the limited bookmobile service and existing library locations are inadequate to serve the needs of the existing population. The inadequacy will continue to worsen with the project population growth in Maili and Nanakuli.

4.2.2 Expansion of Bookmobile Services

Expansion of bookmobile services is considered an unacceptable alternative due to the size and projected growth of the Maili and Nanakuli areas, and the limited serviced offered by the bookmobile.

4.2.3 Use of New Library Facility in Kapolei

A new regional library in Kapolei is currently in the planning stage. It is intended to serve all West Oahu as the Hawaii State Library in Downtown Honolulu has served the entire island. While the Kapolei facility will also serve the residents of Maili and Nanakuli the projected population growth for these communities warrant a separate branch library.

4.2.4 Alternative Site

In November 1994, the *Environmental Impact Statement and Site Selection for Nanakuli Public Library* was published. The site selection study examined various alternative sites for the library, including six "possible sites" that were reduced to five "candidate sites". The Camp Andrews site was among the sites considered.

4.3 Leeward Head Start Facility

4.3.1 No Action Alternative

The "No Action" alternative would mean that the existing Head Start facility would remain in operation at its current location or find an alternative site. The facility would continue serving 20 children, ages 3 to 5.

5. LIST OF REQUIRED PERMIT APPROVALS

Federal

National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Associated with Construction

State of Hawaii

Water Allocation
DOH Noise Permit
DHHL Agreements
Work with State Right of Way

City and County of Honolulu

Applications for Sewer Connection
Building Permit
Grubbing, Grading, Excavation, Stockpiling Permit
Site Plan Review
Special Management Area Permit
Work with City Right of Way

6. DETERMINATION OF FINDING OF NO SIGNIFICANT IMPACT

This Final EA was prepared in accordance with the consultation process of Chapter 343, Hawaii Revised Statutes. Based on the significance criteria set forth in Section 200-12 of Title 11, Administrative Rules, Department of Health, State of Hawaii, it is determined that the proposed project will not have a major effect on the environment, and therefore this Finding of No significant Impact (FONSI) will be filed with the State Office of Environmental Quality Control (OEQC).

(1) Involve an irrevocable commitment to loss or destruction of any natural cultural resource;

The proposed action is not anticipated to involve any construction activity that might lead to a loss or destruction of any natural or cultural resource.

(2) Curtail the range of beneficial uses of the environment;

The proposed project will not curtail the beneficial uses of the environment.

(3) Conflict with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;

The proposed project does not conflict with the long-term environmental policies, goals and guidelines of the State of Hawaii. As presented in this EA, the project's potential adverse impacts are associated only with short-term construction-related activities and can be mitigated through adherence to standard construction mitigation practices.

(4) Substantially affect the economic or social welfare of the community or state;

The proposed project would provide short-term economic benefits in the form of construction jobs. The proposed project will move Nanikapono Elementary School out of FEMA's designated flood zone.

(5) Substantially affect public health;

No impacts to the public's health and welfare are anticipated.

(6) Involve substantial secondary impacts, such as population changes or effects on public facilities;

No secondary effects are anticipated with the construction or operation of the proposed project.

(7) Involve a substantial degradation of environmental quality;

Construction activities associated with the proposed project are anticipated to result in relatively insignificant short-term impacts to noise, air quality, and traffic in the immediate project vicinity. With the incorporation of the recommended mitigation measures prior to and during the construction period, the project will not degrade environmental quality.

(8) Individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;

The proposed project is not anticipated to have a considerable cumulative effect upon the environment.

(9) Substantially affect a rare, threatened or endangered species, or its habitat;

There are no known rare, threatened or endangered species of flora or fauna or associated habitat on the project site that could be adversely affected by the construction and operation of the proposed project.

(10) Detrimentally affect air or water quality or ambient noise levels;

Operation of construction equipment would temporarily elevate ambient noise and concentrations of exhaust emission in the immediate vicinity of the project site. Operation of the proposed project will have no significant long-term impact on air or water quality or ambient noise levels in the vicinity.

(11) Affect or is likely to suffer damage by being located in an environmentally-sensitive area such as a flood p lain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;

According to the Flood Insurance Rate Map, Community Panel Number 150001 0100C, (revised September 28, 1990) prepared by the Federal Emergency Management Agency (FEMA), the project site is within Zone D, "areas in which flood hazards are undetermined" as shown in Figure 1-4. Based on an investigation of the project site, it was determined that the risk of flooding associated with drainage from mauka areas is negligible. Across Farrington Highway from the project site, Nanaikapono Elementary School is currently located in Zone AE, special flood hazards areas that may be inundated by 100-year flood, where base flood elevations associated with tsunami are shown as 14 feet. Nanaikapono Elementary School has an elevation of 8 to 10 feet.

(12) Substantially affect scenic vistas and viewplanes identified in county or state plans or studies; or

The proposed project will not significantly impact makai views from Farrington Highway since the project site is located on the mauka side of the highway. Mauka views from the highway would be gradually altered by the development of presently vacant land and removal of dense vegetation that presently obscures views of the project site from the highway. The proposed elementary school, which will be developed first, will alter mauka views by adding a new driveway for buses on Farrington Highway. The single-story school buildings, however, will be set back approximately 400 feet from the highway, reducing the perception of visual mass. Existing vegetation on the future public library and Head Start facility site adjacent to the highway will also help to obscure views of the school buildings. Subsequent development of the single-story library and Head Start facility in the site adjacent to the highway will progressively intensify the urban character along the mauka side of the highway.

The proposed public library which will front Farrington Highway will be set back approximately 30 feet from the highway right of way.

(13) Require substantial energy consumption.

Construction and operation will not require substantial increase in energy consumption.

7. CONSULTATION

7.1 Pre-Assessment Consultation

The following agencies and organizations were contacted during the preparation of the Draft EA. Of the 11 parties that formally replied during the pre-assessment period, some had no comments while others provided substantive comments as indicated by the ✓and ✓✓, respectively. All written comments are reproduced herein.

Federal

U.S. Army Corps of Engineers
✓ U.S. Department of Interior, Fish and Wildlife Service (Lorna Wada, Personal Communication)
✓ U.S. Department of the Navy, Facilities Engineering Command, Pacific Division

State

Department of Business, Economic Development & Tourism, Office of Planning
✓✓ Department of Education
Department of Hawaiian Home Lands
✓ Department of Health, Environmental Planning Office
✓✓ Department of Health, Office of Environmental Quality Control
✓ Department of Land and Natural Resources, Historic Preservation Division
Department of Land and Natural Resources, Land Division
✓✓ Department of Transportation, Highways Division
✓ Office of Hawaiian Affairs
University of Hawaii, Environmental Center

City and County

✓✓ Board of Water Supply
Department of Planning and Permitting
✓✓ Fire Department
✓ Police Department
✓✓ Department of Transportation Services
Waianae Neighborhood Board

Elected Officials

Senator Colleen Hanabusa
Representative Michael P. Kahikina

Other

Nanakuli Homestead Association
Nanakuli Neighborhood Housing Services

7.2 Parties Consulted During Draft EA

The following agencies and organizations were consulted and comments solicited for the Draft EA. Of those who formally replied, some had no comments, while others provided substantive comments as indicated by the ✓and ✓✓, respectively. All written comments are reproduced herein.

Federal

U.S. Army Corps of Engineers
U.S. Department of Interior, Fish and Wildlife Service
✓ U.S. Department of the Navy, Facilities Engineering Command, Pacific Division

State

✓✓ Department of Accounting and General Services
Department of Business, Economic Development & Tourism, Office of Planning
✓✓ Department of Education
✓✓ Department of Hawaiian Home Lands
✓✓ Department of Health, Environmental Planning Office
✓✓ Department of Health, Office of Environmental Quality Control
✓✓ Department of Land and Natural Resources, Historic Preservation Division
Department of Land and Natural Resources, Land Division
Department of Transportation, Highways Division
Office of Hawaiian Affairs
✓✓ University of Hawaii, Environmental Center

City and County

✓✓ Board of Water Supply
✓ Department of Design and Construction
✓✓ Department of Planning and Permitting
✓✓ Fire Department
✓✓ Police Department
✓✓ Department of Transportation Services
Waianae Neighborhood Board

Elected Officials

Senator Colleen Hanabusa
Representative Michael P. Kahikina
Councilmember John DeSoto

Other

Nanakuli Homestead Association
Nanakuli Neighborhood Housing Services

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
517 RUSSELL AVENUE
PEARL HARBOR, HAWAII 96860-4884

EM
TF

IN REPLY REFER TO:
5090P.1H7A
Ser N465/16610
January 27, 2000

Mr. Earl Matsukawa
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, HI 96826

Dear Mr. Matsukawa:

Subj: ENVIRONMENTAL ASSESSMENT (EA) PRE-ASSESSMENT CONSULTATION
NANAKULI IV ELEMENTARY SCHOOL
TAX MAP KEY: 8-9-02:65
NANAKULI, OAHU, HAWAII

As requested by your letter of December 22, 1999, we reviewed the subject EA pre-assessment summary and have no substantive comments to offer at this time.

Thank you for the opportunity to review the proposed project and we look forward to participating in the EA review process.

The Navy's point of contact is Mr. Randy Miyashiro at 471-1171, Ext 233.

Sincerely,

C.K. Yokota
C.K. YOKOTA
REC Engineer
Regional Environmental Department
By direction of the Commander

WILSON
OKAMOTO
& ASSOCIATES, INC
ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

6321-01
March 16, 2000

Mr. C.K. Yokota
REC Engineer
Regional Environmental Department
Department of the Navy
517 Russell Avenue
Pearl Harbor, Hawaii 96860-4884

Dear Mr. Yokota:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated January 27, 2000. We acknowledge that you had no comments to offer at that date.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation in the pre-assessment consultation phase of the EA process.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

PAUL G. LeMAHIEU, Ph.D.
SUPERINTENDENT

OFFICE OF THE SUPERINTENDENT

Em

January 13, 2000

Mr. Earl Matsukawa
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Matsukawa:

Subject: Nanakuli IV Elementary EA Pre-Assessment Consultation

The Department of Education has the following comment on the subject pre-assessment consultation:

1. The project area should be expanded to include the Hawaii State Public Library and Headstart site (approximately 3 acres). Although these facilities will be developed independent of Nanakuli IV Elementary School, we recommend inclusion of this area in the report to potentially facilitate development of the library in the future.

Thank you for the opportunity to respond. If you have any questions, please call Mr. Sanford Beppu at 733-4862.

Very truly yours,

Paul G. LeMahieu

Paul G. LeMahieu, Ph.D.
Superintendent of Education

PLeM:hy

cc: C. Ito, OBS
The Hon. Virginia Lowell, HSPLS
The Hon. Tim Johns, DLNR
H. Sumile, LDO

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

WILSON
OKAMOTO
& ASSOCIATES, INC

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1907 S. BERETANIA ST
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HONOLULU, HI 96826
PH (808) 946-2277
FAX (808) 946-2253

6321-01
March 16, 2000

Dr. Paul G. LeMahieu
Superintendent of Education
Department of Education
State of Hawaii
P.O. Box 2360
Honolulu, Hawaii 96804

Dear Dr. LeMahieu:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

As a follow up to your letter dated January 13, 2000, regarding the proposed project, the future development of the Hawaii State Public Library and Headstart facility (approximately 3 acres) will be mentioned in the Draft EA.

Your participation in the pre-assessment consultation phase of the EA process is appreciated.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:

February 7, 2000

99-266/epo

EM

RECEIVED
FEB 08 2000
WILSON OKAMOTO & ASSOC., INC

Mr. Earl Matsukawa, AICP
Project Manager
Wilson Okamoto & Associates, Inc.
1907 S. Beretania Street
Honolulu, Hawaii 96826

Dear Mr. Matsukawa:

Subject: Pre-Assessment Consultation
New Nanakuli IV Elementary School
Nanakuli, Oahu
TMK: 8-9-3: 65

Thank you for allowing us to review and comment on the subject project. We do not have any comments to offer at this time.

Sincerely,

GARY GILL
Deputy Director for
Environmental Health

6321-01
March 16, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808) 946-2277
FAX (808) 946-2253

Mr. Gary Gill
Deputy Director
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Gill:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated February 7, 2000. We acknowledge that you had no comments to offer at that date.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation in the pre-assessment consultation phase of the EA process.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

GENEVIEVE SALMONSON
DIRECTOR

EM ✓
-. ✓

RECEIVED
JAN 14 2000
WILSON OKAMOTO & ASSOC., INC.

January 12, 2000

Mr. Earl Matsukawa, AICP
Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street
Honolulu, Hawai'i 96826

Dear Mr. Matsukawa:

In response to your December 22, 1999, letter requesting early consultation comments on the proposed Nanakuli IV Elementary School, we offer the following comments for your consideration.

1. TRAFFIC. Please address traffic impacts in the draft environmental assessment.

2. SUSTAINABLE BUILDING. Plans for building and campus design should incorporate the provisions contained in the Environmental Council's "Guidelines for Sustainable Building Design in Hawai'i" (enclosed) especially with respect to the use of renewable energy resources such as solar power.

3. USE OF XEROPHYTES IN LANDSCAPING. The region is relatively dry. To conserve on water use, we would like to suggest the use of native Hawaiian xerophytic vegetation in landscaping the campus.

4. USE OF RECYCLABLE PRODUCTS. To promote recycling, we suggest the use of recyclable products. Playground equipment should be made of recyclable materials. Also, we would like to suggest that parking lots be surfaced with "glasphalt," an aggregate of glass and asphalt.

5. PHASING. Please explain the use of the Roman numeral "IV" following "Nanakuli" and whether it refers to a site number or a phase designation. If a phase designation, please disclose all earlier phases in the draft environmental assessment.

6. PREVIOUS MILITARY USE OF PROPERTY. Please disclose if Camp Andrews was used by the military. If so, please consult with the Office of Hazard Evaluation and

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Emergency Response of the Department of Health to ascertain if hazardous materials or hazardous wastes were treated, stored or disposed of on the property.

7. DRAINAGE CANAL. Please disclose design considerations to ensure that students do not wander into the drainage canal.

8. CULTURAL AND HISTORICAL CHARACTERISTICS. Please consult with the Office of Hawaiian Affairs and the State Historic Preservation Division concerning the property's respective cultural and historical characteristics.

If you have any questions, please call Leslie Segundo at 586-4185. Thank you for the opportunity to comment.

Sincerely,

GENEVIEVE SALMONSON
Director

Enclosures

Guidelines for Sustainable Building Design in Hawai`i
A planner's checklist
(Adopted by the Environmental Council on October 13, 1999)

Introduction
Hawai`i law calls for efforts to conserve natural resources, promote efficient use of water and energy and encourage recycling of waste products. Planning a project from the very beginning to include sustainable design concepts can be a critical step toward meeting these goals.

The purpose of the state's environmental review law (HRS Ch. 343) is to encourage a full, accurate and complete analysis of proposed actions, promote public participation and support enlightened decision making by public officials. The Office of Environmental Quality Control offers the following guidelines for preparers of environmental reviews under the authority of HRS 343 to assist agencies and applicants in meeting these goals.

These guidelines do not constitute rules or law. They have been refined by staff and peer review to provide a checklist of items that will help the design team create projects that will have a minimal impact on Hawai`i's environment and make wise use of our natural resources. In a word, projects that are *sustainable*.

A sustainable building is built to minimize energy use, expense, waste, and impact on the environment. It seeks to improve the region's sustainability by meeting the needs of Hawai`i's residents and visitors today without compromising the needs of future generations. Compared to conventional projects, a resource-efficient building project will:

I. Use less energy for operation and maintenance
II. Contain less *embodied* energy (e.g. locally produced building products often contain less *embodied* energy than imported products because they require less energy-consuming transportation.)
III. Protect the environment by preserving/conserving water and other natural resources and by minimizing impact on the site and ecosystems
IV. Minimize health risks to those who construct, maintain, and occupy the building
V. Minimize construction waste
VI. Recycle and reuse generated construction wastes
VII. Use resource-efficient building materials (e.g. materials with recycled content and low embodied energy, and materials that are recyclable, renewable, environmentally benign, non-toxic, low VOC (Volatile Organic Compound) emitting, durable, and that give high life cycle value for the cost.)
VIII. Provide the highest quality product practical at competitive (affordable) first and life cycle costs.

In order to avoid excessive overlapping of items, the checklist is designed to be read in totality, not just as individual sections. This checklist tries to address a range of project types, large scale as well as small scale. Please use items that are appropriate to the type and scale of the project.

Although this list will help promote careful and sensitive planning, mere compliance with this checklist does not confirm sustainability. Compliance with and knowledge of current building codes by users of this checklist is also required.

TABLE OF CONTENTS

I. Pre Design

___1. Hold programming team meeting with client representative, Project Manager, planning consultant, architectural consultant, civil engineer, mechanical, electrical, plumbing (MEP) engineer, structural engineer, landscape architect, interior designer, sustainability consultant and other consultants as required by the project. Identify project and sustainability goals. Client representatives and consultants need to work together to ensure that project and environmental goals are met.

___2. Develop sustainable guideline goals to insert into outline specifications as part of the Schematic Design documents. Select goals from the following sections that are appropriate for the project.

___3. Use Cost-Benefit Method for economic analysis of the sustainability measures chosen. (Cost-Bunefit Method is a method of evaluating project choices and investments by comparing the present and life cycle value of expected benefits to the present and life cycle value of expected costs.)

___4. Include "Commissioning" in the project budget and schedule. (Building "Commissioning" is the process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained in accordance with specifications that meet the owner's needs, and recognize the owner's financial and operational capacity. It improves the performance of the building systems, resulting in energy efficiency and conservation, improved air quality and lower operation costs. *Refer to Section IX.*)

II. Site Selection & Site Design

A. Site Selection

___1. Analyze and assess site characteristics such as vegetation, topography, geology, climate, natural access, solar orientation patterns, water and drainage, and existing utility and transportation infrastructure to determine the appropriate use of the site.

___2. Whenever possible, select a site in a neighborhood where the project can have a positive social, economic and/or environmental impact.

___3. Select a site with short connections to existing municipal infrastructure (sewer lines, water, waste water treatment plant, roads, gas, electricity, telephone, data communication lines and services). Select a site close to mass transportation, bicycle routes and pedestrian access.

B. Site Preparation and Design

___1. Prepare a thorough existing conditions topographic site plan depicting topography, natural and built features, vegetation, location of site utilities and include solar information, rainfall data and direction of prevailing winds. Preserve existing resources and natural features to enhance the design and add aesthetic, economic and practical value. Design to minimize the environmental impact of the development on vegetation and topography.

___2. Site building(s) to take advantage of natural features and maximize their beneficial effects. Provide for solar access, daylighting and natural cooling. Design ways to integrate the building(s) with the site that maximizes and preserves positive site characteristics, enhances human comfort, safety and health, and achieves operational efficiencies.

___3. Locate building(s) to encourage bicycle and pedestrian access and pedestrian oriented uses. Provide bicycle and pedestrian paths, bicycle racks, etc. Racks should be visible and accessible to promote and encourage bicycle commuting.

___4. Retain existing topsoil and maintain soil health by clearing only the areas reserved for the construction of streets, driveways, parking areas, and building foundations. Replant exposed soil areas as soon as possible. Reuse excavated soils for fill and cut vegetation for mulch.

___5. Grade slopes to a ratio of less than 2 : 1 (run to rise). Balance cut and fill to eliminate hauling. Check grading frequently to prevent accidental over excavation.

___6. Minimize the disruption of site drainage patterns. Provide erosion and dust controls, positive site drainage, and siltation basins as required to protect the site during and after construction, especially, in the event of a major storm.

___7. Minimize the area required for the building footprint. Consolidate utility and infrastructure in common corridors to minimize site degradation, and cost, improve efficiency, and reduce impermeable surfaces.

___8. For termite protection, use non toxic alternatives to pesticides and herbicides, such as Borate treated lumber, Basaltic Termite Barrier, stainless steel termite barrier mesh, and termite resistant materials.

III. Building Design

___1. Consider adaptive re-use of existing structures instead of demolishing and/or constructing a new building. Consult the State Historic Preservation Officer for possible existing historic sites that may meet the project needs.

___2. Plan for high flexibility while designing building shell and interior spaces to accommodate changing needs of the occupants, and thereby extend the life span of the building.

___3. Design for re-use and/or disassembly. (For recyclable and reusable building products, see Section VII).

___4. Design space for recycling and waste diversion opportunities during occupancy.

___5. Provide facilities for bicycle and pedestrian commuters (showers, lockers, bike racks, etc.) in commercial areas and other suitable locations.

___6. Plan for a comfortable and healthy work environment. Include inviting outdoor spaces, wherever possible. *(Refer to Section VIII.)*

___7. Provide an Integrated Pest Management approach. The use of products such as Termi-mesh, Basaltic Termite Barrier and the Sentricon "bait" system can provide long term protection from termite damage and reduce environmental pollution.

___8. Design a building that is energy efficient and resource efficient. *(See Sections IV, V, VII.)* Determine building operation by-products such as heat gain and build up, waste/gray-water and energy consumption, and plan to minimize them or find alternate uses for them.

___9. For natural cooling, use
  a. Reflective or light colored roofing, radiant barrier and/or insulation, roof vents
  b. Light colored paving (concrete) and building surfaces
  c. Tree Planting to shade buildings and paved areas
  d. Building orientation and design that captures trade winds and/or provides for convective cooling of interior spaces when there is no wind.

IV. Energy Use

___1. Obtain a copy of the State of Hawai'i Model Energy Code (available through the Hawai'i State Energy Division, at Tel. 587-3811). Exceed its requirements. (Contact local utility companies for information on tax credits and utility-sponsored programs offering rebates and incentives to businesses for installing qualifying energy efficient technologies.)

___2. Use site sensitive orientation to :
  a. Minimize cooling loads through site shading and carefully planned east-west orientation.
  b. Incorporate natural ventilation by channeling trade winds.
  c. Maximize daylighting.

___3. Design south, east and west shading devices to minimize solar heat gain.

___4. Use spectrally selective tints or spectrally selective low-e glazing with a Solar Heat Gain Coefficient (SHGC) of 0.4 or less.

___5. Minimize effects of thermal bridging in walls, roofs and window systems.

___6. Maximize efficiencies for lighting, Heating, Ventilation, Air Conditioning (HVAC) systems and other equipment. Use insulation and/or radiant barriers, natural ventilation, ceiling fans and shading to avoid the use of air conditioning whenever appropriate.

___7. Eliminate hot water in restrooms when possible.

___8. Provide tenant sub-metering to encourage utility use accountability.

___9. Use renewable energy. Use solar water heaters and consider the use of photovoltaics and Building Integrated Photovoltaics (BIPV).

__10. Use available energy resources such as waste heat recovery, when feasible.

A. Lighting

___1. Design for at least 15% lower interior lighting power allowance than the Energy Code.

___2. Select lamps and ballasts with the highest efficiency, compatible with the desired level of illumination and color rendering specifications. Examples that combine improved color rendering with efficient energy use include compact flourescents and T8 flourescents that use tri-phosphor gases.

___3. Select lighting fixtures which maximize system efficacy and which have heat removal capabilities

___4. Reduce light absorption on surfaces by selecting colors and finishes that provide high reflectance values without glare.

___5. Use task lighting with low ambient light levels.

___6. Maximize daylighting through the use of vertical fenestration, light shelves, skylights, clerestories, building form and orientation as well as through translucent or transparent interior partitions. Coordinate daylighting with electrical lighting for maximum electrical efficiency.

___7. Incorporate daylighting controls and/or motion activated light controls in low or intermittent use areas.

__8. Avoid light spillage in exterior lighting by using directional fixtures.

__9. Minimize light overlap in exterior lighting schemes.

_10. Use lumen maintenance procedures and controls.

B. Mechanical Systems

___1. Design to comply with the Energy Code and to exceed its efficiency requirements.

___2. Use "Smart Building" monitor/control systems when appropriate.

___3. Utilize thermal storage for reduction of peak energy usage.

___4. Use Variable air volume systems to save fan power.

___5. Use variable speed drives on pumping systems and fans for cooling towers and air handlers.

___6. Use air-cooled refrigeration equipment or use cooling towers designed to reduce drift.

___7. Specify premium efficiency motors.

___8. Reduce the need for mechanical ventilation by reducing sources of indoor air pollution. Use high efficiency air filters and ultraviolet lamps in air handling units. Provide for regular maintenance of filtration systems. Use ASHRAE standards as minimum.

___9. Locate fresh air intakes away from polluted or overheated areas. Locate on roof where possible. Separate air intake from air exhausts by at least 40 ft.

__10. Use separate HVAC systems to serve areas that operate on widely differing schedules and/or design conditions.

__11. Use shut off or set back controls on HVAC system when areas are not occupied.

__12. Use condenser heat, waste heat or solar energy. (Contact local utility companies for information on the utility-sponsored Commercial and Industrial Energy Efficiency

Programs which offer incentives to businesses for installing qualifying energy efficient technologies.)

__13. Evaluate plug-in loads for energy efficiency and power saving features.

__14. Improve comfort and save energy by reducing the relative humidity by waste reheat, heat pipes or solar heat.

__15. Minimize heat gain from equipment and appliances by using:
  - a. Environmental Protection Agency (EPA) Energy Star rated appliances.
  - b. Hoods and exhaust fans to remove heat from concentrated sources.
  - c. High performance water heating that exceeds the Energy Code requirements.

__16. Specify HVAC system "commissioning" period to reduce occupant exposure to Indoor Air Quality (IAQ) contaminants and to maximize system efficiency.

V. Water Use

A. Building Water

___1. Install water conserving, low flow fixtures as required by the Uniform Plumbing Code.

___2. If practical, eliminate hot water in restrooms.

___3. Use self closing faucets (infrared sensors or spring loaded faucets) for lavatories and sinks.

B. Landscaping and Irrigation

(See Section VI.)

VI. Landscape and Irrigation

___1. Incorporate water efficient landscaping (xeriscaping) using the following principles:
  - a. <u>Planning, Efficient irrigation</u>: Create watering zones for different conditions. Separate vegetation types by watering requirements. Install moisture sensors to prevent operation of the irrigation system in the rain or if the soil has adequate moisture. Use appropriate sprinkler heads.
  - b. <u>Soil analysis/improvement</u>: Use (locally made) soil amendments and compost for plant nourishment, improved water absorption and holding capacity.
  - c. <u>Appropriate plant selection</u>: Use drought tolerant and/or slow growing hardy grasses, native and indigenous plants, shrubs, ground covers, trees, appropriate for local conditions, to minimize the need for irrigation.
  - d. <u>Practical turf areas</u>: Turf only in areas where it provides functional benefits.

  - e. <u>Mulches</u>: Use mulches to minimize evaporation, reduce weed growth and retard erosion.

  Contact the local Board of Water Supply for additional information on xeriscaping such as efficient irrigation, soil improvements, mulching, lists of low water-demand plants, tours of xeriscaped facilities, and xeriscape classes.

___2. Protect existing beneficial site features and save trees to prevent erosion. Establish and carefully mark tree protection areas well before construction.

___3. Limit staging areas and prevent unnecessary grading of the site to protect existing, especially native, vegetation.

___4. Use top soil from the graded areas, stockpiled on the site and protected with a silt fence to reduce the need for imported top soil.

___5. Irrigate with non-potable water or reclaimed water when feasible. Collect rainwater from the roof for irrigation.

___6. Sub-meter the irrigation system to reduce water consumption and consequently water and sewer fees. Contact the local county agency to obtain irrigation sub-metering requirements and procedures. Locate irrigation controls within sight of the irrigated areas to verify that the system is operating properly.

___7. Use pervious paving instead of concrete or asphalt paving. Use natural and man-made berms, hills and swales to control water runoff.

___8. Avoid the use of solvents that contain or leach out pollutants that can contaminate the water resources and runoff. Contact the State of Hawai'i Clean Water Branch at 586-4309 to determine whether a NPDES (National Pollutant Discharge Elimination System) permit is required.

___9. Use Integrated Pest Management (IPM) techniques. IPM involves a carefully managed use of biological and chemical pest control tactics. It emphasizes minimizing the use of pesticides and maximizing the use of natural process

___10. Use trees and bushes that are felled at the building site (i.e. mulch, fence posts). Leave grass trimmings on the lawn to reduce green waste and enhance the natural health of lawns.

___11. Use recycled content, decay and weather resistant landscape materials such as plastic lumber for planters, benches and decks.

VII. Building Materials & Solid Waste Management

A. Material Selection and Design

___1. Use durable products.

___2. Specify and use natural products or products with low embodied energy and/or high recycled content. Products with recycled content include steel, concrete with glass, drywall, carpet, etc. Use ground recycled concrete, graded glass cullet or asphalt as base or fill material.

___3. Specify low toxic or non-toxic materials whenever possible, such as low VOC (Volatile Organic Compounds) paints, sealers and adhesives and low or formaldehyde-free materials. Do not use products with CFCs (Chloro-fluoro-carbons).

___4. Use locally produced products such as plastic lumber, insulation, hydro-mulch, glass tiles, compost.

___5. Use advanced framing systems that reduce waste, two stud corners, engineered structural products and prefabricated panel systems.

___6. Use materials which require limited or no application of finishing or surface preparation. (i.e. finished concrete floor surface, glass block and glazing materials, concrete block masonry, etc.).

___7. Use re-milled salvaged lumber where appropriate and as available. Avoid the use of old growth timber.

___8. Use sustainably harvested timber.

___9. Commit to a material selection program that emphasizes efficient and environmentally sensitive use of building materials, and that uses locally available building materials. (A list of Earth friendly products and materials is available through the Green House Hawai'i Project. Call Clean Hawai'i Center, Tel. 587-3802 for the list.)

B. Solid Waste Management, Recycling and Diversion Plan

___1. Prepare a job-site recycling plan and post it at the job-site office.

___2. Conduct pre-construction waste minimization and recycling training for employees and sub-contractors.

___3. Use a central area for all cutting.

___4. Establish a dedicated waste separation/diversion area. Include Waste/Compost/Recycling collection areas and systems for use during construction process and during the operational life cycle of the building.

___5. Separate and divert all unused or waste cardboard, ferrous scrap, construction materials and fixtures for recycling and/or forwarding to a salvage exchange facility. Information on "Minimizing C&D (construction and demolition) waste in Hawai'i" is available through Department of Health, Office of Solid Waste Management, Tel. 586-4240.

___6. Use all green waste, untreated wood and clean drywall on site as soil amendments or divert to offsite recycling facilities.

___7. Use concrete and asphalt rubble on-site or forward the material for offsite recycling.

___8. Carefully manage and control waste solvents, paints, sealants, and their used containers. Separate these materials from C&D (construction and demolition) waste and store and dispose them of them carefully.

___9. Donate unused paint, solvents, sealants to non-profit organizations or list on HIMEX (Hawai'i Materials Exchange). HIMEX is a free service operated by Maui Recycling Group, that offers an alternative to landfill disposal of usable materials, and facilitates no-cost trades. See web site, www.himex.org.

___10. Use suppliers that re-use or recycle packaging material whenever possible.

VIII. Indoor Air Quality

___1. Design an HVAC system with adequate supply of outdoor air, good ventilation rates, even air distribution, sufficient exhaust ventilation and appropriate air cleaners.

___2. Develop and specify Indoor Air Quality (IAQ) requirements during design and contract document phases of the project. Monitor compliance in order to minimize or contain IAQ contaminant sources during construction, renovation and remodeling.

___3. Notify occupants of any type of construction, renovation and remodeling and the effects on IAQ.

___4. Inspect existing buildings to determine if asbestos and lead paint are present and arrange for removal or abatement as needed.

___5. Supply workers with, and ensure the use of VOC (Volatile Organic Compounds)-safe masks where required.

___6. Ensure that HVAC systems are installed, operated and maintained in a manner consistent with their design. Use UV lamps in Air Handling Units to eliminate mold and mildew growth. An improperly functioning HVAC system can harbor biological contaminants such as viruses, bacteria, molds, fungi and pollen, and can cause Sick Building Syndrome (SBS).

___7. Install separate exhaust fans in rooms where air polluting office equipment is used, and exhaust directly to the exterior of the building, at sufficient distance from the air intake vents.

___8. Place bird guards over air intakes to prevent pollution of shafts and HVAC ducts.

___9. Control indoor air pollution by selecting products and finishes that are low or non-toxic and low VOC emitting. Common sources of indoor chemical contaminants are adhesives, carpeting, upholstery, manufactured wood products, copy machines, pesticides and cleaning agents.

___10. Schedule finish application work to minimize absorption of VOCs into surrounding materials e.g. allow sufficient time for paint and clear finishes to dry before installing carpet and upholstered furniture. Increase ventilation rates during periods of increased pollution.

___11. Allow a flush-out period after construction, renovation, remodeling or pesticide application to minimize occupant exposure to chemicals and contaminants.

IX. Commissioning & Construction Project Closeout

___1. Appoint a Commissioning Authority to develop and implement a commissioning plan and a preventative maintenance plan. Project Manager's responsibilities must include coordination of commissioning activities during project closeout.
___2. Commissioning team should successfully demonstrate all systems and perform operator training before final acceptance.
___3. Provide flush-out period to remove air borne contaminants from the building and systems.
___4. Provide as-built drawings and documentation for all systems. Provide data on equipment maintenance and their control strategies as well as maintenance and cleaning instructions for finish materials.

X. Occupancy and Operation

A. General Objectives
___1. Develop a User's Manual for building occupants that emphasizes the need for Owner/Management commitment to efficient sustainable operations.
___2. Management's responsibilities must include ensuring that sustainability policies are carried out.

B. Energy
___1. Purchase EPA rated, Energy Star, energy-efficient office equipment, appliances, computers, and copiers. (Energy Star is a program sponsored by U.S. Dep. Of Energy. Use of these products will contribute to reduced energy costs for buildings and reduce air pollution.)
___2. Institute an employee education program about the efficient use of building systems and appliances, occupants impact on and responsibility for water use, energy use, waste generation, waste recycling programs, etc.
___3. Re-commission systems and update performance documentation periodically per recommendations of the Commissioning Authority, or whenever modifications are made to the systems.

C. Water
___1. Start the watering cycle in the early morning in order to minimize evaporation.
___2. Manage the chemical treatment of cooling tower water to reduce water consumption.

D. Air
___1. Provide incentives which encourage building occupants to use alternatives to and to reduce the use of single occupancy vehicles.

___2. Provide a location map of services within walking distance of the place of employment (child care, restaurants, gyms, shopping).
___3. Periodically monitor or check for indoor pollutants in building.
___4. Provide an IAQ plan for tenants, staff and management that establishes policies and documentation procedures for controlling and reporting indoor air pollution. This helps tenants and staff understand their responsibility to protect the air quality of the facility.

E. Materials and Products
___1. Purchase business products with recycled content such as paper, toners, etc.
___2. Purchase Furniture made with sustainably harvested wood, or with recycled and recycled content materials, which will not off gas VOC's.
___3. Remodeling and painting should comply with or improve on original sustainable design intent.
___4. Use low VOC, non-toxic, phosphate and chlorine free, biodegradable cleaning products.

F. Solid Waste
___1. Collect recyclable business waste such as paper, cardboard boxes, and soda cans.
___2. Avoid single use items such as paper or Styrofoam cups and plates, and plastic utensils.

XI. Resources

Financing: Energy Efficiency in Buildings. U.S. Department of Energy, DOE/EE-0152, May, 1998 (Call Tel.1-800-DOE-EREC or visit local office)

Building Commissioning: The Key to Quality Assurance. U.S. Department of Energy, DOE/EE-0153, May, 1998 (Call Tel.1-800-DOE-EREC or visit local office)

Guide to Resource-Efficient Building in Hawaii. University of Hawai'i at Manoa, School of Architecture and Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, October 1998. (Call Tel. 587-3804 for publication)

Hawaii Model Energy Code. Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, November 1997 (Call Tel. 587-3810 for publication)

Photovoltaics in the Built Environment: A Design Guide for Architects and Engineers. NREL Publications, DOE/GO #10097-436, September 1997 (Call Tel.1-800-DOE-EREC or visit local office)

Building Integrated Photovoltaics: A Case Study. NREL Publications #TP-472-7574, March 1995 (Call Tel.1-800-DOE-EREC or visit local office)

Solar Electric Applications: An overview of Today's Applications. NREL Publications, DOE/GO #10097-357, Revised February, 1997 (Call Tel.1-800-DOE-EREC or visit local office)

Green Lights: An Enlightened Approach to Energy Efficiency and Pollution Prevention. U.S. Environmental Protection Agency, Pacific Island Contact Office (Call Tel. 541-2710 for publication.)

Healthy Lawn, Healthy Environment. U.S. Environmental Protection Agency, Pacific Island Contact Office. (Call Tel. 541-2710 for this and related publications)

How to Plant a Native Hawaiian Garden. Office of Environmental Quality Control (OEQC), Department of Health, State of Hawai'i (Call Tel. 586-4185 for publication)

Buy Recycled in Hawai'i. Clean Hawai'i Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, November 1997. (Call Tel. 587-3802 for publication)

Hawai'i Recycling Industry Guide and other recycling and reuse related fact sheets. Clean Hawai'i Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, July 1999. (Call Tel. 587-3802 for publication)

Minimizing Construction and Demolition Waste. Office of Solid Waste Management, Department of Health and Clean Hawai'i Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, February 1998. (Call Tel. 586-4240 for publication)

Contractor's Waste Management Guide and Construction and demolition Waste Management Facilities Directory. Clean Hawai'i Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, 1999. (Call Tel. 587-3802 for publication)

Waste Management and Action: Construction Industry. Department of Health, Solid and Hazardous Waste Branch (Call Tel. 586-7496 for publication)

Business Guide For reducing Solid Waste. U.S. Environmental Protection Agency, Pacific Island Contact Office, Tel. 541-2710 (Call for publication.)

The Inside Story: A Guide to Indoor Air Quality. U.S. Environmental Protection Agency, Pacific Island Contact Office, Tel. 541-2710 (Call for this and related publications.) Additional information is available from the American Lung Association, Hawai'i, Tel. 537-5966

Selecting Healthier Flooring Materials. American Lung Association and Clean Hawai'i Center, February 1999. (Call Tel. 537-5966 x307)

Office Paper Recycling: An Implementation Manual. U.S. Environmental Protection Agency, Pacific Island Contact Office, Tel. 541-2710 (Call for publication.)

Acknowledgments.

OEQC and the Environmental Council would like to thank Allison Beale, Gary Gill, Nick H. Huddleston, Gail Suzuki-Jones, Purnima McCutcheon, Virginia B. MacDonald, Steve Meder, Ramona Mullahey, Thomas P. Papandrew, Victor Olgay, Howard Tanaka, and Howard Wiig for their assistance with this project.

WILSON
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& ASSOCIATES, INC.

ENGINEERS
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1907 S. BERETANIA ST
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FAX (808)946-2253

6321-01
March 16, 2000

Ms. Genevieve Salmonson
Director
Office of Environmental Quality Control
State of Hawaii
236 S. Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated January 12, 2000, with regard to the proposed project. We offer the following responses in the respective order of your comments:

1. A traffic report was conducted and will be included in the Draft EA.

2 & 4. The "Guidelines for Sustainable Building Design in Hawaii" you have provided will be a part of the basis of design. However, cost and competitive or non-proprietary specifications are other important factors to consider.

3. To the extent possible, in considerate of budgetary constraints and function requirements, plant materials selected for this project will be tolerant of environmental conditions associated with the Nanakuli area. For example, playgrounds and lawns require groundcover that can withstand trampling and provide a suitable surface for play. Therefore, groundcover that can optimally meet environmental and functional demands will be selected.

5. The numerical reference in the project name indicates that it would be the fourth school to be built in the Nanakuli School Complex, as opposed to a project phase. The other three schools in the Complex are Nanakuli Elementary, Nanaikapono Elementary and Nanakuli Intermediate and High School. Following completion of the proposed project, Nanaikapono Elementary School will be relocated into the new facility, which will then and assume that name.

6. Camp Andrews was previously used by the military as a recreational facility. A Phase I Environmental Site Assessment was conducted for the site and will be included in the EA.

7. A six foot chain-linked fence will be built along both sides of the drainage canal, to prevent students from wandering into the canal.

8. An Archaeological Assessment was conducted and will be included in the EA. The State Historic Preservation Division was consulted during the Pre-Assessment consultation and in conjunction with the preparation of the Archaeological Assessment.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. Your participation in the pre-assessment consultation phase of the EA process is appreciated.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

RECEIVED
JAN 13 2000
WILSON OKAMOTO & ASSOC. INC

EM
TS
VO

January 7, 2000

Earl Matsukawa, Project Manager
Wilson Okamoto & Associates, Inc.
1907 S. Beretania St., Suite 400
Honolulu, Hawaii 96826

LOG NO: 24684 ✓
DOC NO: 0001EJ04

Dear Mr. Matsukawa:

SUBJECT: Chapter 6E-8 Historic Preservation Review - Environmental Assessment
Pre-Assessment Consultation: Nanakuli IV Elementary School
Nanakuli, Wai'anae, O'ahu
TMK: 8-9-02:65

Thank you for the opportunity to provide comment on this during the pre-EA phase. We received your notification on December 27, 1999, via U. S. Postal Service.

A review of our records shows that there are no known historic sites at the project location however, no archaeological inventory survey has been conducted for this parcel. According to you, an archaeological survey will be conducted in conjunction with the EA. We look forward to reviewing the archaeological inventory survey report for acceptance in order to comment on this project's effect on historic sites.

If you have any questions please call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

EJ:jk

WILSON
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FAX (808) 946-2253

6321-01
March 16, 2000

Mr. Don Hibbard
Administrator
Historic Preservation Division
State of Hawaii
501 Kamokila Blvd., Room 5
Honolulu, Hawaii 96707

Dear Mr. Hibbard:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated January 7, 2000. We acknowledge that you will be reserving your comments until you have had the opportunity to review the Archaeological Assessment Report for the proposed elementary school. The report will be included in the Draft EA.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation in the pre-assessment consultation phase of the EA process.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

EM

December 28, 1999

Mr. Earl Matsukawa, Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania St., Suite 400
Honolulu, HI 96826

PC# 64(99)

Subject: Environmental Assessment (EA) Pre-Assessment Consultation
Nanakuli IV Elementary School
TMK: 8-9-02:65

Dear Mr. Matsukawa,

Thank you for the opportunity to review the above-referenced document. At this time there is not enough information for the Office of Hawaiian Affairs to comment on. We will reserve our comments until such time that a Draft EA is prepared and we have had the opportunity to review it.

If you have any questions, please contact Ken R. Salva Cruz, Policy Analyst, at 594-1847.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator

cc: Board of Trustees

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FAX (808)946-2253

6321-01
March 16, 2000

Mr. Colin C. Kippen
Deputy Administrator
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Blvd., Suite 500
Honolulu, Hawaii 96826

Dear Mr. Kippen:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated December 28, 1999. We acknowledge that you had no comments to offer at that date and will be reserving your comments until the Draft EA is prepared and published.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation in the pre-assessment consultation phase of the EA process is appreciated.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO:
HWY-PS
2.6878

JAN 21 2000

EM

JAN 24 2000

Mr. Earl Matsukawa
Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Matsukawa:

Subject: Environmental Assessment, Pre-Assessment Consultation
Nanakuli IV School, Nanakuli, TMK: 8-9-02: 65

Thank you for requesting our review of the proposed school.

Please submit the traffic study for the elementary school when it is available for our review and comment.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
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HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

6321-01
March 16, 2000

Mr. Kazu Hayashida
Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Hayashida:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated January 21, 2000. We acknowledge that you will be reserving your comments until you have had the opportunity to review the Traffic Impact Report for the proposed elementary school. The Traffic Impact Report will be included in the Draft EA.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation in the pre-assessment consultation phase of the EA process.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

ARD OF WATER SUPPLY
Y AND COUNTY OF HONOLULU
0 SOUTH BERETANIA STREET
NOLULU, HAWAII 96843

#6321-02/034

February 4, 2000

RECEIVED
FEB 10 2000
WILSON OKAMOTO & ASSOC., INC.

Mr. Earl Matsukawa
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Matsukawa:

Subject: Environmental Assessment Pre-Assessment Consultation Dated December 22, 2000 Regarding the Proposed Nanakuli IV Elementary School, Nanakuli, Hawaii, TMK: 8-9-02: 65

Thank you for the opportunity to review and comment on the pre-assessment for the proposed elementary school.

We have the following comments:

1. There is no existing water service to TMK: 8-9-02: 65. There is one 5/8-inch water meter, Premise ID 1107937, serving TMK: 8-9-02: 23. However, this water service was terminated on January 14, 2000.

2. The existing water system cannot provide adequate fire protection as required by our Water System Standards. Our standards require a fire hydrant to be located within 125 linear feet (l.f.) of the site. The nearest fire hydrant is located approximately 300 l.f. away; therefore, the applicant will be required to install a fire hydrant in the vicinity of the parcel. The construction drawings should be submitted for our review and approval.

3. The availability of water will be confirmed when the building permit application is submitted for our review and approval. when water is made available, the applicant will be required to pay our Water System Facilities Charges for transmission and daily storage.

4. The applicant will be required to obtain a water allocation from the Department of Land and Natural Resources.

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5. If a three-inch or larger meter is required, the construction drawings showing the installation of the meter should be submitted for our review and approval.

6. The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

7. The proposed project is subject to our cross-connection control requirements prior to the issuance of the building permit application.

If you have any questions, please contact Kathryn Kami at 527-5221.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

WILSON
OKAMOTO
& ASSOCIATES, INC.

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907 S. BERETANIA ST
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HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

6321-01
March 16, 2000

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
830 S. Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Jamile:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated February 4, 2000. We offer the following responses in the respective order of your comments:

1. A new lateral line with a compound meter will be provided to supply domestic water for the school. A new lateral line will be connected to the existing 8" water line under Mano Avenue and will run north towards the site. The size of the meter will be either 2" or 3" depending on the peak water demands for domestic and irrigation uses.

2. Fire water supply will be provided from the water system on Farrington Highway. A new 12" water line will be connected to the existing water transmission main and will run south under the proposed bus access road towards the site. A new 8" detector meter assembly on the proposed 12" fire line will be provided and will be located within the project site adjacent to Farrington Highway. Fire hydrants will be provided along the parking lots, fire lanes and access roads for fire protection use. Construction drawings for these facilities will be submitted to you for review and comment.

3. We acknowledge that the availability of water will be confirmed when the building permit application is submitted to you for review and approval. We further acknowledge that the State will be required to pay Water System Facilities Charges for transmission and daily storage.

4. Department of Accounting and General Services have submitted a water allocation application to Department of Land and Natural Resources.

5. If a three-inch or larger meter is required for the project, we will submit *construction drawings showing the installation of the meter for your review and* approval.

6. The Honolulu Fire Department has reviewed and approved the Utility Master Plan for the project.

7. We will comply with the cross-connection control requirements for the project in conjunction with the building permit application.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation in the pre-assessment consultation phase of the EA process.

Sincerely,

Earl Matsukawa, AICP
Project Manager

cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425
HONOLULU, HAWAII 96819-1869

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

January 21, 2000

Mr. Earl Matsukawa, AICP
Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Matsukawa:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation
Nanakuli IV Elementary School
Tax Map Key: 8-9-002: 065
Nanakuli, Oahu, Hawaii

We received your letter dated December 22, 1999, regarding the proposed Nanakuli IV Elementary School.

The Honolulu Fire Department (HFD) requests that the following be complied with:

1. Provide a private water system where all appurtenances, hydrant spacing, and fire flow requirements meet Board of Water Supply standards.

2. Provide a fire department access road to within 150 feet of the first floor of the most remote structure. Such access shall have a minimum vertical clearance of 13 feet 6 inches, be constructed of an all-weather driving surface complying with Department of Transportation Services (DTS) standards, capable of supporting the minimum 60,000 pound weight of our fire apparatus, and with a gradient not to exceed 20%. The unobstructed width of the fire apparatus access road shall meet the requirements of the appropriate county jurisdiction. All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround having a radius complying with DTS standards.

---

3. Submit construction plans to the HFD and the Department of Planning and Permitting.

Should you have any questions, please call Battalion Chief Kenneth Silva of our Fire Prevention Bureau at 831-7778.

Sincerely,

Attilio K. Leonardi

ATTILIO K. LEONARDI
Fire Chief

AKL/KS:jo

6321-01
March 16, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
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1907 S. BERETANIA ST
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PH (808)946-2277
FAX (808)946-2253

Mr. Attilio K. Leonardi
Chief
Fire Department
City and County of Honolulu
3375 Koapaka Street, H425
Honolulu, Hawaii 96819

Dear Mr. Leonardi:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated January 21, 2000. We offer the following responses in the respective order of your comments:

1. A new water line will be provided to supply domestic water for the school. Fire water supply will be provided from the water system on Farrington Highway.

2 & 3. Our Project Civil Engineer, Lance Oyama, P.E., met with Captain Kishida on December 21, 1999 to discuss the Fire Safety requirements of the proposed project. Captain Kishida approved the layout of fire hydrants and fire lanes (Refer to Utility Master Plan and Preliminary Project Site Plan).

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation in the pre-assessment consultation phase of the EA process.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Enclosures

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111
http://www.honolulupd.org

JEREMY HARRIS
MAYOR

LEE D. DONOHUE
CHIEF

XXXXXXXXXXX
MICHAEL CARVALHO
DEPUTY CHIEFS

OUR REFERENCE CS-DL

EM

January 19, 2000

JAN 24 [illegible]

Mr. Earl Matsukawa
Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, 400
Honolulu, Hawaii 96826

Dear Mr. Matsukawa:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation
Nanakuli IV Elementary
Tax Map Key: 8-9-02:65
Nanakuli, Oahu, Hawaii

Thank you for the opportunity to review and comment on the subject plans.

We have no comment at this time, but may have after the various studies have been completed.

If there are any questions, please call me at 529-3255 or Captain George Yamamoto of District 8 at 674-8802.

Sincerely,

LEE D. DONOHUE
Chief of Police

By EUGENE UEMURA
Assistant Chief
Support Services Bureau

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
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HONOLULU, HI 96826
PH (808) 946 2777
FAX (808) 946 2253

6321-01
March 16, 2000

Mr. Lee D. Donohue
Chief
Police Department
City and County of Honolulu
801 S. Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Donohue:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated January 19, 2000. We acknowledge that you had no comments to offer at that date and will be reserving your comments until the Draft EA is prepared and published.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation in the pre-assessment consultation phase of the EA process.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
PACIFIC PARK PLAZA • 711 KAPIOLANI BOULEVARD, SUITE 1200 • HONOLULU, HAWAII 96813
TELEPHONE: (808) 523-4529 • FAX: (808) 523-4730

JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

JOSEPH M. MAGALDI, JR.
DEPUTY DIRECTOR

EM

January 20, 2000

TPD12/99-06342R

Mr. Earl Matsukawa, Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Matsukawa:

Subject: Nanakuli IV Elementary School

In response to your December 22, 1999 request, the project summary for the subject project was reviewed. The following comments are the result of this review:

1. The traffic impact study and the environmental assessment (EA) should address whether improvements would be required to Mano Avenue to accommodate the additional traffic that is generated by the school. The EA should also address transit and pedestrian impacts.

2. Off-street loading/unloading areas and parking should be adequate to accommodate all activities anticipated at the school, including functions held before and after school hours. The loading/unloading areas should be separated from the parking area. The drop-off areas should be designed to accommodate all passenger loading/unloading activities on-site and not on public streets.

3. The project must comply with the Americans with Disabilities Act Accessibility Guidelines.

We look forward to receiving copies of the traffic impact study and draft EA.

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

Cheryl D. Soon

CHERYL D. SOON
Director

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

6321-01
March 16, 2000

Ms. Cheryl D. Soon
Director
Department of Transportation Services
City and County of Honolulu
711 Kapiolani Blvd., Suite 1200
Honolulu, Hawaii 96813

Dear Ms. Soon:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation- Nanakuli IV Elementary School
TMK: 8-9-02: 65
Nanakuli, Oahu, Hawaii

Thank you for your letter dated January 20, 2000 with regard to the proposed project. We offer the following responses in the respective order of your comments:

1. There will be additional traffic in the vicinity of the school, especially along Mano Avenue. Appropriate traffic controls such as signs, crosswalks, and barriers will also be incorporated in the design of the school. A traffic impact report will be included in the Draft EA.

2. Off-street loading/unloading areas and parking are incorporated in the site plan. The loading/unloading area is separate from the parking area. The parking area will provide approximately 120 stalls.

3. The proposed project will be designed to comply with the American with Disabilities Act Accessibility Guidelines.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. Your participation in the pre-assessment consultation phase of the EA process is appreciated.

Sincerely,

Earl Matsukawa, AICP
Project Manager

Cc: Mr. Ralph Morita, Department of Accounting and General Services
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

EM✓

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
517 RUSSELL AVENUE, SUITE 110
PEARL HARBOR, HAWAII 96860-4884

IN REPLY REFER TO:
5090
Ser N465/ 12737
08 FEB 2001

RECEIVED
FEB 12 2001
WILSON OKAMOTO & ASSOC., INC.

Mr. Earl Matsukawa
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, HI 96826

Dear Mr. Matsukawa:

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (EA) AND FINDING OF NO SIGNIFICANT IMPACT (FONSI) OF NOVEMBER 2000 NANAKULI IV ELEMENTARY SCHOOL TAX MAP KEY: 8-9-02:65, 23 AND POR. 1 NANAKULI, OAHU, HAWAII

As requested, we reviewed the subject Draft EA and FONSI of Nov 00 and have no comments.

Thank you for the opportunity to review the proposed project and participating in the EA review process.

The Navy's point of contact is Mr. Randy Miyashiro at 471-1171, ext. 233.

Sincerely,

C. K. Yokota
C. K. YOKOTA
REC Engineer
Regional Environmental Department
By direction of
Commander, Navy Region Hawaii

Copy to: Commander, Pacific Division, Naval Facilities Engineering Command (PLN 23)

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1121.

FEB 21 2001

Mr. C. K. Yokota
REC Engineer
Regional Environmental Department
Department of the Navy
517 Russell Avenue, Suite 100
Pearl Harbor, Hawaii 96860-4884

Dear Mr. Yokota:

Subject: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key (1) 8-9-02: 65, 23 and portion of 1

Thank you for your letter dated February 8, 2001, (Ref: 5090 Ser. N465/12797) acknowledging that you have no comments to offer on the subject Draft EA at this time.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be included in the Final EA.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

RY:mo
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober/Hanssen/Mitchell Architects

EA

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

PAUL G. LeMAHIEU, Ph.D.
SUPERINTENDENT

DIVISION OF ADMINISTRATIVE SERVICES
[redacted]

RECEIVED
DEC 1 1 20
WILSON OKAMOTO & ASSOC., INC.

December 6, 2000

MEMO TO: Mr. Ralph Morita, Branch Chief
Planning Branch, DAGS

F R O M: Lester H. T. Chuck, Director
Facilities and Support Services Branch

SUBJECT: Nanakuli IV Elementary School Draft EA

The Department of Education (DOE) offers the following comments on the subject draft environmental assessment:

1. Page 1-1, Section 1.1. First Paragraph. The text should clarify that the DOE will not be doing the actual construction of the Leeward Head Start facility nor the public library.

2. We note that the proposed Nanakuli IV Elementary School will provide safer transportation and access for the students than the existing Nanaikapono Elementary School because they will not have to cross Farrington Highway.

Thank you for the opportunity to comment. If you have any questions, please call Mr. Sanford Beppu at 733-4862.

LHTC:SB:hy

cc: G. Salmonson, OEQC
E. Matsukawa, Wilson Okamoto & Associates ✓

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1035.

JAN 23 2001

TO: Mr. Raynor M. Minami, Interim Director
Facilities and Support Services Branch
Department of Education

SUBJECT: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated December 6, 2000 regarding the subject Draft EA. We offer the following responses in the respective order of your comments:

1. We concur that the proposed Nanakuli Public Library and Leeward Head Start Facility should be presented as separate projects that will not be developed by the Department of Education in conjunction with the proposed elementary school. The Final EA will clarify that the Library and Head Start Facility will be developed in the future by their respective owners and that their funding and timing are separate from the proposed elementary school.

2. We concur that the proposed Nanakuli IV Elementary School will provide safer transportation and access for the students than the existing Nanaikapono Elementary School. The Final EA will note this improvement.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

GORDON MATSUOKA
Public Works Administrator

RY:mo
cc: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

RECEIVED
JAN 0
WILSON OKAMOTO & ASSOC., INC.

December 22, 2000

To: The Honorable Raymond H. Sato, State Comptroller
Department of Accounting and General Services

Attn: Ralph Morita

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Nanakuli IV Elementary School, Draft Environmental Assessment, TMK 8-9-2:65, 23, 1 por., Nanakuli, Oahu, Dated November, 2000

Thank you for the opportunity to review the subject application. The Department of Hawaiian Home Lands (DHHL) is concerned about the increase in traffic that will occur within the lower Nanakuli neighborhood along Haleakala Avenue, Mano Avenue, and Nanakuli Avenue as a result of operating the subject project.

On-street parking occurs along Mano Avenue, which may cause for reduced traffic flows and potential safety hazards. DHHL recommends that the State consult with area residents that will be directly impacted by the implementation of the proposed project to coordinate appropriate mitigation measures.

An alternative to intra-neighborhood traffic congestion would be to work with DHHL in providing for improvements to Farrington Highway which may include the expansion of the highway and the installation of storage lanes for full left turn movements onto the subject property.

If you have any questions, please call Daniel Ornellas of our Planning Office at 586-3836.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1038.

JAN 25 2001

TO: The Honorable Raynard Soon, Chairman
Department of Hawaiian Home Lands

SUBJECT: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated December 22, 2000 regarding the subject Draft EA. While we acknowledge your concern regarding the increase in traffic associated with the proposed elementary school in the lower Nanakuli neighborhood, relocating Nanaikapono Elementary School to the mauka side of Farrington Highway will provide safer transportation and pedestrian access for students, overall.

The traffic impact assessment prepared for the Draft EA (Appendix G) concludes that operation of the proposed school will not significantly impact existing traffic conditions. On-street parking on Mano Street is an existing condition accounted for in the traffic impact assessment. Existing peak traffic flow conditions along Mano Street are not anticipated to worsen as a result of the proposed school because school-related traffic does not peak at the same time as non-school traffic.

Farrington Highway is a limited access roadway. Therefore, the Department of Transportation will not permit left-turns into the proposed bus driveway along Farrington Highway. South-bound buses on Farrington Highway would turn left onto Haleakala Avenue, right onto Mano Avenue, right onto Nanakuli Avenue, and right onto the north-bound lane of Farrington Highway to turn right into the bus driveway.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

Raymond H. Sato
RAYMOND H. SATO
State Comptroller

c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:

99-266A/epo

January 26, 2001

Mr. Ralph Morita
Department of Accounting and
General Services
Kalanimoku Bldg., Room 430
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Morita:

Subject: Draft Environmental Assessment (DEA)
Nanakuli IV Elementary School
Nanakuli, Oahu
TMK:8-9-02:65, 23, and por. 1

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Control of Fugitive Dust

The Department of Accounting and General Services, State of Hawaii, proposes to construct Nanakuli IV Elementary School, Nanakuli Public Library, and Leeward Head Start Facility on approximately 16.62 acres of land. The project also includes construction of roads, parking lots, and playgrounds.

The Clean Air Branch has some concerns where potential dust problems may arise from construction activities. There is a significant potential for fugitive dust to be generated during clearing and removal of debris, grubbing, grading, and excavation of the project site. Implementation of adequate dust control measures during all phases of construction is necessary. Construction activities must comply with provisions of Chapter 11-60-1, Hawaii Administrative Rules, Section 11-60.1-33 on Fugitive Dust. The contractor must provide adequate measures to control dust from road areas and during the various phases of construction activities. These measures include, but are not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the lest impact;

b. Providing an adequate water source at site prior to start-up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Controlling of dust from shoulders, and access roads;

e. Providing adequate dust control measure during weekends, after hours, and prior to daily start-up of construction activities; and

f. Controlling of dust from debris being hauled away from project site

If you have any questions on fugitive dust issues, please contact Ms. Crystal Peltier of the Clean Air Branch at 586-4200.

Water Pollution

1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. If a federal permit is required, then a Section 401 Water Quality Certification is required from the State Department of Health, Clean Water Branch.

2. A National Pollutant Discharge Elimination System (NPDES) general permit is required for the following discharges to waters of the State:

    a. Storm water discharges relating to construction activities, such as clearing, grading, and excavation, for projects equal to or greater than five acres;

    b. Storm water discharges from industrial activities;

    c. Construction dewatering activities;

    d. Noncontact cooling water discharges less than one million gallons per day;

    e. Treated groundwater from underground storage tank remedial activities;

    f. Hydrotesting water;

    g. Treated effluent from petroleum bulk stations and terminals; and

    g. Treated effluent from well drilling activities.

Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department's Clean Water Branch at least 30 days prior to commencement of any discharge to waters of the State.

3. After construction of the proposed facility is completed, a NPDES individual permit will be required if the operation of the facility involves any wastewater discharge into State waters.

Any questions regarding these comments should be directed to Mr. Denis Lau, Branch Chief, Clean Water Branch at 586-4309.

Vector Control

The property may be harboring rodents which will be dispersed to the surrounding areas when any buildings are demolished or the site is cleared. The applicant is required by Hawaii Administrative Rules, Chapter 11-26, "Vector Control" to eradicate any rodents prior to demolition or site clearing activities and to notify the Department of Health by submitting Form VC-12 to the local Vector Control Branch when such action is taken. Rodent traps and/or rodenticides should be set out on the project site for at least a week or until the rodent activity ceases.

The Vector Control Branch phone numbers are as follows:
Oahu: 831-6767
Kauai: 241-3306
Hawaii--Hilo: 974-4238, Kona: 322-7011
Maui (includes Molokai and Lanai): 873-3560

Noise Concerns

1. Activities associated with the construction phase of the project must comply with the Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control."

    a. The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the rules as stated in Section 11-46-6(a).

    b. Construction equipment and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers as stated in Section 11-46-6(b)(1)(A).

    c. The contractor must comply with the requirements pertaining to construction activities as specified in the rules and the conditions issued with the permit as stated in Section 11-46-7(d)(4).

2. Through facility design, sound levels emanating from stationary equipment such as air conditioning systems, exhaust fans, refrigeration compressors or generators must be attenuated to comply with the provisions of the Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control."

3. Noise from recreational activities associated with school activities, as well as vehicular traffic entering and leaving the premises, may have adverse impacts on adjacent residences. These impacts should be mitigated as much as possible.

Should there be any questions on this matter, please call Mr. Russell Takata, Environmental Health Program Manager of the Noise, Radiation and Indoor Air Quality Branch at 586-4701.

Sincerely,

Gary Gill

GARY GILL
Deputy Director
Environmental Health Administration

c: OEQC
Wilson Okamoto & Assoc.
CAB
CWB
VCB

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1130.1

FEB 22 2001

TO: Mr. Gary Gill, Deputy Director
Environmental Health Administration
Department of Health

SUBJECT: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated January 26, 2001, (Ref: 99-266A/epo) regarding the subject Draft EA. The following responses are provided in the respective order of your comments:

Control of Fugitive Dust

Adequate dust control measures during all phases of construction will be implemented and will comply with Chapter 11-60-1, Hawaii Administrative Rules, Section 11-60.1-33 on Fugitive Dust. Section 2.12 of the subject EA will be revised to include the following measures:

1. Planning the different phases of construction, focusing on minimizing amount of dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

2. Providing an adequate water source at site prior to start-up of construction activities;

3. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

4. Controlling of dust from shoulders, and access roads;

5. Providing adequate dust control measure during weekends, after hours, and prior to daily start-up of construction activities; and

6. Controlling of dust from debris being hauled away from the project site.

Water Pollution

1. The Army Corps of Engineers has been consulted and a federal permit is not required.

2. A National Pollutant Discharges Elimination System (NPDES) General Permit for Storm Water Associated with Construction Activity is required based on the following discharges to waters of the State:

   Storm water discharges relating to construction activities, such as clearing, grading, and excavation, for project equal to or greater than five acres. The NPDES Permit will be filed to the Clean Water Branch for approval at least 30 days prior to construction.

3. After the proposed facility is completed, the operation of the facility will not be discharging wastewater into State waters, therefore, a NPDES individual permit will not be required.

Vector Control

Prior to clearing the project site, a Form VC-12 will be submitted to the State Department of Health Vector Control Branch notifying them of eradication measures. Section 2.6 of the subject EA will be revised accordingly.

Noise Concerns

1. As stated in Section 2.12 of the subject Draft EA, construction noise impacts will be mitigated by compliance with provisions of Chapter 11-46, "Community Noise Control" and will be revised to include the following:

   a. The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the rules as stated in Section 11-46-6(a).

   b. Construction equipment and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers as stated in Section 11-46-6(b)(1)(A).

c. The contractor must comply with the requirements pertaining to construction activities as specified in the rules and the conditions issued with the permit as stated in Section 11-46-7(d)(4).

2. Sound levels emanating from stationary equipment such as air conditioning systems, exhaust fans, refrigeration compressors or generators will be attenuated to comply with the provisions of the Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control".

3. Vehicular traffic entering and leaving the school grounds will be limited to the morning and afternoon, when children are being dropped off and picked up. Noise from recreational activities will be during school hours. The main playground located on the southeastern side of the project site, adjacent to the drainage channel, should not have a significant impact on the surrounding residents.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be included in the Final EA.

GORDON MATSUOKA
Public Works Administrator

RY:mo
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

GENEVIEVE SALMONSON
DIRECTOR

RECEIVED
DEC 2 [illegible]
WILSON OKAMOTO & ASSOC., INC.

December 21, 2000

Mr. Raymond Sato, Comptroller
State of Hawaii
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Sato:

Subject: Draft EA for the Nanakuli IV Elementary School, Oahu

Thank you for the opportunity to review the subject document. We have the following comments.

1. Thank you for consulting with us prior to submitting the draft environmental assessment. You have responded adequately to our comments of January 12, 2000.

2. This project should comply with sections 103D-407 and 408 of Hawaii Revised Statutes concerning the use of indigenous plants and recycled glass.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185. Mahalo.

Sincerely,

Genevieve Salmonson
Director

c: Wilson Okamoto & Associates

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1034.

JAN 23 2001

TO: Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control

SUBJECT: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated December 21, 2000 regarding the subject Draft EA. We offer the following responses in the respective order of your comments:

1. Your acknowledgment that we adequately responded to your comments of January 12, 2000 is appreciated.

2. The proposed elementary school is being designed in compliance with Sections 103D-407 and 408, Hawaii Revised Statutes, concerning the use of indigenous plants and recycled glass.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

Gordon Matsuoka

GORDON MATSUOKA
Public Works Administrator

RY:mo
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
2550 Campus Road • Crawford 317 • Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

REVISED
December 28, 2000
EA: 0252

Mr. Ralph Morita
Department of Accounting and General Services
1151 Punchbowl Street, Room 430
Honolulu, Hawaii 96813

Dear Mr. Morita:

Draft Environmental Assessment (DEA)
Nanakuli IV Elementary School
Nanakuli, Oahu

The Department of Accounting and General Services (DAGS) and the Department of Education (DOE) propose to construct an elementary school in Nanakuli, Oahu. The proposed elementary school would be comprised of single story structures including administrative buildings, a library, a cafeteria, and 43 classrooms. The school would serve preschool aged children, children with special needs, and grades K-6. The area will also contain a computer training/workroom/ lounge, a museum, supporting utilities, and a covered bus loading area. The design enrollment for the school is 1,050 students and is estimated at a cost of $19 million. In addition to the elementary school, a new public library will be constructed on the site and the nearby Head Start facility will be relocated to the site. The purpose of this project is to replace the nearby Nanaikapono Elementary School which is situated within the Federal Emergency Management Agency flood zone and the school's lease with the Department of Hawaiian Home Lands will expire in October 2001.

This review was conducted with the assistance of Nguyen V. Hue, Agronomy & Soil Science; Marion Kelly, Ethnic Studies; and Jacquelin Miller and Renee Thompson of the Environmental Center. We submitted review comments on this DEA on December 26, 2000. We have since received additional comments from Marion Kelly regarding historic and archaeological resources as well as safety concerns that should be considered in making a determination as to the significance of the potential impacts of this project. Since these issues could have a significant impact on the children attending this school, we have revised our previous review to include these additional comments.

General Comments

We believe this project may warrant the preparation of an environmental impact statement (EIS). The EIS law requires the preparation of an impact statement if the *project may have a significant impact* (emphasis added). The presence of hazardous chemical waste residue may have a

---

significant impact on the school's users making the findings of no significant impact (FONSI) inappropriate. We note, that in the past, DAGS and the DOE has prepared EISs for schools on sites with far fewer problems.

Flood/Tsunami Hazard

We note that the proposed new location for the school is within Zone D, "areas in which flood hazards are undetermined" as shown in Figure 1-4. According to the DEA, it was determined that the risk of flooding from the mauka areas is negligible. However, the site lies well within the tsunami inundation area and hence within the State Tsunami Evacuation Zone. While warning time for distantly generated tsunamis should be sufficient to insure safe evacuation of school children, such warning time may not be possible for locally generated tsunamis. Provisions should be made to insure that teachers and students are adequately and routinely trained in tsunami evacuation procedures including those appropriate for locally generated waves.

Historic and Archaeological Resources

Cultural Surveys Hawaii, Inc uncovered a burial site on the property, according to page 2-9 of the EA. The consultants speculate that there may be others on the property. Building a school on the site may have a significant impact on the burials and other cultural items found on the property. This is another reason why an EIS should be prepared.

Very little is mentioned about the use of the land at Camp Andrews from the time the military acquired the land in 1917 to the time it was returned to the State "in the late 1950s". What provisions were made during that time for toilet facilities and the disposal of garbage? Were latrines and garbage or waste pits provided at the site? Where were these located? Soil tests should be carried out at those sites and at the site(s) of a known military bunker(s) that may have been used to store ammunition or other types of toxic materials, given that the site was under military control for over 35 years (Appendix C:10). We note that 4 of those years were during WWII, when military activities were being carried out at Makua, Lualualei and other sites along the Waianae coast in numbers estimated to be from 15,000 to 20,000 (Appendix C:9). Use of several sites along the coast was probable, due to the fact that coastal areas were protected from possible enemy invasion with miles of barbed wire and hundreds of machine gun "nests" (Appendix C:9). Troops stationed at intervals along the coast would presumably have been "serviced" by convenient camps set up for that purpose.

Remarks by Roy Bodnar who stated that the buildings on the military land were merely wood frames with "canec walls" should trigger an investigation of canec remnants in the area. This material poses a potential health hazard, especially when it is in a degenerated condition. The canec dust can damage lung tissue when enhaled, as does asbestos (Appendix C:15).

What effect did the fact that a coastal portion of Nanakuli was once "the site of the Milcon P-313 Range Operations Center Naval Undersea Warfare Engineering Station Detachment" (Appendix C:16) have on the land under investigation? Little is mentioned about this range, its activities, and nothing about its possible effect at the site.

Mr. Ralph Morita
Department of Accounting and General Services
December 28, 2000
Page 3 of 3

Answers to the above questions are necessary in order to accurately and adequately evaluate the potential effects of possible contaminants on children attending a school constructed on an ex-military site. A full evaluation of these potential contaminants is needed to determine the children's exposure risk and the corresponding state's liability. Parents of children attending this school should be provided with the results of these studies.

Hazardous and Toxic Materials

According to page 2-12 of the EIS, hazardous and toxic chemicals are present at the site. We generally concur with the Masa Fujioka and Associates recommendations, listed on page 21 of Appendix F, of the need for surface soil excavations and the development of a plan for handling hazardous materials that may be encountered on the site. We believe phytoremediation is a more economical means to clean up Arsenic than excavation and land fill. Lead (Pb) should be quite immobile/stable in the alkaline soils of the Nanakuli area. However, since this is a particularly dry area, is it possible that the lead in the soil may be transmitted as dust and inhaled by students?

Alternatives

Although the EA does discuss alternatives to the proposed project on pages 4-1 and 4-2, we note that they were quite brief. Alternatives should be discussed in greater detail so that decision-makers and the public can understand why these alternatives were not chosen.

Conclusion

This EA has discussed many of the issues associated with this type of development at a level of detail usually found in an EIS. This document should be resubmitted as an EIS with an enhanced alternatives section so that the public would have the full 45 days to review its contents. Thank you for the opportunity to comment on this document.

Sincerely,

Jacquelin N. Miller
for Peter Rappa
Environmental Review Coordinator

cc: OEQC
Wilson Okamoto & Associates
James Moncur, WRRC
Marion Kelly, Ethnic Studies
Nguyen V. Hue, Agronomy and Soil Science
Jacquelin Miller
Renee Thompson

E

FEB 09

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1053.

FEB -8 2001

Mr. Peter Rappa
Environmental Review Coordinator
University of Hawaii at Manoa
Environmental Center
2550 Campus Road, Crawford 317
Honolulu, Hawaii 96822

Dear Mr. Rappa:

Subject: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your revised letter dated December 28, 2000 (EA: 0252) regarding the subject Draft EA. The following responses are provided in the respective order of your comments:

General Comments

Based on the findings of the various studies prepared in conjunction with the Draft EA, including the Phase I Environmental Site Assessment (ESA), no significant environmental impacts are anticipated to result from the proposed action. Hence, the processing of an EA/Finding of No Significant Impact (FONSI) is appropriate.

With regard to the hazardous materials and contaminated soil found at the project site, the Phase I ESA recommends appropriate remediation, after which there will be no significant impacts on subsequent occupants.

Flood/Tsunami Hazard

We disagree with your assertion that the project site is in a tsunami inundation area. As shown in Figure 1-4 of the Draft EA, the areas affected by tsunami are delineated as VE - Coastal flood with velocity hazard and AE - Areas where base flood elevations have been determined. These flood areas are located makai of Farrington Highway, and include a portion of the existing Nanaikapono Elementary School campus. The proposed elementary school will relocate the existing school out of the tsunami inundation area. As noted in Section 2.5 of the Draft EA, however, the proposed school site is within the State's Tsunami Evacuation Zone, which is a more conservative delineation to ensure public safety in an emergency. As at the existing school, administrators and staff at the proposed school will be trained in evacuation procedures for the school.

Our reference to Zone D - Areas in which flood hazards are undetermined, pertains to flooding from mauka areas. As shown in Figure 1-4 of the Draft EA, upland flooding hazards were not previously determined for areas west of Nanakuli Avenue. Nevertheless, areas in the vicinity of the project site are comparable in elevation and topography to areas east of Nanakuli Avenue designated X where flood hazards are minimal. Based on an investigation of drainage facilities, including the large drainage channel adjacent to the project site, it was determined that the risk of flooding associated with drainage from mauka areas is negligible.

Historic and Archaeological Resources

The Department of Land and Natural Resources, State Historic Preservation Division (SHPD), was consulted in determining an appropriate scope and approach for archaeological investigations based on the presence of limestone sinks at the project site. As recommended by the SHPD, two (2) of the largest sinks were excavated, yielding cultural deposits, a possible Native Hawaiian burial and remains of extinct prehistoric bird species. The SHPD was provided with a report of the findings and both the Archaeological Branch and the Burials Program are fully aware of the potential for additional burials being uncovered at the project site. As recommended by the SHPD, a series of mitigation measures will be implemented to address historic, archaeological and burial issues, as documented in Section 2.7 of the Draft EA. In commenting on the Draft EA, the SHPD stated that, "If these steps are taken, then we believe that the proposed construction of the Nanakuli IV Elementary School, Nanakuli Library, and Head Start facilities will have `no adverse effect' on significant historic resources." (See attached copy of letter dated December 20, 2000).

There is little information available regarding the military use of Camp Andrews. Based on the available information, there is no indication that the camp was used for anything other than recreation. As recommended by the SHPD, and documented as mitigation measures in Section 2.7 of the Draft EA, further historical and archival research on Camp Andrews will be conducted in conjunction with the inventory survey of the project site.

With regard to potential hazardous materials associated with military use of Camp Andrews, no evidence of waste pits or munitions storage were found during the Phase I ESA. Therefore, soil tests were not necessary. Latrines would have been connected to septic tanks, but these do not pose a health concern. Canec material, such as those found in the limestone sinks, will be managed as a hazardous material in accordance with a mitigation plan to be developed in consultation with the Department of Health (DOH) as discussed in Section 2.9 of the Draft EA.

The site of the former Milcon P-313 Range Operations Center Naval Undersea Warfare Engineering Station Detachment is not within the project site. Also, there is no indication that the activity had any effect of environmental or historic preservation concern on the project site. Your associations regarding prior military activities in the region relative to the project site are speculative and unsupported by the research and site investigations documented in the Phase I ESA.

Your suggestion that potential hazardous materials on the project site may pose a health concern to school children beyond that addressed by the mitigation measures discussed in Section 2.9 of the Draft EA is unfounded. The DOH was consulted in determining the scope of the Phase I ESA specifically because the project site would be used for a school. The mitigation plan discussed in Section 2.9 will be developed in consultation with the DOH to address potential impacts of identified soil contamination and suspected hazardous materials prior to and during construction. The Draft EA addresses the issue of potential hazardous materials in a responsible manner based on a methodical investigation involving appropriate agencies and commitment to the preparation of a mitigation plan for addressing suspected hazardous materials that may be uncovered during construction. The aforementioned effort represents what we believe to be a total evaluation of the hazardous potential of the site.

All reports on issues related to hazardous materials at the project site will be public record and available for review. If the parents of students attending the proposed school express significant interest regarding hazardous materials assessment and remediation procedures conducted at the project site, the relevant reports can be made available for review at the school.

Hazardous and Toxic Materials

We acknowledge your concurrence with the recommendations presented in the Phase I ESA and which are summarized as mitigation measures in Section 2.9 of the Draft EA. We disagree, however, with your suggestion that phytoremediation would be more economical method of addressing arsenic contamination. Due to time constraints related to the expiring land lease for the Nanaikapono Elementary School campus, as discussed in Section 1.2 of the Draft EA, phytoremediation is impractical. By contrast, removing the approximately 15 cubic feet of contaminated soil to landfill could be accomplished quickly and at relatively low cost.

While we concur that lead in dust can be inhaled, the soils on the project site with lead concentrations above regulatory action levels will be excavated and removed. The remaining soils have lead concentrations below action levels. Regulatory action levels are protective of human health, including children, for a combination of exposure pathways, including inhalation of dust.

Alternatives

Section 11-200-10, Hawaii Administrative Rules, requires environmental assessments to include "(6) Identification and summary of … alternatives considered." Section 4 of the Draft EA identifies and summarizes the alternatives considered and why they were not chosen. Notably, the summary of alternative sites for the elementary school refers to a 1995 Final Environmental Impact Statement (EIS) and Site Selection Study for a new elementary school within the Nanakuli School Complex.

The project site was not considered in that site selection study because it was not within the Nanakuli III EIS service area. The project site was selected because it is available for development by the DOE and therefore would not incur land acquisition costs.

Conclusion

As discussed above, a Final EIS and Elementary School Site Selection Study for a new elementary school in the Nanakuli School Complex was published in 1995 examining a range of alternative school sites in the area. Although the project site was not considered, it was selected for this project because it now will avoid major land acquisition costs. A thorough EA for the project site was prepared to determine if significant environmental impacts are anticipated. The Draft EA concluded that, with appropriate mitigation, the proposed action would not have a significant environmental impact. Therefore, an EIS is not required.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

RY:mo
Attachments
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

RECEIVED
DEC 2 , 20
WILSON OKAMOTO & ASSOC., INC.

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December 20, 2000

MEMORANDUM

LOG NO: 26602 ✓
DOC NO: 0011SC25

TO: Ralph Morita, Planning Branch
Kalanimoku Building, Room 430
Public Works Division
Department of Accounting and General Services

FROM: DON HIBBARD, Administrator
Historic Preservation Division

SUBJECT: Chapter 6E-8 Historic Preservation Review of a Draft Environmental Assessment (DEA) for the Proposed Nanakuli IV Elementary School
Nanakuli, Wai'anae, O'ahu
TMK: 8-9-002: 065, 023, and portion of 001

The Department of Accounting and General Services (DAGS) plans to construct Nanakuli IV Elementary School, Nanakuli Public Library, and a new Leeward Head Start Facility on approximately 15 acres of state-owned land in Nanakuli, O'ahu. Our review is based on historic maps, aerial photographs, records, and reports maintained at the State Historic Preservation Division; in addition, Sara Collins and Elaine Jourdane of our staff briefly inspected a portion of the project area in July 2000. We provide the following comments.

As noted in the DEA, the subject parcel was formerly the site of Camp Andrews, a WW II-era military installation. As such, properties associated with Camp Andrews are historic in age (over 50 years in age), and may be significant under one or more criteria, and eligible for placement on the Hawai'i and National Registers of Historic Places. In addition, as noted in the DEA, a preliminary archaeological inventory survey was conducted at two of the 17 sinkholes identified on the property. Significant historic sites, including a human burial and archaeological deposits, were found. It is likely that many or all of the remaining 15 sinkholes to be investigated contain similar types of properties. Therefore, in general concurrence with the DEA (pages 3-13 & 3-14), we recommend that the following steps be taken:

Prior to beginning any ground disturbance, an archaeological inventory survey with testing should be carried out at the remaining sinkholes identified on the property. A report of the findings should be submitted to the State Historic Preservation Division for review and approval. If significant historic sites such as cultural deposits or human burials are found to be present, an appropriate mitigation will need to be prepared for review and approval by our office. Mitigation steps can include archaeological data recovery, a burial treatment plan, and preservation. The burial treatment plan should be prepared in consultation with the O'ahu Island Burial Council and any recognized descendants.

If these steps are taken, then we believe that the proposed construction of Nanakuli IV Elementary School, Nanakuli Library, and Head Start facilities will have "no adverse effect" on significant historic sites.

Should you have any questions about archaeology, please feel free to contact Sara Collins at 692-8026. Should you have any questions about burial matters, please feel free to contact Kala'au Wahilani at 587-0010.

SC:jk

c: Mr. A. Van Horn Diamond, Chair, O'ahu Island Burial Council
✓ Mr. Earl Matsukawa, Wilson, Okamoto & Associates, 1907 South Beretania, Suite 400, Honolulu, HI 96826
Mr. Kala'au Wahilani, Burial Sites Program

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1036.1

JAN 23 2001

TO: Mr. Don Hibbard, Administrator
Historic Preservation Division
Department of Land and Natural Resources

SUBJECT: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated December 20, 2000 (Doc. No: 0011SC25) regarding the subject Draft EA. Your assistance in developing the scope and approach for the archaeological investigations conducted at the project site is greatly appreciated.

We concur with your rationale and recommendations for the archaeological inventory survey and for the processing of any cultural deposits or human burials found at the project site. These recommendations have been documented in Section 2.7 of the Draft and Final EA as required mitigation measures.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

GORDON MATSUOKA
Public Works Administrator

RY:mo
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

EM
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November 29, 2000

RECEIVED
DEC 4 20
WILSON OKAMOTO & ASSOC., INC.

Mr. Earl Matsukawa
Wilson Okamoto and Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Matsukawa:

Subject: Your Transmittal of November 20, 2000 Regarding the Draft Environmental Assessment for the Proposed Nanakuli Elementary IV School, Nanakuli, Oahu

Thank you for the opportunity to review and comment on the Draft Environmental Assessment for the proposed elementary school in Nanakuli.

We have the following comments to offer:

1. There is an existing 2-inch water meter currently serving TMK: 8-9-02: 1 and an inactive 1-inch service serving TMK: 8-9-02: 23.

2. The existing water system is presently adequate to accommodate the proposed elementary school.

3. The applicant will be required to obtain a water allocation from the State Department of Land and Natural Resources.

4. The availability of water will be confirmed when the building permit application is submitted for our review and approval. When water is made available, the applicant will be required to pay our Water System Facilities Charges for transmission and daily storage.

5. If a three-inch or larger meter is required, the construction drawings showing the installation of the meter should be submitted for our review and approval.

6. A Board of Water Supply approved Reduced Pressure Principle Backflow Prevention Assembly will be required to be installed after all domestic water meters serving the proposed project area.

If there are any questions, please contact Scot Muraoka at 527-5221.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1032.1

JAN 23 2001

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Jamile:

Subject: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated November 29, 2000 regarding the subject Draft EA. We offer the following responses in the respective order of your comments:

1. Your confirmation of the existing 2-inch water meter serving TMK: 8-9-02: 1 and the inactive 1-inch service serving TMK 8-9-01: 23 is acknowledged.
2. We appreciate your determination that the existing water system is presently adequate to accommodate the proposed elementary school.
3. The Department of Accounting and General Services requested water allocation from the Department of Land and Natural Resources by correspondence dated October 11, 2000.
4. We acknowledge that the availability of water for the proposed elementary school will be confirmed when the building permit application for the project is submitted for your review and approval. We also acknowledge that Water System Facilities Charges will be applicable to the project for transmission and daily storage.
5. Construction drawings for the proposed compound metering system will be submitted for your review.

6. As required, we will install an approved Board of Water Supply Reduced Pressure Principle Backflow Prevention Assembly after the FM meter and meter box for domestic and fire protection water serving the project area.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

RY:mo
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

DC-530

December 11, 2000

Department of Accounting and General Services
Kalanimoku Building, Room 430
1151 Punchbowl Street
Honolulu, Hawaii 96813

Attn: Mr. Ralph Morita

Aloha,

Subject: Nanakuli IV Elementary School
Draft Environmental Assessment

This is in response to your request to review the subject document.

We have no comments to make, but appreciate the opportunity to review the document.

Should there be any questions, please contact Douglas Collinson of my staff at telephone 527-6375.

Very truly yours,

FOR GARY Q. L. YEE, AIA
Director

GQLY:kw
cc: Ms. G. Salmonson, OEQC
Mr. E. Matsukawa, Wilson Okamoto & Associates, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1037.

JAN 23 2001

Ms. Rae M. Loui, P.E.
Acting Director
City and County of Honolulu
Department of Design and Construction
650 South King Street, 14th Floor
Honolulu, Hawaii 96813

Dear Ms. Loui:

Subject: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated December 11, 2000 (Ref: DC-530), acknowledging that you have no comments to offer on the subject Draft EA at this time.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

RY:mo
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE (808) 523-4414 • FAX (808) 527-6743 • INTERNET www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

RECEIVED
JAN 09 2001
WILSON OKAMOTO & ASSOC., INC

2000/CLOG-6083 (RY)

January 5, 2001

Mr. Ralph Morita
Department of Accounting and General Services
Kalanimoku Building, Room 430
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Morita:

Nanakuli IV Elementary School, Draft Environmental
Assessment and Findings of No Significant Impact
Waianae, Oahu, Hawaii

Thank you for the opportunity to provide comments for the above draft environmental assessment (DEA) document. We provide the following for your consideration:

General Plan and the Waianae Sustainable Communities Plan

1. The Waianae Development Plan, Land Use Map, and Public Facilities Map have been superseded by the Waianae Sustainable Communities Plan (SCP) and Waianae Public Infrastructure Map (PIM). Thus, references to the old Waianae Development Plan should be deleted. Instead, reference should be made to the newly adopted Waianae SCP and the Waianae PIM. The DEA must include statements on project consistency with applicable planning guidelines and objectives found in the SCP.

2. The document should disclose that the proposed project site will be located in the general area designated on the newly adopted Waianae PIM for the Nanakuli Community Park - (PIM Symbol No. 011). At this time, there are no immediate plans to develop a community park. For more information on PIM No. 11, we suggest you coordinate your project with the City Department of Design and Construction.

Special Management Area

The project is located within the Special Management Area (SMA) and a major SMA and Use Permit is required. For your information, the SMA Use Permit application requires the following additional information or clarifications which may be included in the subject environmental assessment:

1. SECTION 1 - SETTING AND PROJECT DESCRIPTION

   Project Need: Please provide a concise summary on why the existing school site is no longer feasible and how the new site addresses concerns that led to the proposed replacement. Perhaps your discussion could include consistency with the State Department of Education (DOE) plans, obsolescence, maintenance costs, pupil safety, shoreline erosion or flood hazards, insufficient parking, or access problems, etc..

   With respect to the proposed Nanakuli Public Library, a more complete description of the library facility must be provided, including building size, number of floors, parking lot dimensions and capacity, staffing, and whether meeting facilities or other features are planned. Similarly, a more complete description of the proposed Leeward Head Start Facility is also needed, including background information on the existing facility mentioned in Section 1.2.3. which the proposed facility is intended to replace. And, additional details of the proposed facility, staffing requirements, hours of operation, parking requirements, and clarification on whether other community services during evening hours are proposed, must be addressed. Furthermore, site maps for both projects, the library and the head start facility must be included .

2. SECTION 2 - DESCRIPTION OF THE EXISTING ENVIRONMENT, PROJECT IMPACTS AND MITIGATION MEASURES

   Geology and Topography: There is no description of the actual site preparation work that will be required in the development of the proposed projects. A description of what actual construction activities are anticipated to develop each project site, including estimates of the amount of grading and fill required at each site, must be included. The inclusion of topographic maps would be useful in illustrating the site preparation activities required. This section should also discuss whether the importation of fill is anticipated.

1.3.1 Elementary School: Although this section indicates that construction cost of the new school will be $19 million, the entire project cost which includes the cost of demolition of the existing school and any site remediation (e.g., asbestos removal) which may be required for the return of the site to DHHL, should be disclosed in the SMA application.

3. SECTION 3 - PLANS, POLICIES AND CONTROLS

3.2.3 Land Use Ordinance (LUO) and Zoning: Both the proposed Nanakuli Elementary IV and Nanakuli Library will not require the approval of a Minor Conditional Use Permit (Cm) as indicated, insofar as they are both considered "public uses" by the LUO (Section 21-10.1). However, it not clear from this document whether the Leeward Head Start Facility is considered a "public use" pursuant to the LUO. If the Honolulu Community Action Program, Inc. (HCAP) is a program that is "not purely a function, activity or service of government" or is a nonprofit organization or are private entrepreneurs, then a CUP minor will be required.

3.2.4 Special Management Area: The comment regarding the Recreational Resource Objective of the SMA could be expanded to describe possible recreational opportunities which are made possible by the vacating of a sizable parcel of shore front property. The Final EA should provide some discussion of what is to become of the existing Nanaikapono school site.

In the absence of elevation drawings of the proposed library and Head Start Facility, it is difficult to determine their likely impact on the quality of coastal scenic and open space resources of this area. Additional illustrations and a discussion are needed relative to scenic and open space resource objectives.

Wastewater

We suggest that the Department of Hawaiian Home Lands be consulted because they are responsible for dry sewers on Mano Street that connect to the municipal sewer system. We are aware of their option to connect the dry sewers to the municipal sewer system on Farrington Highway through the subject site. This option should be addressed in the environmental assessment.

Civil Engineering Concerns

Under Section 2.15.6, the permanent water quality facility must be addressed in accordance with Section II of the Rules Relating to Storm Drainage Standards and incorporated into the final design. In addition, separate drainage and storm water quality reports must be submitted to our Site Development Division when grading plans are submitted to DPP for review and approval.

Traffic/Roadway Concerns

Improvements at the intersection of Mano Street at Haleakala Avenue and Nanakuli Avenue and in the vicinity of the driveway on Mano Street should be considered due to the projected increase in automobile and bus traffic. The planned route for school buses should be specified since it appears that the majority of the student population will be located on the Waianae side of the school and no left turns will be permitted from Farrington Highway into the proposed driveway.

Other Comments and Concerns

1. The document should clarify what building designs/appurtenant facilities will be implemented to address the anticipated student/faculty indoor environment. For example, will buildings include air-conditioning, ventilation systems, or be sited to take advantage of natural ventilation, etc., to minimize discomfort due to the area's hot and dry climate? Please provide more discussion on this concern.

2. The applicant concludes on page 2-32 that "No significant impacts to the municipal solid waste collection and disposal systems are anticipated during construction of the proposed facilities." However, because of the history of illegal dumping in the Waianae/Nanakuli rural areas, we recommend the contractor(s) implement strict controls to monitor the hauling "trip" tickets to ensure that construction debris are properly disposed at either the construction and debris (C&D) landfill in Nanakuli privately operated by PVT or the municipal Waimanalo Gulch Sanitary Landfill in Ewa.

3. Please note that there is a binding error in Appendix F - Phase I Environmental Site Assessment Report, in that some of the figures (No. 1 to 5), Photo Plates 1 and 2 and pages 8 and 9 of EcoSearch's Report were bound on the wrong side so the pages are "upside-down" (also the Priority Risk Report Maps did not have any page numbers so they may be out of sequence).

If you have any questions, please contact Raymond Young of our staff at 527-5839.

Sincerely yours,

for RANDALL K. FUJIKI, AIA
Director of Planning and Permitting

RKF:lh
cc: ✓Wilson Okamoto & Associates, Inc.
(Tracy Fukuda)
Doc 70353

EM

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO (P)1054.

JAN 30 2001

Mr. Randall K. Fujiki, AIA
Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Subject: Draft Environmental Assessment (DEA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion 1

Thank you for your letter dated January 5, 2001 (2000/CLOG-6083 [RY]) regarding the subject DEA. The following responses are provided in the respective order of your comments:

General Plan and the Waianae Sustainable Communities Plan

1. As historical perspective, the DEA included statements of project consistency with applicable planning objectives, policies and guidelines for the former Waianae Development Plan as well as the newly adopted Waianae Sustainable Communities Plan. As you have requested, all references to the Waianae Development Plan will be omitted in the Final EA (FEA).

2. The FEA will mention that the proposed project site will be located across from the proposed Nanakuli Community Park (PIM Symbol No. 11).

Special Management Area

The proposed Nanakuli IV Elementary School, Nanakuli Public Library and Head Start facility were collectively assessed in the DEA in compliance with Section 11-200-7, Hawaii Administrative Rules as "component actions… of a larger undertaking" at the project site. This assures assessment of potential cumulative impacts that the separate projects may have such as on traffic.

The proposed Nanakuli Public Library and the Head Start facility, however, will not be developed by the Department of Education (DOE) in conjunction with the proposed elementary school. The library and Head Start facility will be developed in the future by their respective owners using funds and on a schedule independent of the proposed elementary school. Hence, the Special Management Area Use Permit (SMAUP) application being prepared for the elementary school will include neither the library nor the Head Start facility.

1. The rationale for the proposed elementary school is provided in Section 1.2.1 of the DEA. The three (3) primary reasons discussed were the location of the existing Nanaikapono Elementary School in a tsunami inundation area, the expiration of the current land lease with the Department of Hawaiian Homes Land (DHHL) and the availability of the site for development by the DOE.

2. Section 2.2 Geology and Topography describes site preparation work in the second sentence of the Impacts and Mitigation Measures sub-section. Grading quantity estimates, including imported fill, for the proposed elementary school will be provided in the SMAUP application, along with maps of existing and finished topography.

   The existing Nanaikapono Elementary School buildings will not be demolished but turned over to DHHL for their use. The long-term disposition of these buildings is unknown at this time.

3. We appreciate your clarification that both the proposed Nanakuli IV Elementary School and Nanakuli Library are public uses that will not require the approval of a Minor Conditional Use Permit (MCUP). The FEA will reflect this clarification.

   The Head Start facility will be developed by the Honolulu Community Action Program, Inc. (HCAP) is a 501 (c) (3) nonprofit, human service agency, that services low-income populations on Oahu. Therefore, a MCUP will be required for the Head Start facility.

As mentioned previously, the existing Nanaikapono Elementary School site will be returned to the DHHL along with the existing buildings, for their use. The long-term disposition of the buildings and site are unknown at this time.

The rationale for including the library and Head Start facility in the DEA was discussed previously. The design of these facilities has not commenced, although they will be single-story in height. Inasmuch as both will require approval of SMAUP, a determination of their impact on coastal scenic and open space resources can be made when those permits are processed based on designs that will be available at that time. The DEA assesses the anticipated visual impacts of these facilities based on their conceptual location and height.

Wastewater

According to Mr. Daniel Ornellas of the DHHL, the option to connect dry sewers to the municipal sewer system on Farrington Highway through the project site is no longer being considered. DHHL continues to consider other options for connecting to the municipal sewer system.

Civil Engineering Concerns

A permanent water quality facility design is being developed for the proposed elementary school. Drainage and storm water quality reports were submitted to the Site Development Division on September 7, 2000, for review and comment. Based on comments received, the plans are being revised for final design approval.

Traffic / Roadway Concerns

The traffic impact assessment prepared for the DEA (Appendix G) concludes that operation of the proposed school will not significantly impact existing traffic conditions. In general, relocating Nanaikapono Elementary School to the mauka side of Farrington Highway will provide safer transportation and pedestrian access for students. To accommodate the change in pattern of vehicular and pedestrian traffic, improvements such as signs, crosswalks, and barriers may be necessary for safe pedestrian access in the vicinity of the project site, as discussed in Section 2.11 of the DEA.

The FEA will describe the route for southbound buses on Farrington Highway entering the proposed elementary school in Section 1.3.1 describing the proposed project. Such buses would turn left onto Haleakala Avenue, right onto Mano Avenue, right onto Nanakuli Avenue, and right onto the north-bound lane of Farrington Highway to turn right into the bus driveway. The traffic impact assessment assumes this route in its analysis.

Other Comments and Concerns

1. The FEA will note in Section 1.3.1 that classroom and office spaces will be air-conditioned. The cafeteria will be naturally ventilated and oriented to take advantage of the prevailing wind in the area.

2. During construction, the contract specifications clearly require the contractor to dispose of solid wastes at an appropriate and legal disposal area and we intend to enforce those provisions.

3. Thank you for pointing out the upside down pages reproduced in Appendix F of the DEA. Apparently, when the report was reduced and reoriented to fit two (2) pages on one (1), the original "landscape"-oriented pages became upside down relative to the rest of the DEA. The orientation of these pages will be corrected in the FEA. We will also check the pagination of the laboratory reports.

We appreciate your participation in the DEA review process. Your letter, along with this response, will be reproduced in the FEA.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

RY:mo
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

EM

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425 • HONOLULU, HAWAII 96819-1869
TELEPHONE (808) 831-7761 • FAX (808) 831-7750 • INTERNET www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

November 29, 2000

RECEIVED
DEC
WILSON OKAMOTO & ASSOC., INC

Mr. Ralph Morita
State of Hawaii
Department of Accounting and General Services
Kalanimoku Building, Room 430
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Morita:

Subject: Draft Environmental Assessment
Nanakuli IV Elementary School
Tax Map Key: 8-9-002: 065, 023, Portion 1

We received your letter regarding the Draft Environmental Assessment for the Nanakuli IV Elementary School.

We have no objections to the project provided the following conditions are complied with:

1. Provide a private water system where all appurtenances, hydrant spacing, and fire flow requirements meet Board of Water Supply standards.

2. Provide a fire department access road within 150 feet of the first floor of the most remote structure. Such access shall have a minimum vertical clearance of 13 feet 6 inches, be constructed of an all-weather driving surface complying with Department of Transportation Services (DTS) standards, capable of supporting the minimum 60,000 pound weight of our fire apparatus, and with a gradient not to exceed 20%. The unobstructed width of the fire apparatus access road shall meet the requirements of the appropriate county jurisdiction. All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround having a radius complying with DTS standards.

3. Submit civil drawings to the Honolulu Fire Department for review and approval.

Should you have any questions, please call Battalion Chief Kenneth Silva of our Fire Prevention Bureau at 831-7778.

Sincerely,

Attilio K. Leonardi

ATTILIO K. LEONARDI
Fire Chief

AKL/KS:bh

cc: Ms. Genevieve Salmonson, Director, Office of Environmental Quality Control
Mr. Earl Matsukawa, Project Manager, Wilson Okamoto & Associates, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1033.1

JAN 23 2001

Mr. Attilio K. Leonardi
Fire Chief
Honolulu Fire Department
City and County of Honolulu
3375 Koapaka Street, Suite H-425
Honolulu, Hawaii 96819-1869

Dear Mr. Leonardi:

Subject: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated November 29, 2000 regarding the subject Draft EA. We offer the following responses in the respective order of your comments:

1. A new water system extending from a transmission main in Farrington Highway will be constructed to supply water for domestic use and fire protection at the proposed elementary school. Hydrant spacing and fire flow requirements of the system will meet Board of Water Supply standards.

2&3. Our Project Civil Engineer, Mr. Lance Oyama, P.E., of Wilson Okamoto and Associates met with Captain Kishida of your Plans Examining Section on December 21, 1999, to discuss fire protection requirements for the proposed project. The layout plan for the hydrants and fire lanes was subsequently revised as recommended by Captain Kishida and submitted for approval on January 11, 2000. He approved the revised plan on January 18, 2000.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

RY:mo
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111
http://www.honolulupd.org
www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

LEE D. DONOHUE
CHIEF

MICHAEL CARVALHO
ROBERT AU
DEPUTY CHIEFS

EM.
Tr

OUR REFERENCE CS-LS

December 13, 2000

RECEIVED
DEC 18 20
WILSON OKAMOTO & ASSOC., INC

Mr. Ralph Morita
Department of Accounting and
General Services
Kalanimoku Building, Room 430
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Morita:

Thank you for the opportunity to respond to the Draft Environmental Assessment for the Nanakuli IV Elementary School.

We anticipate minimal impact on police services when the proposed project is completed. However, there may be calls for police service during the construction phase since dust, noise, and traffic problems are inevitable at that time.

We would like to recommend that the concept of Crime Prevention Through Environmental Design be applied in designing the facility as a means of minimizing potential criminal activity. Police officers from District 8 (Kapolei) will be happy to meet with you and offer their assistance. You may contact them at 692-4243.

If there are any questions, please call Carol Sodetani of the Support Services Bureau at 529-3658.

LEE D. DONOHUE
Chief of Police

By Eugene Uemura
EUGENE UEMURA, Assistant Chief
Support Services Bureau

cc: Ms. Genevieve Salmonson, OEQC
✓Mr. Earl Matsukawa, Wilson Okamoto and
Associates, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1046.

JAN 24 2001

Mr. Lee D. Donohue
Chief of Police
City and County of Honolulu
801 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Donohue:

Subject: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated December 13, 2000 (Ref. CS-LS), regarding the subject Draft EA. The following responses are provided in the respective order of your comments:

1. We acknowledge that police service may be required during the construction phase of the proposed project in response to public concerns regarding air quality, noise and traffic. All construction activities will comply with applicable regulations and requirements to minimize such impacts.

2. Thank you for offering your assistance in designing the school using the concept of Crime Prevention through Environmental Design. We have forwarded your offer to the project designers at Kober Hanssen Mitchell Architects.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

Sincerely,

GORDON MATSUOKA
Public Works Administrator

RY:mo
c: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
PACIFIC PARK PLAZA • 711 KAPIOLANI BOULEVARD, SUITE 1200 • HONOLULU, HAWAII [illegible]
PHONE [illegible] • FAX [illegible]

JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

JOSEPH M. MAGALDI JR.
DEPUTY DIRECTOR

EM
CL

RECEIVED
DEC 2[illegible]
WILSON OKAMOTO & ASSOC., INC.

December 27, 2000

TPD11/00-05592R

Mr. Ralph Morita
Department of Accounting and General Services
State of Hawaii
Kalanimoku Building, Room 430
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Morita:

Subject: Nanakuli IV Elementary School

We have reviewed the draft environmental assessment (EA) for the subject project and have the following comments:

1. The draft EA and the traffic impact report should address the following:
   - Project's impact on the surrounding City roadway system and the residents living along area streets
   - Availability of safe existing area pedestrian student routes or proposed mitigation measures to ensure pedestrian safety to/from the school
   - Proposed improvements planned for implementation on Haleakala, Nanakuli, and Mano Avenues to ensure pedestrian and vehicular safety
   - Area traffic (vehicular and pedestrian) impact of the scenario where an access point for the school is provided on Haleakala Avenue
2. The last sentence on Page 2-21 of the draft EA states that improvements to ensure safe pedestrian access will be incorporated into the design of the school. The mitigative measures should be detailed in the draft EA. Marked crosswalks should not be installed unless warranted. In order to facilitate the safe crossing of Mano Avenue in the vicinity of the school, a raised median or medians at selected locations should be considered for installation in conjunction with the construction of the school.

3. The design of the school campus should incorporate a well-designed drop-off/pick-up area(s) for students brought to or picked up by vehicle within the school grounds.
4. The school campus should have a designated, well-designed loading/unloading area within the school grounds.
5. The area neighborhood board and residents should be informed of the project and its impact on the surrounding roadway system, including Haleakala, Nanakuli and Mano Avenues.
6. The last paragraph on Page 2-16 discusses the Haleakala Avenue/Mano Avenue/Palikea Street intersection. However, in this same paragraph, Mano Avenue/Palikea Street is identified as Mano Avenue. This paragraph should be consistent in its reference to this section of roadway.
7. The last sentence on Page 2-20 states that coordination of work hours to avoid peak traffic hours will mitigate short-term traffic impacts. The measures that will be taken to accomplish this coordination, such as restricting the movement of construction-related vehicles to off-peak traffic hours, should be discussed.
8. Corrections similar to those made to respond to Comment No. 6 should be made to Appendix G, Traffic Impact Report for the Nanakuli IV Elementary School. Also, the second sentence in Paragraph e. Haleakala Avenue and Mano Avenue on Page 13 of Appendix G should refer to Haleakala Avenue and not Nanakuli Avenue.

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

Cheryl D Soon

CHERYL D. SOON
Director

cc: Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control

Mr. Earl Matsukawa, Project Manager
Wilson Okamoto & Associates, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. (P)1039.1

JAN 24 2001

RECEIVED
JAN 26 2001
WILSON OKAMOTO & ASSOC., INC.

Ms. Cheryl Soon, Director
Department of Transportation Services
City and County of Honolulu
711 Kapiolani Boulevard, Suite 1200
Honolulu, Hawaii 96813

Dear Ms. Soon:

Subject: Draft Environmental Assessment (EA)
Nanakuli IV Elementary School
Tax Map Key: 8-9-02: 65, 23, and portion of 1

Thank you for your letter dated December 27, 2000 regarding the subject Draft EA. The following responses are provided in the respective order of your comments:

1. The traffic impact assessment prepared for the Draft EA (Appendix G) concludes that operation of the proposed school will not significantly impact existing traffic conditions. In general, relocating Nanaikapono Elementary School to the mauka side of Farrington Highway will provide safer transportation and pedestrian access for students. To accommodate the change in pattern of vehicular and pedestrian traffic, improvements such as signs, crosswalks, and barriers may be necessary for safe pedestrian access in the vicinity of the project site, as discussed in Section 2.11 of the Draft EA. The advantage of developing an additional access point to the project site from Haleakala Avenue will be examined if and when the opportunity to acquire a suitable parcel arises in the future.

2. As discussed above, improvements may include signs, crosswalks and barriers. Inasmuch as Mano Street is a local road, it is not wide enough to accommodate a raised median.

3. The drop-off/pick-up area for students arriving by car is located along the sidewalk area fronting the playground, administration building and library, as shown in Figure 1-6 of the Draft EA. The drop-off/pick-up area is located along a loop driveway from Mano Street that circumscribes the faculty/visitor parking lot. Located entirely within the campus, the driveway and drop-off/pick-up area are designed to operate efficiently, thereby deterring drop-offs/pick-ups along surrounding streets.

4. Loading and unloading of supplies will be accommodated at the aforementioned drop-off/pick up area for the administration building and library. A separate loading and unloading area will be provided at the cafeteria, which has been correctly labeled in Figure 1-4 for the Final EA. A third loading/unloading area is provided at the mechanical/electrical building.

5. Copies of the Draft EA were sent to the Waianae Neighborhood Board, Nanakuli Homestead Association, Nanakuli Neighborhood Housing Services, and local libraries.

6. The sentence you refer to on Page 2-16 of the Draft EA and Tables 2-1 to 2-3 will be revised accordingly in the Final EA.

7. Page 2-21 lists examples of measures that may be taken, as appropriate, to mitigate potential vehicular and pedestrian traffic impacts. One of these measures is restricting transport of construction vehicles during the peak traffic hours.

8. The corrections noted in Appendix G-Traffic Impact Report of the Draft EA will be incorporated in the Final EA.

We appreciate your participation in the Draft EA review process. Your letter, along with this response, will be reproduced in the Final EA.

Sincerely,

Gordon Matsuoka

GORDON MATSUOKA
Public Works Administrator

RY:mo
cc: Mr. Earl Matsukawa, Wilson Okamoto & Associates, Inc.
Mr. John Toguchi, Kober Hanssen Mitchell Architects

8. REFERENCES

1. City and County of Honolulu, Department of Land Utilization. *Coastal View Study*. 1987.

2. City and County of Honolulu, Department of Planning and Permitting. *General Plan Objectives and Policies*. 1992.

3. City and County of Honolulu, Department of Planning and Permitting. *Tsunami Evacuation Oahu Map 16: Pokai Bay to Kahe Point*. March 1999.

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5. DHM inc. *Nanakuli III Elementary School Final Environmental Impact Statement and Site Selection Study*. February 1995.

6. DHM inc. *New Nanakuli Public Library Final Environmental Impact Statement and Site Selection*. November 1994.

7. Department of Education. *Educational Specifications and Standards for Facilities Volume 1: The Elementary School*. July 1992.

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9. Hawaii State Department of Agriculture. *The Agricultural Lands of Importance in the State of Hawaii*. 1977.

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11. Kabushiki Kaisha Oban. *Final Environmental Impact Statement Lualualei Golf Course*. April 1991.

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14. Macdonald, Gordon A., A.T. Abbott and Frank L. Peterson. *Volcanoes in the Sea, The Geology of Hawaii*. Second Edition 1986.

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17. Takasaki, Kiyoshi J. *Ground Water in the Waianae District, Oahu, Hawaii*. United States Geological Survey, 1971.

18. United States Bureau of Census. *1990 Census of Population and Housing Census Tracts, Hawaii*, 1993.

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

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Appendix A

Preliminary Soils Study

PRELIMINARY SOILS STUDY FOR SITE EVALUATION/ ENVIRONMENTAL ASSESSMENT NANAKULI IV ELEMENTARY SCHOOL NANAKULI, WAIANAE, OAHU, HAWAII DAGS JOB NO. 12-16-2285

for

KOBER/HANSSEN/MITCHELL ARCHITECTS

ERNEST K. HIRATA & ASSOCIATES, INC.
W.O. 99-3189
September 2, 1999

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

ERNEST K. HIRATA, P.E.
PAUL S. MORIMOTO, P.E.
DAVID M. KITAMURA, P.E.
JUNG K. KIM, P.E.
CON C. TRUONG, P.E.

99-1433 Koaha Place • Aiea, Hawaii 96701-3279
Phone: (808) 486-0787 • Fax: (808) 486-0870
E-mail: eha@aloha.net

September 2, 1999
W.O. 99-3189

Mr. John Toguchi
Kober/Hanssen/Mitchell Architects
55 Merchant Street, Suite 1400
Honolulu, Hawaii 96813

Dear Mr. Toguchi:

Our report, "Preliminary Soils Study for Site Evaluation/Environmental Assessment, Nanakuli IV Elementary School, Nanakuli, Waianae, Oahu, Hawaii, DAGS Job No. 12-16-2285," dated September 2, 1999, our Work Order 99-3189 is enclosed. This investigation was conducted in general conformance with the scope of work presented in our proposal dated June 10, 1999.

Medium hard coral was encountered throughout the site at shallow depths. It is our opinion that conventional shallow foundations founded on the coral layer should be adequate for support of the various school structures. Concrete slabs-on-grade will require only the standard gravel cushion and moisture barrier.

The following is a summary of our preliminary geotechnical recommendations. This summary is not intended to be a substitute for our report which includes more detailed explanations of our recommendations, as well as additional requirements.

- Allowable bearing value = 4000 psf
- Coefficient of friction = 0.4
- Passive earth pressure = 300 pcf

As indicated in our report, the preliminary recommendations are for planning purposes only. If the project proceeds beyond the Site Evaluation/Environmental Assessment phase, a complete foundation investigation, including additional borings at the proposed building sites, will be required for design.

We appreciate this opportunity to be of service. Should you have any questions concerning this report, please feel free to call on us.

Very truly yours,

ERNEST K. HIRATA & ASSOCIATES, INC.

Ernest K. Hirata
Ernest K. Hirata
President

EKH:CCT:ph

TABLE OF CONTENTS

APPENDIX

PRELIMINARY SOILS STUDY
FOR
SITE EVALUATION/ENVIRONMENTAL ASSESSMENT
NANAKULI IV ELEMENTARY SCHOOL
NANAKULI, WAIANAE, OAHU, HAWAII
DAGS JOB NO. 12-16-2285

INTRODUCTION

This report presents the results of our preliminary soils study performed for the Site Evaluation/Environmental Assessment of the proposed Nanakuli IV Elementary School in Nanakuli. Our work scope for this study included the following:

- A visual reconnaissance of the site and its vicinity to observe existing conditions which may affect the project. The general location of the project site is shown on the enclosed Location Map, Plate 1.
- A review of available in-house soils information pertinent to the site and the proposed project.
- Drilling and sampling five exploratory borings to depths ranging from approximately 20 to 26.5 feet. The soils encountered are described on the Boring Logs, Plates B1 through B5. The approximate exploratory boring locations are shown on the enclosed Boring Location Plan, Plate 2.
- Laboratory testing of selected soil samples. Testing procedures are presented in the Description of Laboratory Testing, Pages 1 and 2 in the Appendix, and test results are shown in the Description of Laboratory Testing, on the Boring Logs, and on Plates C1, C2, D1, D2, and E.
- Engineering analyses of the field and laboratory data.
- Preparation of this report which presents a description of the subsurface soils encountered, our opinion regarding the foundation types necessary to support the various school structures, as well as preliminary geotechnical design parameters for planning purposes.

PROJECT CONSIDERATIONS

Information concerning the proposed project was furnished by personnel from your staff, and Wilson Okamoto & Associates, Inc., Civil Engineers.

The proposed school will be located on 15 acres of the former Camp Andrews property in Nanakuli. The school buildings are expected to be one story in height with relatively light structural loads. The main access to the school will be from Mano Avenue with bus access provided from Farrington Highway.

We expect that grading for development of the school site will require both cutting and filling. Cuts will generally be required at the north end of the school site and along the main school access. Minor fills may be necessary in the areas fronting Farrington Highway.

SITE CONDITIONS

The proposed school site encompasses approximately 15 acres of land located on the northwest side of the drainage channel which bisects the former Camp Andrews property. The site is bordered by Farrington Highway on the south and single story residences on the north and west. Nanaikapono Elementary School is located diagonally across Farrington Highway to the southwest.

The property is relatively level, with a total relief on the order of 10 feet. Most of the site is covered by kiawe trees, stockpiles of construction rubble, and abandoned vehicles. Remains of previous building foundations and slabs-on-grade were observed throughout the site. Coral outcrops were also observed in selected areas.

FIELD EXPLORATION

The site was explored on June 29 and 30, 1999 by drilling five exploratory test borings with a truck-mounted Mobile B40-L22 drill rig. Four borings were drilled to depths of approximately 20 feet while one boring was drilled to a depth of about 26.5 feet.

The soils were continuously logged by our field engineer and classified by visual examination in accordance with the Unified Soil Classification System. A Boring Log Legend is presented on Plate A1; the Unified Soil Classification System is shown on Plate A2. The approximate boring locations are shown on Plate 2, and the soils encountered are logged on Plates B1 through B5.

Representative soil samples and core samples of coral were recovered from the borings for selected laboratory testing and analyses. Representative samples were obtained by driving a 3-inch O.D. thin-walled split tube sampler with a 140-pound hammer from a height of 30 inches. The blow counts required for 12 inches of penetration are shown at the appropriate depths on the enclosed Boring Logs. Core samples were obtained by drilling with a 4-inch diameter core barrel. Recovery percentages for each core run are also shown on the enclosed Boring Logs.

SOIL CONDITIONS

Tan coral was encountered in all of our borings at depths ranging from approximately 6 inches to 2 feet. This conforms to information in the Soil Survey prepared by the U.S. Soil Conservation Service which identifies the predominant soil in the project

area as coral outcrops. The coral was in a medium hard condition and extended to the maximum depths drilled in borings B1 through B3, and to depths of approximately 17 and 11.5 feet in borings B4 and B5, respectively.

Overlying the coral stratum was reddish brown silty clay in boring B1 and fill consisting of loose to medium dense silty gravel with sand in the remaining borings. The silty clay was in a medium stiff condition and had a dry and friable consistency. Laboratory testing on the silty clay indicated a slight expansion potential.

Underlying the coral layer in borings B4 and B5 were alluvial deposits consisting of brown silty clay with coral fragments and river-washed basalt gravel. The silty clay was in a medium stiff condition and extended to the maximum depths drilled.

Groundwater was encountered in our borings at depths ranging from about 15.4 to 17.1 feet below existing grade.

CONCLUSIONS

Based on the results of our exploratory borings, laboratory testing, and engineering analyses, it is our opinion that from a geotechnical viewpoint, the site is feasible for development of the proposed school. Conventional shallow foundations should be adequate for support of the various school structures.

Since coral was encountered at shallow depths throughout the project site, we recommend that preliminary planning assume that all building footings will be founded on the medium hard coral. Although cavities were not encountered in the coral stratum, we believe that a probing and grouting program for the building foundations should be included in preliminary planning.

Depending on the building finish floor elevations, we believe that the slab-on-grade subgrades will expose either new compacted fill or the medium hard coral. The slabs will therefore require only the standard 4-inch gravel cushion and moisture barrier.

Only a thin layer of surface soil overlies the coral stratum and we believe that much of the soils will be removed during the clearing and grubbing operations. In building areas prior to fill placement, the onsite silty gravel may be left in place after scarifying and recompaction. However, we believe that the reddish brown silty clay will be difficult to recompact and should therefore be stripped from the building areas for reuse in non-structural fill areas.

Our borings indicate that the coral stratum is in a medium hard condition. We expect that mass excavations into the coral can generally be accomplished using a large bulldozer with rippers. However confined excavations, such as those required for utility trenches or footing excavations, will probably require pneumatic equipment.

PRELIMINARY RECOMMENDATIONS

Preliminary design parameters are presented for planning and cost estimating purposes only and should not be used for design. A final foundation investigation, including additional borings at the selected building sites, will be required during the design phase of the proposed school project.

Foundations

Conventional spread footings founded on medium hard coral may be used to support the proposed school structures. An allowable bearing value on the order of 4000 pounds per square foot may be assumed for planning purposes. A probing and grouting program to check for cavities below the building foundations is recommended.

If applicable, building foundations located adjacent to the drainage channel should be embedded below an imaginary plane extending upward from the bottom of existing channel wall at a 45 degree angle from the horizontal. The purpose of this embedment is to reduce the additional lateral stresses on the channel wall imposed by the foundation loads.

Lateral Design

The bearing value indicated above is for the total of dead and frequently applied live loads, and may be increased by one-third for short duration loading which includes the effect of wind and seismic forces. Resistance to lateral loading may be provided by friction acting at the base of foundations and by passive earth pressure acting on the buried portions of foundations.

An allowable coefficient of friction of 0.4 may be used with the dead load forces. Passive earth pressure may be computed as an equivalent fluid having a density of 300 pounds per cubic foot with a maximum earth pressure of 300 pounds per square foot. Unless covered by pavement or concrete slabs, the upper 12 inches of soil should not be considered in computing lateral resistance.

For active earth pressure considerations, equivalent fluid pressures of 40 and 55 pounds per cubic foot may be used for freestanding and restrained conditions, respectively. To prevent buildup of hydrostatic pressures, weepholes or subdrains should be included in the design of all retaining structures.

Slabs-on-Grade

Building slabs-on-grade will require only the standard 4-inch gravel cushion consisting of clean gravel, such as #3 Fine (ASTM C 33, No. 67). A plastic moisture barrier should overlie the gravel cushion.

Exterior slabs and concrete sidewalks should be underlain by at least 4 inches of compacted aggregate base course.

Pavement Design

Preliminary planning and cost estimates for the main school access road and parking lot may assume the following flexible pavement section:

2.0"	Asphaltic Concrete
6.0"	Aggregate Base Course (minimum CBR = 85)
8.0"	Total Thickness

Planning for the school bus access road and bus drop off area may assume the following pavement section:

3.0"	Asphaltic Concrete
8.0"	Aggregate Base Course (minimum CBR = 85)
11.0"	Total Thickness

Site Grading

The surface silty gravel fill and excavated coral material may be reused in compacted fills provided all rock and coral fragments larger than three inches in maximum dimension are removed. The excavated coral should either be crushed or mixed to a well-graded gradation prior to reuse in fills.

Reuse of the onsite surface silty clay should be limited to non-structural fill areas.

We believe that mass excavations into the coral stratum can generally be accomplished using a large bulldozer with rippers. However, confined excavations, such as those required for utility trenches or footing excavations, may require pneumatic equipment.

LIMITATIONS

The boring logs indicate the approximate subsurface soil conditions encountered only at those times and locations where our borings were made, and may not represent conditions at other times and locations.

This report was prepared specifically for Kober/Hanssen/Mitchell Architects and their sub-consultants for the Nanakuli IV Elementary School Site Evaluation/ Environmental Assessment. The boring logs, laboratory test results, and preliminary recommendations presented in this report are for site evaluation and planning purposes only. If the project proceeds beyond the Site Evaluation/Environmental Assessment phase, a complete foundation investigation, including additional borings at the proposed building sites, will be required for design.

Our conclusions and preliminary recommendations are based upon the site materials observed, the preliminary design information made available, the data obtained from our site exploration, our engineering analyses, and our experience and engineering judgement. The conclusions and recommendations are professional opinions which we have strived to develop in a manner consistent with that level of care, skill, and competence ordinarily exercised by members of the profession in good standing, currently practicing under similar conditions. No other warranty is expressed or implied.

Respectfully submitted,

ERNEST K. HIRATA & ASSOCIATES, INC.

Con C. Truong, P.E.

Paul S. Morimoto
Paul S. Morimoto, P.E.

No 5299-C

This work was prepared by
me or under my supervision

APPENDIX

DESCRIPTION OF LABORATORY TESTING

CLASSIFICATION

Field classification was verified in the laboratory in accordance with the Unified Soil Classification System. Laboratory classification was determined by visual examination and sieve analysis testing. The final classifications are shown at the appropriate locations on the Boring Logs, Plates B1 through B5.

MOISTURE-DENSITY

Representative samples were tested for field moisture content and dry unit weight. The information was useful in providing a gross picture of the soil consistency between borings and any local variations. The dry unit weight was determined in pounds per cubic foot while the moisture content was determined as a percentage of dry weight. Samples were obtained using a 3-inch O.D. split tube sampler. Test results are shown at the appropriate depths on the Boring Logs, Plates B1 through B5.

SWELL TESTS

A swell test was performed to determine the relative expansiveness of the onsite soils. The test was performed on a remolded soil sample by placing a 90 psf surcharge load on a one-inch high specimen. The sample was inundated with water, and total expansion recorded after a period of at least 24 hours. The soil sample, obtained from ground surface near boring B4, was remolded to 90 percent of its maximum density at optimum moisture content. An expansion potential of 2.9 percent was recorded.

PROCTOR TESTS

Modified Proctor tests were performed on bag samples to determine the optimum moisture content at which the various soil types compact to 100 percent density. The tests were performed in general accordance with ASTM D 1557, and results are shown on Plates C1 and C2.

CALIFORNIA BEARING RATIO TESTS

CBR tests were performed on bag samples to evaluate the relative quality of subgrade soils to be used in the design of pavements. The tests were performed in general accordance with ASTM D 1883, and results are shown on Plates D1 and D2.

SIEVE ANALYSIS TESTS

A sieve analysis test was conducted on a bulk sample to determine the distribution of particle sizes in the soil. This test was used to classify granular soils and was conducted in general accordance with ASTM D 422. Test results are presented on Plate E.

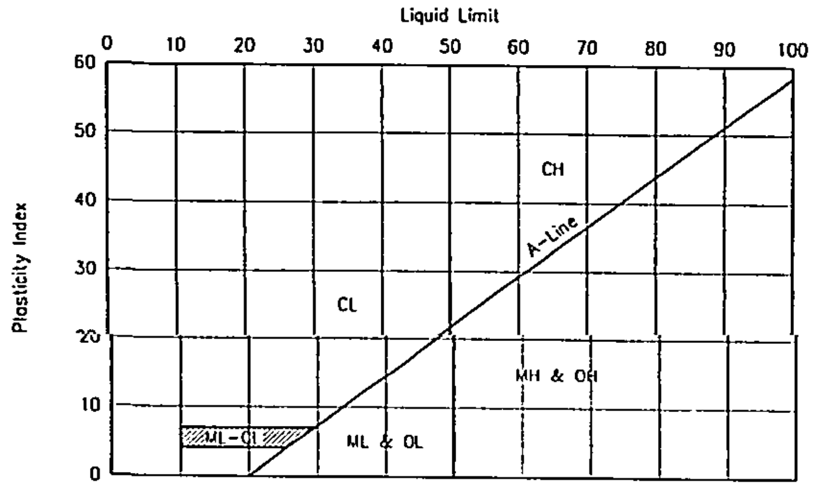
MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of the material is LARGER than No. 200 sieve size.)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines.)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines.)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size.)	CLEAN SANDS (Little or no fines.)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines.)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of the material is SMALLER than No. 200 sieve size.)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50.)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils.
				FRESH TO MODERATELY WEATHERED BASALT
				VOLCANIC TUFF / HIGHLY TO COMPLETELY WEATHERED BASALT
				CORAL

SAMPLE DEFINITION

- ☒ 2" O.D. Standard Split Spoon Sampler
- ☐ 3" O.D. Split Tube Sampler
- ☒ Shelby Tube
- NX / 4" Coring
- RQD Rock Quality Designation
- ▽ Water Level

W.O. 99-3189	Nanakuli IV Elementary School
Ernest K. Hirata & Associates, Inc.	BORING LOG LEGEND Plate A1

PLASTICITY CHART



GRADATION CHART

COMPONENT DEFINITIONS BY GRADATION	
COMPONENT	SIZE RANGE
Boulders	Above 12 in.
Cobbles	3 in. to 12 in.
Gravel	3 in. to No. 4 (4.76 mm)
Coarse gravel	3 in. to 3/4 in.
Fine gravel	3/4 in. to No. 4 (4.76 mm)
Sand	No. 4 (4.76 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.76 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and clay	Smaller than No. 200 (0.074 mm)

W.O. 99-3189	Nanakuli IV Elementary School
Ernest K. Hirata & Associates, Inc.	UNIFIED SOIL CLASSIFICATION SYSTEM Plate A2

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 99-3189

BORING NO. B1 DRIVING WT. 140 lb. DATE OF DRILLING 6/29/99
SURFACE ELEV. 13.6±* DROP 30 in. WATER LEVEL @ 15.4 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0	▨					Silty CLAY (CL-ML) - Reddish brown, slightly moist, medium stiff, with sand and coral gravel.
	▨	▮				CORAL - Tan, medium hard, fragmented. Begin 4-inch coring at 2 feet. 63% Recovery from 2 to 7 feet.
5	▨	▮				93% Recovery from 7 to 12 feet.
10	▨	▮				95% Recovery from 12 to 17 feet. Highly fragmented from 12 feet.
∇	▨	▮				100% Recovery from 17 to 20 feet.
20						End boring at 20 feet.
25						
30						• Elevations based on Topographic Survey Map provided by Controlpoint Surveying, Inc.

Plate B1

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 99-3189

BORING NO. B2 DRIVING WT. 140 lb. DATE OF DRILLING 6/29/99
SURFACE ELEV. 16± DROP 30 in. WATER LEVEL @ 16.2 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0	▨					Silty GRAVEL (GM-GP) - Brown, slightly moist, medium dense, with sand.
	▨	▮				CORAL - Tan, medium hard, fragmented. Begin 4-inch coring at 2 feet. 100% Recovery from 2 to 7 feet.
5	▨	▮				100% Recovery from 7 to 12 feet.
10	▨	▮				80% Recovery from 12 to 17 feet.
15 ∇	▨	▮				33% Recovery from 17 to 20 feet. Medium dense from 18 feet (coral rubblestone)
20						End boring at 20 feet.
25						
30						

Plate B2

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 99-3189

BORING NO. B3
SURFACE ELEV. 17.5±
DRIVING WT. 140 lb.
DROP 30 in.
DATE OF DRILLING 6/29/99
WATER LEVEL @ 16.2 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty GRAVEL (GM-GP) - Brown, slightly moist, medium dense, with sand.
						CORAL - Tan, medium hard, fragmented. Begin 4-inch coring at 2 feet. 100% Recovery from 2 to 7 feet.
5						98% Recovery from 7 to 12 feet.
10						Highly fragmented from 11 feet. 90% Recovery from 12 to 17 feet.
15 ∇						83% Recovery from 17 to 20 feet.
20						End boring at 20 feet.
25						
30						

Plate B3

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 99-3189

BORING NO. B4
SURFACE ELEV. 20±
DRIVING WT. 140 lb.
DROP 30 in.
DATE OF DRILLING 6/30/99
WATER LEVEL 16.7 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty GRAVEL (GM-GP) - Brown, slightly moist, medium dense, with sand.
						CORAL - Tan, medium hard, fragmented. Begin 4-inch coring at 1 foot. 100% Recovery from 1 to 6 feet.
5						100% Recovery from 6 to 11 feet.
10						71% Recovery from 11 to 16 feet.
15 ∇						Highly fragmented from 14.5 feet, dense. 25% Recovery from 16 to 20 feet.
						Silty CLAY (MH) - Brown, medium stiff, with sand, gravel, and cobbles.
20						End boring at 20 feet.
25						
30						

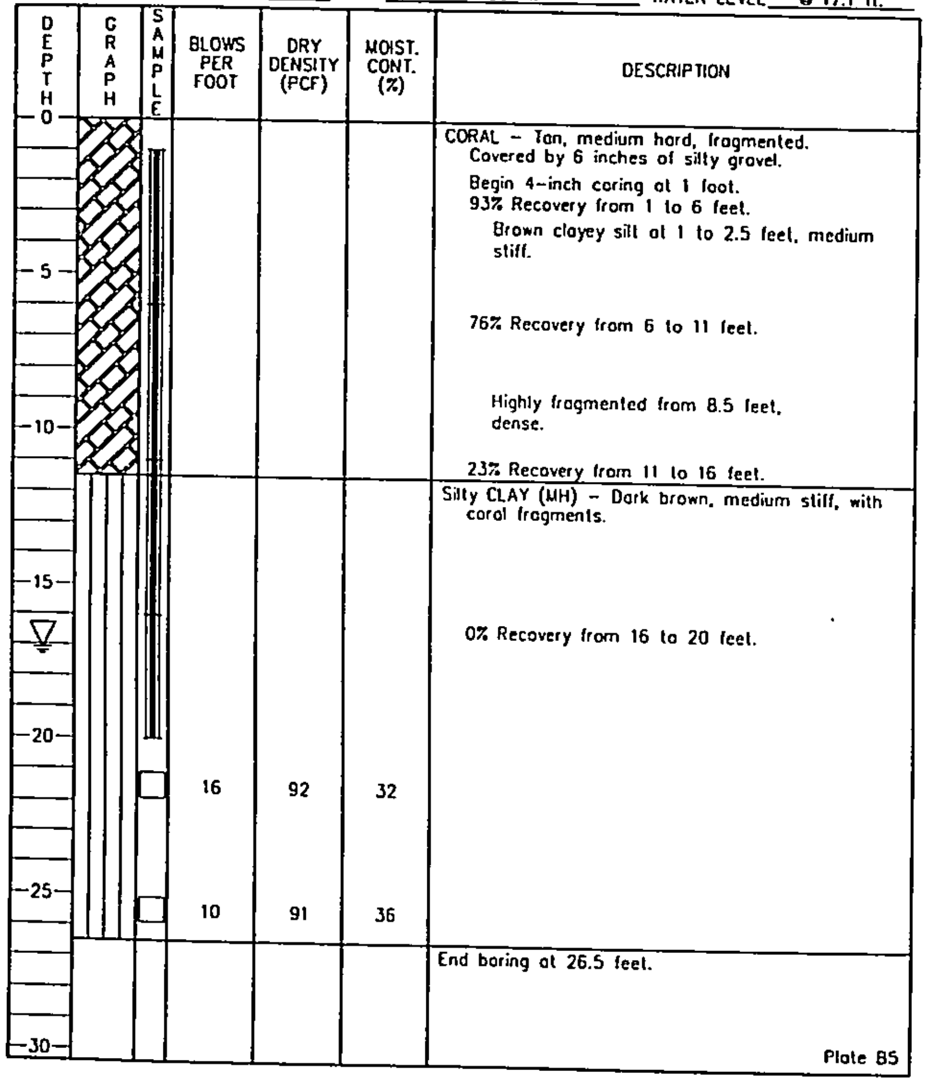
Plate B4

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

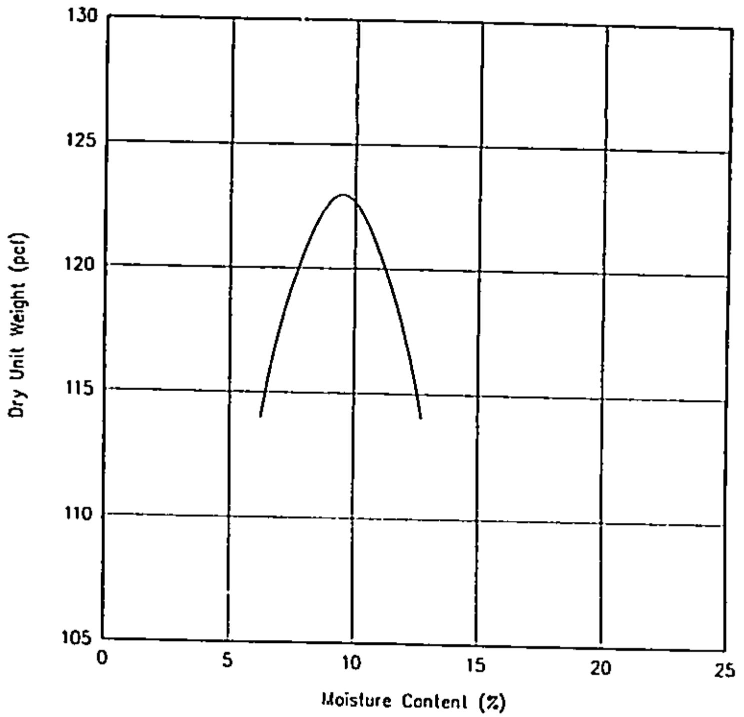
W.O. 99-3189

BORING NO. B5
SURFACE ELEV. 19±
DRIVING WT. 140 lb.
DROP 30 in.
DATE OF DRILLING 6/30/99
WATER LEVEL @ 17.1 ft.



DEPTH	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0				CORAL – Tan, medium hard, fragmented. Covered by 6 inches of silty gravel. Begin 4-inch coring at 1 foot. 93% Recovery from 1 to 6 feet. Brown clayey silt at 1 to 2.5 feet, medium stiff. 76% Recovery from 6 to 11 feet. Highly fragmented from 8.5 feet, dense. 23% Recovery from 11 to 16 feet.
11				Silty CLAY (MH) – Dark brown, medium stiff, with coral fragments. 0% Recovery from 16 to 20 feet.
21.5	16	92	32	
25.5	10	91	36	
26.5				End boring at 26.5 feet.

Plate B5

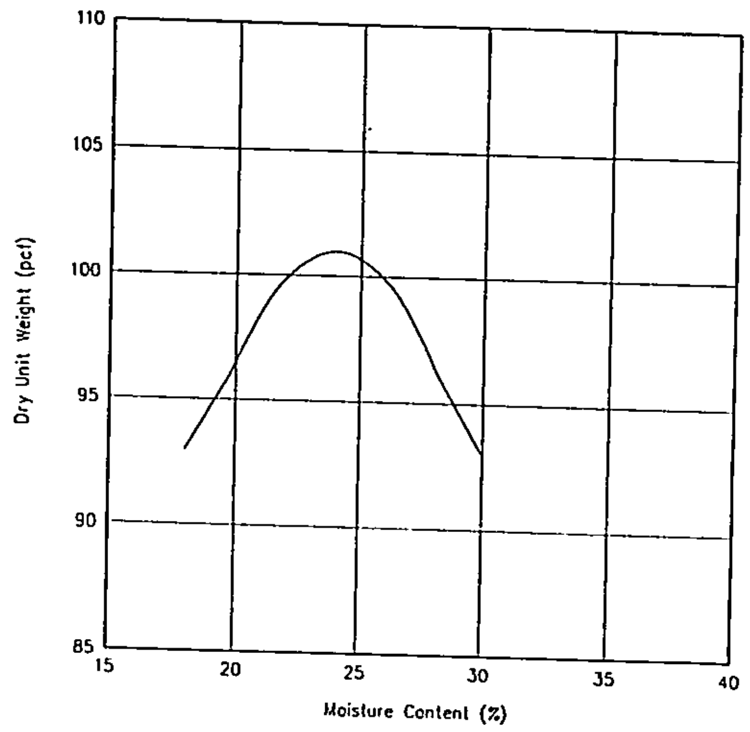


Soil Data
Location: Boring B3 @ surface
Description: Brown silty gravel with sand

Test Results
Maximum Dry Density: 123 pcf
Optimum Moisture Content: 9.5%

W.O. 99-3189	Nanakuli IV Elementary School
Ernest K. Hirata & Associates, Inc.	MODIFIED PROCTOR CURVE

Plate C1



Soil Data

Location:	Near boring B4 @ surface
Description:	Dark reddish brown silty clay with sand

Test Results

Maximum Dry Density:	101 pcf
Optimum Moisture Content:	24%

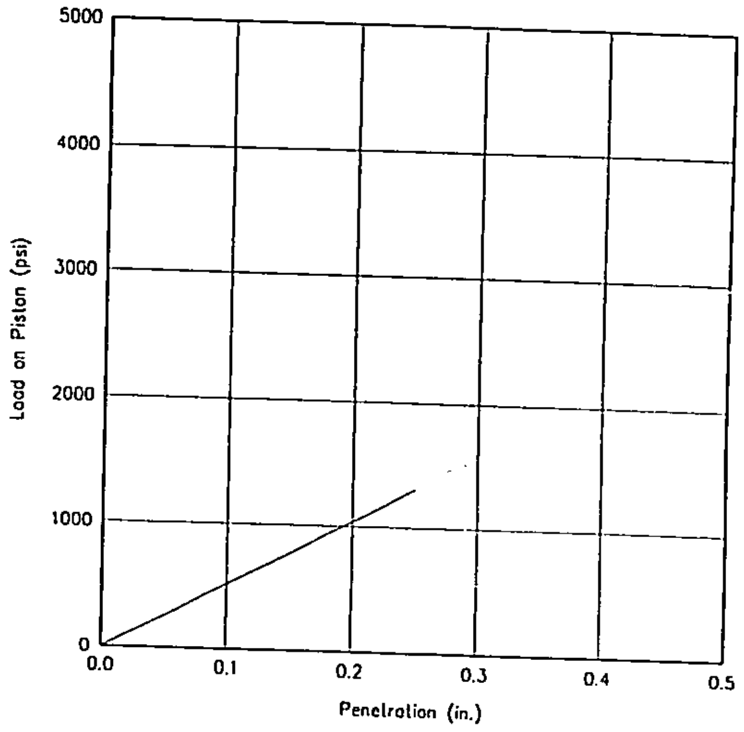
W.O. 99-3189

Ernest K. Hirata
& Associates, Inc.

Nanakuli IV Elementary School

MODIFIED PROCTOR CURVE

Plate C2



Soil Data

Location:	Boring B3 @ surface
Description:	Brown silty gravel with sand
Sample Dry Density:	123 pcf
Sample Moisture Content:	9%

Test Results

CBR Value:	53%
Expansion:	0.0%

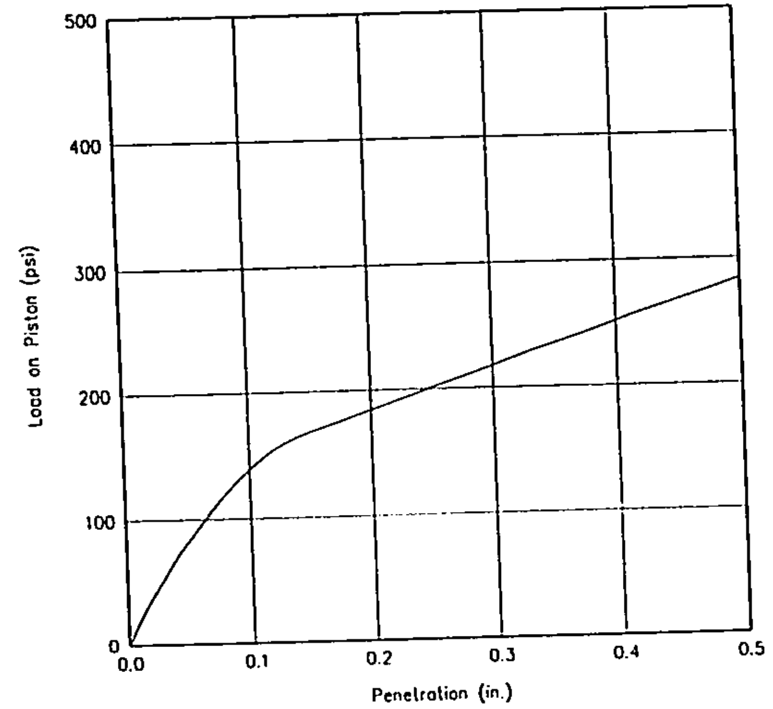
W.O. 99-3189

Ernest K. Hirata
& Associates, Inc.

Nanakuli IV Elementary School

CBR STRESS PENETRATION CURVE

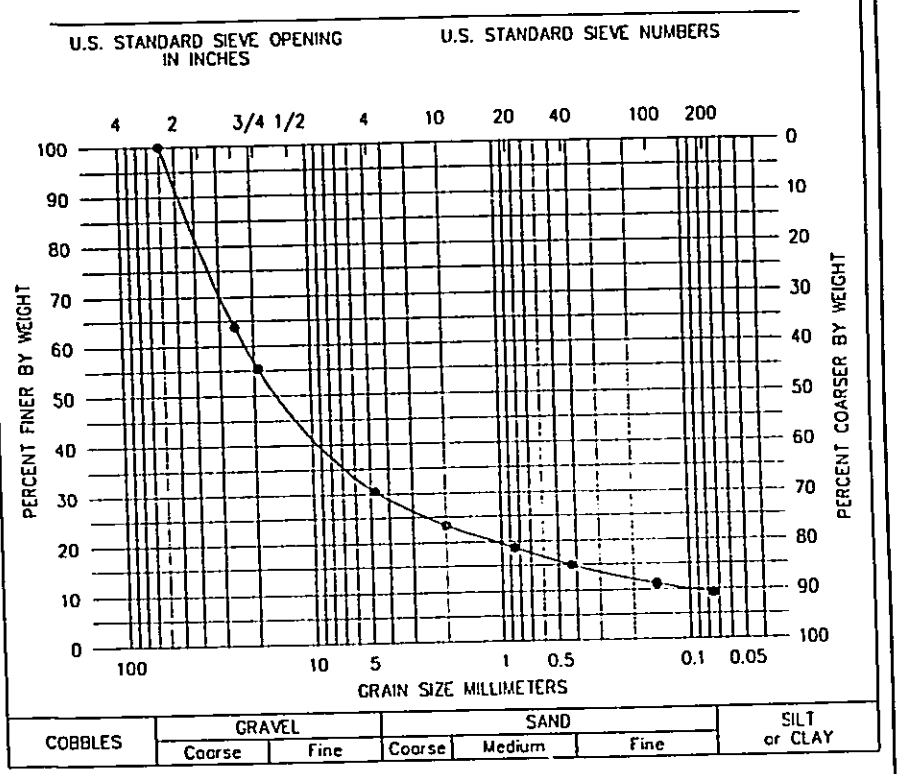
Plate D1



Soil Data
Location: Near boring B4 @ surface
Description: Dark reddish brown silty clay with sand
Sample Dry Density: 99.8 pcf
Sample Moisture Content: 24.8%

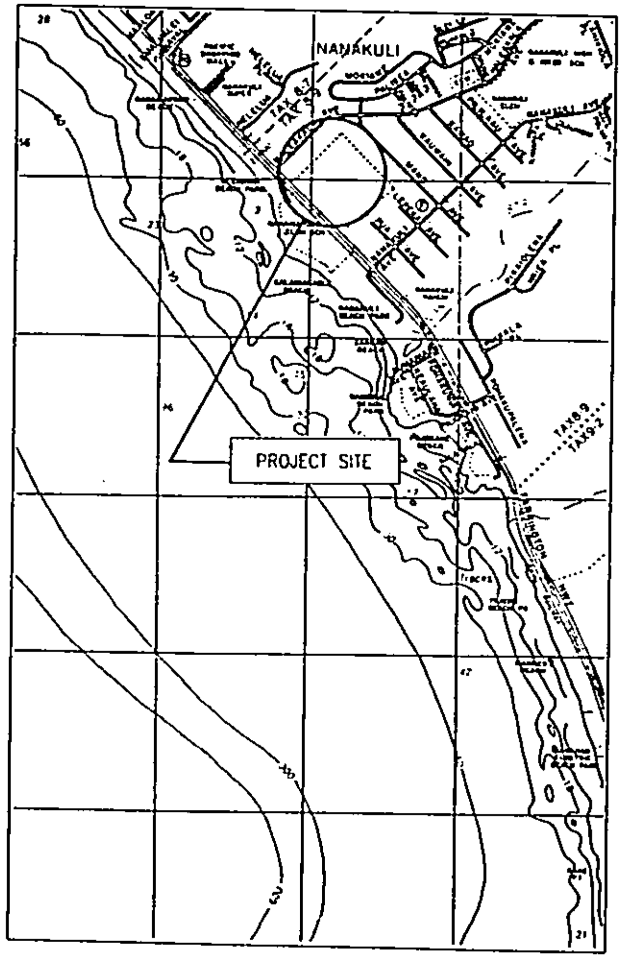
Test Results
CBR Value: 14%
Expansion: 2.2%

W.O. 99-3189	Nanakuli IV Elementary School
Ernest K. Hirata & Associates, Inc.	CBR STRESS PENETRATION CURVE Plate D2



● Sample #1	Location:	Boring B3 @ surface
	Description:	Brown silty gravel with sand

W.O. 99-3189	Nanakuli IV Elementary School
Ernest K. Hirata & Associates, Inc.	GRADATION CURVES Plate E



Reference: Bryan's Sectional Maps, 1999 Edition
(Copyright J.R. Clere, used with permission)

Scale: 1:24,000

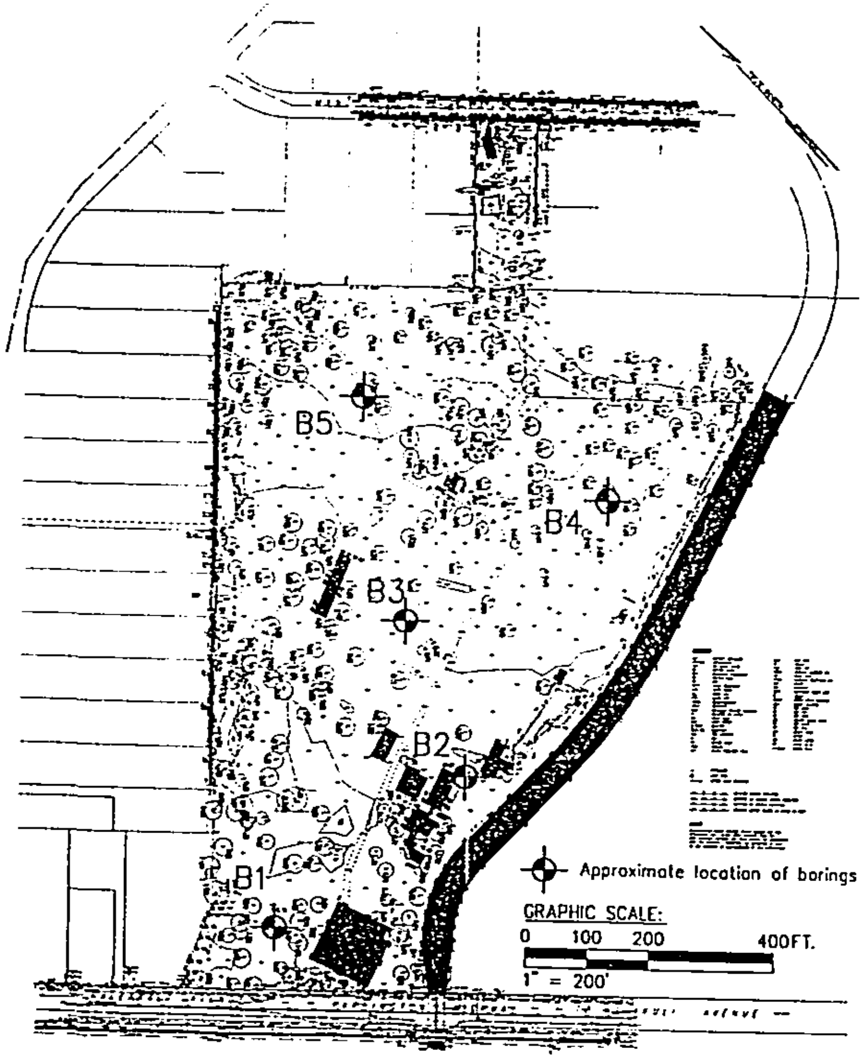
W.O. 99-3189

Nanakuli IV Elementary School, Waianae

Ernest K. Hirata
& Associates, Inc.

LOCATION MAP

Plate 1



Reference: Topographic Survey Map prepared by ControlPoint Surveying, Inc.

W.O. 99-3189

Nanakuli IV Elementary School

Ernest K. Hirata
& Associates, Inc.

BORING LOCATION PLAN

Plate 2

Appendix B

Flora/Fauna Study Report

FLORA/FAUNA SURVEY REPORT FOR THE PROPOSED NANAKULI IV ELEMENTARY SCHOOL SITE

FOR
WILSON OKAMOTO & ASSOCIATES INC.
1907 SOUTH BERETANIA STREET, SUITE 400
HONOLULU, HAWAII 96826

BY
EVANGELINE J. FUNK, PH.D.
BOTANICAL CONSULTANTS
HONOLULU, HAWAII
1999

TABLE OF CONTENTS

INTRODUCTION

A botanical survey of approximately 15 acres of the former Camp Andrews property to be known as the proposed Nanakuli IV Elementary School site was carried out on December 7, 1999. The proposed site is located on the nortwestern side of the drainage canal that bisects the former Camp Andrews property on Farrington Highway, Nanakuli, Oahu, Hawaii.

The purpose of the survey was to describe the vegetation of the site and to determine the presence of any candidate, proposed, listed threatened or endangered plant species as set forth in the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543). The results of the survey are presented below.

BOTANICAL HISTORY

The proposed Nanakuli Elementary IV School site is located in Zone A or the scrub formation of Ripperton and Hosaka (1942). In this zone they described the "coastal fringe" as algaroba trees (kiawe or *Prosopis pallida* (Humb.& Bonpl. ex Willd.) Kunth) where "all of the dominants are well established exotics" (alien). The principal shrubs are klu (*Acacia farnesiana* (L.) Willd.), koa haole (*Leucaena leucocephela* (Lam.) deWit),and ʻilima (*Sida fallax* Walp.). There was no mention of the perennial grasses that are now so common on the site.

In a 1984 Flora and Fauna Report of the nearby Naval Magazine, Lualualei (U.S. Navy Contract N62742-84-0082) 1984) the area was described as "koa haole/kiawe scrub where most of the open area is covered by perennial buffel grass (*Cenchrus ciliaris* L.)".

Of the twenty-seven environmental documents filed for projects in the Nanakuli area since 1972, seventeen have been negative declarations (ND), two have been for special management areas (SMA), and eight have been final environmental impact statements (FEIS). A typical description of the flora in a ND is "the lots are covered with a variety of weeds and grasses (almost exclusively introduced species) as well as some trees and scrub brush. Characteristic plants found in this low lying area include kiawe trees, koa haole, finger and pili grass (Atlas of Hawaii 1973).---, the vegetation is typical of second growth" (Belt Collins 1992, RMTC 1992).

The flora of an SMA site was described as "the project site has for the most part been void of native vegetation foi many years ----.A few small palm trees, grass, and kiawe bushes and trees are scattered about the site (RMTC 1992)."

Much the same sort of description of the flora was to be found in the EIS's. One (DHM inc 1994) stated "----the existing vegetation consists primarily of non-native species including landscape plants, kiawe, koa haole, and dry scrambled grasses and shrubs."

METHODS

A two person team surveyed the project area by way of the walk through method which consisted of a walk around the periphery of the site with frequent forays into the central part of the site. All parts of the site were examined.

RESULTS

The vegetation of the site was found to be Kiawe/Buffel grass scrub. The kiawe trees are 10 to 15 meters in height and were found throughout the area. The understory was koa haole 2 to 4 meters in height. The koa haole understory was more commonly found along Farrington Highway where many Be-still trees (*Cascabela thevetia* (L.)

Lippold) also form part of the understory. The ground layer throughout the site was buffelgrass with some other grasses mixed in.

In many places could be found remnants of old plantings such as pencil tree (*Euphorbia tirucalli* L.), bow string hemp (*Sansevieria trifasciata* Prain), aloe (*Aloe vera* L.), and tamarind trees (*Tamarindus indica* L.). In some places some of these form dense, drought resistant stands.

CONCLUSIONS

The vegetation found on the proposed Nanakuli Elementary IV School site can be found on low elevation, leeward places on most Hawaiian Islands. It is made up of mostly alien species which are considered to be of no value. No great harm will result from the clearing of this site.

ENDANGERED SPECIES

No proposed or listed threatened or endangered species as set forth in the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543), are known to occur in this area and none were found during this survey.

SPECIES LIST OF THE PLANTS FOUND ON THE PROPOSED NANAKULI IV ELEMENTARY SCHOOL SITE

The plant families in the following species list have been alphabetically arranged within two groups, Monocotyledons, and Dicotyledons. The genera and species are arranged alphabetically within families. The taxonomy and nomenclature follow that of Wagner, Herbst, and Sohmer (1990). For each taxon the following information is provided:

1. An asterisk before the plant name indicates a plant introduced to the Hawaiian Islands since Cook or by the aborigines.
2. The scientific name of the plant.
3. The Hawaiian name or the most widely used common name of the plant.
4. Abundance ratings are for this site only and they have the following meanings:
    - Uncommon = a plant that was found less than five times.
    - Occasional = a plant that was found between five and ten times.
    - Common = a plant considered an important part of the vegetation.
    - Locally abundant = plants found in large numbers over a limited area. For example the plants found in grassy patches.

This species list is the result of an extensive survey of this site during the dry fall season (December 1999) and it reflects the vegetative composition of the flora during a single season. Minor changes in the vegetation will occur due to introductions and losses and a slightly different species list would result from a survey conducted during a different growing season.

Scientific Name	Common Name	Abundance
MONOCOTYLEDONS		
AGAVACEAE – Agave Family		
•*Sansevieria trifasciata* Prain	Mother-in-law's tongue	Common
COMMELINACEAE - Spiderwort Family		
•*Commelina diffusa* N. L. Burm.	Honohono	Locally abundant
LILIACEAE – Lily Family		
•*Aloe vera* L.	Aloe	Locally abundant
POACEAE - Grass Family		
•*Cenchrus ciliaris* L.	Buffel Grass	Common
•*Chloris barbata* (L.) Sw.	Swollen fingergrass	Common
•*Eragrostis ciliarensis* (All.) Link	Stink grass	Occasional
•*Eragrostis tenella* (L.) P. Beauv. ExRoem. & Schult.	Love grass	Occasional
•*Panicum maximum* Jacq.	Guinea grass	Common
•*Paspalum conjugatum* Bergius	Hilo grass	Locally abundant
DICOTYLEDONES		
ACANTHACEAE – Acanthus Family		
•*Asystasia gangetica* (L.) T. Anderson	Chinese violet	Locally abundant
AMARANTHACEAE – Amaranth Family		
•*Achyranthes aspera* L.		Occasional
ANACARDIACEAE – Mango Family		
•*Schinus terebinthifolius* Raddi	Christmas berry	Occasional
APOCYNACEAE – Dogbane Family		
•*Cascabeta theveta* (L.) Lippold	Be-still tree	Common

Scientific Name	Common Name	Abundance
ASTERACEAE – Sunflower Family		
•*Pluchea x fosbergii* Cooperr. & Galang		Uncommon
•*Pluchea symphytifolia* (Mill.) Gillis	Sourbush	Common
•*Sonchus oleraceus* L.	Sow thistle	Occasional
•*Tridax procumbens* L.	Coat buttons	Locally abundant
•*Verbesina enceliodes* (Cav.) Benth. & Hook.	Golden crown beard	
BORAGINACEAE – Borage Family		
•*Heliotropium procumbens* Mill.		Occasional
CHENOPODIACEAE – Goosefoot Family		
•*Chenopodium murale* L.	Aheahea	Locally abundant
CONVOLVULACEAE Morning glory Family		
•*Ipomoea obscura* (L.) Ker-Gawl		Occasional
•*Merremia aegyptica* (L.) Urb.	Hairy merremia	Uncommon
CUCURBITACEAE – Gourd Family		
•*Coccinia grandis* (L.) Voight	Ivy gourd	Occasional
EUPHORBIACEAE – Spurge Family		
•*Chamaesyce hirta* (L.) Millsp.	Hairy spurge	Occasional
•*Euphorbia tirucalli* L.	Pencil tree	Occasional
FABACEAE – Bean Family		
•*Acacia farnesiana* (L.) Willd.	Klu	Occasional
•*Cassia* sp.	Shower tree	Uncommon
•*Desmanthus virgatus* (L.) Willd.	Slender mimosa	Occasional
•*Indigofera spicata* Forssk.	Creeping indigo	Occasional
•*Leucaena leucocephala* (Lam.) de Wit	Koa haole	Common
•*Prosopis pallida* 9humb. & Bonpl. Ex Willd.) Kunth	Kiawe	Common
•*Tamarindus indica* L.	Tamarind	Occasional

Scientific Name	Common Name	Abundance
LAMIACEAE – Mint Family		
*_Hyptis pectinata_	Comb hyptis	Occasional
*_Leonurus sibiricus_ L	Lion's tail	Occasional
MALVACEAE – Mallow Family		
*_Malvastrum coromandelianum_ (L.) Garcke	False mallow	Occasional
*_Malva parviflora_ L.	Cheese weed	Locally abundant
*_Sida fallax_ L.	Ilima	Occasional
*_Sida rhombifolia_ L.		Occasional
*_Sida spinosa_ L.	Prickly sida	Occasional
MORACEAE – Fig Family		
*_Ficus microcarpa_ L. fil.	Chinese banyan	Occasional
NYCTAGINACEAE – Four-o'clock Family		
*_Boerhavia coccinea_ Mill.		Occasional
PASSIFLORACEAE – Passion Flower Family		
*_Passiflora foetida_ L.	Love-in-a-mist	Occasional
PORTULACACEAE – Purslane Family		
*_Portulaca oleracea_ L	Pig weed	Occasional
STERCULIACEAE Cacao Family		
Waltheria indica L.	'Uhaloa	Common
VERBENACEAE – Verbena Family		
*_Stachytarpheta jamaicensis_ (L.) Vahl	Vervain	Occasional
Vitex rotundifolia L. fil.	Beach vitex	Occasional

FAUNA SURVEY REPORT FOR THE PROPOSED NANAKULI IV ELEMENTRY SCHOOL SITE

INTRODUCTION AND METHODS

This report summarizes the results of a fauna survey of the proposed Nanakuli IV Elementry School Site located on the former Camp Andrews property in Nanakuli, Hawaii on Farrington Highway. This survey was carried out on December 9, 1999 during the early morning hours to take advantage of the higher activity levels of both birds and mammals during cooler parts of the day.

The study site consists of approximately fourteen acres of land, the greater part of which is covered by Kiawe /Buffel grass Wasteland which at this time of year had shed most of its seed and offered little forage for seed eating birds.

To document the presence of the avifauna and mammals, three fixed station observation points of from twenty to thirty minutes duration were carried out.

RESULTS

No native vegetation was found on this site and the scrub, wasteland type vegetation which is most common and that usually attracts many introduced, seed eating birds was past the seed bearing stage. Therefore although there were some bird species, they were low in number except for spotted doves which were seen in large numbers.

MAMMALS

House Mouse (_Mus musculus_). Mice were not seen during this survey, but is assumed to be present because this is basically a grasssland where some seed is always available. The house mouse is usually six to seven inches long, including its tail, and weighs approximately one ounce. It varies in color depending on its home location.

Like the house mouse, the black rat (Rattus rattus) is presumed to be present on this site due to the dumping of household rubbish which appears to contain discarded food stuffs No rats were seen during the survey.

The Indian mongoose (*Herpestes auropunctatus auropunctatus*) is a small, grayish brown or golden colored mammal. It weighs one to three pounds and is a member of the cat family. Because of the food available on the site, i.e. bird eggs, young nestling birds, and plant seeds, the mongoose can be expected to inhabit the area although none were seen during the survey.

AVIFAUNA

The most rewarding observation station was the one in the central part of the site where the area was more open. A total of seven bird species were observed, none of which is native to the Hawaiian Islands.

Family Estrildidae: Waxbills, Mannikins, and Parrotfinches

Estrilda astrild (Common waxbill), the common waxbill is a very small, brown bird with a red bill and a red streak from its bill through its eye. Waxbills feed on weed seed and are usually found in small to large flocks. Waxbills were seen in low numbers at this site.

Family Passeridae: Old World Sparrows

Passer domesticus (House sparrow) The streaky brown and gray house sparrow is a familiar commensal species and is often referred to a flying mouse. A few of these little birds were seen in the central open part of the site near where household rubbish had been dumped.

Family Pycnonotidae: Bulbuls

Pycnonotus cafer (Red-vented bulbul). Large, raucous birds, red-vented bulbuls have a distinctive crest, and a white rump. Red vented bulbuls were seen in all parts of the site. These fruit eaters appear to be spreading ivy gourd seeds around the site, especially along the stream.

Family Columbidae: Pigeons and Doves

Streptopelia chinensis (Spotted Dove), the spotted dove is a large, gray brown bird with rosy blushed breast feathers. At the sides and back of its neck is a patch of black and white spots. Spotted doves were the most commonly seen birds on this site. Flocks of ten to fifteen birds were common.

Geopelia striata (Zebra Dove). Smaller and usually more abundant than the spotted dove, ground dwelling zebra doves were seen in trees, on the ground and flying about. They were not as plentiful as the spotted doves.

Columba livia (Rock Dove). A small flock of these chunky, fantailed pigeons flew over the site from east to west. There were usually five to seven birds in a group. Most of the birds were all white.

ENDANGERED SPECIES

No candidate, proposed, or listed threatened or endangered species as set forth in the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) are known from this site and none were found during this survey.

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Appendix C

Archaeological Assessment

ARCHAEOLOGICAL ASSESSMENT OF AN APPROXIMATELY 15-ACRE PARCEL, *AHUPUA'A* OF NĀNĀKULI, WAI'ANAE DISTRICT, ISLAND OF O'AHU
(TMK 8-9-02: 65)

by

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Prepared for

WILSON OKAMOTO AND ASSOCIATES

Cultural Surveys Hawaii
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I. INTRODUCTION

A. Project Background

At the request of Wilson Okamoto and Associates, Cultural Surveys Hawai'i has completed an archaeological assessment of an approximately 15-acre parcel (TMK 8-9-02:65) in the *Ahupua'a* of Nānākuli, Wai'anae District, on the island of O'ahu (Figures 1 & 2). The parcel is bounded by Farrington Highway on its southwest side, by a concrete drainage canal on its southeast side, and by houselots on its northwest and northeast sides. The parcel was formerly a portion of a military installation named Camp Andrews.

B. Scope of Work

1. Historical research to include study of archival sources, historic maps, Land Commission Awards and previous archaeological reports to construct a history of land use and to determine if archaeological sites have been recorded on or near this property.

2. Field inspection of the project area to identify any surface archaeological features and to investigate and assess the potential for impact to such sites. This assessment will identify any sensitive areas that may require further investigation or mitigation before the project proceeds. It is anticipated that remnant military features do exist and are presumably, at least in part, older than 50 years.

3. Preparation of a report to include the results of the historical research and the fieldwork with an assessment of archaeological potential based on that research, with recommendations for further archaeological work, if appropriate.

C. Methods

The project area was inspected on December 1 and 10, 1999. All portions of the project area were investigated and documented by field notes and photographs. Four shovel test units were excavated in various portions of the project area to assess possible presence of subsurface cultural materials.

Background research included a review of archaeological studies in the library of the State Historic Preservation Division; document searches at the Hawai'i State Archives, the U.S. Army Museum-Hawai'i, the Mission Houses Museum Library, the Hawai'i Public Library, the libraries of the University of Hawai'i-Manoa, and the Archives of the Bishop Museum; and a study of maps at the Survey Office of the Department of Land and Natural Resources.

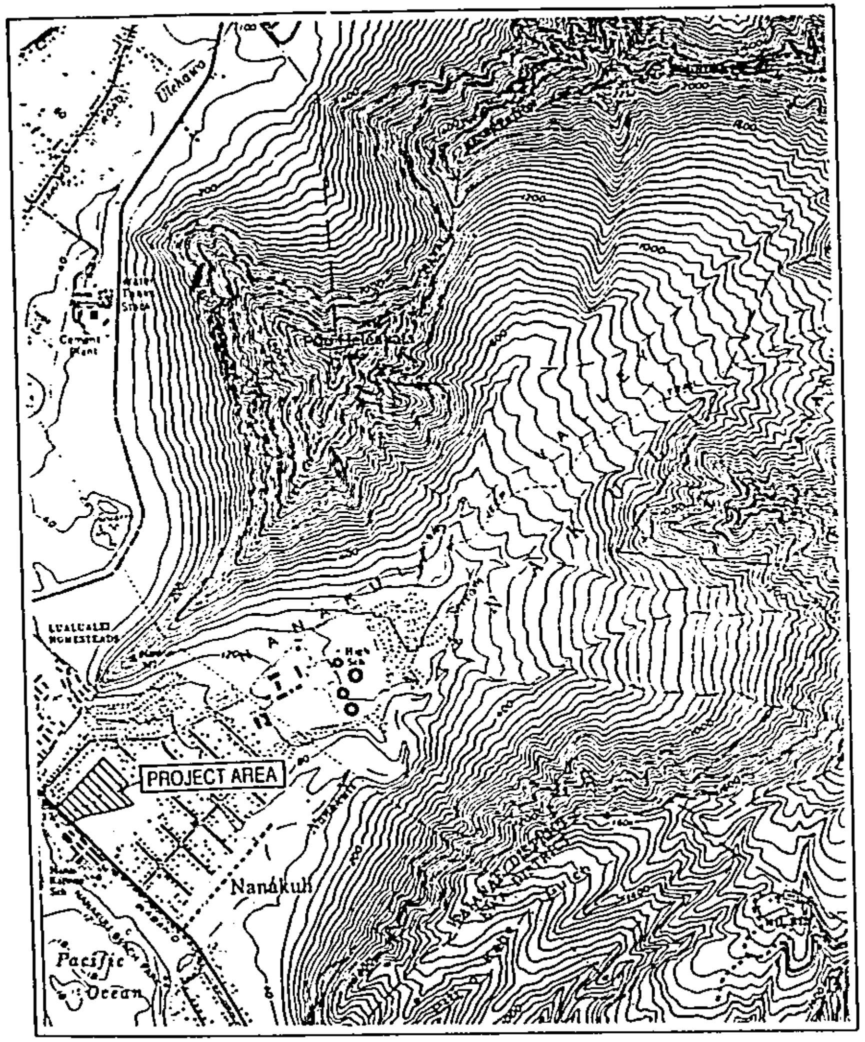

Figure 1 Portion of USGS 7.5 Minute Series Topographical Map, Schofield Barracks Quadrangle, showing present study area

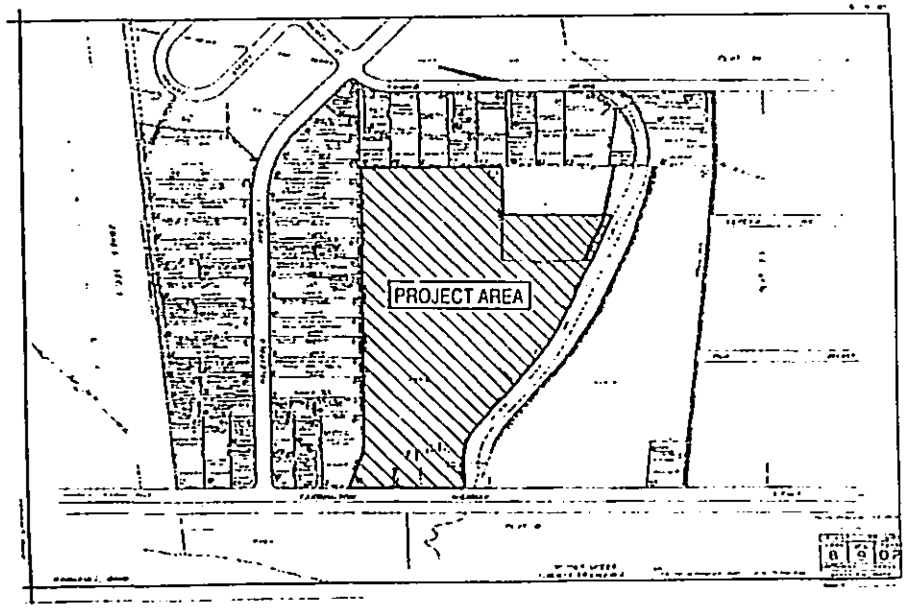

Figure 2 Tax map showing present study area (TMK 8-9-02:65)

II. NATURAL SETTING

The former Camp Andrews project area is located within Nānākuli Valley (*Ahupua`a* of Nānākuli ), on the leeward side of O`ahu, within the Wai`anae District. Nānākuli Valley encompasses a total area of 1,602 acres (Juvik and Juvik 1998; 306) and is presently home to 9,575 residents.

Nānākuli Valley is cut into the eroded remnants of the Wai`anae shield volcano, the first volcano to form what is now O`ahu (Abbott, Macdonald, Peterson 1983; 426). Nānākuli Valley is an amphitheater-headed erosional feature of the southeast rift zone of the Wai`anae shield volcano (*Ibid*; 218-221, 426). The prevailing winds in the area are the northeast trades that blow over the Ko`olau mountains then continue over the Wai`anae range and head out over the southwest potion of the island (Juvik and Juvik 1998; 55). This wind pattern is responsible for the relatively low rainfall averages on the leeward side of the island. The winds cause the rain to hit the Ko`olau Range first releasing most of their moisture there and then continue on over the Wai`anae Range releasing what moisture may be left (Abbott, Macdonald, Peterson 1983; 224). Based on data from the *Rainfall Atlas of Hawai`i* the mean annual rainfall around the project area is 31.5 inches (Giambelluca, Nullet, Schroeder 1986; 138). The majority of precipitation occurs during the rainy season, October-April, and less precipitation occurs May-September (*Ibid*; 139-150). Temperatures in the area range from 43-88 degrees Fahrenheit in January to 58-95 degrees Fahrenheit in July (UH-Department of Geography [Armstrong ed.] 1973; 58).

Before the introduction of the exotic species with Western contact, the native ecosystems of the area consisted of lowland dry and mesic forests, lowland dry shrub lands, and grasslands. These areas range from warm to very hot and dry. Today practically the entire area has been altered by human activity (Juvik and Juvik 1998; 122-123). Vegetation in the project area consists of *kiawe* (*Prosopis pallida*), *koa haole* (*Leucana hlauca*), lantana (*Lantana camara*) and grasses.

III. CULTURAL AND HISTORICAL BACKGROUND

A. The Greater Region of Wai`anae

Nānākuli in times of old, as today, was part of the District of Wai`anae on the leeward shore of O`ahu. In ancient times the District of Wai`anae was known for its abundant fish and especially for deep sea fishing off Ka`ena where the ocean currents meet. Handy and Handy (1972) attribute the naming of Wai`anae to a large fresh water pond for mullet called *Pueha*. Today, the waters off Wai`anae are still considered one of the best fishing grounds on O`ahu.

Wai`anae was also known for the independent lifestyle and attitudes of its inhabitants, another trend that continues into the modern day. This independence was a factor in many of the political struggles of the prehistoric and early historic period when the district was the scene of battles and rebellions and often the refuge of dissident and/or contentious factions. This independent spirit is often attributed to the conditioning of generations having to cope with marginal environments, as many areas of Wai`anae, especially Nānākuli, were notorious for their inhospitable climate. In Nānākuli, the lack of water for cultivation and consumption was balanced by the productivity of the marine resources available off-shore.

B. Nānākuli: Pre-Contact to Early 1800s

In 1793, Captain George Vancouver, sailing along the Wai`anae coast from Pu`uloa (Pearl Harbor), described the coast as "one barren rocky waste nearly destitute of verdure, cultivation or inhabitants" (Vancouver in McGrath 1973:17).The only village Vancouver observed was "at Wai`anae, located in a grove of coconut and other trees on the southern side of a small sandy bay" (*Ibid*). Along the rest of the coast he reported seeing only "a few straggling fishermen's huts" and "a small grove of shabby cocoanut trees" (*Ibid*). Undoubtedly there were also small settlements subsisting mainly on sweet potato, in the valleys where constant streams were lacking (Nānākuli and Mākua). In famine times, then, there was reef fishing, and the Wai`anae Mountains had wild banana, *ti*, fern, and other roots that were edible (Handy & Handy 1972:270-71).

Native accounts and those of early foreign observers paint only general sketches of indigenous life and culture in the *ahupua`a* of Nānākuli. Specific information regarding Nānākuli Valley during the early historic period is sparse. One of the first mentions of a coastal settlement in Nānākuli comes from a description by John Papa `Ī`ī describing a visit to an aunt in the early 1800s. No specific description of the settlement was given, other than an indication that breadfruit trees were growing near the shore (`Ī`ī 1983:28).

The *`ōku`u* epidemic of 1804 (thought to be cholera) undoubtedly had a major effect on the native Hawaiian population, not only in Wai`anae, but throughout the rest of the islands as well. John Papa `Ī`ī recalled that the *`ōku`u* "broke out, decimating the armies of Kamehameha I [on O`ahu]" (1983:16).

By 1811, sandalwood merchants began actively exploiting the Hawai`i market and huge amounts of sandalwood were exported to China. (Traditionally, Hawaiians used sandalwood for medicinal purposes and as a scent to perfume their *kapa*.) Kamehameha I and a few other chiefs controlled the bulk of the sandalwood trade. The sandalwood trade altered Hawaiian culture and the traditional lifestyle. In an effort to acquire western goods, ships, guns and ammunition, the chiefs had acquired massive debts to the American merchants (ʻĪʻī 1983:155). These debts were paid off in shiploads of sandalwood. While it is unclear how extensive Nānākuli's sandalwood resources were, the population shifts and disruption of traditional lifestyles and subsistence patterns initiated by the sandalwood trade would undoubtedly have affected the population of Nānākuli.

The Rev. William Ellis visited the Hawaiian Islands in 1823. At that time, he estimated the population on the island of Oʻahu to be about 20,000(Ellis 1974:19). Protestant missionaries were the first to gather systematic figures regarding population statistics throughout the various districts on each island. In the first censuses, specific population figures for Nānākuli were not recorded. However the population of the Waiʻanae District was recorded as 1,868 (in 1831-32) and 1,654 (in 1835-36) (Schmitt 1973:9).

Nānākuli, no doubt, sustained a sparse population, but to what extent is not exactly known. Environmental factors such as the dry, arid climate, low rainfall and geologic limitations, "much of the seaward portion of the valley is uplifted coral limestone that in some areas is thinly disguised with a shallow layer of soil" (Kelly in Haun *et al.*, 1991:310), were likely determinative constraints upon population density along the coast.

C. Mid-1800's: Land Commission Awards (LCAs)

At the time of the *Māhele*, the *ahupuaʻa* of Waiʻanae, which included Lualualei and Nānākuli, was listed as *Crown* lands and was claimed by King Kamehameha III as his personal property (Board of Commissioners 1929:28). As such, the land was under the direct control of the King.

In 1850, the Privy Council passed resolutions which would affirm the rights of the commoners or native tenants. To apply for fee-simple title to their lands, native tenants were required to file their claim with the Land Commission within the specified time period of February 1846 and February 14, 1848. The *Kuleana* Act of 1850 confirmed and protected the rights of native tenants.

In Nānākuli there was only one application for quiet title to lands during the time of the *Māhele*. Even though this award was not granted, it does give some insight into land use in Nānākuli Valley. In testimony taken from the Native Register, Kuluahi speaks of his lands in the *ʻili* of Hāpai:

> To the Land Commissioners: *ʻIli* of Hāpai, *Ahupuaʻa* of Nānākuli, Waiʻanae District, Oʻahu. I, the one whose name is below, have a *muliwai*, a pond, a cultivated *kula* and for firewood also, a valley planted in *wauke mauka*, and a *kula* house lot. It is finished. Kuluahi, X, his mark. January 17, 1848. (Native Register Vol. 5:342)

Unfortunately, these are the only clues remaining from the *Māhele* records which give any indication of traditional land use in Nānākuli.

Tax records for Nānākuli list eight people who paid a total of $26 for taxes in 1855. These people lived in the area, but did not file land claims. The tax payment in currency suggests that the traditional way of life is coming to an end and that people have switched over to a monetary system (Hawaiʻi State Archives: J.W. Makalena Tax Records). The records indicate that about 50 people resided along the shore. The population in the area dropped precipitously during the 1800's, and in 1888, the Hawaiian Island Directory referenced only four residents of Nānākuli (Hawaiʻi State Archives: J.W. Makalena Tax Records:7).

D. 1850s to 1900

Ranching

Much of the Crown Lands, of which Nānākuli was a part, were either sold, borrowed against as collateral or leased to generate income for the King (Kamehameha III) and his family. In the case of Nānākuli and nearby Lualualei, large portions were leased for the purposes of ranching. By the mid-1800's the back of Nānākuli valley appears to have been used solely for ranching purposes and probably did not support permanent habitation.

The first longhorn cattle had been brought to Oʻahu from Hawaiʻi island in 1809 by John Young and Kamehameha I (Kamakau 1992:268). One of the first areas to be utilized for ranching on the Waiʻanae coast was Lualualei. Bureau of Conveyance records show that William Jarrett leased approximately 17,000 acres of land from Kamehameha III in 1851. The lease was written for 30 years with a lease fee of $700 per year (B.C. Liber 4:616-618). It seems that Jarrett sold Paul F. Marin (son of Don Francisco de Paula Marin) one-half of his interest in the ranch. Marin lived on the ranch and managed it until 1864 when a dispute arose over the profits of the ranch. (Apparently, Marin had never turned over any ranch profits to Jarrett during the time he managed it.) After the dispute was settled, Jarrett took on George Galbraith as a new partner (B.C. Liber 18:31). In 1869, Jarrett sold the remaining years of his son's interest in Lualualei Ranch to James Dowsett (B. C. Liber 29:16-18). James Dowsett was an entrepreneur whose interests included:

> . . . a whaling fleet, a dairy, a salt works, an extensive trade in *awa* (a Hawaiian narcotic drink) and numerous land holdings . . . He also ran cattle at different times in Nānākuli, Mikilua and Lualualei. (McGrath 1973:32)

In 1880, George Bowser traveled through Waiʻanae and observed about Nānākuli:

> From the Lualualei Valley to the Nānākuli Valley I had a rather dreary ride of three miles. The intervening country towards the sea is barren, with a little pasturage at the base of the mountains. The track, however, is in very good order, much better than I expected to find it, looking to the mountainous and rocky character of the country through which it passes. At Nānākuli and at Hōʻaeʻae, close adjoining, the Messrs. Robinson have cattle ranches. The pasture here cannot be compared with that in the valleys I had just left behind, but inland among the mountain ranges it is much better. (Bowser 1880:494)

In 1894, Link McCandless entered the ranching scene:

> . . .he and a man named Tom King chartered the brigantine Oakland in Seattle, filled her hole with cattle and the cabins with feed, and sailed for Hawai'i. By the turn of the century, McCandless' ranching empire covered much of the Wai'anae Coast, including land at Nānākuli, 4,000 acres at Lualualei, San Andrews' property in Mākua and pastures toward Ka'ena Point. (McGrath 1973:31)

O'ahu Railway and Land Company

The O'ahu Railway and Land Company (OR&L) signed its charter on February 4, 1889. The Railway was the brainchild of Benjamin Franklin Dillingham. Along with James Castle and others, he had invested in large tracts of land for speculation and resale, but the idea was slow to catch on because "the land lay too far from Honolulu, at least 12 miles" (McGrath 1973:54). The railway was a means to provide transportation to the country and promote development of unoccupied lands, as well as connect with the sugar plantations in 'Ewa, Wai'anae, Waialua and Kahuku. Construction on the railway began in March of 1889. The first length of the railway was completed and opened to the public by January 1, 1890. Five years later, on July 4, 1895 the railway finally reached Wai'anae. The Railway served the Wai'anae coast until 1946 when the Wai'anae Sugar Plantation closed down.

E. Early 1900s to Present

Homesteading

There were two waves of homesteading on the Wai'anae Coast. The first had less of an impact on Nānākuli, while the second resulted in development of Nānākuli as a residential area. After the overthrow of the Hawaiian monarchy in 1893, the Crown Lands and the Government Lands were combined to become Public Lands. The Crown Lands were no longer indistinguishable and inalienable. In 1895, the Republic of Hawai'i decided to open up lands for homesteading in the hopes of attracting a "desirable class of immigrants" — Americans and those of Caucasian decent (Kuykendall & Day 1961:204).

In 1902, the Government ran notices in the local newspapers announcing its intent to open up land in Lualualei for homesteads. Because the lots lacked water, they were classified as second class pastoral land, rather than agricultural land. An installment payment plan of one-fifth down and the balance of payments over a period of four years was the incentive to attract prospective homesteaders. There was also a stipulation that rquired the homesteader to make specific improvements to the property over the five-year period (Dept. of the Interior, October 6, 1902, Hawai'i State Archives).

The homesteads were sold in three series. The first series consisted of nine lots which were sold between 1903 and 1909. These lots were much larger than the second and third series of lots sold. Seven of these lots averaged about 585 acres each. The two largest lots were 1,479.1 acres and 1,149.9 acres. The well-known families that obtained homestead lots at this time were Von Holt, McCandless and Dowsett. The majority of the Dowsett land was

used to pasture cattle, with other portions being leased to the Sandwich Island Honey Company for apiaries (B.C. Liber 376:237; B.C. Liber 288:324,331).

Despite promises by the Government to supply water, there was none and what little there was, was not enough to go around. Competition between the Wai'anae Sugar Company plantation and the homesteaders for water caused friction within the community. The lack of water placed a hardship on the homesteaders. Water had to be carried in and many lost their crops. The Wai'anae plantation had a lease with the Government to take 2.5 million gallons of water daily from Government lands. But even after their lease had expired, the plantation continued to take the water. In 1924, the Government made an agreement with the plantation to release 112,000 gallons of water daily for the homesteaders.

The first wave of homesteading by-passed dry, barren Nānākuli:

> Because of its water shortage, parched Nānākuli had never attracted many residents. It remained a kiawe wilderness. Yet, the very fact that nobody wanted it turned the area into a kind of informal public park. Its magnificent beaches attracted a growing colony of squatters from all over O'ahu who wee running our of places to camp. . . . The entire island had been hung with Kapu signs. But not Nānākuli. There the tawny, crescent beaches were open to anyone. Some came for the summer. Others camped all year round. Most of them were Hawaiians. (McGrath 1973:103)

In the mid-1920s, not counting the squatters, there were only ten residents in all of the Nānākuli (McGrath 1973:107).

A second wave of homesteading occurred in the late 1920s and 1930s after the U.S. Congress passed the Hawaiian Homes Commission Act in 1920. This law set aside almost 200,000 acres for homesteaders of Hawaiian ancestry. Previous leases of Nānākuli land had expired at this time and the land was subdivided for residential lots. Whether there would be sufficient water for the new residential habitation, particularly because of the continued consumption of the Wai'anae Plantation Sugar Fields, was in question. Water came in through a two-inch pipe from the Lualualei water system which was often dry. By 1930 over 200 residential lots had been taken. The new homesteaders found them selves embroiled in the water rights issue with Wai'anae Plantation. (McGrath 1973:108-118).

Military

The number of troops stationed and trained on the Wai'anae Coast during World War II at times reached 15, 000 to 20,000 (McGrath 1973:136). The beaches were fortified with barbed wire and concrete bunkers--many of which are still visible today. Martial law severely curtailed the movements of the local population. In Nānākuli, the Japanese attack on Pearl Harbor resulted in the explosion of misdirected Japanese bombs on the steep southeast valley wall.

Following the war the lower portions of Nānākuli Valley developed into the residential housing area visible today. The installation of paved roads, utilities, and the construction of

Nānākuli High School have altered the landscape. *Mauka* of the residential area, cattle grazing and pig and poultry raising operations continue to the present day.

F. Camp Andrews Project Area

In 1917, the property that would later comprise Camp Andrews was appropriated by the U.S. Army to "build barracks with nearby beach recreation for soldiers, and access by the old round-Oahu railroad" (Honolulu Advertiser 8/19/98: B3). The property, identified as a "U.S. Military Reservation", appears on a 1922 map of the Wai'anae District (Figure 3). The map shows a rock wall coursing through the *mauka*-central portion of the property. The wall is likely associated with cattle ranching activities continuing into the 20th century. Also shown on the map is a single structure in the western portion of the property. Other structures are shown just beyond the property toward Wai'anae.

The Army may not have followed through on its plans to build barracks on the property. A newspaper article of May 27, 1940, headlined "Navy Plans Rest Camp At Nanakuli, suggests that it was the U.S. Navy that first developed the property:

> The navy's first beach rest camp in Hawaii is being constructed at Nanakuli for the benefit of the enlisted personnel, it was announced today by naval authorities
>
> The camp is located between Kalanianaole park and the Oahu Sugar Co.'s beach camp It will handle about 500 men.
>
> Vice Admiral Adolphus Andrews, commander of the Hawaiian detachment of the fleet, is in charge of the construction of the camp.
>
> A detachment of marines and sailors was at Nanakuli over the week constructing the camp. Though not fully completed, it is finished sufficiently to be used this week.
>
> Purpose of the camp, naval authorities explained, is to give the enlisted personnel a chance to get off ships on weekends and enjoy swimming and camping on the beach.
>
> The camp site belongs to the army and permission has been received for its temporary usage. (Honolulu Star-Bulletin 5/27/40: 1)

Further documentation of Camp Andrews in the 1940s is scarce. It is likely that, subsequently, the camp was named after the Admiral Andrews mentioned in the newspaper article. A group of photographs taken in 1944-45 shows military personnel in the park and beach across from Camp Andrews (Figures 4-6). Structures in the backgrounds of the photographs may be associated with the camp.

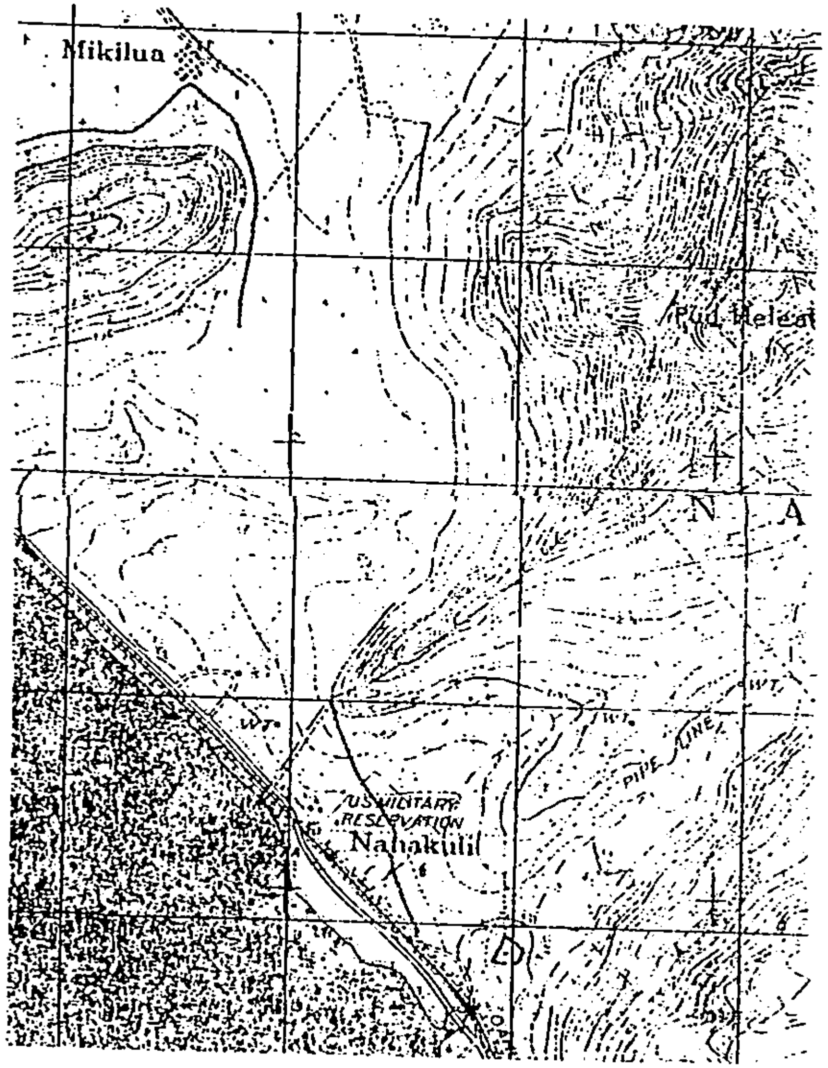

Figure 3 Portion of 1922 U.S. Army Corps of Engineers Fire Control map showing present project area identified as "U.S. Military Reservation"

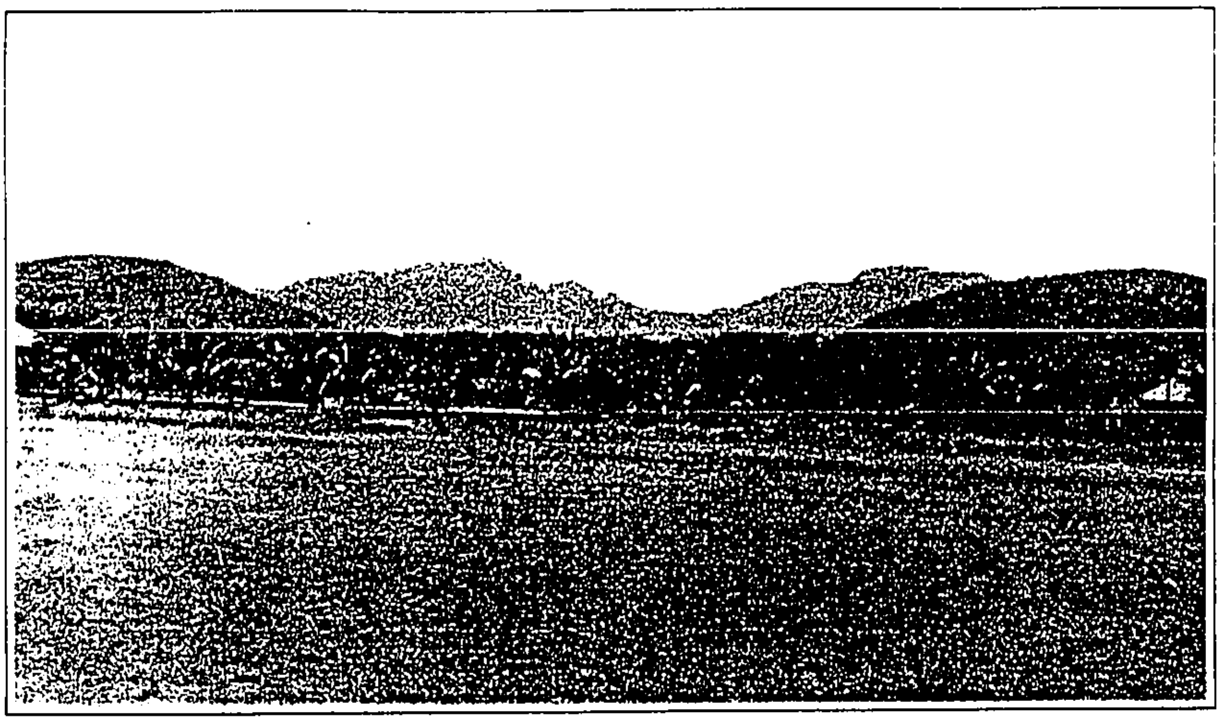

Figure 5 "Kalanianaole Park" (present Nānākuli Beach Park) in 1944 or 1945 (Bishop Museum Archives)

Figure 4 Servicemen playing baseball in field identified as "Kalanianaole Park" (present Nānākuli Beach Park) in 1944 or 1945 (Bishop Museum Archives)

Figure 6 Nānākuli Beach in 1944 or 1945 (Bishop Museum Archives)

Following World War II, Camp Andrews was apparently deactivated and the land returned to the U.S. Army. A 1997 newspaper article records a resident's recollection:

> Roy Bodnar of Honolulu moved to Nanakuli in 1949, long after the Army [*sic*] had vacated. "The buildings were still there, and they were just two-by-four framings with canec walls and screens. You could just poke your hand right through...What the Army couldn't sell, they gave away,' he said.
>
> Bodnar's church acquired 10 of the buildings, and they were all moved in a weekend, he recalls. Nanaikapono Elementary used the ramshackle barracks as classrooms in the late '40s -- until they fell down. (Honolulu Star Bulletin 8/11/97: B1)

The Camp Andrews parcel was turned over to the state in the late 1950s and has since remained undeveloped. An American Legion Hall may have been the last building in use on the property (Honolulu Advertiser 8/19/98: B3).

IV. PREVIOUS ARCHAEOLOGICAL STUDIES IN NĀNĀKULI

The first archaeological survey of Nānākuli Valley was conducted in 1929-1930 by J. Gilbert McAllister as part of an island-wide survey of archaeological sites on O`ahu. McAllister's survey focused on locating larger religious, habitation, and traditional/mythological sites. It is not surprising that he identified only one site in Nānākuli, the approximate location of the now-destroyed `Ilihune *heiau* (McAllister site 147). `Ilihune *heiau* was located in the mouth of Nānākuli Valley, on the southeastern slope of Pu`u Heleakalā (Sterling & Summers 1978:80). The remnants of `Ilihune *heiau* were apparently used in the mid-1890's as a cattle pen (McAllister 1933:110).

The next cultural study of Nānākuli Valley was done as part of an island wide survey of ethnographic agricultural practices. According to a study by Handy (1940), there were remnants of Hawaiian habitation high in the head of the valley, in the form of abandoned terraces, stone platforms, and paving stones (Sterling & Summers 1973:61). That most of the identifiable sites in Nānākuli are located in the upper valley, beyond where the streams converge, has been recently confirmed by the research for the Hawaiian Homelands in the Valley, see discussion below.

It is thought that Nānākuli Valley was initially settled as early as A.D. 1300 (Pak & Cordy 1990:4). As a relatively dry and inhospitable area, Nānākuli was probably settled last among areas in the Wai`anae District. Likely, early habitation occurred along the sandy coast as abundant marine resources were readily available. Today, these coastal areas, including the sand beach, low dunes and sand flats, have been significantly altered, and are covered by Nānāikapono Elementary School, Nānākuli Beach Park, Farrington Highway, and nearby houses and other structures *mauka* of the Highway (Cordy 1997:12). Interestingly, data from the tsunami that struck the Islands on April 1, 1946 indicate that the surge reached a height of approximately 20 feet at Nānākuli (Shepard *et al.* 1950:419). It is possible that this event had a significant impact on the sand beaches and any burials or cultural materials that they may have contained.

Only one archaeological study has been done to date in the coastal portion of Nānākuli, at the site of the Milcon P-313 Range Operations Center Naval Undersea Warfare Engineering Station Detachment. The subsurface testing here found no traces of cultural deposits over 50 years old. This is not surprising as the land form within the Milcon P-313 project area is shallow, most likely recent fill material sediments, over emerged reef and/or beach rock (Ogden Environmental and Energy Services, Co. 1995:11). No historic properties have been recorded in the coastal zone of Nānākuli. However, immediately to the north of Nānākuli the Ulehawa Beach Park parcel was the focus of subsurface archaeological inventory survey investigations. Two different areas of subsurface, apparently prehistoric or early historic deposits were located (McDermott and Hammatt 1999 in prep.). Based on these results it is likely that Nānākuli sandy deposits will contain similar remains of past traditional Hawaiian habitation, including burials. Cordy (1997:14) also suggests that there is the potential for cultural deposits in the coastal areas of Nānākuli.

Nānākuli's central lowlands, including the currently developed areas, are highly eroded and lack indications of archaeological sites (Ogden Environmental and Energy Services, Co. 1995:9). If surface structures related to such agricultural pursuits did exist in the lower valley portions of Nānākuli *ahupua`a*, they may have been eradicated by historic cattle ranching and development activities.

By far the most extensive archaeological investigations in Nānākuli were conducted as part of the joint Department of Hawaiian Homelands/Department of Land and Natural Resources (State Historic Preservation Division) archaeological inventory survey. This study focused on the *mauka* areas of the valley, up beyond the current residential neighborhoods. According to Cordy (1997), nearly all of the flat land between the west and east branches of Nānākuli Stream is covered with the ruins of agricultural fields (Cordy 1997:8; Pak & Cordy 1990: 2). The extensive nature of these ruins indicates that the entire upper valley floor, as well as the side valley, were landscaped to catch water run-off and create soil pockets. In addition to the ruins of agricultural fields, this survey recorded remnants of other, large enclosures, permanent and temporary house sites, field shelters, and work areas (Cordy 1997:8). A total of 26 permanent habitation sites were identified in the upper portion of Nānākuli Valley. Only two possible religious sites were identified: one small shrine and a large structure interpreted to be a possible *heiau* (*Ibid.*:10). The sites identified in Nānākuli are thought to be excellent examples of sites of their types in the Wai`anae district, and may reflect broad patterns of settlement and of the development of dry-land agriculture systems (Pak & Cordy 1990:6).

V. FIELD INSPECTION

A. Surface Investigation

The project area was inspected on December 8, 1999 (Figure 7). No surface Hawaiian archaeological sites were observed in any portion of the project area. Only two intact remnants of the former Camp Andrews were observed.

A small concrete structure is located in the southwest portion of the project area (Figures 8 & 9). It is barrel vaulted with inward-sloping walls. According to staff of the U.S. Army Museum-Hawai'i at Ft. DeRussy, the structure is likely a reinforced bunker.

Along the boundary of the project area fronting Farrington Highway are two coral block pillars with a section of pipe extending from the top of each (Figures 10 & 11). The pillars formerly marked the entrance to Camp Andrews. According to information in a newspaper article, the pipes "braced another horizontal pipe that held up the entrance sign" to the camp (Honolulu Star-Bulletin 8/11/97: B1).

The only other evidences of the camp are an unpaved roadway extending through the camp from Farrington Highway and numerous concrete foundation remnants (Figures 12 & 13). Modern trash piles and abandoned vehicles are the only surface evidences of activities in the project area since the camp's closing.

B. Subsurface Investigation

The sandy deposits along Hawaii's coastal areas are known to contain prehistoric cultural deposits, including buried cultural strata related to habitation and human burials. Accordingly, as part of the current assessment it was important to determine if coastal Camp Andrews contained calcareous sand deposits. If these sand deposits were present in the project area, there would be a greater likelihood of cultural deposits.

According to the State of Hawaii Soil Survey, the entire 15 acre Camp Andrews project area consists of "Coral Outcrop" (Foote *et al.* 1972):

> Coral outcrop (CR) consists of coral or cemented calcareous sand on the island of Oahu. The coral reefs formed in shallow water during the time the ocean stand was at a higher level. Small areas of coral outcrop are exposed on the ocean shore, on the coastal plains, and at the foot of the uplands. Elevations range from sea level to approximately 100 feet. The annual rainfall amounts to 18-40 inches. Coral outcrop is geographically associated with Jaucas, Keaau, and Mokuleia soils.
>
> Coral outcrop make up about 80 to 90 percent of the acreage. The remaining 10 to 20 percent consists of a thin layer of friable, red soil material in cracks, crevices, and depressions within the coral outcrop. This soil material is similar to that of the Mamala series. This land type is used for military installations, quarries, and urban development. Vegetation is sparse. It consists of kiawe, koa haole, and fingergrass.

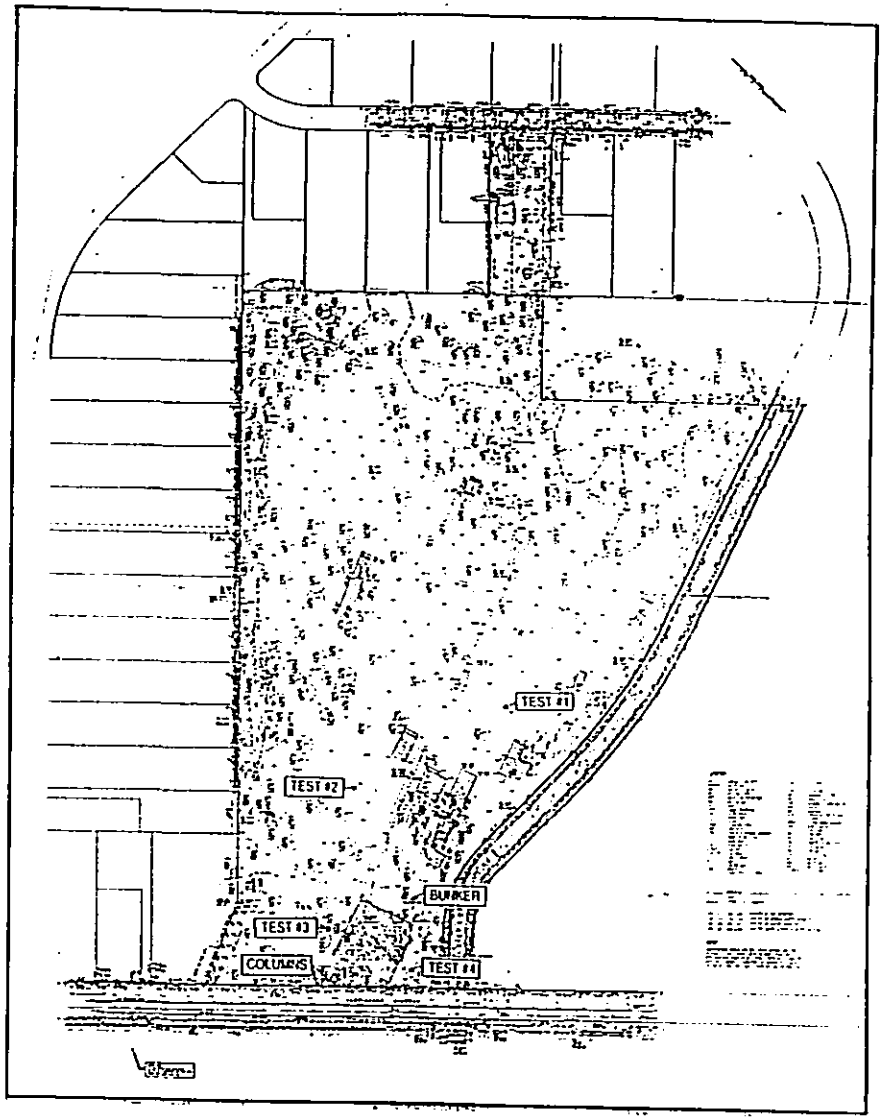

Figure 7 Project area showing locations of Camp Andrews sites and shovel test units

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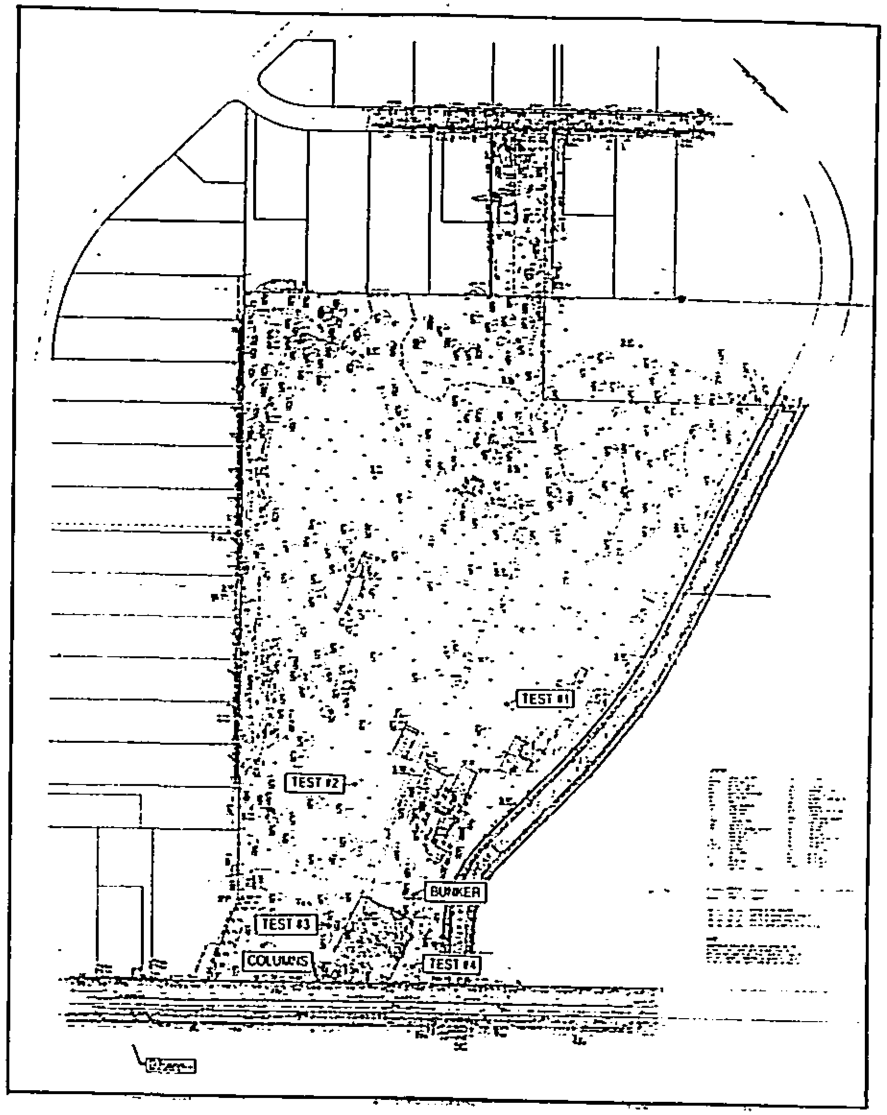

Figure 7 Project area showing locations of Camp Andrews sites and shovel test units

Figure 8 Concrete bunker amid grass and *kiawe*

Figure 9 Concrete bunker

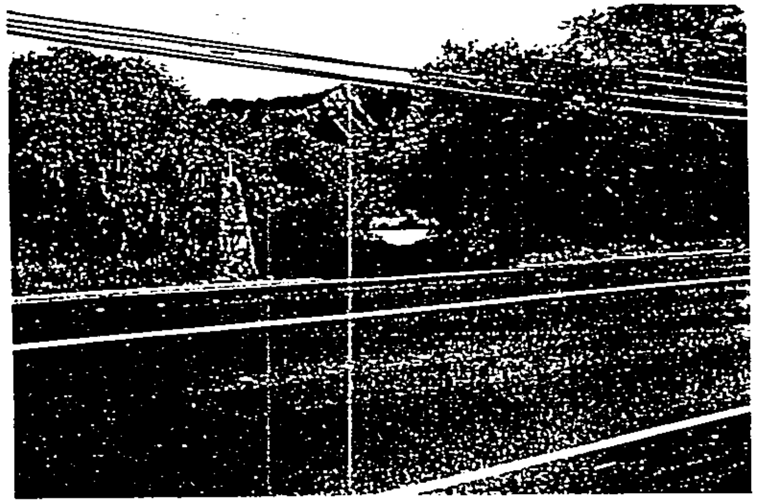

Figure 10 Coral block pillars viewed across Farrington Highway

Figure 11 Coral block pillars showing pipe set in top

Figure 12 Unpaved road through project area

Figure 13 Typical concrete foundation remnant in project area

According to the soil survey, the coastal areas on either side of Camp Andrews contained beach sand, but the area including Camp Andrews itself was without sand deposits.

During the field inspection it was evident that coral outcrop was the dominant land form. Coral outcrop protrudes from the soil surface throughout the project area. In the *mauka* one-third of the project area, rather than isolated protuberances, the coral substrate is readily and nearly continuously visible. Although there is some sand visible on the land surface, it is dispersed and appears to be related to dumping and/or storm surge deposition. Hurricanes *Iniki* and *Iwa* are known to have deposited substantial sand deposits across Farrington Highway; however, there is little or no surface evidence of these deposits at Camp Andrews. Based on surface appearances, it did not appear that beach sand deposits were likely in the project area. However, to further confirm that there are no sand deposits, limited subsurface testing was carried out in the *makai* one-third of the project area. The *makai* one-third was tested because it was the most likely to contain sandy deposits.

Four combination shovel and auger excavations were dug (see Figure 7 above for the excavation locations). These shovel test units were placed in areas were surface exposures of coral outcrop were not evident. The shovel excavations were 25 centimeters (cm) square. Where the sediments were deeper than 25 cm, a 6-inch bucket rotary hand auger was used within the shovel excavation to proceed 25 cm below surface. The exposed sediments were described. No prehistoric cultural deposits or materials were found. Some modern garbage, dating to the military use of Camp Andrews, was observed in the upper layers. In all four excavations the reddish brown, silt loam sediments were shallow (generally 10-15 cm deep, a maximum of 52 cm deep). All excavations extended to coral outcrop bedrock. No sand deposits were observed.

Based on the observations of the project area pedestrian inspection, which noted the coral outcrop throughout the project area, and the lack of sand deposits within the four shovel test units, sand deposits are very unlikely within the project area. Based on observations and testing, the fine grained sediments within the project area appear to be a mix of terrigenous aeolian deposit and weathered in place limestone reef. The sediment descriptions for the four shovel test excavations are given below.

Shovel Test # 1
Stratum I: 0-13 centimeters below surface (cmbs), reddish brown (5YR 4/4), fairly compact, silt loam, structureless, contains a few roots and rootlets, lower boundary = abrupt/smooth. A horizon. Coral outcrop bedrock below 13 cmbs.

Shovel Test # 2
Stratum I: 0-12 cmbs, reddish brown (5YR 3/2), fairly compact, silt loam, moderate, fine granular structure, contains abundant roots and rootlets and some modern bottle glass, lower boundary = wavy smooth. A horizon.

Stratum II: 13-53 cmbs, reddish brown (5YR 3/3), compact, silt loam (finer than stratum I), structureless, contains few roots and rootlets, lower boundary = wavy smooth. B/C horizon. Coral outcrop bedrock below 52 cmbs. A sample of this sediment was mixed with a mild acid. The moderately strong effervescence indicated that a substantial component of the sediment is derived from coralline sand and/or limestone reef parent material. However, the strong reddish-brown color indicates a basaltic component as well. The sediment appears to be mix of weathered limestone reef and fine, aeolian deposited, terrigenous silts.

Shovel Test # 3

Stratum I: 0-10 cmbs, reddish brown (5YR 3/2), fairly compact, silt loam, moderate, fine granular structure, contains abundant roots and rootlets and some modern bottle glass, lower boundary = wavy smooth. A horizon. Coral outcrop bedrock below 10 cmbs.

Shovel Test # 4

Stratum I: 0-23 cmbs, reddish brown (5YR 3/2), fairly compact, silt loam, moderate, fine granular structure, contains abundant roots and rootlets and modern bottle glass and construction material (concrete fragments, nails, rusted metal), lower boundary = wavy smooth. A horizon. Coral outcrop bedrock below 23 cmbs.

C. Sink Features

One of the characteristics of coral outcrop is the presence of sinkholes of varying size and depth. Coral outcrop is emerged reef deposit and these natural sink features were at least partially formed prior to emergence from the sea. Subsequently the sinks are modified and enlarged through mechanical and chemical weathering of the limestone coral matrix. Sink features are common throughout the ʻEwa Plain, where coral outcrop is the dominant land form.

During the pedestrian inspection of the project area numerous limestone sink formations were noted. It is difficult to count the number of sink features, or to describe their general dimensions because most were filled in with limestone boulders and cobbles at some time in the past. The in-filling of the sinks probably occurred over many years, possibly beginning with Native Hawaiians in prehistoric times, continuing into the 19th century when Nānākuli was used for ranch land and *paniolo* would have filled the sinks to protect their cattle from injury, and into the 20th century when the military use of the parcel required further sink in-filling.

One of the largest sink features observed is in the center of the project area. It is only partially filled with boulders and cobbles and measures approximately 2.5 meters in diameter and is at least 1.75 meters deep. This sink presently contains a fresh, apparently complete, large pig skeleton. Several other sink features were noted that appeared to be the same size, although it was difficult to tell when they are filled with rubble. Many other smaller sinks were observed.

Extensive archaeological and paleotological research of sink features at adjacent Barber's Point and West Beach has confirmed the cultural and scientific importance of these feature types (Sinoto 1976; Folk and Hammatt 1981; Davis *et al.* 1986). Sink features contain the remains of extinct fauna, from land snails to birds, and plant remains, such as pollen and phytoliths. Studying these floral and faunal remains helps illuminate Hawaii's past evolutionary and ecological trends. The sinks also contain cultural deposits, such as human burials and cultural middens. These cultural deposits can inform on Native Hawaiian prehistory.

It is unclear if the sink features within the project area contain significant cultural or paleontological deposits. However, considering the paleontological and archaeological importance of sink features on the ʻEwa Plain immediately to the south, it is important that the Camp Andrews sinks be tested for significant cultural and biological deposits.

VI. SUMMARY AND RECOMMENDATIONS

Summary

By the first decades of the 20th century, the present project area had been appropriated by the U.S. military for a reservation. In 1940, the Navy constructed and opened a recreation camp for enlisted men, subsequently named Camp Andrews, apparently in honor of Admiral Adolphus Andrews, commander of the Hawaiian detachment of the U.S. fleet at the time. The camp continued in operation during World War II. Following the war, the camp was deactivated and several of its buildings were dispersed in the Nānākuli community for use by a church and by Nānāikapono School. The camp parcel was returned to the state in the late 1950s and has since remained undeveloped.

During field inspection for the present assessment, no surface Hawaiian archaeological sites were observed in the project area. The only intact constructions associated with the camp were a concrete bunker and two coral block columns at a former entrance to the camp. Miscellaneous concrete foundation remnants and an unpaved roadway through the project area were the only other evidence of the former camp.

Sandy deposits along Hawai'i's coastal areas often contain prehistoric cultural deposits, including buried cultural strata related to habitation and human burials. Accordingly, as part of the current assessment, four shovel test pits were dug to determine if the project area contained calcareous sand deposits. No sand deposits were observed in any of the four test units. Based on the observations of the project area pedestrian inspection, which noted coral outcrop throughout the project area, and the lack of sand deposits within the four shovel test units, sand deposits are very unlikely within the project area.

During the pedestrian inspection of the project area numerous limestone sink formations were noted in the project area. Most of the sinks features were filled in with limestone boulders and cobbles at some time in the past. In-filling possibly began with Native Hawaiians in prehistoric times, continuing into the 19th century when Nānākuli was ranch land and *paniolo* would have filled the sinks to protect cattle from injury. In the 20th century, military use of the parcel likely required further sink in-filling.

Recommendations

Based on the findings of this assessment, there is at least one significant historic property within the project area and the potential for more. The assessment results indicate that an archaeological inventory survey of the project area is necessary. This survey would gather data to determine the presence and evaluate the significance of the potential historic properties within the project area.

The single identified historic property is the remains of Camp Andrews itself. This historic site is significant under State and National Registers of Historic Places Criterion D, for its information content regarding World War II era military installations in the Pacific. It is recommended that Camp Andrews be assigned a state site number as part of the inventory survey investigations. Further historical and archival research during the inventory survey phase may gather additional information about this fragment of World War II history in Hawai'i. Research might also include the gathering of oral histories from former military personnel and *kama'aina* Nānākuli residents.

There is the potential for significant historic properties within the sink hole features on the coral outcrop landscape that covers the project area. The majority of these features had been filled in with coral rubble at some time in the past. From surface observations, these sink hole features are remarkably similar to sink hole features in the coral outcrop from the nearby 'Ewa Plain. Archaeological and paleontological research on the sinks of the 'Ewa Plain have demonstrated the cultural and scientific significance of these types of features. Sinks on the 'Ewa Plain contain cultural deposits related to prehistoric occupation, including midden deposits, agricultural modifications, and human burials. Paleontological research on 'Ewa Plain sinks has also documented faunal remains of extinct and extirpated species, especially bird bone.

It is important that the sink features in the project area be tested so that their cultural and scientific significance can be determined. It is recommended during the inventory survey that an inventory of the sink features be prepared and that an adequate sample of the sinks be tested for cultural and paleontological deposits. If significant cultural and/or paleontological deposits are located within the project area's sink features, additional historic preservation steps, beyond the inventory survey, may be required. These additional steps might include data recovery and/or site preservation. The inventory survey will gather the information needed to determine if these steps will be required.

An additional concern is the possibility that the sinks contain human burials. If so, burial treatment would follow the guidelines of Hawaii Administrative Rules Chapter 13-300 "Rules of Practice and Procedure Relating to Burial Sites and Human Remains". The discovery of human remains during the inventory survey would likely require the preparation of a mitigation plan outlining the treatment of the remains.

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Appendix D

Letter to State Historic Preservation Division

CULTURAL SURVEYS HAWAII, INC.
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August 8, 2000

Dr. Sara Collins
State Historic Preservation Division
Department of Land and Natural Resources
Kakuhihewa Building, Room 555
601 Kamokila Blvd.
Kapolei, Hawaii 96707

SUBJECT: End-of-Fieldwork Results for the Location of Sink Features (for Land Surveyor Recording) and Excavation of Two Large Sink Features-- A Subset of the Work for the Archaeological Inventory Survey for the Proposed Nanakuli IV Elementary School, Nanakuli, Waianae, O'ahu (TMK 8-9-02:01)

Dear Dr. Collins:

This letter report is to inform you of the end-of-field-work results of the subset of the Nanakuli IV Elementary School archaeological inventory survey. It describes the background conditions that created this specific scope of work, the scope of work itself, methods, results, and recommendations for future work. Included are a number of figures, located at the back of the report. Dr. Alan Ziegler's (Zoological Consultant) vertebrate identification results are present as Appendix A.

Project Background, Scope of Work, and Methods

As you may recall, the proposed location of the Nanakuli IV Elementary school was the subject of a Cultural Surveys Hawaii, Inc., archaeological assessment in late 1999 (Hammatt, McDermott, and Chiogioji 1999). The assessment summary identified the single known historic property in the subject parcel, the remains of Camp Andrews itself. It also identified the potential for significant historic properties in the numerous limestone sink features that cover the *mauka* portion of the approximately 15-acre parcel:

> By the first decades of the 20th century, the present project area had been appropriated by the U.S. military for a reservation. In 1940, the Navy constructed and opened a recreation camp for enlisted men, subsequently named Camp Andrews, apparently in honor of Admiral Adolphus Andrews, commander of the Hawaiian detachment of the U.S. fleet at the time. The camp continued in operation during World War II. Following the war, the camp was deactivated and several of its buildings were dispersed in the Nānākuli community for use by a church and by Nānāikapono School. The camp parcel was returned to the state in the late 1950s and has since remained undeveloped.

During field inspection for the present assessment, no surface Hawaiian archaeological sites were observed in the project area. The only intact constructions associated with the camp were a concrete bunker and two coral block columns at a former entrance to the camp. Miscellaneous concrete foundation remnants and an unpaved roadway through the project area were the only other evidence of the former camp.

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During the pedestrian inspection of the project area numerous limestone sink formations were noted in the project area. Most of the sinks features were filled in with limestone boulders and cobbles at some time in the past. In-filling possibly began with Native Hawaiians in prehistoric times, continuing into the 19th century when Nānākuli was ranch land and *paniolo* would have filled the sinks to protect cattle from injury. In the 20th century, military use of the parcel likely required further sink in-filling. (Hammatt, McDermott, and Chiogioji 1999:26)

Based on the assessment findings, the following recommendations were made:

> Based on the findings of this assessment, there is at least one significant historic property within the project area and the potential for more. The assessment results indicate that an archaeological inventory survey of the project area is necessary. This survey would gather data to determine the presence and evaluate the significance of the potential historic properties within the project area.
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> The single identified historic property is the remains of Camp Andrews itself. This historic site is significant under State and National Registers of Historic Places Criterion D, for its information content regarding World War II era military installations in the Pacific. It is recommended that Camp Andrews be assigned a state site number as part of the inventory survey investigations. Further historical and archival research during the inventory survey phase may gather additional information about this fragment of World War II history in Hawai'i. Research might also include the gathering of oral histories from former military personnel and *kama'aina* Nānākuli residents.

There is the potential for significant historic properties within the sink hole features on the coral outcrop landscape that covers the project area. The majority of these features had been filled in with coral rubble at some time in the past. From surface observations, these sink hole features are remarkably similar to sink hole features in the coral outcrop from the nearby 'Ewa Plain. Archaeological and paleontological research on the sinks of the 'Ewa Plain have demonstrated the cultural and scientific significance of these types of features. Sinks on the 'Ewa Plain contain cultural deposits related to prehistoric occupation, including midden deposits, agricultural modifications, and human burials. Paleontological research on 'Ewa Plain sinks has also documented faunal remains of extinct and extirpated species, especially bird bone.

It is important that the sink features in the project area be tested so that their cultural and scientific significance can be determined. It is recommended during the inventory survey that an inventory of the sink features be prepared and that an adequate sample of the sinks be tested for cultural and paleontological deposits. If significant cultural and/or paleontological deposits are located within the project area's sink features, additional historic preservation steps, beyond the inventory survey, may be required. These additional steps might include data recovery and/or site preservation. The inventory survey will gather the information needed to determine if these steps will be required.

An additional concern is the possibility that the sinks contain human burials. If so, burial treatment would follow the guidelines of Hawaii Administrative Rules Chapter 13-300 "Rules of Practice and Procedure Relating to Burial Sites and Human Remains". The discovery of human remains during the inventory survey would likely require the preparation of a mitigation plan outlining the treatment of the remains. (Hammatt, McDermott, and Chiogioji 1999:26-27)

These recommendations reflect SHPD's input, as you and Elaine Jourdane came out to the project area to see the sinks and discuss the scope of work for the archaeological inventory survey of the parcel. Subsequently, on March 9th, 2000, you and Elaine Jourdane attended a planning meeting at the Department of Accounting and General Services (DAGS) regarding the proposed Nanakuli IV Elementary School project. One of the points of discussion at the meeting was the archaeological inventory scope of work for the project. Clearly the archaeological inventory survey of the numerous limestone sink features in the project area was not a small proposition. The DAGS meeting discussion sought a way to relatively quickly and cost effectively collect needed planning information concerning how best to complete the inventory survey and mitigate potential project impacts on significant historic properties. At this meeting it was decided that a subset of the proposed inventory scope of work would be conducted. The results of these initial investigations would be used to plan how the remainder of the inventory survey could best be accomplished and to explore potential avenues of historic preservation mitigation. A three part scope of work for this "subset" of the overall inventory survey scope of work was worked out in consultation

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with you and Ms. Jourdane.

Part one of this "subset" scope of work consisted of the location of all perceivable sink hole features by archaeologist. This was accomplished by systematic pedestrian sweeps of the project area. I estimated previously that there are between 8 and 14 substantial sinks within the project area, and a number of smaller sinks. The identified sink locations were marked with flagging tape for recording by land surveyors.

Part two of this "subset" scope of work involved the archaeological excavation of the two deepest known sink holes. This involved the removal of the boulder rubble fill from both sinks. This was done using a backhoe and hand excavation. Once clear of rubble, both sinks were tested for the presence of cultural and/or paleontological deposits. One meter squared excavations were dug in each sink. These test excavations used standard stratigraphically controlled excavation techniques. All sediment material was screened through 1/8th (in the field) to 1/16 inch (in the laboratory) screen mesh, with the retention of all cultural and pertinent biological material. Bulk soil samples, charcoal samples, etc., were collected from each excavation as appropriate. Excavation profiles were drawn and standard sediment descriptions were recorded once the excavations were complete. Plan view and cross-section drawings of each excavated sink document the location of each test unit.

Part three of the "subset" scope of work is the preparation of this letter report documenting the findings of the excavations in each of the two sinks, as well as the sink identification. There has not been time for detailed analysis of the excavation samples. This report focuses on a qualitative description of the excavation findings and an assessment of the information potential of the project area's sink hole deposits. Recommendations for further inventory survey work are made.

As we discussed outside the DAGS meeting on March 9th, it is understood by our client that this end-of-fieldwork letter report would be used for planing purposes. It is understood that these results will be used to fine tune the scope of work for the remainder of the inventory survey of the project area. Furthermore, our client is fully aware that this letter report and its findings will in no way remove the need for a complete inventory survey of the project area. This inventory survey will require additional background research on Camp Andrews, further subsurface testing of sink features, analysis of collected material, and a full presentation of findings, including historic property significance evaluations and recommendations for mitigation of impacts to any historic properties. It will also include radiocarbon dating analysis and faunal analysis (to be completed by Dr. Alan Ziegler, Zoological Consultant).

Fieldwork was done from July 19th to July 28th, 2000, by a crew comprised of Matt McDermott B. A., Doug Borthwick B. A., Jesse York, Scott Kikiloi B. A., and Dave Perzinski B. A. All work was done under the supervision of Dr. Hallett H. Hammatt

Results of Sink Feature Identification

Based on my initial observations of the project area during the archaeological assessment fieldwork, I had estimated the *mauka* portion of the project area contained between 8 and 14 large sink features, with a number of smaller ones. I have since learned that this was an underestimation. With more intensive inspection of the project area land surface it became more and more clear how difficult sink identification can be. *Kiawe* and grass vegetation, sporadic soil cover, large amounts of modern rubbish, and boulder and cobble fill materials within the sinks themselves all contributed to the difficulty. These materials/conditions create camouflage that blurs and obscures the boundaries of the sink features. They make it hard to distinguish between sink edges or lips and undulations in the exposed limestone surface. Also, there are numerous small sinks that are too small to excavate (on the order of 40 cm squared), but that may contain cultural and/or paleontological deposits, or human burials.

Seventeen sink features were located and flagged for land surveyor recording. These 17 by no means constitute the entire sink population in the project area. Sinks that were too small, and/or too full of kiawe tree trunks--and therefore not feasible for archaeological investigation--were not flagged to be put on the map. Undoubtedly more sink features will be discovered during the development of the project area, especially during the grubbing and grading. It is also possible that some of the flagged sinks will turn out to be mere shallow depressions that have no depth and no sediment deposit of interest.

The 17 sinks that were flagged represent the best determination of the potential sink features that are large enough for archaeological investigation. The locations of these sinks are shown on Figure 1, with some descriptive information on Table 1, at the back of this letter. The visible sinks are clearly located in the *mauka* portion of the project area. It remains to be seen if grading in the *makai* portions of the project area will expose more sink features.

Excavation Results

Sinks 1 and 2 were selected for test excavation because they are the largest known sinks in the project area. With their large size they were thought to have more potential for cultural deposits related to habitation and mortuary practices. The sink's large size was not thought to lessen the potential for paleontological deposits.

Boulder and cobble rubble removal from each of the sinks was difficult. This was particularly true in Sink 1 where the rubble fill extended to a depth of 4 meters below surface. This depth is the absolute limit of backhoe excavation because of the limiting factors of the length of the backhoe arm and the narrowness of the sink opening.

Stratigraphy, Sink 1, Excavation Unit 1

Excavation Unit 1 in Sink 1 was located in the western portion of the sink beneath a shallow overhang. The surface of the unit is 4 meters below the rim of the sink. Figures 2 and 3, at the back of this report, are a plan view and cross section of Sink 1 showing the location of Excavation Unit 1. Sink 1 was almost entirely filled with limestone boulder and cobble rubble prior to backhoe excavation.

Figures 4 and 5, at the back of this report, are profiles of Excavation Unit 1 in Sink 1. Figure 4 is the actual north profile of Excavation Unit 1, while Figure 5 is a schematic profile that shows the stratigraphic relationships of all strata and arbitrary levels within strata that were excavated. Figure 5 is particularly useful in consideration of Dr. Ziegler's faunal identification results, described below, which are labeled by strata and level.

Stratum I	(0-45 cmbs)	(Dry) 7.5 YR 4/2 Brown, noncoherent, cobbly gravelly sandy clay loam, weak fine granular structure, contains abundant historic garbage including rusted metal, canec (from the construction of the Camp Andrews superstructures), bottle glass, plastic, tinfoil, as well as abundant large basalt flakes, bone, charcoal, crab claw, with some marine shell midden, very few roots and rootlets, lower boundary is abrupt/smooth.
Stratum II	(45-70 cmbs)	(Moist) 7.5 YR 5/4 Brown, noncoherent, stoney cobbly gravelly sandy clay loam, weak fine granular structure, contains bird bone, some charcoal, abundant crab claw, a few pieces of rusted metal, one basalt flake, very few roots and rootlets, lower boundary is clear/smooth.
Stratum III	(70-90 cmbs)	(Moist) 2.5 YR 6/3 Light yellowish brown, noncoherent, cobbly gravelly sandy clay loam (with a greater sand content than Strata I and II), weak fine to medium granular structure, contains abundant crab claw and bird bone, a few charcoal fragments, very few roots or rootlets, lower boundary is abrupt/smooth.
Stratum IV	(90-95 cmbs)	(Moist) Mottled 10 YR 6/3 Light brown, 10 YR 5/1 Gray, and 10 YR 7/3 Very pale brown, cemented calcareous sediment (including sand, limestone fragments, unidentified crystalline particles), contains some small bone fragments within the matrix, thought to have formed at the water table from precipitation and the fluctuating wet/dry conditions, lower boundary is abrupt/smooth.

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Water Table at 100 cmbs.

Stratum V (95-112 cmbs) (Wet) 10 YR 3/3 Dark brown, wet consistency is sticky, dry consistency is weakly coherent, cobbly gravelly sandy loam with pockets of silty loam, contains abundant charcoal and bird bone, a few pieces of marine shell midden (cowry, *pipipi*, and *Brachidontes*), a few basalt flakes, abundant land snails (recovered from the 1/16 inch mesh through water screening).

The excavation was terminated because of the standing water in the trench at water table.

Stratum I contained abundant historic and modern material that was undoubtedly deposited in the sink over the years as refuse. Historic accounts of Camp Andrews describe the use of "canec" building material (processed sugar cane pulp pressed into a construction material) in the construction of the camp superstructures. Abundant canec was found in the upper levels of the excavation. This layer also included charcoal, abundant animal bone, land crab remains, and large basalt flakes from traditional-Hawaiian lithic tool manufacture. Because of the abundant historic and modern artifacts found throughout this layer, the vertebrate fauna was not sent to Dr. Ziegler for identification. All of the vertebrate material from the strata below Stratum I were identified by Dr. Ziegler (see Appendix A--lists by stratum and level).

In relation to Stratum I, Stratum II contains much less historic garbage, much less basalt lithics, less charcoal, and less vertebrate remains. All of the vertebrate remains recovered were identified by Ziegler, see Appendix A. Avifaunal remains included the remains of at least 8 prehistorically extinct bird species, along with bones and bone fragments that could not be identified beyond general bird size ranges. Fish remains were slight, consisting of a few identifiable fragments. The mammal remains were also fairly slight and consisted of *Rattus exulans* (Polynesian introduced rat), *Canis familiaris* (Polynesian or historically introduced dog), and *Herpestes auropunctatus* (historically introduced mongoose).

Stratum I and II, based on their material content, are related to both historic and the prehistoric/early historic land use in the vicinity of the sink. The gravelly, cobbly matrix of these two layers allowed some filtration of materials from nearer the surface to lower levels. This appears to have taken place in the instance of the historic material found in Stratum II. Although it is not certain, it appears more likely that stratum I is a relatively stable surface that accumulated both historic and prehistoric/traditional artifacts and midden over time. The few rusted metal flakes found in Stratum II are thought to be the result of filtration from Stratum I above. This most likely occurred during excavation. Filtration from above could also account for the single historically introduced mongoose bone that was found between 45 and 60 cm below surface in Stratum II.

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Stratum III is more sandy than Strata I and II and contains markedly less cultural material. There are no clearly historic materials in this deposit. This is a strong indication that filtration through the sink deposit from upper strata and/or the surface is not common and does not extend to this level. The only other cultural material found consisted of a few charcoal fragments. This charcoal is thought to be prehistoric in origin--but this is as yet untested. The abundant bird bone clearly increased (in comparison to Strata I and II) in the counts of Medium Procellarid, Small Passeriform, Medium Rallid, Medium Bird and prehistorically extinct species. In all the remains of 7 different prehistorically extinct bird species were found in Stratum III, with an relative abundance of *Corvus* sp. (Hawaiian crow). A single bone from Dr. Ziegler's, prehistorically extinct, Undescribed Vespertilionid Bat was found. Fish and other mammal remains were absent from Stratum III, with the exception of the Undescribed Vespertilionid Bat. Bird bone was found in concentrations within Stratum III. For example at 70 cmbs in the SW corner of the excavation--see Ziegler's Appendix A, page 6).

Stratum IV consists of a cemented layer of calcareous sediment located immediately above the water table (90-95 cmbs). This layer contains bone fragments in the cemented matrix. It is thought to have formed through precipitation of minerals at the alternating wet and dry conditions due to fluctuations in the water table. The formation process is not fully understood but it is thought to be generally analogous to the formation of beach rock along calcareous shorelines.

Stratum V was only observed at or below the water table, so it could not be exposed in profile. Observations regarding this sediment were less straightforward. Stratum V is markedly different from the sediments above it. Stratum I through IV are entirely calcareous in origin and the limestone of the sink itself is clearly the parent material. Stratum V clearly contains a large admixture of the sandy Stratum III, but it also contains abundant silty loam not seen in the sediments above. This silty loam is found in pockets amid the more sandy sediments. The silty admixture is similar in color and texture to the surface sediments that surround the sink opening today. These surface sediments, along with Stratum V, appear to have a significant basaltic, perhaps aeolian component. This component is absent in Stratum II and III and only slightly evident in Stratum I. Further study of the sink sediments, in particular Stratum V, is in order to determine their depositional history.

Stratum V contains high concentrations of fairly large charcoal particles, up to nearly a centimeter in diameter. A few pieces of marine shell midden and several small basalt flakes were found in Stratum V. Along with the high charcoal concentrations, these other cultural materials indicate prehistoric land use, possibly with agricultural burning, in the vicinity of the sink. Mammal remains consist of *Rattus exulans* (Polynesian introduced rat) and *Canis familiaris* (Polynesian or historically introduced dog). Based on context it is most likely that the dog remains are prehistoric Polynesian. Fish remains are more common, including those of larger sized fish c. 25-30 cm in length. These larger fish remains are likely midden food remains from human habitation, although it is possible they were deposits by sea birds nesting in the vicinity. There is also a high concentration of bird bone, including the remains of 5 prehistorically extinct species. Because Stratum V was only visible at the water table, two bulk samples, each 2.5 gallons (11 liters) were brought back to the laboratory and water screened through 1/16 inch mesh (Appendix A, Stratum V 90-102 cmbs and 90-112 cmbs, pages 7 and 8). All of the faunal and cultural remains recovered from Stratum V come from this 5 gallon (22 liter) sample. In contrast, the material collected from the upper strata represents the material collected from 1/8 inch screen from a much larger volume, on the order of tens of gallons, of screened sediment. Accordingly, the concentrations of bird bone and cultural material from the Stratum V sample are much greater than any of the upper strata.

Although mere speculation at this point, it is possible that the Sink 1 was a fresh or brackish water source to birds, and possibly humans, in the past. This may explain the high occurrence of land birds as opposed to sea birds in the sink deposit. It may also account for the fairly abundant cultural material found at the level of the water table. Further excavation in the sink and a test of the salinity of the ground water would help to determine if this were the case.

Summary of Excavation Unit 1, Sink 1

Based on the results of Excavation Unit 1, Sink 1 contains a cultural deposit that documents the land use of the vicinity from the modern era, represented by World War II debris and modern garbage, back into the prehistoric period. Extinct avifauna remains are found throughout the deposit. At the base of the excavation, immediately at and below the water table, Stratum V is a culturally enriched deposit that contains abundant remains of extinct avifauna. Although no chronological data is yet available, the cultural deposits at the base of the excavation have potential to be quite old, possibly associated with the initial human habitation of this portion of the Waianae Coastline. The co-occurrence of culturally enriched sediments, Polynesian-introduced rat, and extinct avifauna may offer the opportunity to investigate the relationship between human colonization and the extinction and extirpation of endemic and indigenous bird species. The wet silty sediments of Stratum V could contain preserved palynomorph particles. Identification of these pollen and spore remains may inform on past environmental conditions and vegetation regimes.

Stratigraphy, Sink 2, Excavation Unit 1

Prior to boulder and cobble rubble removal with the backhoe, Sink 2 had to be cleaned of the abundant partially decomposed chicken, dog, pig, goat, and cow remains that were thickly distributed over the boulders and cobbles that partially filled the sink interior. This pleasant task was undertaken prior to backhoe excavation to remove the odoriferous material from the general location of the sink--thereby making sink excavation bearable.

Excavation Unit 2, Sink 2 was placed in the southeast portion of the sink feature, below a natural overhang in the sink side wall. Figures 6 and 7, at the back of this report, are a plan view and cross-section of Sink 2 showing the location of Excavation Unit 1. Excavation Unit 1 was excavated from a level soil surface approximately 1.65 m below the lip of the sink feature. The soil surface of Excavation Unit 1 contained abundant chicken, pig, dog, goat, and cow bone--all related to the modern deposition of faunal refuse in the sink. Other historic and modern debris, including bottle glass, plastic, and rusted metal was on the surface. Because of the extreme amounts of modern bone on the surface of the excavation unit, and its inclusion in the upper levels of the excavation, the vertebrate material from Excavation 1, Sink 2 was not sent to Dr. Ziegler for identification.

Figure 8 is the southwest profile of Excavation Unit 1. The stratigraphy encountered in the excavation consisted of the following:

Stratum I	(0-10 cmbs)	(Dry) 10 YR 4/2 Dark grayish brown, non coherent, cobbly gravelly silt loam, structureless, contains roots and rootlets, abundant historic and modern garbage (bottle glass, rusted metal, plastic), abundant modern bone (including chicken, dog, pig, cow, goat--all from modern rubbish disposal), some land snails, some basalt flakes, some marine shell midden (mostly *pipipi* shells), lower boundary is abrupt/smooth.
Stratum II	(10-35 cmbs)	(Dry) 10 YR 5/3 Brown, non coherent, gravelly silt loam, structureless, contains roots and rootlets, some historic and modern garbage in the upper levels, some bone, land snails, large basalt flakes, marine shell midden, and a human burial (see discussion below).

Excavation terminated at level of burial find--30-35 cmbs.

Stratum I is the A-horizon. It is full of historic and modern debris, but it contains prehistoric/traditional artifacts as well (basalt flakes). The marine shell midden could be either modern, historic, or prehistoric. The upper levels of Stratum II also contain abundant historic and modern debris, however, at the lower elevation of Stratum II (20-30 cmbs) there is a marked decrease in the amount of historic artifacts and an increase in the basalt flakes and marine shell midden. The faunal remains at this lower level of Stratum II include bird bone. The abundant bone from the historically introduced species is not present.

On the afternoon of July 26, 2000, human skeletal remains were encountered at a depth of approximately 30 cmbs in the southern quadrant of Excavation Unit 1, Sink 2. The distal portion of the lower limbs, consisting of various tarsals, a calcaneus, tibiae, and a fibula, were exposed articulated in anatomical position--see Figures 8 and 9 at the back of this report. The exposed long bones extended into the side wall of the excavation unit. Based on distance between the sink side wall and the exposed portions of the lower limbs in the excavation unit, if an entire individual is present, it is most likely at least partially flexed. Because the remains were found in articulated anatomical position, they more likely represent a primary burial. No historic artifacts, such as shoe leather or buckles, buttons, decomposing cloth, etc., were found in association with the burial remains. Mr. Kala'au Wahilani of the SHPD Burials Program staff was notified of the find, as was Ms. Muffet Jourdane of SHPD's Archaeology Branch (messages were left on their respective answering machines). In subsequent conversations with these individuals it was confirmed that they received the telephone messages. Following Mr. Wahilani's lead, the burial was not further exposed, was left in place, and the trench was back filled. No age-at-death or sex determination could be made on the exposed remains. Based on general context, the remains are most likely prehistoric/early historic Native Hawaiian, although this has not been conclusively demonstrated.

Summary of Excavation Unit 1, Sink 2

Because human remains were encountered, Excavation Unit 1, Sink 2 extended only to 35 cmbs. It is clear from the excavation results that Sink 2 contains cultural deposits related to prehistoric/traditional Hawaiian habitation and likely contains at least one prehistoric/early historic Native Hawaiian burial. The cultural deposits, including marine shell midden and basal flakes, are not overly abundant and are mixed with historic and modern materials. This is evidence for the stratigraphic mixing of the upper levels of Sink 2. Such stratigraphic mixing can be biological (tree roots, rodent burrows) or cultural (perhaps children playing in the sink prior to the deposition of the boulder and cobble rubble fill). It does appear that with greater depth the cultural deposit is composed of more traditional-Hawaiian remains. With greater depth in Sink 2, below the depth of the present excavation, it is quite possible that undisturbed prehistoric cultural deposits are present.

Burial in limestone sink features is a fairly common traditional-Hawaiian mortuary practice that has been documented extensively on O'ahu at Barber's Point (Kalaeloa) and the adjacent West Beach area. Although the location of a burial in one of the two 1 by 1 m^2 excavation units excavated in the project area could be merely fortuitous happenstance, it may also be an indication that burials in the sinks of the project area are fairly common. Only additional excavation will tell.

Summary and Recommendations

The preliminary "subset" investigations of the archaeological inventory survey for the proposed Nanakuli IV Elementary School were successful at documenting the types of historic properties that are located within the project area. Sink 1 contains an abundant extinct avifauna deposit. It also contains the artifacts, food midden remains, and charcoal from prehistoric/traditional-Hawaiian land use in the vicinity of the sink and possibly within the sink itself. Sink 2 contains prehistoric/traditional Hawaiian cultural remains. Sink 2 also contains what is most likely a prehistoric/traditional Hawaiian burial. Sink 2 may also contain additional undisturbed prehistoric cultural layers and/or paleontological deposits.

As a result of the sink identification program, 17 sink features were marked with flagging tape for recording by land surveyors. These 17 sinks represent the sink features which, because of their size, can be excavated archaeologically. It is possible that sinks not flagged, either because they were too small to excavate or not visible at the time of the survey, will be found to contain cultural or paleontological deposits. The sink features detectable on the current land surface are confined to the *mauka* portion of the project area.

Based on the current results, it is likely that human burials will be found in a significant number of the identified sink features. It is quite possible that some sinks will contain more than one burial. The burial in Sink 2 was located during part of an archaeological inventory survey. It is therefore considered a previously recorded burial and its mitigation falls under the jurisdiction of the O'ahu Island Burial Council. Because additional burials are likely to be found in the project area, it is recommended that the O'ahu Island Burial Council be informed immediately of the proposed Nanakuli IV Elementary School project and the potential for finding additional burials. Potential mitigation routes, such as preservation in place or temporary removal with reinterment on site in a burial preserve area, should be discussed with the Burial Council members. As part of the inventory survey of the project area, additional sink features should be tested for the presence of burials. It is only after this additional testing has taken place that we will have a more concrete idea of the burial density within the project area's sink features. Once the input of the Burial Council has been obtained, and additional sink features have been tested, a detailed burial treatment plan should be prepared for the project area.

It should be noted however that many of these sinks are fairly large. Thus, although a single excavation within a sink may not locate a burial, that does not mean that no burials are present in that particular sink. The complete excavation of each sink would be required to conclusively determine whether burials are present in the different sinks. An additional complication is that some sinks are too small to excavate, but may still contain a burial. It should be understood that testing for the presence or absence of burials in sink features is a sampling exercise at best. Sampling of the sinks during the inventory survey will be discussed below.

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Regarding the paleontological deposits (primarily extinct avifauna), Dr. Ziegler was kind enough to offer his input. Dr. Ziegler recommended that rather than expending effort (time and money) at collecting more extinct vertebrate bone, the investigation should concentrate on ^{14}C radiocarbon dating of selected species/bone samples. This important information would help to fill in the chronology of vertebrate extinctions in the Hawaiian Islands. Dr. Ziegler pointed out that the types of remains that were found in Sink 1 were amply represented from other excavations in the state. Dating of these types of remains, rather than stockpiling more of the same, was more important. The dating of the remains may also inform on the relationship of faunal extinction and human colonization, especially from contexts such as the lowest levels of Sink 1 where extinct vertebrate remains are found with cultural deposits. It is therefore recommended that the paleontological investigations of the inventory survey focus on dating identified bones from informative stratigraphic contexts. The inventory survey proposal should have provisions for this dating analysis.

Both sink features that were tested contained prehistoric/traditional-Hawaiian cultural deposits. Cultural deposits in other sinks are likely. These types of deposits have the potential to inform on the types of activities that were practiced in the sinks, or in their immediate vicinity. They also can provide information regarding the chronology of initial settlement and subsequent land used. A sampling strategy should be implemented to determine the density of cultural deposits in the sink features, within the project area.

The sampling strategy for the inventory survey should be worked out in consultation with SHPD. In our initial conversations regarding the project area, when you and Ms. Jourdane visited the project area, you were in favor of a 1 by 1 m^2 excavation in all of the sink features. At that time we were not yet sure if the sinks contained cultural deposits. Now we have reason to believe cultural, human burial, and paleontological deposits are likely in many of project area's sinks. For the completion of the inventory survey within the project area, the sampling strategy of testing each of the remaining 15 identified sinks seems appropriate. Each should have its rubble content removed using hand excavation and/or the backhoe. Subsequently a 1 by 1 m^2 excavation should be placed in each of the 15 untested sinks. Based on the experience of the "subset" preliminary excavations, this is a labor intensive and costly proposition. However, I cannot think of any other way to adequately inventory the sink deposits. This sample should provide for more concrete discussions of burial locations and density, ample paleontological vertebrate material for ^{14}C radiocarbon dating, and cultural material (artifacts, midden remains, charcoal) for discussions of land use and (possibly) settlement chronology in the vicinity of the project area.

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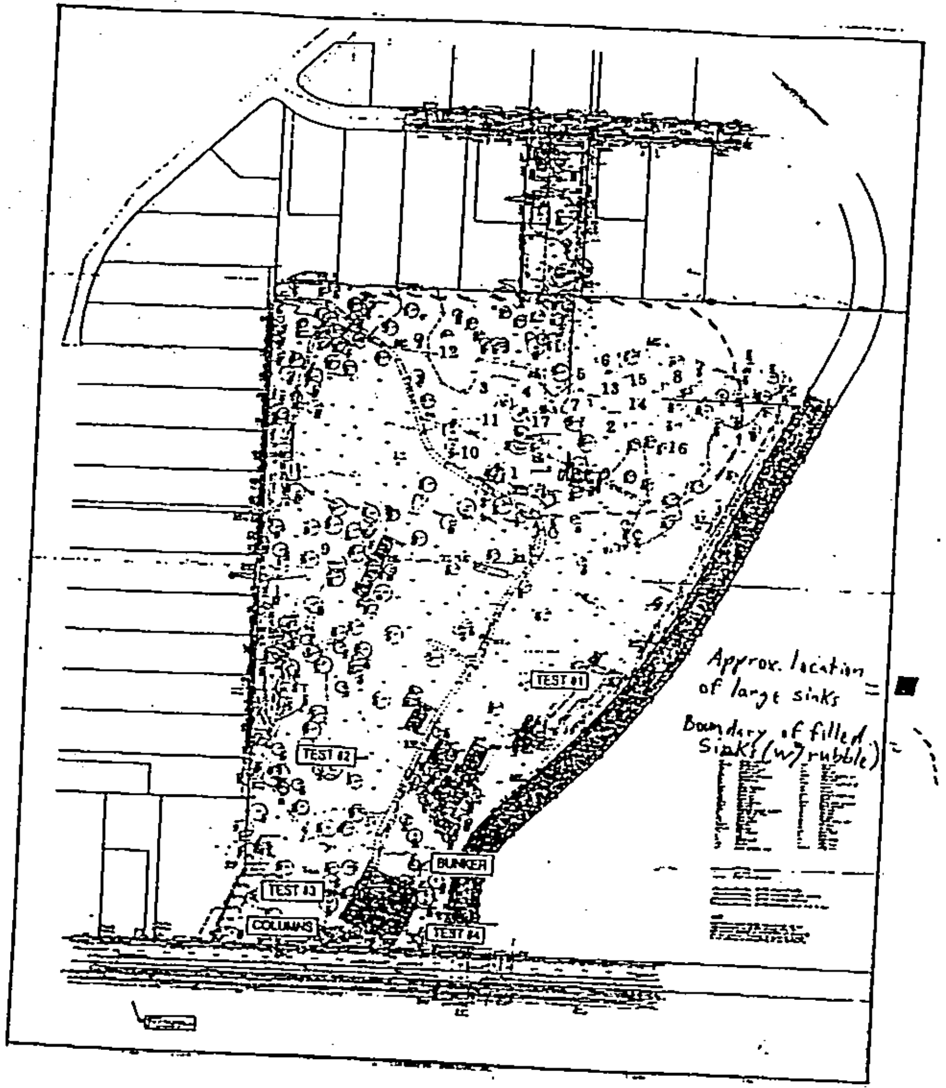
Of course I welcome your input regarding the scope of work for the inventory survey. I hope this summary has provided the information you need to evaluate the historic preservation concerns for the project. Please give me a call regarding this matter at your convenience.

Sincerely,

Matt McDermott (with Dr. Hallett H. Hammatt).

References

Hammatt H. Hallett, Matt McDermott, and Rodney Chiogioji
1999 *Archaeological Assessment of an Approximately 15-Acre Parcel,* Ahupua'a *of Nanakuli, Wai'anae District, Island of O'ahu (TMK 8-9-02:65).* Cultural Surveys Hawaii, Inc. Kailua, Hawaii.



Sink Features Located in Nanakuli IV Elementary School Parcel

Figure 1 Location of the 17 identified sink features within the project area

Table 1: Sink Features Located in Nanakuli IV Elementary School Parcel

[illegible]	[illegible]	[illegible]
1	2.5 by 2.5 by 4.0 m deep	20 m makai of cock fight ring--excavation inside
2	2.5 by 1.7 by 2.2 m deep	was full of bones--still smells--excavation inside
3	2.0 by 3.0 by 1.2 m deep	full of plastic buckets (black) wire mesh plastic bags
4	2.5 by 1.4 by 0.6 m deep	appears to be shallow, elongated, oriented roughly north/south
5	1.75 by 1.5 by 0.7 deep	irregular in shape, contains a wood pallet and foam pad, metal 55 gallon drum lid
6	1.75 by 1.2 by 0.6 deep	contains a baby stroller
7	1.2 by 1.0 by 0.9 deep	jumbled boulders around north side
8	1.75 by 1.3 by 0.9 deep	oval shaped, contains beer cans and gray plastic milk crate
9	2.0 m in diameter, 0.4 m deep	roughly round
10	3.6 by 1.0 m, elongated	located near concrete pad by sink #1, contains plastic bottles, white plastic grocery bag
11	4 by 2.2 by 0.46 m deep	contains a deflated rubber ball and a piece of 2 by 4 " lumber with nails in it
12	large 5-8 m in diameter, hard to define--East border easier to follow	contains large kiawe tree, sheet metal fragments, and located southwest of a large trash pile
13	roughly round 3-3.5 m in diameter	soil covered interior, three kiawe trees growing out of it
14	3 by 1.7 m	soil covered interior w/ blue plastic bag in interior surface, kiawe trees growing out of the middle
15	4 by 2.4 m	contains white plastic bucket and soda cans, covered in kiawe branches
16	irregular shaped 2.5 by 1.3 by 1.0 m deep	somewhat buried under dead kiawe branches, contains some brown beer bottles
17	roughly circular 2.5-3 m in diameter	contains some large boulders

Sink features are flagged with orange, pink, or blue flagging tape--3 to 5 flags around sink perimeter. Sink features are predominantly labeled with a centrally located yellow "caution" tape piece with the sink number printed with black "sharpie" marker. Some sinks are labeled with a centrally located colored flagging tape piece with black sharpie marker.

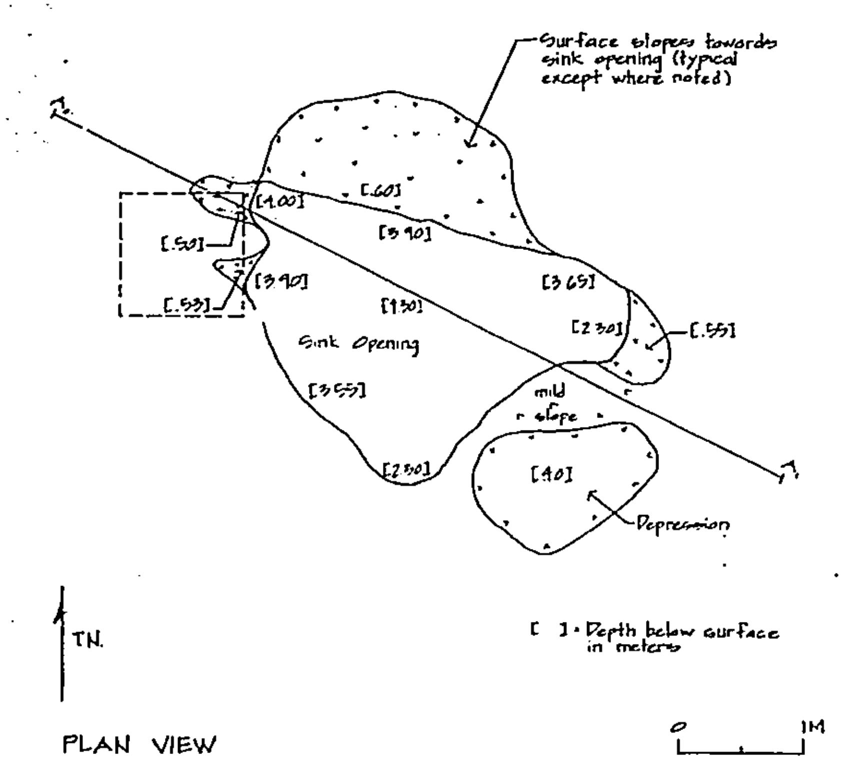


Figure 2 Plan view of Sink 1 showing the location of Excavation Unit 1.

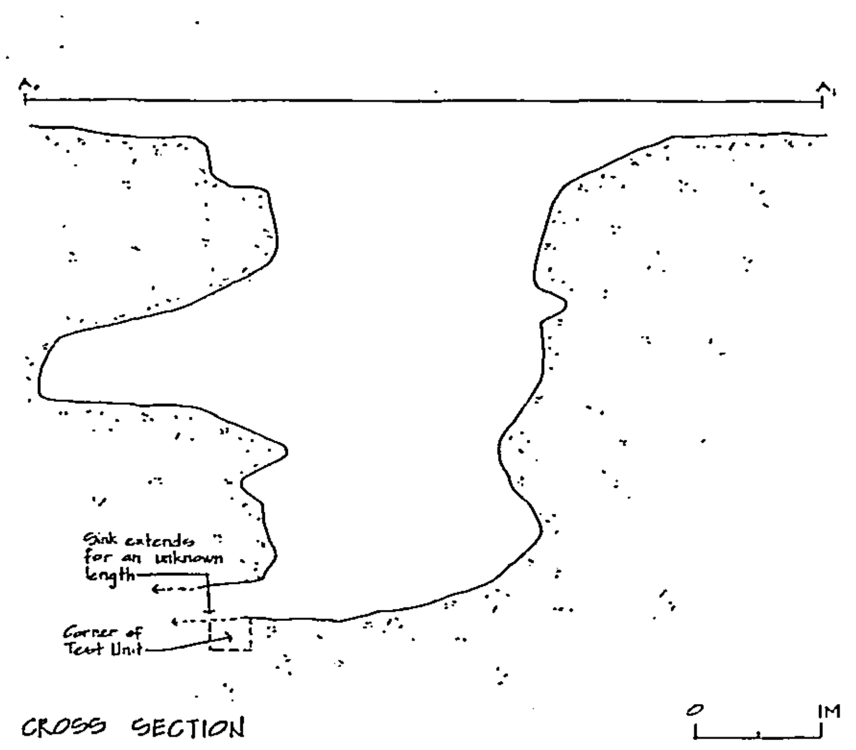
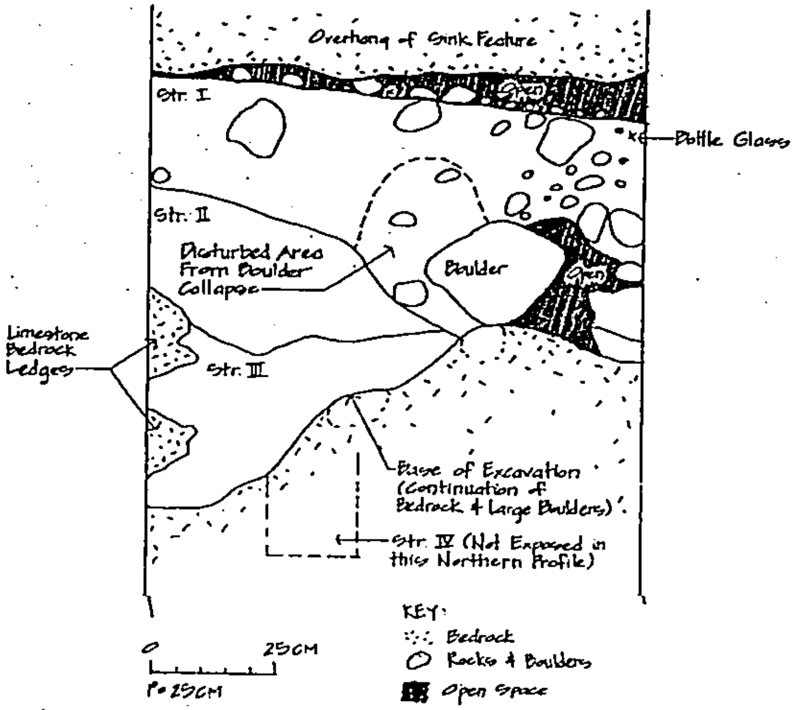


Figure 3 Cross-section of Sink 1 showing the location of Excavation Unit 1.

Figure 4 North profile of Excavation Unit 1, Sink 1.



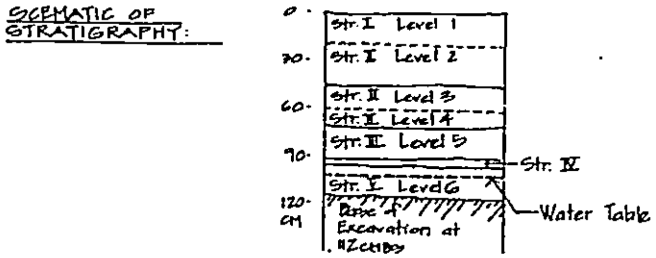


Figure 5 Schematic of stratigraphy inExcavation Unit 1, Sink 1, showing strata and levels used in Dr. Ziegler's vertebrate identification lists (Appendix A).

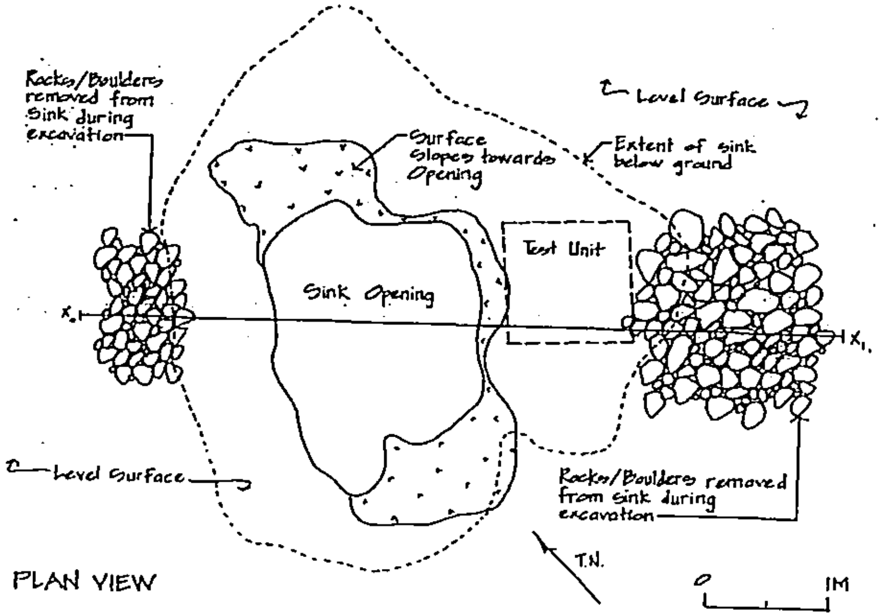


Figure 6 Plan view of Sink 2 showing the location of Excavation Unit 1.

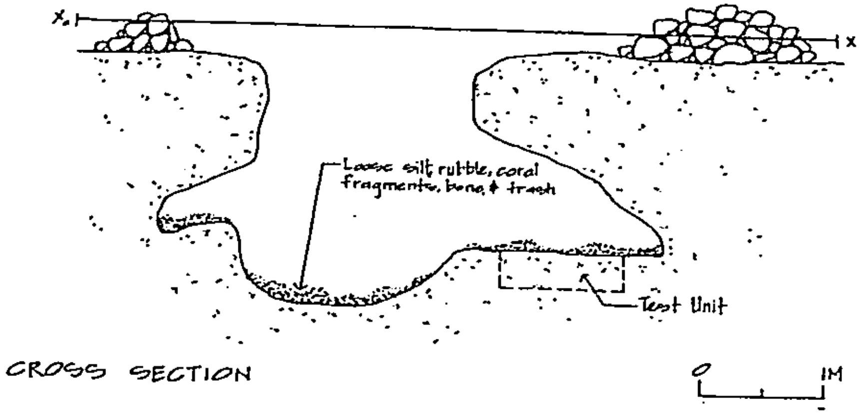


Figure 7 Cross-section of Sink 2 showing the location of Excavation Unit 1.

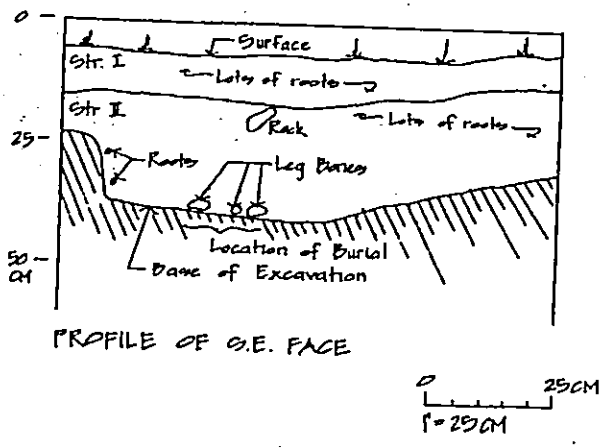


Figure 8 Southeast profile of Excavation Unit 1, Sink 2.

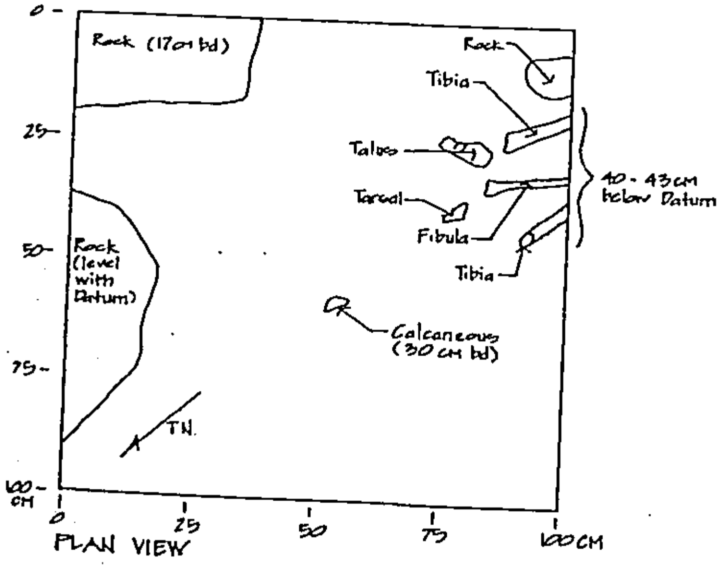


Figure 9 Plan view of the base of excavation of Excavation Unit 1, Sink 2, showing the position of the exposed burial remains.

Appendix A

Preliminary identification of vertebrate faunal material from Cultural Surveys Hawai'i Project NAMA 9S by Alan C. Ziegler, 31 July 2000.

Figures indicate number of entire bones or bone fragments.
† = species prehistorically extinct on at least O'ahu.

Sink 1, EU 1, 45-60 cmbs, Stratum II, Level 8, 20 Gallons through 1/8" mesh

Labrid	
Scombrid	
Fish	
	1
† *Pterodroma phaeopygia*	
Puffinus sp.	2
Small Procellariid	1
Medium Procellariid	1
† *Oceanodroma castro*	6
† *Branta* sp.	
† *Thambetochen xanion*	3
Small Anatid	
† Medium or Large Anatid	
† *Porzana ziegleri*	
Medium Rallid	1
cf. *Pluvialis fulva*	5
† *Grallistrix orion*	
† *Corvus* sp. (= Crow)	1
† *Chaetoptila* sp.	1
Small Passeriform	2
Small Bird	8
Medium Bird	5
Large Bird	45
	1
† Undescribed Vespertilionid Bat	
Rattus exulans	
Canis familiaris	1
Herpestes auropunctatus (historic species)	

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(Preliminary identifications of vertebrate faunal material from Cultural Surveys Hawai'i Project HANA 9S, by A.C. Ziegler, 31 July 2000, page 2 of 8.)

Sink 1, EU 1, 45-60 cmbs, Stratum II, Level 3 "below boulders", 17.5 Gallons through 1/8" mesh

Labrid	
Scombrid (len. = 50-55 or so cm)	3
Fish	1
† *Pterodroma phaeopygia*	2
Puffinus sp.	
Small Procellariid	1
Medium Procellariid	6
† *Oceanodroma castro*	
† *Branta* sp.	3
† *Thambetochen xanion*	
Small Anatid	2
† Medium or Large Anatid	1
† *Porzana ziegleri*	
Medium Rallid	18
cf. *Pluvialis fulva*	
† *Grallistrix orion*	1
† *Corvus* sp. (= Crow)	
† *Chaetoptila* sp.	4
Small Passeriform	7
Small Bird	9
Medium Bird	32
Large Bird	
† Undescribed Vespertilionid Bat	
Rattus exulans	5
Canis familiaris	1
Herpestes auropunctatus (historic species)	1

• • •

(Preliminary identifications of vertebrate faunal material from Cultural Surveys Hawai'i Project HANA 9S, by A.C. Ziegler, 31 July 2000, page 3 of 8.)

Sink 1, EU 1, 60-70 cmbs, Stratum II, Level 4, 10 Gallons through 1/8" mesh

Labrid	
Scombrid	
Fish	
† *Pterodroma phaeopygia*	3
Puffinus sp.	
Small Procellariid	
Medium Procellariid	7
† *Oceanodroma castro*	1
† *Branta* sp.	2
† *Thambetochen xanion*	
Small Anatid	
† Medium or Large Anatid	
† *Porzana ziegleri*	
Medium Rallid	13
cf. *Pluvialis fulva*	1
† *Grallistrix orion*	5
† *Corvus* sp. (= Crow)	2
† *Chaetoptila* sp.	1
Small Passeriform	7
Small Bird	9
Medium Bird	55
Large Bird	4
† Undescribed Vespertilionid Bat	
Rattus exulans	
Canis familiaris	
Herpestes auropunctatus (historic species)	

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(Preliminary identifications of vertebrate faunal material from Cultural Surveys Hawai'i Project NANA 9S, by A.C. Ziegler, 31 July 2000, page 4 of 8.)

Sink 1, EU 1, 70-90 cmbs, Stratum III, Level 5, 17.5 Gallons through 1/8" mesh

Labrid	
Scombrid	
Fish	
† *Pterodroma phaeopygia*	9
Puffinus sp.	
Small Procellariid	
Medium Procellariid	40
† *Oceanodroma castro*	
† *Branta* sp.	8
† *Thambetochen xanion*	5
Small Anatid	
† Medium or Large Anatid	1
† *Porzana ziegleri*	
Medium Rallid	84
cf. *Pluvialis fulva*	
† *Grallistrix orion*	16
† *Corvus* sp. (= Crow)	39
† *Chaetoptila* sp.	9
Small Passeriform (incl. 13 up./low. mand. frags.)	163
Small Bird	34
Medium Bird	388
Large Bird	31
† Undescribed Vespertilionid Bat	1
Rattus exulans	
Canis familiaris	
Herpestes auropunctatus (historic species)	

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(Preliminary identifications of vertebrate faunal material from Cultural Surveys Hawai'i Project NANA 9S, by A.C. Ziegler, 31 July 2000, page 5 of 8.)

Sink 1, EU 1, 70 cmbs, Stratum III, Level 5, Concentration in SW Quadrant of excavation

Labrid	
Scombrid	
Fish	
† *Pterodroma phaeopygia*	1
Puffinus sp.	
Small Procellariid	
Medium Procellariid	5
† *Oceanodroma castro*	
† *Branta* sp.	12
† *Thambetochen xanion*	1
Small Anatid	
† Medium or Large Anatid	
† *Porzana ziegleri*	
Medium Rallid	3
cf. *Pluvialis fulva*	
† *Grallistrix orion*	11
† *Corvus* sp. (= Crow)	12
† *Chaetoptila* sp.	1
Small Passeriform	12
Small Bird	7
Medium Bird	37
Large Bird	6
† Undescribed Vespertilionid Bat	
Rattus exulans	
Canis familiaris	
Herpestes auropunctatus (historic species)	

• • •

(Preliminary identifications of vertebrate faunal material from Cultural Surveys Hawai'i Project NAHA 9S, by A.C. Ziegler, 31 July 2000, page 6 of 8.)

Sink 1, EU 1, 84 cmbs, Stratum III, Level 6, Single bone in NW Quadrant of excavation

Labrid	
Scombrid	
Fish	
† *Pterodroma phaeopygia*	
Puffinus sp.	
Small Procellariid	
Medium Procellariid	
† *Oceanodroma castro*	
† *Branta* sp.	
† *Thambetochen xanion*	1
Small Anatid	
† Medium or Large Anatid	
† *Porzana ziegleri*	
Medium Rallid	
cf. *Pluvialis fulva*	
† *Grallistrix orion*	
† *Corvus* sp. (= Crow)	
† *Chaetoptila* sp.	
Small Passeriform ~~(incl. XX up./low. mand. frags.)~~	
Small Bird	
Medium Bird	
Large Bird	
† Undescribed Vespertilionid Bat	
Rattus exulans	
Canis familiaris	
Herpestes auropunctatus (historic species)	

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(Preliminary identifications of vertebrate faunal material from Cultural Surveys Hawai'i Project NAHA 9S, by A.C. Ziegler, 31 July 2000, page 7 of 8.)

Sink 1, EU 1, 90-112 cmbs, Stratum V, Level 6, 2.5 gallons (11 liters) wet screened through 1/16" mesh

Labrid	
Scombrid	
Fish	2
† *Pterodroma phaeopygia*	4
Puffinus sp.	
Small Procellariid	
Medium Procellariid	13
† *Oceanodroma castro*	
† *Branta* sp.	1
† *Thambetochen xanion*	
Small Anatid	
† Medium or Large Anatid	
† *Porzana ziegleri*	
Medium Rallid	28
cf. *Pluvialis fulva*	
† *Grallistrix orion*	5
† *Corvus* sp. (= Crow)	4
† *Chaetoptila* sp.	
Small Passeriform (incl. 7 up./low. mand. frags.)	39
Small Bird	9
Medium Bird	131
Large Bird	1
† Undescribed Vespertilionid Bat	
Rattus exulans	2
Canis familiaris	1
Herpestes auropunctatus (historic species)	

• • •

(Preliminary identifications of vertebrate faunal material from Cultural Surveys Hawai'i Project MANA 9S, by A.C. Ziegler, 31 July 2000, page 8 of 8.)

Sink 1, EU 1, 90-102 cmbs, Stratum V, Level 6, 2.5 gallons (11 liters) wet screened through 1/16" mesh

Labrid	1
Scombrid	
Fish (len. = 25-30 cm)	9
† *Pterodroma phaeopygia*	1
Puffinus sp.	
Small Procellariid	
Medium Procellariid	6
† *Oceanodroma castro*	
† *Branta* sp.	3
† *Thambetochen xanion*	
Small Anatid	
† Medium or Large Anatid	
† *Porzana ziegleri*	
Medium Rallid	18
cf. *Pluvialis fulva*	1
† *Grallistrix orion*	6
† *Corvus* sp. (= Crow)	12
† *Chaetoptila* sp.	2
Small Passeriform (incl. 10 up./low. mand. frogn.)	62
Small Bird	24
Medium Bird	190
Large Bird	5
† Undescribed Vespertilionid Bat	
Rattus exulans	5
Canis familiaris	
Herpestes auropunctatus (historic species)	

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Appendix E

Cultural Impact Assessment

A Traditional Practices Assessment for the Proposed Nānākuli IV Elementary School Site, Nānākuli, Waiʻanae District, Island of O'ahu (TMK: 8-9-02: 65, 23, por 1)

DRAFT

by

Kaʻohulani Mc Guire, B.A.

and

Hallett H. Hammatt, Ph.D.

Prepared for

Wilson Okamoto & Associates, Inc.

Cultural Surveys Hawaiʻi
October , 2000

ABSTRACT

A traditional practices assessment for the proposed Nānākuli IV Elementary School site was requested by Wilson Okamoto and Associates. The proposed project area (TMK 8-9-02:65, 23, por 1), known as Camp Andrews, is comprised of approximately 15 acres in the *ahupua'a* of Nānākuli, in the Wai'anae District on the island of O'ahu (Figures 1 & 2).

Research of the oral and historical record showed that information regarding traditional Hawaiian lifestyle during the pre-contact and early post-contact periods up to the end of the 19th century was remarkably absent. At the time of the *Māhele*, Nānākuli was Crown lands and was owned by Kamehameha III. A search of the *Māhele* records indicated there was only one *kuleana* (commoner) claim made throughout the *ahupua'a* of Nānākuli. The claim was not awarded. Because the *Māhele* records were virtually lacking, there were no early maps to show *kuleana* or *'ili* boundaries. The scant information regarding land use and gathering practices comes from the one unawarded claim. The exact location of Hāpai *'ili*, which was named in the claim, is not known. If any mention is made at all, early explorer and journal entries regarding Nānākuli are limited to a scant few lines at the most.

The Camp Andrews site is located in an area that was used for cattle ranching since the last half of the 19th century and during the first half of the 20th century, the site was utilized by the military for a rest and recreation spot for its military personnel. In the 1950's, the Camp Andrews site was returned to the State of Hawai'i where it has remained undeveloped until today.

The Camp Andrews site has some interesting features. Besides, being the home of a historic military site, over 50 years old, it contains numerous sink features. Preliminary archaeological testing indicates that the sinks are valuable for containing cultural deposits, extinct fauna, as well as prehistoric/early historic Hawaiian burials. One human burial was inadvertently found in one of the larger sink features. Sinks are commonly used in traditional Hawaiian burial practices. Based on the above testing, the construction of the proposed Nānākuli IV Elementary School at the Camp Andrews location may have an impact on culturally significant properties and native Hawaiian burials. It is recommended that further testing be carried out and that a mitigation plan and Burial Treatment Plan be in place prior to any work being done at the site, such as clearing, grading and grubbing. No other traditional practices were found within the project area.

Note: Throughout this report the spelling of Hawaiian vocabulary and place names has been standardized to present orthography.

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LIST OF FIGURES

I. INTRODUCTION

This traditional practices assessment was prepared at the request of Wilson Okamoto & Associates, Inc. for a 15-acre portion of a parcel known as the Camp Andrews site. The proposed site will house the Nānākuli IV Elementary School, the proposed Hawai'i State Public Library and the relocation of the Leeward Head Start facility.

The Hawai'i State Constitution, Article XII, Section 7 protects "all rights" of native Hawaiians that are "customarily and traditionally exercised for subsistence, cultural and religious purposes". Most recently, H.B. No. 2895 was passed by the 20th Legislature, and approved by Governor Cayetano as Act 50 on April 26, 2000. The bill acknowledges that

> "... the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture."

This bill makes it clear that "... environmental assessments or environmental impact statements should identify and address effects on Hawai'i's culture, and traditional and customary rights."

The purpose of this traditional practices assessment is to consider the effects the proposed development may have on native Hawaiians as it pertains to their right to practice traditional customs. The process for evaluating cultural impacts is still evolving and Public Access Shoreline Hawai'i (PASH) issues pertaining to traditional access and gathering rights continue to be unresolved. There is no foreseeable easy solution at hand and it is unlikely that the many complexities surrounding PASH issues will be resolved in the immediate and near future.

This assessment is meant to be informational for the purpose of disclosing any impacts the proposed development might have on native Hawaiian culture and to meet the requirements of the Office of Hawaiian Affairs (OHA) and any other state and county agencies involved in the review process for the proposed development.

Scope of Work

In addressing any Hawaiian customary and traditional rights and their applicability to the project area, the following scope of work was followed:

1) Examination of historical documents, Land Commission Awards, historic maps, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal and other resources or agricultural pursuits as may be indicated in the historic record.

2) A review of the existing archaeological information pertaining to the sites on the property as they may allow us to reconstruct traditional land use activities and identify and describe the cultural resources, practices and beliefs associated with the parcel, and to identify present uses, if appropriate.

3) Conduct oral interviews with knowledgeable persons about the historic and traditional practices in the project area and region.

4) Preparation of a report on the above items summarizing the information gathered related to traditional practices and land use. The report will assess the impact of the proposed action on the cultural practices and features identified.

Interview Informants

Kupuna within the Nānākuli community were contacted to determine if they had any knowledge of the Camp Andrews project area and the Nānākuli District in general, and especially in relation to Hawaiian cultural practices and burials within the proposed site. An interview was conducted with one knowledgeable *kupuna* who remembered the Camp Andrews site from the perspective of a young boy growing up in Nānākuli. This *kupuna* is Walter Kamanā, Jr. An interview was conducted with Mr. Kamanā by Rodney Chiogioji, of Cultural Surveys Hawaiʻi. The interview was conducted at Mr. Kamanā's home in December of 1999.

In relation to a recent project conducted by Cultural Surveys Hawaiʻi, interviews were also conducted with four other knowledgeable *kūpuna* who were *kamaʻāina* to the Nānākuli District. These interviews, though they lack specific information of the proposed project area, give a glimpse into the rich history and past of Nānākuli and capture a certain sense of the rich cultural heritage which the Nānākuli community can be proud of. Where applicable, portions of these interviews are quoted in the report. Full transcripts of the interviews are included in the Appendix of this report.

Following are brief biographical sketches of the five interviewees, listed in alphabetical order.

Fred Cachola

Mr. Cachola is of Hawaiian and Filipino heritage and was born on Kohala, Hawaiʻi. On the Hawaiian side, he traces his lineage back to his great-great-great-grandparents, Kupaianalua and Halulukamanawaululanipili, from Kohala. Upon graduating from college in 1960, he moved to Waiʻanae where he began his first teaching assignment at Waiʻanae Intermediate. Since teaching Hawaiian history to 7th-graders was part of his job, Mr. Cachola took a keen interest in the people, the history and legends of the Waiʻanae Coast area. He was very involved in the community and lived there for over 30 years. Mr. Cachola has since retired, but he spends his time as a docent at ʻIolani Palace and conducts historical tours of the Waiʻanae Coast, Kohala and other areas of interest.

Black Hoʻohuli

Mr. Hoʻohuli was born in Waiʻanae and raised in Nānākuli all of his life. His family was one of the first homesteaders in Nānākuli. Mr. Hoʻohuli attended Nānākuli High School and is currently employed there as a custodian. Mr. Hoʻohuli is very involved in the community. He is active in community planning meetings and is concerned about Nānākuli's welfare. He was very willing to share his knowledge. Black Hoʻohuli and Fred Cachola are friends and many of the stories Mr. Cachola shared with me were stories he had heard from Mr. Hoʻohuli.

Walter Kamanā, Jr.

Mr. Kamanā was born in Nānākuli in 1937. He was raised in the old Hawaiian style by his grandparents, from whom he learned to fish. Mr. Kamanā is well-known for his expertise in fishing and his knowledge of *limu* along the Nānākuli and Waiʻanae Coast. Mr. Kamanā's knowledge of Camp Andrews comes from his early years of fishing and bartering with the military cook and soldiers for needed supplies which he would trade for fresh caught bounty from the ocean.

Lehua Kapaku

Mrs. Kapaku is of Hawaiian ancestry and was born in Waipiʻo Valley on the island of Hawaiʻi. She is currently the curator of Nānāikapono Community School Museum. She moved to Oʻahu to attend the University of Hawaiʻi at Mānoa. In 1960, she moved to Nānākuli and has lived there for the past 39 years. Because of the nature of her job at the Museum, Mrs. Kapaku is well-connected with the local community. She is also the President of "*Mālama* Nānākuli *Ahupuaʻa*, Inc." whose purpose is to "restore, preserve and establish an educational place for the people of Nānākuli." The organization has a partnership with three schools and other community associations. Mrs. Kapaku works closely with Ross Cordy, Archaeology Branch Chief, at the State Historic Preservation Division, who is very involved in *Mālama* Nānākuli *Ahupuaʻa* and has been conducting archaeological studies in upper Nānākuli Valley over the past few years.

Jay Landis

Mr. Landis is of part-Hawaiian ancestry and was born in 1919 in San Francisco, California. He was *hānai* to an aunt and moved to Waiʻanae about 1933 at the age of 14 years. He is related to the McCandless family and lives on family land at Lualualei, where he was raised. He was described to me by many people in the community as someone who would be a good resource for information because he was involved in community organizations, grew up in the area, and knew a lot about the history of the Waiʻanae Coast.

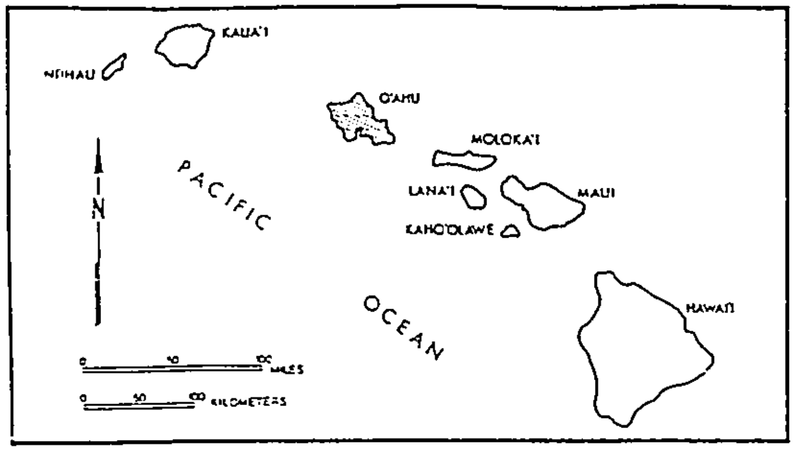

Fig. 1 State of Hawai'i

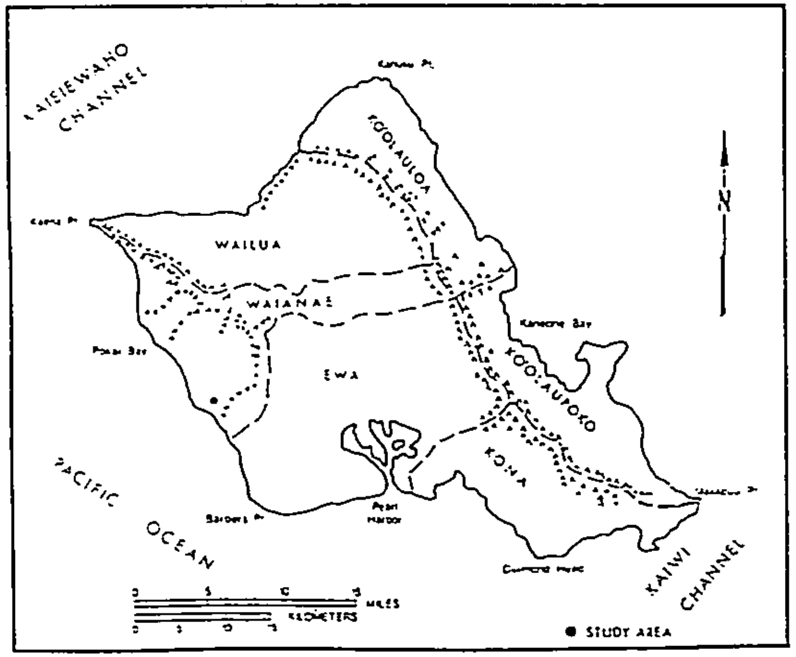

Fig. 2 O'ahu Island Location Map

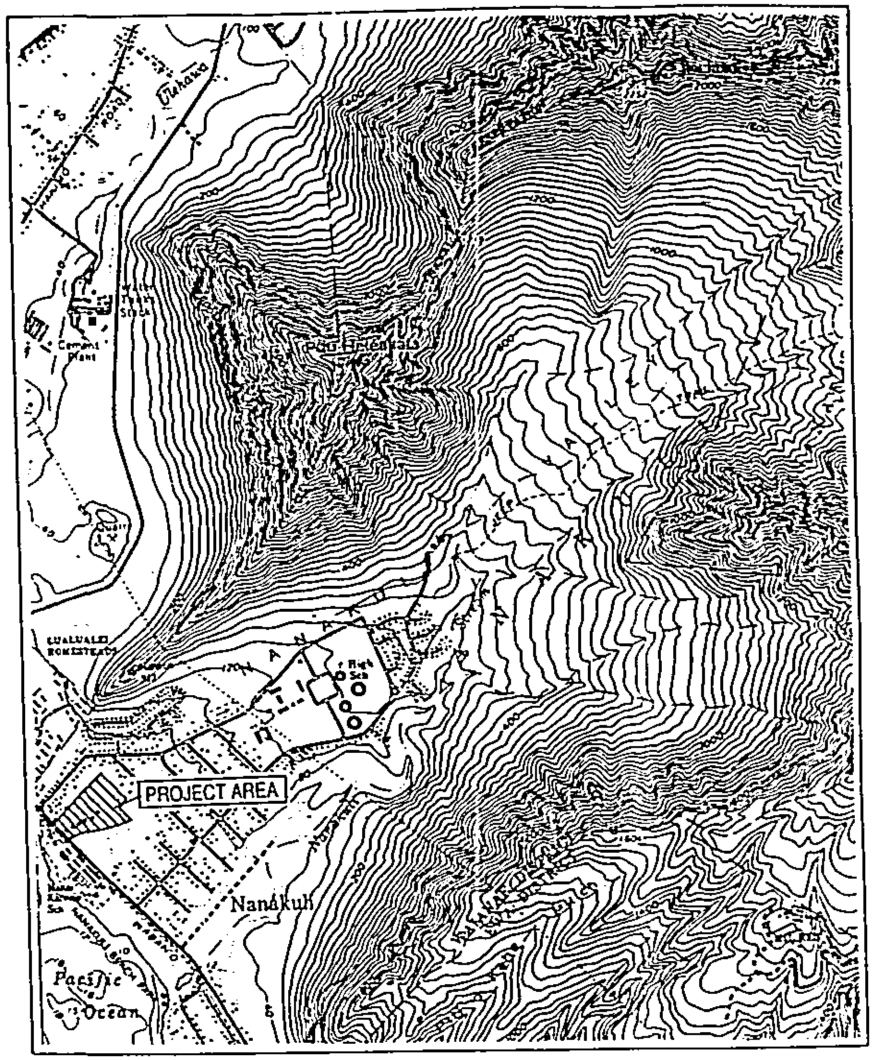

Figure 3 Portion of (1983) USGS 7.5 Minute Series Topographical Map, Schofield Barracks Quadrangle, showing the present study area

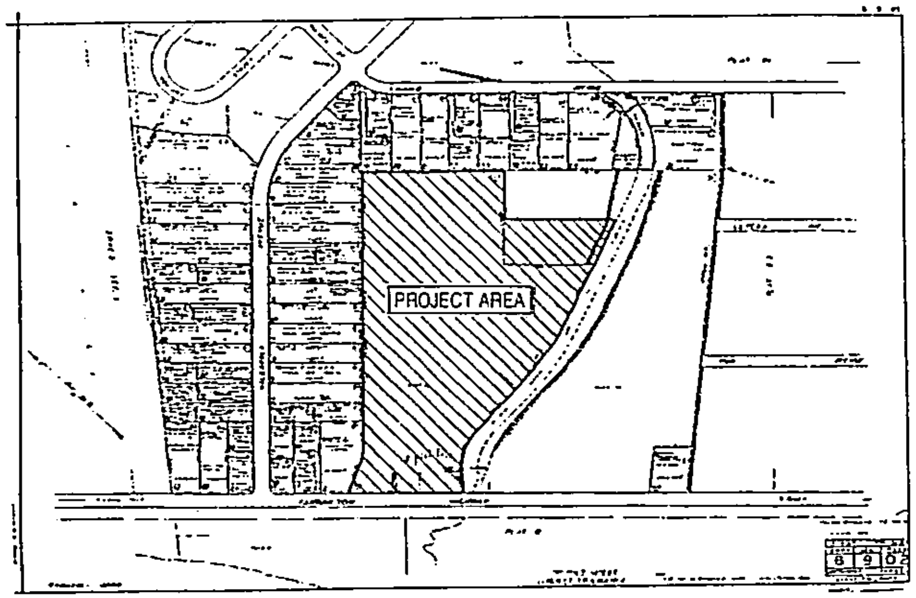

Figure 4 TMK map showing present study area (TMK 8-9-02:65, 23, por 1)

II. DESCRIPTION OF THE PROJECT AREA AND TRADITIONAL CUSTOMS AND PRACTICES REGION

Project Area

The project area is comprised of an approximately 15-acre parcel (TMK 8-9-02:65, 23, por 1) in the *ahupuaʻa* of Nānākuli, Waiʻanae District, on the island of Oʻahu (Figures 1-4). The parcel is a portion of a larger 37-acre parcel known as Camp Andrews. The site was formerly a military reservation and was set aside for an overnight rest and recreation spot for enlisted men only during World War II. The actual project area is bounded on the southwest by Farrington Highway, on the southeast by a drainage canal and on the northwest and northeast sides by house lots.

The land area of Nānākuli is situated between the *ahupuaʻa* of Lualualei on the northwest and Honouliuli on the southeast and encompasses a total area of 1,602 acres. The former Camp Andrews site is located at the base of Nānākuli Valley, which presently is home to 9,575 residents s (Juvik and Juvik 1998: 306).

Natural Setting

Nānākuli Valley is an amphitheater-headed erosional feature that is cut into the eroded remnant of the Waiʻanae shield volcano, the first volcano to form what is now Oʻahu (Abbott, Macdonald, Peterson 1983: 426). Puʻu Heleakalā (1890 feet AMSL) lies northwest of the project area and divides Lualualei from Nānākuli. To the northeast likes Puʻu Manawahua (2401 feet AMSL). Nānākuli Beach Park (formerly Kalanianaʻole Beach Park) is located approximately 1.1 km (3/4 mile) southwest of the project area.

The prevailing winds are the northeast trades that blow over the Koʻolau Mountains, continue over the Waiʻanae Range and head out over the southwest portion of the island. There is a regular sea breeze that blows through the area between Waiʻanae Town and Nānākuli. The Waiʻanae Coast is dependent on winter rains which can supply as much as half the annual rainfall. The average annual rainfall ranges from less than 20 inches along the coast to as much as 40 inches in the upper valley during the rainy, winter season (Juvik and Juvik 1998: 55-56; Sanderson 1993: 33). The average temperature ranges from 43 to 88 degrees Fahrenheit in January and 58 to 95 degrees Fahrenheit in July (Armstrong 1973: 58).

Before the introduction of exotic species at Western contact, the native ecosystem of the area consisted of lowland dry and mesic forests, lowland dry shrub lands and grasslands. Today, nearly the entire area has been altered by human activity (Juvik and Juvik 1998: 122-23). Vegetation within the Camp Andrews project area consists of *kiawe* (*Prosopis pallida*), *koa haole* (*Leucaena leucocephala*), klu (*Acacia farnesiana*), *ʻilima* (*Sida fallax*) and introduced perennial grasses and weeds. In addition, there are also planted stands of pencil tree (*Euphorbia tirucalli*), bow string hemp (*Sansevieria trifasciata*), aloe (*Aloe vera*) and tamarind trees (*Tamarindus indica*).

Nānākuli Stream lies outside of the project area to the east and runs parallel to Nānākuli Avenue, exiting into the ocean at Nānākuli Beach Park just north of Laumania Avenue.

The soils in the project area consist of Coral outcrop (CR). Coral outcrop consists of coral or calcareous sand. On Oʻahu, both these soils are found usually between sea level and 100 ft. elevations (Foote *et al.*, 1972: 29, 93). This type of land is used for "military installations, quarries and urban development. Vegetation is sparse. Generally, it consists of *kiawe, koa haole*, and fingergrass" (*Ibid.*: 29).

III. CULTURAL SETTING

The Greater Region of Waiʻanae

Nānākuli is situated within the larger geographic land section known as Waiʻanae. As it was in distant times, Waiʻanae is one of six major *moku* (districts) on the island of Oʻahu and borders the ʻEwa district on the southeast and extends to Kaʻena on the northwest. Today, Waiʻanae consists of nine *ahupuaʻa* (traditional land division which in many cases extends from the mountain to the sea). These nine *ahupuaʻa* are (in order from southeast to northwest) Nānākuli, Lualualei, Waiʻanae, Mākaha, Keaʻau, ʻŌhikilolo, Mākua, Kahanahāiki and Keawaʻula.

In ancient times, the Waiʻanae District was known for its multitude of fish and especially for deep sea fishing off Kaʻena where the ocean currents meet. The meaning of Waiʻanae (mullet water) also implies an abundance of fish — *ʻanae*, which is the full-grown mullet (Pukuʻi *et al.*, 1976). Handy and Handy (1972) attribute the naming of Waiʻanae to a large fresh water pond for mullet called Pueha [*sic*] [Puehu]. Today, Waiʻanae is still considered one of the best fishing grounds on Oʻahu.

Traditional Descriptions of the *Moku* (District) of Waiʻanae

Waiʻanae is reknowned for the intense heat of the sun that is offset by the cooling breezes of the *kaiāulu* wind made famous in both *oli* (chant) and *mele* (song) of the Hawaiian people. Thus, the *ʻōlelo* no*ʻeau* (proverb), *Ola ʻO Waiʻanae i ka malu kaiāulu.* Waiʻanae survives in the shade of the kaiāulu wind. (Judd 1930:54.) Following is a poetic description of Waiʻanae which extols its virtues:

> . . . Waiʻanae of the gentle Kaiāulu wind, the sweet waters of ʻEku, the thick poi of Pāhoa, the stringy poi of Lehano and Kūāiwa, the rich poi of Kamaile, and the *aku* fish "tidbits" (*aku nahu pū*) of Waiʻanae — in Waiʻanae, land beloved of the sun. (Kamakau 1991:106)

It was at Kaʻena, in Waiʻanae, that Kawelo became an expert at fishing. The chiefs Pōkaʻī and Mōʻeke made Waiʻanae their home and it was Pōkaʻī who planted the renowned coconut grove at Malaea which is spoken about in chants and songs (Kamakau 1991:106, 68). The grove no longer exists. Waiʻanae is home to the Māui legends where the super-hero and demi-god began his humble origins at Ulehawa.

A chant (*Kūnihi Kaʻena, Holo i ka Mālie*), composed by Hiʻiaka on her homeward journey to Hawaiʻi island with Lohiau and Wahineʻōmaʻo, speaks of the renowned place names throughout the Waiʻanae District (Emerson 1993:157 & Theodore Kelsey Notes).

Waiʻanae is home to the *leimoku* surf and the *kaiāulu* wind. Mt. Kaʻala in Waiʻanae, the highest mountain peak on Oʻahu (4003 ft.), is where the pig-god, Kamapuaʻa, made his home. Kaʻala is home to Kōina, the goddess who sends an *ʻiwa* bird to assist weary travelers who have lost their way. Also at Kaʻala, the sweet *maile lau liʻi* (*Alyxia oliviaeformis*) and the fragrant *palapalai* (*Microlepia strigosa*) are sought after by hula dancers for adornment. These plants, which are sacred to Laka, the patron of hula, can still be found at Ka'ala today.

Wai'anae was the home of ruling chiefs. Kamehameha the Great unsuccessfully launched his fleet of war canoes from Wai'anae in an attempt to conquer Kaua'i. The fleet was capsized by a strong wind called *kūlepe* in the Ka'ie'iewaho Channel off the leeward coast and the warriors were forced to return to shore (Kamakau 1992:173).

The *Ahupua'a* of Nānākuli

The *ahupua'a* of Nānākuli encompasses 1,062 acres and is bounded on the east by Honouliuli in the 'Ewa District and on the west by Lualualei in the Wai'anae District. The leeward area between Mākua and Nānākuli is especially noted for its susceptibility to drought and famine. In valleys such as Nānākuli, where perennial streams are lacking, agricultural resources would have been sparse due to poor water and land resources. It is probable that there were small, scattered settlements here and there whose main subsistence was the *'uala* (*Ipomoea batatas*) or sweet potato.

> The eastern slopes of the southern end of the Wai'anae Mountains below Pu'u Puna were famous for sweet potato growing. Although there was a little taro grown in the valleys of Wai'anae-uka, sweet potatoes grown on the *kula* lands were the main food of the people here. On the other side of the Wai'anae Mountains sweet potatoes were planted on the dry slopes of Nānākuli, Lualualei, Wai'anae-kai, and the other small valleys as far as Mākua. With the exception of Wai'anae-kai, the sweet potato was the staple for the inhabitants of this dry section . . . (Handy 1940:156)

To make up for this agricultural deficit, the coastal areas were rich in marine resources. There was always an abundant supply of fish to be had for the catching (Handy and Handy 1972:275,277).

Stories and Their Origins of How Nānākuli Was Named

There are several stories which attempt to explain the origin of the name "Nānākuli". An ancient story about the meaning of Nānākuli refers to Ka'ōpulupulu, a renowned *kahuna* who lived during the rule of Kahahana, a *kapu* chief of O'ahu (Kamakau, 1992:128). The meaning is in reference to Kahahana's turning a deaf ear to advice, for which, Ka'ōpulupulu tattooed his knees as an expression of his disapproval.

> Kahahana dug up bones from their burial places "to make arrows for rat-shooting and hooks for fishing. The bones of chiefs were bartered for skirts for chiefesses and handles for *kāhili*. Ka'ōpulupulu pleaded with him in vain to stop this disrespectful deed, but Kahahana turned a deaf ear to Ka'ōpulupulu's pleas. As a sign of protest, Ka'ōpulupulu, his followers, relatives and members of his household all tatooed their knees to signify Kahahana's unwillingness to listen to his advice. [The word *kuli* means both "knee" and "deaf".] (Kamakau 1992:133)

Another story comes from Mary Kawena Puku'i while she was working at the Bishop Museum. It was told to her by Simeona Nawa'a in 1945 who heard it from Kanui, a woman and *kama'āina* from Wai'anae:

> In the olden days, this place was sparsely inhabited because of the scarcity of water. The fishing was good but planting was poor. When it rained, some sweet potatoes would be put into the ground, but the crops were always poor and miserable.
>
> There were brackish pools from which they obtained their drinking water and it is only when they went to the upland of Wai'anae that they were able to get fresh water. They carried the water home in large calabashes hung on *māmaka* or carrying sticks and used their water very carefully after they got it home. They spent most of their time fishing and most of the fish they caught were dried as gifts for friends and relatives in the upland. Sometimes they carried dried and fresh fish to these people in the upland and in exchange received poi and other vegetable foods. And as often as not, it was the people of the upland who came with their products and went home with fish.
>
> Because of the great scarcity of water and vegetable food, they were ashamed to greet passing strangers. They remained out of sight as much as possible. Sometimes they met people before they were able to hide, so they just looked at strangers with expressionless faces and acted as though they were stone deaf and did not hear the greeting. This was so that the strangers would not ask for water which they did not have in that locality.
>
> The strangers would go on to other places and mention the peculiar, deaf people who just stared and they would be told that the people were not deaf but ashamed of their inability to be hospitable. So the place they lived was called *Nānā* [sic], or to look, and *kuli*, deaf — that is, Deaf [*sic*] mutes who just look. (Sterling and Summers 1978:62)

Yet, another meaning relates to a variant translation of *kuli* ("knees"). In 1933, William 'Olepau, a resident of Nānākuli, related the following story:

> There were two women who went up the hill of "Pu'uhakila" or Pu'uhela [probably Pu'u Heleakalā] to dry their Kapas [*sic*]. While the kapas were being dried they left and went down the hill to the pool for some water. They
>
> heard dogs barking, so they stood, looking around for the barking was deafening. (Sterling and Summers 1978:62)

The play on the word "*kuli*" is obvious. "*Kuli*" can also mean a "loud, deafening noise". From this story, Mr. 'Olepau gave the following explanations for "Nānākuli" and its relationship to "knee".

1) Women used to go to the top of a hill to dry their kapa, and when they got there they looked at their knees — *nānā kuli.*

2) Royalists of the valley used to sit with their knees up and watch their knees — *nānā kuli.* (Sterling and Summers 1978:62)

A similar story in regard to "looking at the knees" is said to be connected to Kuali'i, a famous chief of O'ahu. After a particularly long and tiring journey, Kuali'i's attendants wanted to see and press his knees in an attempt to relieve the fatigue (*Ibid.*).

An interview with Fred Cachola, who worked and lived in the Wai'anae District for many years, brought forth another story and possible meaning for Nānākuli:

CSH: What have you heard about the meaning of "Nānākuli"?

FC: All the meanings are there in the books. But, when I was a principal at Nānāikapono, I was intrigued with the name, "Nānāikapono". And so I asked my secretary, who was living down there for many, many years, Mrs. Brown. I said, "Mrs. Brown, can you tell me about how this school got its name Nānāikapono?" which inadvertently gave me the meaning of Nānākuli. And she said, "Oh, I'll ask Mrs. Eli to come down and talk to you, because she's the old timer here and she knows all what happened here." So, a couple of days later Mrs. Eli walked into my office. I was just a young principal. I was about 30 years old. I was maybe 32, 33 [years old]. And she came in sort of sheepishly and, very respectful, and she sat down in my office and I asked her, "Can you tell me about Nānāikapono?" And she sort of looked around, as if nobody was listening, kind of a thing, you know. I said, "Uh-oh, here comes something that I know is going to be a little different from what I heard." So she said that the first principal of that school was a Reverend Awai and that he knew that the tradition of that area, Nānākuli, had a Hawaiian hidden meaning which she told me was "Nānā-i-ka-ule". I was kind of smiling. And she said, "Yeah, because that's how in the old days this place was known for its promiscuity. It got this name from ancient times. And it might have something to do with the mountain range." Look at your map. Look at your map. The one that you were showing me. Because you can see the *ule* over there. See? There it is. See the testicles over here, and the penis sticking out there. So it could be [in] reference to that. If you down in here, you always looking at that. It reminds people of that, so it's Nānāikaule, which literally means *looking at a man's testicles, looking at his penis.* And so, Reverend Awai was not gonna let his school be named after something like that. No way! And so he said, "This is not gonna be called Nānākuli Elementary, no way!" So he named the school "Nānāikapono", which of course, means *look to the way of righteousness*, as opposed to Nānāikaule. So I was sort of pleasantly surprised. But to me, Hawaiian's have this thing about names. You have to look at names and all of its ramifications and all of its contexts. Of course, the one about looking at the knees, and standing there looking deaf, and all that kind of stuff, which is part of the nice tradition. But all of that might have been camouflage. You know, people don't want to say, "Our place means *looking at a man's penis.* They're not gonna say [that]. They're gonna create other things. And so, I thanked her for that and I shared this with several people too, but I have never seen this written anywhere. I think that's why, Mrs. Brown, my secretary, knew what it was going to be. She didn't want to tell me, so she asked Mrs. Eli to come down and tell me (laughs). And so she did. That's one of the interpretations for the name. And, it's very Hawaiian. To me, it's a very Hawaiian thing, very Hawaiian.

CSH: That's the first time I heard that story.

FC: This is actually Mrs. Eli's story, not mine, and I'm just telling you what she told me. She was a well (spoken with emphasis) respected homesteader. She was down there for many, many years. She was like a matriarch of that community.

An interview with Lehua Kapaku, a resident of Nānākuli since 1960, revealed an entirely different story about the place name Nānākuli. Commenting on the legendary hero, Māui, Mrs. Kapaku gives yet another possible interpretation of the name:

LK: The Māui legend names off the various places this side of O'ahu. Māui had so many brothers and he had two sisters. One was Lualualei and [the other was] his baby sister whom he treasured. The baby sister's name was Nānāku'ulei [which means] *look to my pretty lei.* To have the name "Lualualei" which is *sacred wreath*, and, then having a baby sister [whose name means] *looking deaf*, I just didn't agree, I wasn't satisfied with that. So I accepted the Māui legend part where his baby sister was named Nānāku'ulei. Now, history tells us that when you misspell a Hawaiian word, or forget to put the *'okina* or the *kahakō*, it totally changes the meaning of the word. So, if it was Nānāku'ulei, which would be very positive, very good, I don't think the people or anybody would feel negative about it. This is the only place in this whole State to have a derogatory name, *look deaf.* You look at any other place, they have nice names. Could be a special event or a special person. Only Nānākuli. So, it may have been a misprint and it may have been what the Sites of O'ahu says, but it depends on how the people react to that name. We've come to even give the name another meaning and that was *perseverance*, just to change the negative attitude. And, we find that this community has been so put down, I tell you — talking about patience and perseverance — and finally Nānākuli is a community that's noted that whatever they do, or whatever they accomplish, they real Hawaiian and give away. I've been here long enough to see that this place has really accomplished a lot of things.

CSH: So, you really think that, perhaps, the original name, or another name for Nānākuli was really Nānāku'ulei?

LK: Yeah, I say that because there's three so-called meanings of the name Nānākuli. [One meaning is] *look deaf.* I said, "How can you look deaf?" My *kūpuna*, when they wanted to emphasize the point of looking deaf, they would pull your ears and say *pepeiao kuli*. They would not say, "You look deaf". Your ear is deaf, your eye is blind. But never "look deaf". There was no definition, or there is no word that tells us that you "look deaf". Another one is a chief *looking at his penis* and another one *looking at his knee. Kuli* in Hawaiian is knee. So, you're looking at your knee, you're looking at your penis, or you're looking deaf.

In Hawaiian culture, the name of a place is significant because it documents history and relates details of a specific geographical area. When repeating the name, the story that goes along with the name is also remembered and told. This practice affirms the oral tradition in Hawaiian culture. Often, place names are also connected to stories (*mo'olelo*) which serve to teach and perpetuate cultural values. In some cases, place names were given entirely new names to reflect changes in history and record more recent events. It can be seen from the above stories that "Nānākuli" has taken on several different meanings over time. In a Hawaiian framework, all of these stories are valid because they held meaning for the people living during those particular times. What is important to remember is that all the stories and meanings are rooted in Hawaiian culture.

The Māui Legends

Numerous Hawaiian legends, in addition to archaeological evidence, reveal the Wai'anae coast and *mauka* interior to be an important center of Hawaiian history. It is here, in Wai'anae, that the famous exploits of Māui are said to have originated. Traditional accounts of neighboring Lualualei focus on the mischievous adventures of the demi-god Māuiakalana. It was here that Māui learned the secret of making fire for mankind and perfected his fishing skills. Other famous accounts of Māui tell of the place where Māui's adzes were made, and of the magic fishhook, Mānaiakalani and the snare for catching the sun, and his kite-flying expedition. Pu'u Heleakalā is the ridge that separates Nānākuli from Lualualei. It was at Pu'u Heleakalā where Hina, Maui's mother, lived in a cave and made her *kapa*.

Samuel Kamakau tells us that Māui's genealogy can be traced from the 'Ulu line thru Nana'ie:

> . . . Wawena lived with Hina-mahuia, and Akalana, a male, was born; Akalana lived with Hina-kawea, and Māui-mua, Māui-waena, Māui-ki'iki'i, and Māui-akalana, all males, were born.

> 'Ulehawa and Ka'ōlae, on the south side of Wai'anae, O'ahu, was their birthplace. There may be seen the things left by Māui-akalana and other famous things: the *tapa*-beating cave of Hina, the fishhook called Mānai-a-kalani, the snare for catching the sun, and the places where Māui's adzes were made and where he did his deeds. However, Māui-akalana went to Kahiki after the birth of his children in Hawai'i. (Kamakau 1991:135)

Māui Rock

The Māui rock, Site 148 in McAllister's *Archaeology of O'ahu*, is located within the Garden Grove complex at 87-1550 Farrington Highway in Lualualei, to the northeast of the project area. In 1930 when McAllister conducted his fieldwork he noted:

> . . . it was here that Māui reposed and sunned himself . . . The large rock is now split in half and adorned with many small, oddly shaped rocks. It is said to be bad fortune to build one's house across a line drawn directly from the rock to the shore. (1933: 110)

The "small, oddly shaped rocks" McAllister speaks of are no longer present and cannot be seen today. The Māui rock is currently overgrown with young Chinese banyan saplings (*Ficus retusa*) and grasses and weeds. Following is an excerpt from an interview with Fred Cachola, in which he shares his knowledge and experiences of the Māui rock.

CSH: Tell me about your interest in Māui and Māui's connection to Nānākuli?

FC: As part of my research down there, of course, I got to Sites of O'ahu and McAllister. And in there, I think it's Site #148 for the Wai'anae district. He cited this Māui Rock — an unusually big boulder of rock. I was really intrigued. I said, "Where is this stone?" There was a little "x" on the map, which nobody could [figure out] because McAllister's map is notorious. It's just a scratch in the map and you wouldn't know where it's at. So I went to my friend Black. It was early in the evening so, as I was coming back from my work at Kamehameha, I stopped by his house. I said, "Eh Black, you know this place — have you ever seen a huge rock that looked so unusual it looks like it doesn't belong there?" He thought for awhile and he says, "Oh, yeah, yeah, yeah. Down by the old haunted house." And I said, "Where?" And he said, "Well, come, come. Let's go take a look." And so we drove down there. I knew what house he was talking about because there was this old mansion and this big banyan tree and it was choke with weeds. You couldn't even see the stone. Now I know why nobody could see the stone because it was sort of like on the side of the house and there was all this underbrush covering it. So, it was early in the evening when we got there. We parked our car and by then it was nightfall already. We started walking to the stone. And there was construction going on. They were building these condos down there. And all this construction equipment, materials, lumber, supplies [were] all over the place. And all of a sudden we heard this guy [say], "Hey, what are you guys doing here? What are you guys doing?" It was the night watchman. We said, "Oh, you know, we just wanna look for this stone. This big rock." And he said, "Oh, you mean Māui Rock." And I looked — eh, how did this guy

— he read McAllister or what? And obviously, he was an elderly *kupuna* — Hawaiian man. And he said, "Come, come. I show you guys. I show you guys." So he took out his flashlight and we walked maybe about another twenty to thirty yards from where he was parked. And then he shone it and then we saw it. He put his light on [the rock] and I said, "Oh, my god!" Because it was huge. It was bigger than a car. It was really big. You've seen it. And there were, on the top of the boulder, were all this tiny, tiny rocks. Small little uprights. There were many there. They were kinda like scattered around the place, on the top — which is all gone now. I don't know what happened to 'em. And so we started talking about it and he said, "Oh yeah. You know, over here, all the night watchmen quit from the company because nobody like work over here. I said, "What's the problem?" And he just said one word, "Pō Kāne." And I said, "Wow, you mean the night walkers?" He said, "Yeah, yeah. They come from right over here." And he pointed to this small little sapling, this little banyan tree. He said, "They come from over here. And then they walk straight down to the beach. And sometimes, I park my truck, whoa, they move [my truck] so much, I spill my coffee." So I just say, "Okay, okay." I no scared 'dem. I swear at them. But I gotta move my truck. (Because he's in the way.) And so he said, "Yeah, they come from over here [and] they go down to the beach." But he said he was hired in the middle of the night because why? The watchman there was the sixth person to quit. And they were desperate. I don't know how they got hold of him, [but] somebody called him. He wasn't afraid of this, but all the other night watchmen, they said, in that area strange things happened. Like you know, things start flying around and things start moving and all this unusual events going on. And they see things too. So nobody wanted to work there. And then he said, "Eh, you folks wanna see Māui? You folks saw Māui? You like see Māui?" And we said, "Maui? You cannot see Maui from here." I thought he meant the island Maui. How can you see Maui from here? But by then, I didn't want to question him. And he said, "You know, come early tomorrow morning. Come just before sunrise when the sun is coming up. I'll show you guys Māui." And I looked at Black, Black looked at me, and [we] said, "Okay." So the next morning, sunrise, I was down at Black's house and we went right back to that site where we met him the night before. And he took us to the rock. There were no buildings there then. You could see the whole mountain range very clearly. And as the sun was coming up, he said, "There's Māui." And I looked up, and I was stunned! Whoa! It was one of those moments. I said, "Wow!" Here was this magnificent silhouette of a sleeping man. Huge. You know, I was telling your group, people brag about the sleeping giant on Kaua'i. Their sleeping giant is like a *menehune* compared to this one. This is a giant. This is worthy of Māui. And it's Māui sleeping there. That's why if you look at McAllister, it says Māui is reposing, this is the rock he reposed on, he rested on this rock. And then I said, maybe not. Maybe from that rock you can see [emphasized] Māui reposing. From that rock, that rock marks the spot where in the morning, early in the morning, you can see that whole Māui sleeping. And so, who knows whether or not the Māui Rock is called Māui because of that or that rock was the place from which you could see most clearly. Because if you go too far to the left or too far to the right, the silhouette changes. You cannot see it. It's right from that rock you can see it most clearly. It's just outstanding. It's a silhouette of a huge sleeping person —

Māui. There are all these mountain ranges there. It's a composition of different mountain ranges. But when the sun is coming up in the back of that, it looks like one silhouette. And it's just beautiful. But when the sun rises, then it disappears. You only see it early in the morning when you see that silhouette. You know, we never got that man's name by the way. And Black never met him [again]. I don't know. We just said, "Who was this guy?" We don't know . . . But, that silhouette is still there. It'll be there for eternity unless somebody levels that whole mountain range.

Māui's heroic exploits were well-known and loved by all. The Māui legends are an important part of Hawaiian mythology and add to the rich history of Nānākuli and the Wai'anae District.

An Analysis of Place Names

The concept of *wahi pana* (a place with a story or legend attached to it) in Hawaiian culture is important because it is a connection to the past and, therefore, the ancestors. From the name of a place one can know intimate details about the people who lived there, the environment, cultural practices and historical events which took place. In Hawaiian culture, if a particular spot is given a name, it is because an event occurred there which has meaning for the people of that time. Because Hawaiian culture was an oral tradition, place names and their stories were an important way of remembering these traditions and ensuring these stories would be passed on to future generations. In Hawaiian thinking, the fact that a place has a name deems it important. Often, spiritual power or *mana* is attached to a place which increases its importance. On the subject of *wahi pana*, Edward Kanahele writes:

> As a native Hawaiian, a place tells me who I am and who my extended family is. A place gives me my history, the history of my clan, and the history of my people. I am able to look at a place and tie in human events that affect me and my loved ones. A place gives me a feeling of stability and of belonging to my family, those living and dead. A place gives me a sense of well-being and of acceptance of all who have experienced that place. (Kanahele *in* Van James 1995:6)

The following list of place names for Nānākuli and the district of Wai'anae was compiled and wherever possible, derivations and annotations are given. The list is by no means complete.

Place Names in Nānākuli and the Adjacent Vicinity

All place name translations were taken from *Place Names of Hawai'i* (Puku'i *et al*., (1976) in addition to being supplemented by other sources.

Hālona:	Land section and hill (836 ft. high) in Lualualei. *Lit.*, peering place.
Hāpai:	An *'ili* in Nānākuli and mentioned in Native Register 5:342. Exact meaning unknown, but the word "*hāpai*" can mean any of the following: 1) to carry, lift; 2) pregnant, conceive; 3) a native variety of banana with trunk of medium height, the fruit maturing within it, about two-thirds of the way up. The fruits are small, finger length, and ten or less; their skin is yellow, and the flesh yellow, sweet, and edible raw; 4) to encourage, support (Pukui & Elbert 1986:59).
Heakapili:	A *mo'o* 'āina in Pūhāwai, Lualualei. Taken from L.C. #7456. *Lit.*, the intimate shadow.
Ihele:	A *mo'o 'āina* in Pūhāwai, Lualualei. Taken from L.C. #7454. Meaning not known.
'Ilihune:	A *heiau* in Nānākuli which was identified by T.G. Thrum and described as "A small walled *heiau* of *po'okanaka* class; used about 1860 by Frank Manini as a cattle pen, for which natives prophesied his poverty and death" (Mcallister 1933:110). *Lit.*, tiny skin. It can also mean "poor, destitute; poverty, poor person" (Puku'i & Elbert 1986:98).
Kauhiuhi:	Location unknown. Probably refers to the *uhiuhi* tree (*Mezoneuron kauaiense*). An endemic Hawaiian forest tree [that] has pink to red flowers and a pod or legume. Pods are thin, broad, and winged on one side, two- to four-seeded. The wood is hard and heavy and formerly was used for *hōlua* (sleds), spears, digging sticks, and house construction (Puku'i & Elbert 1986:364; Neal 1965:435).
Keoneloa:	A *mo'o 'āina* in Pūhāwai, Lualualei. Taken from L.C. #8005. *Lit.*, the long sand.
Kolekole:	Pass and road from Schofield Barracks through the Wai'anae Range. A large stone at the pass on O'ahu has been called a sacrificial stone, but it was probably never so used; others say the stone represents a woman named Kolekole who guarded the pass; students of *lua* fighting lay in wait here to practice their skill on travelers. In a battle here Maui forces killed the last of the O'ahu people who had escaped the massacre at Niuhelewai. *Lit.*, raw, scarred. (In one explanation of the name, a woman on the pass saw an apparently blind man approaching; doubting his blindness, she exposed herself. He opened his eyes and exclaimed, *A 'ula, kolekole!* Red, raw!)
Kumu'ōhi'a:	A *mo'o 'āina* in Pūhāwai, Lualualei. Taken from L.C. #7452. Probably refers to the 'ōhi'a tree(s) (*Metrosideros polymorpha*) which probably grew there. *Lit.*, 'ōhi'a tree.

Lualualei:	*'Ahupua'a* adjacent and northwest of Nānākuli. Possible meanings: beloved one spared; flexible wreath (Sterling & Summers 1978:63).
Mā'ili'ili'i:	Hill and stream in Lualualei. *Lit.*, small pebbles. (Variant spelling, *Mā'ili'ili.*) Also called Pu'u Mā'ili'ili'i. *Lit.*, hill of small pebbles.
Mauna Kapu:	Mountain in the Wai'anae range separating Nānākuli and Honouliuli forest reserves. *Lit.*, sacred mountain.
Mikilua:	Land section in Lualualei. Perhaps *lit.*, two active persons.
Nānākuli:	An *ahupua'a* in the Wai'anae district. See earlier section of this report for discussion on possible meanings. *Lit.*, look deaf.
Pālehua:	Land division, hill (2,566 ft.), and road. *Lit.*, *lehua* flower enclosure. Also: The hill with grown lehuas that overlooks Nānākuli on the Waialua side. It is on the boundary of Nānākuli and Honouliuli. When the lehua is in bloom there it resembles a red wreath. King Kalākaua composed "Sweet Lei Lehua" with this hill in mind (David Malo Kupihea *in* Kelsey notes on *O'ahu Place Names*).
Palikea:	Peak (3,098 ft.) above Lualualei in the Wai'anae mountains. *Lit.*, white cliff.
Pali o Ka Menehune	Runs down to Pālehua, from the mountain to the beach (Theodore Kelsey notes on *O'ahu Place Names*). *Lit.*, cliff of the *Menehune*.
Pili o Kahe:	Land section. Lit., clinging to Kahe. Kāne and Kanaloa threw a stone to determine the district boundary for 'Ewa. The stone was found at Pili o Kahe, where two small hills of the Wai'anae Range come down parallel on the boundary between Honouliuli and Nānākuli. It was believed the 'Ewa side of the hill was male and the Wai'anne side female. The name refers to the Wai'anae side of the hill (*kahe* means "to flow") (Sterling and Summers1978:1). Also: it is a "ridge that divides in two at the shore (one side represents a woman with menses (*kahe koko*) (Simeon Nāwa'a). It is between Nānākuli and Lanikuaka'a where Mrs. Alice Kamokila Campbell lives. By Pili-o-kahe are a wharf and a bridge. You look down upon a little bay, then cross over to Nānākuli *'Elua* on the other side of the big hill (David Malo Kupihea *in* Theodore Kelsey Notes on *O'ahu Place Names.*)
Pōhākea:	Mountain and pass (2,200 ft.), Wai'anae mountains. From here, Hi'iaka saw by cloud omens that her *lehua* groves on Hawai'i had been burned by Pele, and that her friend Hōpoe had been turned to stone. Also, this is where Kauhi brutally murdered his wife, Kahalaopuna, because he thought she had been defiled. *Lit.*, white stone (*pōhā* is

	short for *pōhāku*). Also, *Pohākea* or "bursting forth of white light" (Theodore Kelsey *in* Henry Kekahuna notes on *Place Name Chants*).
Pōhaku ʻĀweoweo:	A fish (*Priacanthus*) attracting stone in Nānākuli Gulch. Nānākuli was known for the abundance of *ʻāweoweo* fish. (Lehua Kapaku, Pers. Comm.)
Pōnaha ke one:	A fishing ground off Ulehawa. (Fornander & Thrum, 1996:13; Pers. Comm. Walter Kamanā to Matthew McDermott 7/6/99) *Lit.*, the sand is circular. (Puku'i & Elbert 1986:340)
Puehu:	Fishpond near Lualualei, where the hero Kawelo struck an image that refused to sanction his sailing to Kaua'i to fight. *Lit.*, scattered. Possibly the same fishpond John ʻĪʻī referred to, where his family "spent a night at Lualualei near the fish pond on the plain" (1983:23).
Pūhāwai:	Spring and area, Lualualei. *Lit.*, water bursting out *or* water hollow.
Pu'u Heleakalā:	Hill at Nānākuli. *Lit.*, snared by the sun (the hill blocks the rays of the setting sun). This also explains why the west side of the hill looks so dry, because it is burnt by the afternoon sun (Cachola Interview).
Pu'u Manawahua:	Peak (2,401 ft.) in Nānākuli. *Lit.*, great grief hill, nausea hill.
Pu'u o Hulu:	A hill in Lualualei, named after a chief who was in love with Mā'ili'ili, one of twin sisters. The chief could not tell the sisters apart and could not decide which one to marry. A *mo'o* changed them both to mountains and the stately chief still looks wonderingly at Pu'u Mā'ili'ili today. *Lit.*, Hulu's hill. (Puku'i *et al.*, 1976 Could also mean *hill of feathers*.)
Pu'u o Hulu Kai:	Hill (856 ft.), Lualualei. *Lit.*, seaward Pu'u o Hulu.
Pu'u o Hulu Uka:	Hill (715 ft.), Lualualei. *Lit.*, inland Pu'u o Hulu.
Pu'u Ka ʻIlio:	Peak (1,965 ft.), Kolekole Pass, Wai'anae Range. *Lit.*, dog hill.
Pu'u o Mā'ili'ili'i:	Hill, Lualualei. *Lit.*, pebbly hill.
Pu'u Pāhe'ehe'e:	Ridge and hill (652 ft.). *Lit.*, slippery hill. Probably in reference to a *hōlua* slide which used to be on the mountainside.
Ulehawa:	Stream in Lualualei. The birthplace of Māui and supposedly named after a chief. *Lit.*, filthy penis. Today, there is also a beach park there.

Only nine of the 32 place names listed above are within the *ahupua'a* of Nānākuli and half of the nine names are surrounding mountain ranges. This may reflect the lack of resources, both water and good land for agricultural endeavors.

The majority of the names refer to physical descriptions or characteristics of *pu'u* or hills, mountains and peaks. The name "Hālona" (peering place) implies a hill with a view to see a great distance. One name, Mauna Kapu (sacred mountain), indicates that perhaps this mountain was, for whatever reason, very special and considered either sacred or off-limits. But the reason why this mountain was *kapu* has been lost. The name "Pālehua" refers to a special variety of dwarf red lehua that grows near the mountain top (Puakea Nogelmeier, Pers. Comm). The exact location of *Hāpai 'ili* in Nānākuli is unknown and one can only speculate as to a possible meaning — whether it does refer to a specific variety of *mai'a* (banana) is unknown. The only other name indicative of a food resource and, also, a religious site is Pōhaku *ʻĀweoweo*, a stone said to attract the *ʻāweoweo* fish. Besides the Pōhaku *ʻĀweoweo*, there was one other name referring to a religious site — ʻIlihune *Heiau*. This site, located outside of the project area, was destroyed probably sometime during the mid- to late-1800's.

It is interesting to note that there are no names in Nānākuli that contain the word "*wai*" or water. In fact, within the whole district of Wai'anae, there are only three names with "*wai*" — Pūhāwai which refers to a spring in Lualualei and Waikonekone (location unknown) which means "desiccated or dried-up water" and the name Wai'anae (mullet water) itself. This would seem to indicate a lack of water resources within Nānākuli itself and the Wai'anae District as a whole. This lack of water as a resource bears true even today. Water has long been a source of contention and concern for Nānākuli residents. In contrast, the neighboring district of 'Ewa, where streams are abundant, has numerous names beginning with or containing the word "*wai*". In speaking with Jay Landis, who grew up in nearby Lualualei, he reiterated the reason Nānākuli's population was so low in the earlier half of the 20th century, was because there was a lack of water. Besides fishing, the only other abundant natural resource was *kiawe* trees.

Looking at other names outside of Nānākuli, and within the district of Wai'anae as a whole, there are few names that indicate food resources and gathering practices. The majority of the names describe physical characteristics such as "heat" (Ka'ena), "thin mountain" (Mauna Lahilahi) and "pebbly" (Mā'ili). Five names refer to plant resources: *maile* (2, at Ka'ena), *'ōhi'a* (1, at Pūhāwai), *uhiuhi* (1, unknown location) and *laukī (1, at Mākaha).* Five names refer to marine resources: *pa'akai* or salt (1, at 'Ōhikilolo), *mūhe'e* or cuttlefish (1, at Keawa'ula), *ma'ipalaoa* or ivory, sperm whale genitals (1, location unknown), *'ōhiki* or sand crab (1 at 'Ōhikilolo) and Puehu, a known fishpond site that no longer exists. Judging by the kinds of plant and marine resources named, it is a good indication that these items were gathered for cultural purposes in times past. There was one name which referred to a cultural site, "Pu'u Pāhe'ehe'e" where there was a *hōlua* slide. Though the exact location is unknown, it is possible that the *hōlua* slide could have been associated with the name *Kauhiuhi*. *Uhiuhi* was a type of hard wood used for *hōlua* sleds, weapons, digging sticks and house construction. Other Wai'anae place names refer to

IV. HISTORICAL SETTING

Early Historic Period

Native accounts and those of early foreign observers paint only brief sketches of indigenous life and culture in Nānākuli. In January of 1778, Captain James Cook sighted Wai'anae from a distance, but did not stop to anchor. Fifteen years later, Captain George Vancouver approached the coast of Wai'anae from Pu'uloa and wrote his impressions in the ship's log:

> The few inhabitants who visited us [in canoes] from the village earnestly entreated our anchoring . . . And [they] told us that, if we would stay until morning, their chief would be on board with a number of hogs and a great quantity of vegetables; but that he would not visit us then because the day was taboo poory [a *kapu* day]. The face of the country did not however, promise an abundant supply [of water]; the situation was exposed (Vancouver quoted in McAllister 1933:113)

The only village Vancouver observed was "at Wai'anae, located in a grove of coconut and other trees on the southern side of a small sandy bay" (McAllister 1933:112)

> Along the rest of the coast he reported seeing only "a few straggling fishermen's huts" and "a small grove of shabby coconut trees" (Handy & Handy 1972:270-71).

Vancouver, influenced by the arid coastal environment, continued onward and did not anchor at Wai'anae. He described the Wai'anae coast as " . . . one barren rocky waste nearly destitute of verdure, cultivation, or inhabitants, with little variation all the way to the west point [Ka'ena] of the island" (*Ibid*.:112). Vancouver would have been surprised had he chosen to anchor at the village of Wai'anae. Even though the dry, arid coast presented a dismal forecast, the ocean provided an abundant supply of fish, the lowlands provided *'uala* (*Ipomoea batatas*) and *niu* (*Cocos nucifera*), and the inland valley areas were planted in *kalo* (*Colocasia esculenta*) and *wauke* (*Broussonetia papyrifera*). The upland forest regions provided various woods for weapons and canoes, access to birds for their feathers and other forest resources. By this time, there was probably a small variety of introduced vegetables being planted in the upper valleys, as well. Handy and Handy [illegible] about Wai'anae

> Wai'anae Valley supported a number of areas where wet taro was planted watered by streams from the Wai'anae range, streams whose flows were probably constant owing to the high bogs on top of the mountains. Undoubtedly there were also small settlements subsisting mainly on sweet potato, in the valleys where constant streams were lacking (Nānākuli and Mākua). In famine times, then, there was reef fishing, and the Wai'anae Mountains had wild banana, *ti*, fern, and other roots that were edible (1972:275-276)

[illegible] impacted the [illegible] during the struggle for unification and power [illegible] writes about the rebellion of the O'ahu chiefs against Kahekili

> the native O'ahu chiefs rebelled against the Maui chiefs in 1785 or 1786, but the rebellion was put down with bloody reprisals (Sahlins 1992:36)

Kamakau (1992:149) specifically discusses fighting in the Wai'anae district during this time. The decisive battle of Kūki'iahu was fought in 1791 at Kalauao, in the 'Ewa District, between Ka'eokūlani and Kalanikūpule. It is said that warriors from Waialua and Wai'anae joined the ranks of Ka'eokūlani to war against Kalanikūpule (Kamakau 1992:168). In 1796, Kamehameha I unsuccessfully tried to launch his war fleet of canoes from Wai'anae in an attempt to conquer the island of Kaua'i. The fleet got caught in a storm and was forced to return to Wai'anae, where they stayed for [illegible] of about one year (Kamakau 1992:173; 'Ī'ī 1983:15-16)

One of the first mentions of a coastal settlement in Nānākuli comes from a description by noted historian, John Papa 'Ī'ī who describes a visit to his aunt, Kāneiakama. Little is known about his aunt except that she and her husband, Pa'akonia, were bracelet makers and residents of that land of the foamy sea" and "were well known" ('Ī'ī 1983:20-21). [illegible] was their landlord and they resided at Pūhoa Uka (located in *mauka* Wai'anae [illegible]). He goes on to say

> Ka'ahumanu was fond of Kāneiakama and admired her skill in composing chants. Because of this, perhaps, the land at Wai'anae was given to Kāneiakama and her husband (*Ibid.*).

'Ī'ī mentions visiting his aunt three times, twice at Pūhoa Uka and once at Nānākuli. At the age of eight or nine, he briefly writes about visiting his aunt at that time

> He had heard that his aunt was at Nānākuli, so he and his attendant departed by way of Pu'u o Kapolei to Waimānalo and on to Nānākuli. There he found his aunt and her husband who were in charge of the fishing

> During his visit 'Ī'ī observed how the children of Nānākuli produced a long [illegible] sound while chanting. This was performed while the children sat on the branches of breadfruit trees. They sat apart from each other on branches from the base to the top, chanting [illegible] 'Ī'ī learned the chant at once. This is the chant that they were using

> Kau kolo i ka lā [illegible] Mauna [illegible]
> E [illegible]
> Halulu i [illegible]
> [illegible]

> The sun sends a streak of light [illegible] Mauna [illegible]
> The clouds go scurrying by
> There is a rumble on the mountain top
> That echoes from the [illegible] ('Ī'ī [illegible])
> [illegible]

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Warfare impacted the population during the struggle for unification and power. Marshall Sahlins writes about the rebellion of the Oʻahu chiefs against Kahekili:

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Kau koliʻi ka lā i luna o Maunaloa	The sun send a streak of light on Maunaloa
E ke ao e lele koa	The clouds go scurrying by.
Halulu i ka mauna	There is a rumble on the mountain top
Kikaha ke kuahiwi	That echoes from the mountain of Kona, the calm.

Kū pāpū Hilo i ka ua	Hilo stands directly in the rain.
Paliloa Hāmākua,	Hāmākua's cliffs are tall,
'Ope'ope Kohala i ka makani	Kohala is buffeted by the wind,
Huki Ka'uiki pā i ka lani	Ka'uiki reaches and touches the sky.

> This was memorized by all and was chanted in perfect unison, and the boy noticed how pleasing it was. Thus did 'Ī'ī enjoy himself with the children of Nānākuli, and he continued to spend his spare time with them. ('Ī'ī 1983:29)

The '*ōku'u* epidemic of 1804 (thought to be cholera) undoubtedly had a major effect on the native Hawaiian population, not only in Wai'anae, but throughout the rest of the islands as well. John Papa 'Ī'ī writes, the '*ōku'u* "broke out, decimating the armies of Kamehameha I [on O'ahu]" (1983:16).

By 1811, sandalwood merchants began actively exploiting the Hawai'i market and huge amounts of sandalwood were exported to China. (Traditionally, Hawaiians used sandalwood for medicinal purposes and as a scent to perfume their *kapa.*) Kamehameha I and a few other chiefs controlled the bulk of the sandalwood trade. Kamakau writes, "The chiefs also were ordered to send out their men to cut sandalwood . . . The chief immediately declared all sandalwood to be the property of the government" (1992:204).

The sandalwood trade greatly impacted Hawaiian culture and the traditional lifestyle Hawaiians had always pursued was altered drastically. In an effort to acquire western goods, ships, guns and ammunition, the chiefs had acquired massive debts to the American merchants ('Ī'ī 1983:155). These debts were paid off in shiploads of sandalwood. When Kamehameha found out how valuable sandalwood trees were, he ordered the people not to let the felled trees fall on the young saplings, to ensure their protection for future trade (Kamakau 1992:209-210).

Kamakau comments about the plight of the common people and the general state of the land during this time:

> This rush of labor to the mountains brought about a scarcity of cultivated food throughout the whole group. The people were forced to eat herbs and tree ferns, hence the famine called Hilaulele, Hāhāpilau, Laulele, Pualele, 'Ama'u, or Hāpu'u, from the wild plants resorted to. (*Ibid.*:204)

In 1816, Boki Kama'ule'ule was made governor of O'ahu and chief of the Wai'anae district. He served in that capacity until 1829 when he sailed to New Hebrides in search of sandalwood. By that time the majority of the sandalwood had been harvested and the bottom fell out of the trade business.

The Rev. William Ellis visited the Hawaiian Islands in 1823. At that time, he estimated the population on the island of O'ahu to be about 20,000 (Ellis 1974:19). The missionaries were the first to gather population statistics throughout the various districts on each island. The first census figures were gathered from 1831-1832 and 1835-1836. Separate figures were not given for Nānākuli, but it is probable that the count was

incorporated into the numbers for the *ahupua'a* of Wai'anae. The population numbers given for Wai'anae in the two census were 1,868 and 1,654 respectively (Schmitt 1973:9).

Nānākuli, no doubt, sustained a sparse population, but to what extent is not exactly known. Environmentel factors such as the dry, arid climate, low rainfall and geologic limitations — "much of the seaward portion of the valley is uplifted coral limestone that in some areas is thinly disguised with a shallow layer of soil" (Kelly in Haun *et-al.*, 1991:310) — were likely determinative constraints upon population density along the coast.

Mid-1800's: Land Commission Awards (LCAs)

At the time of the *Māhele*, the *ahupua'a* of Wai'anae, which at that time, included Nānākuli, was listed as *Crown* lands and was claimed by King Kamehameha III as his personal property (Indices of Awards p. 28). As such, the land was under the direct control of the King. Many of the chiefs had run up huge debts to American merchants throughout the early historic period and continuing into the mid-1800's. A common practice at the time was to lease (or mortgage) large portions of unused land to other high chiefs and foreigners to generate income and pay off these earlier debts acquired.

> Until the passage of the Act of January 3, 1865, which made Crown Lands inalienable, Kamehameha III and his successors did as they pleased with the Crown Lands, selling, leasing, and mortgaging them at will. (Chinen1958:27)

In 1850, the Privy Council passed resolutions which would affirm the rights of the commoners or native tenants. To apply for fee-simple title to their lands, native tenants were required to file their claim with the Land Commission within the specified time period of February 1846 and February 14, 1848. The *Kuleana* Act of 1850 confirmed and protected the rights of native tenants. Under this act, the claimant was required to have two witnesses who could testify they knew the claimant and the boundaries of the land, knew that the claimant had lived on the land for a minimum of two years, and knew that no one had challenged the claim. The land also had to be surveyed.

Not everyone who was eligible to apply for *kuleana* lands did so and, further, not all claims were awarded. Some claimants failed to follow through and come before the Land Commission, some did not produce two witnesses, some did not get their land surveyed. For whatever reason, out of the potential 1,500,000 acres of Government lands made available for native Hawaiians throughout Hawai'i, "less than 30,000 acres of land were awarded to the native tenants" (*Ibid*:31).

Nānākuli Māhele Claims

In Nānākuli, there was only one application for quiet title to lands during the time of the Great *Māhele*. Even though this award was not granted, it does give some insight into land use in Nānākuli Valley. In testimony taken from the Native Register, Kuluahi speaks of his lands in the '*ili* of Hāpai:

> To the Land Commissioners: *'Ili* of Hāpai, *Ahupua'a* of Nānākuli, Wai'anae District, O'ahu. I, the one whose name is below, have a *muliwai*, a pond, a cultivated *kula* and for firewood also, a valley planted in *wauke mauka*, and a *kula* house lot. It is finished. Kuluahi, X, his mark. January 17, 1848. (Native Register Vol. 5:342)

The exact location of Hāpai *'ili* is not known, however, it was probably located near the coast at the mouth of Nānākuli stream (*muliwai*) which is outside of the project area. The testimony indicates some kind of aquacultural resource was being utilized and agricultural activity, at least on a small scale, was taking place. *Wauke* (*Broussonetia papyrifera*) was the preferred plant for making *kapa* (cloth). *Wauke* requires a moist climate and it was usually cultivated close to habitation sites, along streams, *lo'i* and at the lower borders of wet forests (Krauss 1993:60).

This sole *Māhele* land claim is not indicative of the total population within Nānākuli Valley. As was the case with neighboring Lualualei, there were other people who lived in Nānākuli but who did not file land claims. Tax records for Nānākuli list eight people who paid a total of $26 for taxes in 1855 (Hawai'i State Archives: J.W. Makalena Tax Records). This suggests Nānākuli was one of the least populated *ahupua'a* on O'ahu at that time. The tax payment in currency suggests that much of the traditional lifestyle was ending and that people were switching over to a monetary system.

Late 1800's

Ranching

Much of the Crown lands, of which Nānākuli was a part, were either sold, borrowed against as collateral or leased to generate income for the King (Kamehameha III) and his family. In the case of Lualualei and Nānākuli, large portions were leased for the purposes of ranching.

The first longhorn cattle were brought to O'ahu from Hawai'i island in 1809 by John Young and Kamehameha I (Kamakau 1992:268). By the mid-1800's, the back of Nānākuli Valley appears to have been used solely for ranching purposes and probably did not support permanent habitation. One of the first areas to be utilized for ranching on the Wai'anae coast was neighboring Lualualei. Bureau of Conveyance records show that William Jarrett leased approximately 17,000 acres of land from Kamehameha III in 1851. The lease was written for 30 years with a lease fee of $700 per year. (B.C. Liber 4:616-618). It seems that Jarrett sold Paul F. Marin (son of Don Francisco de Paula Marin) one-half of his interest in the ranch. Marin lived on the ranch and managed it until 1864 when a dispute arose over the profits of the ranch. (Apparently, Marin had never turned over any ranch profits to Jarrett during the time he managed it.) After the dispute was settled, Jarrett took on George Galbraith as a new partner (B.C. Liber 18:31).

In 1869, Jarrett sold the remaining years of his son's interest in Lualualei Ranch to James Dowsett (B.C. Liber 29:16-18). James Dowsett was a descendant of a British sea captain and is noted for being the first anglo-saxon child born in Honolulu (Nakamura *et al.*, 1994:21). Dowsett was an entrepreneur of sorts and dabbled in many different business ventures, such as:

> . . . a whaling fleet, a dairy, a salt works, an extensive trade in *awa* (a Hawaiian narcotic drink) and numerous land holdings . . . He also ran cattle at different times in Nānākuli, Mikilua and Lualualei. (McGrath 1973:32)

In 1880, George Bowser traveled through Wai'anae and writes about Lualualei in his journal:

> Leaving Wai'anae, a ride of about two miles brought me to the Lualualei Valley, another romantic place opening to the sea and surrounded in every other direction by high mountains. This valley is occupied as a grazing farm by Messrs. Dowsett & Galbraith, who lease some sixteen thousand acres from the Crown. Its dimensions do not differ materially from those of the Wai'anae Valley, except that it is broader — say, two miles in width by a length of six or seven miles. The hills which enclose it, however, are not so precipitous as those at Wai'anae, and have, therefore, more grazing land on their lower slopes, a circumstance which adds greatly to the value of the property as a stock farm. Although only occupied for grazing purposes at present, there is nothing in the nature of the soil to prevent the cultivation of the sugar cane, Indian corn, etc. Arrangements for irrigation, however, will be a necessary preliminary to cultivation. (Bowser 1880:493-94)

At the time of Bowser's visit, sugar cane production had not yet reached Lualualei from Wai'anae Valley. Continuing on his journey, Bowser writes about Nānākuli:

> From the Lualualei Valley to the Nānākuli Valley I had a rather dreary ride of three miles. The intervening country towards the sea is barren, with a little pasturage at the base of the mountains. The track, however, is in very good order, much better than I expected to find it, looking to the mountainous and rocky character of the country through which it passes. At Nānākuli and at Hō'ae'ae, close adjoining, the Messrs. Robinson have cattle ranches. The pasture here cannot be compared with that in the valleys I had just left behind, but inland among the mountain ranges it is much better. (*Ibid.*: 494)

In 1894, Link McCandless entered the ranching scene:

> . . .he and a man named Tom King chartered the brigantine Oakland in Seattle, filled her hole with cattle and the cabins with feed, and sailed for Hawai'i. By the turn of the century, McCandless' ranching empire covered much of the Wai'anae Coast, including land at Nānākuli, 4,000 acres at Lualualei, Sam Andrews' property in Mākua and pastures toward Ka'ena Point. (McGrath 1973:31)

Wai'anae Sugar Plantation

In 1878, Herman A. Widemann, a retired Supreme Court Justice, began the Wai'anae Plantation, one of the first sugar plantations on O'ahu. Roger Green reports that "between 1878 and 1884 the economy and community of Wai'anae underwent a major change, in which the former Hawaiian landscape virtually disappeared" (Green 1980:12). With the hiring of 20 local Hawaiians, 15 *haole* technicians and almost 60 Chinese laborers, Widemann essentially created a town at Wai'anae to support the cultivation and processing of sugarcane. This included the building of 24 new houses and a manager's residence along with a sugar mill and various extensive irrigation systems.

In 1884, the Hawaiian Directory reported Wai'anae to be the largest settlement on the island outside of Honolulu. By 1890, the Wai'anae Sugar Plantation had over 600 acres in sugar cultivation, 12 miles of railroad and 350 laborers. The 1890 census reports 903 residents in the Wai'anae district. With ranching utilizing much of the land area in Nānākuli, it is probable that the few people still living in Nānākuli during the development of the sugar industry eventually relocated to Wai'anae which became a bustling "sugar town".

O'ahu Railway and Land Company

The O'ahu Railway and Land Company (OR&L) signed its charter on February 4, 1889. The Railway was the brainchild of Benjamin Franklin Dillingham. Along with James Castle and others, he had invested in large tracts of land for speculation and resale, but the idea was slow to catch on because "the land lay too far from Honolulu, at least 12 miles" (McGrath 1973:54). Dillingham foresaw an economic opportunity. The railway was a means to provide transportation to the country and promote development of unoccupied lands, as well as connect with the sugar plantations in 'Ewa, Wai'anae, Waialua and Kahuku. Construction on the railway began in March of 1889. The first length of the railway was completed and opened to the public by January 1, 1890. Five years later, on July 4, 1895 the railway finally reached Wai'anae. The Railway served the Wai'anae coast until 1946 when the Wai'anae Sugar Plantation closed down.

In the latter half of the 19th century, ranching became the leading industry in the Wai'anae coast. During this time and prior to 1865, when the King's lands were declared inalienable, large tracts of Crown lands in the Wai'anae district were sold in fee simple or leased out to various entrepreneurial families like Samuel Adams in Mākua Valley, the Dowsetts in Lualualei, Nānākuli and Mikilua, the Robinson brothers in Nānākuli and the Holt clan in Mākaha. Toward the end of the 19th century, The Wai'anae Sugar Plantation began to grow sugar cane on large tracts of leased land. This new economic venture would change the landscape and put an end to traditional Hawaiian ways of life forever.

Early 1900's to Present

Homesteading

There were two phases of homesteading on the Wai'anae Coast. The first was in Lualualei and had less of an impact on Nānākuli, while the second resulted in development of Nānākuli as a residential area.

After the overthrow of the Hawaiian monarchy in 1893, the Crown Lands and the Government Lands were combined to become Public Lands. The Crown Lands were no longer indistinguishable and inalienable. In 1895, the Republic of Hawai'i decided to open up lands for homesteading in the hopes of attracting a "desirable class of immigrants" — Americans and those of Caucasian descent (Kuykendall & Day 1961:204). In anticipation of the Dowsett-Galbraith lease expiring in 1901, the Government intended to auction off these lands to the highest bidder.

In 1902, the Government ran ads in the local newspapers stating their intent to open up land in Lualualei for homesteads. Due to the lack of water, the lots were classified as second class pastoral land, rather than agricultural land. A five-year installment payment plan of one-fifth down during the first year and the balance of payments over a period off four years was the incentive to attract prospective homesteaders. There were other stipulations as well, in which the homesteader was required to make specific improvements to the property over the five-year period (Dept. of the Interior, October 6, 1902, Hawai'i State Archives).

The homesteads were sold in three series. The first series consisted of nine lots which were sold between 1903 and 1909. These lots were much larger than the second and third series of lots sold. Seven of these lots averaged about 585 acres each. The two largest lots were 1,479.1 acres and 1,149.9 acres. The big-name families that obtained homestead lots at this time were Von Holt, McCandless and Dowsett. The majority of the Dowsett land was used to pasture cattle, with other portions being leased to the Sandwich Island Honey Company for apiaries (B.C. Liber 376:237; B.C. Liber 288:324,331).

The second series of eleven lots were much smaller and consisted of 50 to 60 acres each. These were situated *mauka* of the main road, near the coast and were sold in the years following 1907. The third series consisted of 116 lots, some on land that had been used by Wai'anae Sugar Company to grow cane. The lots varied in size from 4.86 acres to 18.18 acres. These lots were opened up in 1912 and by the early 1920s, about forty families had settled there. (Kelly *in* Haun 1991:331-332)

The Government did not fulfill its promise to supply water. What little water there was, was not enough to go around. Competition between the plantation and the homesteaders for water caused friction within the community. The lack of water placed a hardship on the homesteaders. Water had to be carried in and many lost their crops. The Wai'anae Sugar Company had a lease with the Government to take 2.5 million gallons of water daily from Government lands. But even after their lease had expired, the plantation continued to take the water. In 1924, the Government made an agreement with the plantation to release 112,000 gallons of water daily for the homesteaders.

> The early wave of homesteading passed by dry, barren Nānākuli.
> Because of its water shortage, parched Nānākuli had never attracted many residents. It remained a *kiawe* wilderness. Yet, the very fact that nobody wanted it turned the area into a kind of informal public park. Its magnificent beaches attracted a growing colony of squatters from all over O'ahu who were

> running out of places to camp . . .The entire island had been hung with *Kapu* signs. But not Nānākuli. There the tawny, crescent beaches were open to anyone. Some came for the summer. Others camped all year round. Most of them were Hawaiians. (McGrath 1973:103)

In the mid-1920's, not counting squatters, there were only ten residents in all of Nānākuli (*Ibid.* 107).

Under the Hawaiian Homes Commission Act, a second wave of homesteading occurred in the late 1920's and 1930's. This law established almost 200,000 acres for homesteaders of Hawaiian blood. Previous leases of Nānākuli land had expired at this time and the land was subdivided for residential lots. By 1930 over 200 residential lots had been taken. Whether there would be sufficient water for the new homesteads, particularly because of the continued consumption of the Wai'anae Plantation, was in question. Water came in through a 2-inch pipe from the Lualualei water system which was often dry. (McGrath 1973:108-118)

In an interview with Black Ho'ohuli, he reminisces about those early days on the homestead as a young boy:

CSH: What was the homestead area like when you were growing up here?

BH: Not like now. Everybody had half an acre, I think. Some places was a little bigger. I guess it depends on the way the property was. Some was bigger.

CSH: And what was the vegetation like in the area? The trees, the plants?

BH: Oh, all *kiawe* (*Prosopis pallida*), all *kiawe*. I remember to get our yard clean, we had to chop down *kiawe* and the stumps. I remember us in tents.

CSH: Before your house was built?

BH: Yeah. I think my dad's first place was on Manu Street. And what I remember was, when we moved to the highway and that's when I know we were kind of cleaning our yards. And I only seen a picture of my dad's first place.

CSH: So this lot where you're living now is not your original lot?

BH: No. This was my uncle's place and for some reason he just didn't want to stay in the house, I guess, so I asked him if I could take care of the place for him. So while I was taking care of it, I guess he see that I was doing a good job and he gave it to me.

CSH: And back then, did you have water?

BH: We had to go to the park and get water. Water was kind of scarce down here.

CSH: Which park?

BH: Nānākuli Park. Actually the park name is "Kalaniana'ole Park". Everybody knows that park as "Nānākuli Park".

CSH: So, you had no running water, or had a little bit? Just drinking water?

BH: We had. Yeah, it was very, very little. If down neighbors using the water, we had to kind of wait so we get the pressure. It wasn't easy.

The struggle over water found the homesteaders embroiled in a water rights issue with Wai'anae Plantation that took several years to settle.

The Military

World War II greatly affected the Wai'anae coast and Nānākuli Valley. Military troops were sent in to train and do maneuvers. Concrete bunkers and gun emplacements were built on the beaches and ridges and barbed wire was strung along the beaches. Jay Landis, a *kama'āina* of Lualualei, remembers the war years:

CSH: So, would you know anything about how the bunkers were used during the war?

JL: Well, some places they kept people out of the beach because they're training.

CSH: Do you remember which places?

JL: Oh, yeah. Mākaha and Wai'anae mostly. They had these — where the Kamaile School is, when you pass Nānākuli to Mākaha — there was a camp over there that had about 20,000 soldiers over there. They would go down and practice landing war.

CSH: Was there a curfew? I'm assuming there was curfew.

JL: Oh yeah. Eight o'clock, when you hear "Beep, beep, beep, beeeeeeep." Get home, and then the air raid warden would come around checking up on you. No more lights. They had to shield everything. It was rough.

CSH: People stayed away from the beach?

JL: In some places they put a lot of barbed wire. You know the rolled barbed wire.

Black Hoʻohuli also remembers the black-outs and the beaches having barbed wire:

CSH: And what about the war years? Were you here during the war years?

BH: I remember the war, but we were limited, too. Can't be outside. I remember everything on the housing. We used to close up all the windows with these Army blankets. Black-outs. I guess that's what they call "Black-out".

CSH: Cannot have the lights showing.

BH: Yeah. I mean the whole valley, I remember all the Armies, they just park in your yard if they wanted to. All the big tanks going around.

CSH: And what about the bunkers down on the beach?

BH: I remember those. I even remember the whole beach barbed-wired.

CSH: From where to where?

BH: All the way down to Mākua. Where you cannot go is barbed-wires. I remember all those. I remember all the ships outside there.

CSH: So, Ulehawa beach had barbed-wire down it?

BH: All the way. Every beach had barbed-wire. 'Cause Māʻili Point had two guns over there, too. Where they had 'em on the hill. If you look up where the civil defense sign is?

CSH: Yeah, there's a pill-box up there.

BH: Oh, that's two, two big guns.

CSH: And what about the pill-boxes on the beach? When did they use that?

BH: Those, I think, were machine guns. I think they got one in the front of Fast Stop. I think they still got one. One at Ulehawa, I think, get one more, canal. And right on Pōhakunui got one. Māʻili, I think, right where the park's gonna end.

After WWII ended, the lower portions of Nānākuli Valley were further developed into residential lots. The land *mauka* of the current residential area continues to be leased and utilized for animal husbandry — cattle grazing, horse ranches, and pig and poultry operations.

Camp Andrews

On February 8, 1917, the Governor of Hawaiʻi, Lucius E. Pinkham, sent draft Presidential Executive Orders to Brigadier Commanding General Strong of the United States Army which set aside specific lands in Aiea, Waimānalo and Nānākuli for military use — mainly to develop rest and recreation centers for military personnel serving in Hawaiʻi. At the time of the Executive Order, the land was being leased by O.R.&L. Co. for 15 years, beginning from September 1, 1912. As a result of the order, a 39.6-acre parcel was condemned by the U.S. Government for military use. The parcel was located directly *mauka* of where Nānāikapono Elementary School is today. This site, later officially named Camp Andrews, was used as a rest and recreation area for military personnel, both prior to and during WWII. Research at the State Archives revealed the boundaries for the Camp Andrews site:

> Boundaries:
> Beginning at the junction of the fence marking the Northeastern boundary of the O.R.& L. Co. right of way with the Southern line of fence enclosing the ranch house at Nānākuli railroad station; from this point of beginning, the boundary line follows the said fence in a general Northeasterly direction for about one hundred and fifty (150) feet, where the fence changes direction to the Northwest; from this latter point, the boundary line continues Northeast, at right angles to the O.R.& L. Co. Track in this locality, for a distance of one thousand (1000) feet; thence turning at right angles, to the Southeast; for one thousand five hundred (1500) feet; thence turning at right angles again, the line runs in a Southwesterly direction to the Northeastern boundary of the O.R.& L. Co. right of way; thence in a general Northwesterly direction, following said Northeastern boundary, to the point of beginning.
>
> Area: 39.6 acres, more or less.
>
> Remarks. This area is covered with a thick growth of algaroba, and is apparently of value only as a source of fire wood and as a medicore [*sic., mediocre*] pasture. (State Archives: U.S. Depts., Army (Hawaiian Dept.); Military Reservations and Campsites)

The Camp Andrews site, identified as a "U.S. Military Reservation", appears on a 1922 map of the Waiʻanae District (Figure 5). The map also shows a rock wall in the *mauka*-central portion of the property. This wall is most likely associated with cattle ranching activities continuing into the 20th century. Also shown on the map is a single structure in the western portion of the property. Other structures are shown just beyond the property toward Waiʻanae.

It is not clear whether the army actually followed through on its plans to build barracks on the property. A newspaper article dated May 27, 1940, titled "Navy Plans Rest Camp at Nānākuli" suggests that it was the U.S. Navy that first developed the property.

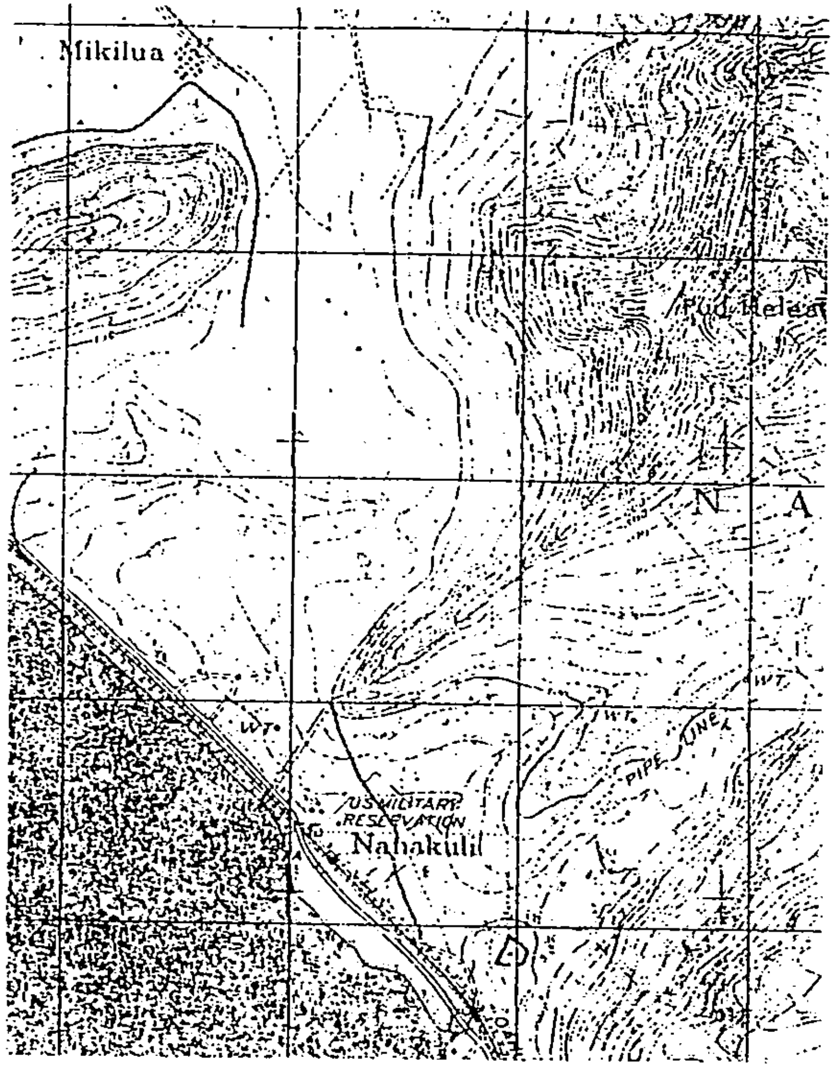

Figure 5 Portion of 1922 U.S. Army Corps of Engineers Fire Control map showing present project area identified as "U.S. Military Reservation"

> The navy's first beach rest camp in Hawai'i is being constructed at Nānākuli for the benefit of the enlisted personnel, it was announced today by naval authorities.
>
> The camp is located between Kalaniana'ole Park and the O'ahu Sugar Co.'s beach camp. It will handle about 500 men.
>
> Vice Admiral Adolphus Andrews, commander of the Hawaiian detachment of the fleet, is in charge of the construction of the camp.
>
> A detachment of marines and sailors was at Nānākuli over the week constructing the camp. Though not fully completed, it is finished sufficiently to be used this week.
>
> The purpose of the camp, naval authorities explained, is to give the enlisted personnel a chance to get off ships on weekends and enjoy swimming and camping on the beach.
>
> The camp site belongs to the army and permission has been received for its temporary usage. (Honolulu Star-Bulletin 5/27/40:1)

Interviews with *kama'āina* in the area seem to support that it was indeed the Navy who first occupied Camp Andrews. From the above article, it is surmised that the camp was named after the Vice Admiral Adolphus Andrews.

After WWII, the camp was deactivated. In the early 1950s, the Federal Government conveyed the Camp Andrews parcel back to the State of Hawai'i, which is the current landowner (Nakamura, *et al.*, 1994:19). The current plans include relocating Nānāikapono Elementary School to the former Camp Andrews site.

Following is an interesting story communicated by Lehua Kapaku about Camp Andrews (Personal Communication to K. Mc Guire; 9/22/00). Apparently, during WWII, a soldier committed suicide and hung himself in one of the buildings. After Nānāikapono Elementary School took over some of the buildings, they built a shop on the site where the suicide took place. Years later, in the early 1980's, the shop was turned into a pre-school area. When the pre-school opened, there were three children who cried and were afraid to enter the school building. They refused to go inside. They described seeing the silhouette of a man wearing army clothes and hanging in a cage which was used for storage in the pre-school area. The teachers and parents were perplexed as no one else could see the silhouette. The matter was brought to the principle's attention. After checking with military personnel at Schofield, it was discovered that, indeed, a soldier had hung himself in that very cage. The soldier was buried at Schofield. Nana Veary was called in to handle the matter, by performing a cleansing ceremony of both the pre-school area and the burial site at Schofield. After the ceremony, the children never saw the silhouette again. The pre-school building was renovated and is now the Special Education building, which is right in line with the drainage ditch on the Wai'anae side of Nānāikapono Elementary School.

Nānākuli High School

The high school was built in the mid-1960's. Fred Cachola related an interesting story about how the Nānākuli community got their own highschool:

CSH: Can you tell me about Nānākuli High School and how that came to be.

FC: Nānākuli High School. This was the days when the people were in awe of the government and the power of politics, etc. And, Nānākuli Highschool was on the grounds of Nānāikapono Elementary. There's 13 acres in that whole campus, and there were over 2000 students squeezed into 13 acres on a tsunami-zoned beach front. And so it got kind of crowded. The principal of the High School was Ray Miyasato. He said, "We've gotta do something about this." But the government's answer was to put more portables in that small, little 13 acre lot. And so, as part of the Model Schools Program we had this community council that we talked to. They volunteered and said, "Maybe we ought to go see the Governor." And we were both young, new principals. It was his first school and it was my first school too. So, we came here, rather nervously, to 'Iolani Palace, where the Governor was, his office was right up there in what was the King's bedroom, and has now been restored as the King's bedroom. That was the Governor's office, Governor Burns. We were with some parents and the student body president for the high school. I think he was a sophomore at that time, Leonard Kwan. He is now teaching at Kamehameha. But I remember Leonard saying, "We all made comments about the need for the high school and the need for another campus, and how things are so bad down there, and how that whole community has always been neglected. It seems like nobody even wants to think about the problems down there, or to address the problems." And Ray Miyasato and I made the case that we're doing the very best we could. But Leonard said to the Governor, "You know, in school we've been taught to have faith and trust in government and every time we've been hearing about this high school, we've been hearing about it for years and years, and I don't know if I can believe or have faith in this government anymore." And I am telling you, Governor Burns was stunned. And he looked at Leonard, and said, "Young man, God willing and I am still alive, your high school will be built." And he picked up the phone and called for the DAGS [Department of Accounting and General Services] and right then and there he moved the priority for Nānākuli High from number six to number one. Much to the chagrin of the people of Pearl City, because Pearl City was number one, and they got shoved down. And Nānākuli High was not only moved up to priority number one, but it was one of the rare occasions where the highschool was built at one time. They didn't go in phases, they built everything one crack. They just built as much as they could. And so, Leonard deserves a lot of credit for

speaking his piece and the parents, Marie Olsen, Raphael Christ, these are the old timers, Rose Jackman. These were tough ladies, man. I mean, they'd go up against anybody. I find Wai'anae, Nānākuli has that kind of a — if you look deeply into the people, they may not say much, but when they do, they do it with conviction. They do it with determination. And it was one of those meetings. So, that's how Nānākuli got the high school.

CSH: What year was the school actually built, or when did construction start?

FC: I think we broke ground in 1965. I can't remember now, its been so long. It was such a wonderful occasion, because Ray Miyasato and I wanted everybody to break ground. So we got these big shovels, we had a lot of shovels, and everybody there took turns turning the ground, from students to parents. This was not gonna be just one or two people. We wanted the whole — this was gonna be a community ground breaking. And, everybody went and broke ground. It was a big day for Nānākuli, a great day!

V. NATIVE HAWAIIAN CUSTOMS PERTAINING TO THE PROJECT AREA

Sink Features

Sink features are valuable because they can record a build-up of cultural deposits over time which may inform on past environmental conditions. It is also a known fact that burials in sinks and limestone features were a fairly common Hawaiian mortuary practice.

During a field inspection of the Camp Andrews site, numerous limestone sink formations (at least 17) were noted. Most of the sink features were filled in with limestone boulders and cobbles at some time in the past. In-filling possibly began with Native Hawaiians in prehistoric times, continuing into the 19th century when Nānākuli was ranch land and *paniolo* would have filled the sinks to protect cattle from injury. In the 20th century, military use of the parcel likely required further sink in-filling (Hammatt, McDermott, and Chiogioji 1999:26). Two of the deepest sink features were tested to determine if they contained any cultural or paleontological deposits or human burials. Sink #1 contained historic and modern trash, charcoal, as well as, pieces of vertebrate remains which consisted of at least 8 prehistorically extinct bird species, along with bones and bone fragments that could not be identified beyond general bird size ranges. Fish remains were slight, consisting of a few identifiable fragments. The mammal remains were also fairly slight and consisted of *Rattus exulans* (Polynesian introduced rat), *Canis familiaris* (Polynesian or historically introduced dog), and *Herpestes auropunctatus* (historically introduced mongoose)

Although preliminary at this point, it is possible that Sink #1 was a fresh or brackish water source to birds, and possibly humans, in the past. This may explain the high occurrence of land birds as opposed to sea birds in the sink deposit. It may also account for the fairly abundant cultural material found at the water table level.

Based on the results of the excavation, Sink #1 contains a cultural deposit that documents the land use of the vicinity from the modern era, represented by World War II debris and modern garbage, back into the prehistoric period. Extinct avifauna remains are found throughout the deposit. Although no chronological data is yet available, the cultural deposits at the base of the excavation have a potential to be quite old, possibly associated with the initial human habitation of this portion of the Wai'anae Coastline. The co-occurrence of culturally enriched sediments, Polynesian-introduced rat, and extinct avifauna may offer the opportunity to investigate the relationship between human colonization and the extinction and extirpation of endemic and indigenous bird species. Further, identification of any pollen and spore remains may inform on past environmental conditions and vegetation regimes.

Sink #2 contained a human burial, anticipated to be prehistoric/early historic Native Hawaiian. For specific details of the burial, see the section on "Burials" below.

Based on the above information, it is possible that the proposed project will impact the sink features and other historic properties, cultural and/or paleontological deposits which may be contained within the sink features themselves.

Burials

As a subset of work done for an Archaeological Inventory Survey for the proposed project area, a letter report by Matt McDermott, B.A., of Cultural Surveys Hawai'i to Dr. Sara Collins of the State Historic Preservation Division (SHPD) (August 8, 2000) identified a human burial located at approximately 30 cmbs in one of the many sink features located on the proposed Camp Andrews property. The burial was left in place, but "Because the remains were found in [an] articulated anatomical position, they more likely represent a primary burial. No historic artifacts, such as shoe leather or buckles, buttons, decomposing cloth, etc., were found in association with the burial remains . . . Based on general context, the remains are most likely prehistoric/early historic Native Hawaiian, although this has not been conclusively demonstrated" (McDermott to Collins letter, 8/8/00:11). Mr. Kala'au Wahilani, SHPD Burials Program staff, as well as an archaeological staff person, Ms. Muffet Jourdane, was informed of the find. Following Mr. Wahilani's recommendation, the burial was not further exposed, was left in place, and trench was back filled.

In an interview with Mr. Walter Kamanā, Jr., he indicated that there probably were burials located within the Camp Andrews site. A portion of the interview is included here:

CSH: The other concern we have is about burials. Do you have any concerns that there might be any burials in that Camp Andrews area?

WK: There might be a couple. Because, I used to see, anyway, a couple old area[s] that when you went across you see something, maybe two, three or —

CSH: You mean, modern burials? I was thinking about old Hawaiian burials.

WK: Well, there were Hawaiian burials there. You know, there were buried in that area. They would put the land, so that their house is right there. So even that is graveyard under. Yeah, there were burials in there.

CSH: You think there might be something — even in the coral, in the sinks? In the depressions?

WK: Yeah. Because when they came inside there, even during the war time, they *hana 'ino* everything. We cover 'em up, we hush 'em up. Nobody made a fuss about it during that time . . . But, us, the young guys that play in there, we know there is burials. There is this old cowboys that was buried in there, or train people was buried in there, you know, put out of the way. Because Nānākuli was only a place of *kiawe* trees . . . I don't think had much of our people were buried at Wai'anae. I think much of our people were buried at Camp Andrews, but was a lost cause. Nobody know. When the army took 'em away, they took 'em away. But someday, when they gonna develop in there, they're gonna find 'em.

Mr. Kamanā's interview seems to support the possibility of more burials located within the project area.

Burials in limestone sink features is a fairly common traditional-Hawaiian mortuary practice that has been documented extensively on O'ahu at Barber's Point (Kalaeloa) and the adjacent West Beach area. This inadvertent burial find may be an indication that burials in the sinks of the project area are fairly common. Based on the above, it is very possible that the project may impact other burials which may be located within the Camp Andrews area.

Hawaiian Trails

Trails served to connect the various settlements throughout O'ahu. John Papa 'Ī'ī mentions three ancient trails that led to Wai'anae. In the early 1800's, when 'Ī'ī was a little boy, these trails were still being used. These trails were:

> . . . one by way of Pu'u o Kapolei, another by way of Pōhākea, and the third by way of Kolekole. *(1983:97)*

He goes on to describe the trails:

> From Kunia the trail . . . met with the trails from Wahiawa and Waialua. The trail continued to the west of Mahu, to Mālamanui, and up to Kolekole, from where one can look down to Pōka'ī and Wai'anae Uka. There was a long cliff trail called Elou from Kalena and Hale'au'au on the east side of Ka'ala coming down to Wai'anae. There was also a trail called Kūmaipō which went up and then down Mākaha Uka.
>
> Below Kūmaipō trail in the olden days was a stronghold named Kawiwi ... [and it] was part of a mountain ridge lying between Wai'anae and Mākaha and overlooking Kamaile. The trail Kūmaipō, went down to the farms of Mākaha and the homes of that land. A branch trail which led up Mount Ka'ala and looked down on Waialua and Mokulē'ia could be used to go down to those level lands. It was customary to have dwelling places along the mountain trails that led downward from here into Kamaile, as well as along the beach trail of Mākaha.
>
> . . . Pu'u o Kapolei [trail] . . . joined the beach trail from Pu'uloa and from Waimānalo. (*Ibid.*) (See Fig. 6 for a map of Leeward O'ahu trails.)

This last trail was the one John Papa 'Ī'ī used as a child to visit his aunt, Kāneiakama, when she was at Nānākuli (1983:29). All three trails mentioned above were outside of the project area and, therefore, no impact to them is expected.

An Archaeological Inventory Survey report conducted by Ross Cordy *et al.* (1990:4) for the Department of Hawaiian Home Lands (DHHL) suggests a possible trail that led from upper Nānākuli Valley and crossed over into Lualualei. No specific historical

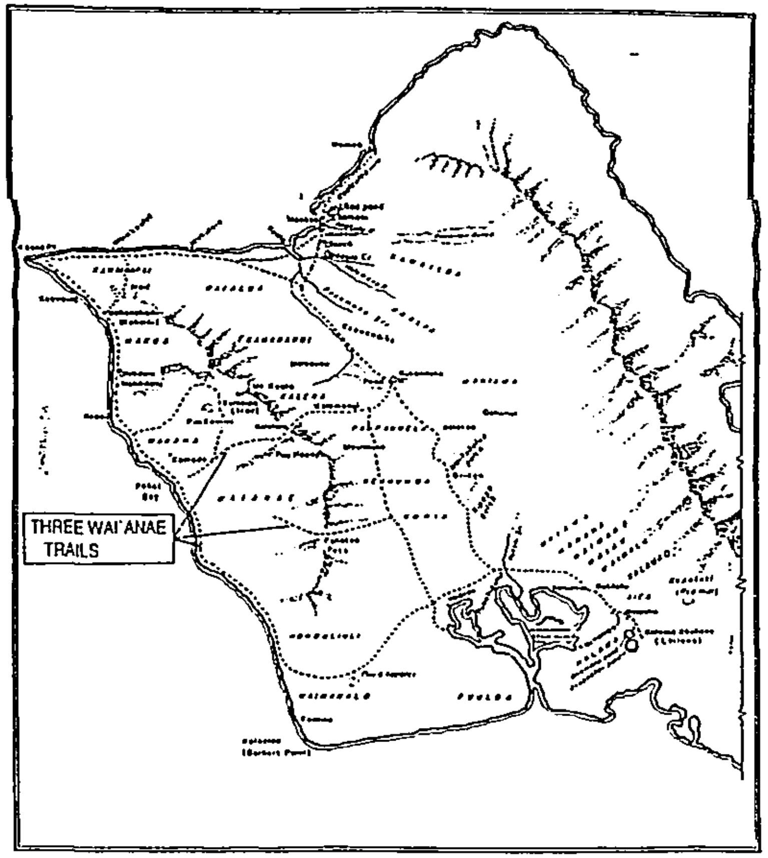

Figure 6 Trails of leeward O'ahu; map by Paul Rockwood (from 'Ī'ī 1983:96)

documentation was given for this suggested trail. As with the above three trails, this posited *mauka* trail lies outside of the proposed project area.

Native Hunting Practices

The discovery of faunal remains within one of the sink features does raise the question of bird hunting and gathering practices within the project area, especially during the prehistoric/early historic period. It should be noted that though the faunal remains represent certain extinct species, they are valuable for interpreting past life patterns and environmental conditions.

In regards to hunting practices, prehistoric or modern, the historic record and interview informants did not reveal any native hunting practices as having occurred within the proposed Camp Andrews site. The lower portion of Nānākuli Valley has been highly disturbed by the development of residential lots and human activity. Pig and goat hunting does occur on mountain ridges and in the upper reaches of Nānākuli Valley where vegetation and water is more abundant (L. Kapaku and J. Landis Interviews). The proposed project area is predominantly vegetated with *kiawe*/buffel grass scrub.

Native Gathering Practices for Plant Resources

An assessment of the plants within the Camp Andrews site located only four plants which are used for medicinal or cultural purposes, *ʻilima, ʻuhaloa, honohono,* and *ʻāheahea* (Funk 1999:5-7). All four plants were used medicinally in Hawaiian culture and they continue to be used today by practitioners of *lāʻau lapaʻau* (healing with medicinal plants and herbs). A discussion of the traditional uses of these four native plants follows.

Besides being used in *lei*, the *ʻilima* (*Sida spp.*) was also used medicinally. The flower is used as a cathartic and is also eaten several months prior to giving birth in order to lubricate the birth canal. The young leaf shoots and root bark are used to make tonics and treat asthma, and the juice from the squeezed flowers is also used as a mild laxative for babies. The flowers are also eaten to aid a nursing mother in producing a sufficient supply of milk (Makuakāne 1994; Gutmanis 1989:38, 40; Pukui & Elbert 1986:98). A Hawaiian proverb (*ʻōlelo noʻeau*) extols the value of the *ʻilima*.

> *Ola nō i ka pua o ka ʻilima. There is healing in the ʻilima blossoms.* (O.N. #2489)
>
> The *ʻilima* blossom is one of the first medicines given to babies. It is a mild laxative. Hiʻiaka, goddess of medicine in Pele's family, used *ʻilima* in some of her healings. (Pukui 1983:272)

The root of the *ʻuhaloa* (*Waltheria indica*) is an effective remedy for sore throats (chewed raw or brewed into a tea) and the tea is especially excellent for treating chronic asthma and pulmonary complications. When made into a tea, *ʻuhaloa* is also used as a gargle or mouth wash. The leaves can be used as a poultice for infected wounds. *ʻUhaloa* was also combined with other herbs to make a douche which was used to clean the vaginal tract after a miscarriage (Makuakāne 1994; Gutmanis 1989:34).

Two other plants, with Hawaiian names, the *ʻāheahea* (*Chenopodium murale*) and the *honohono* (*Commelina benghalensis*) were also located within the project area, but these two plants are introduced species to Hawaiʻi (Wagner, Herbst & Sohmer 1990). All other plants found were non-native. (For a complete listing of identified plants, refer to the independent botanical resources assessment conducted by Evangeline J. Funk 1999.)

None of the plants identified above are of cultural concern and none are listed as threatened or endangered according to the U.S. Fish and Wildlife Service (1999). All of the above plants are common and locally abundant and can be found in similar dry, lowland environments. Interviews with informants and "talk-story" with people in the community did not suggest nor indicate that any type of gathering activity took place or was likely to take place within the proposed project area.

Religious Shrines and Sites

J. Gilbert McAllister conducted the first archaeological survey of Nānākuli Valley from 1929-1930. His survey concentrated on locating religious, habitation and traditional/mythological sites. He reidentified one site which had been previously identified by T. G. Thrum and did not locate any other sites within Nānākuli. The site was ʻIlihune *Heiau* (Site 147) which no longer exists. Site 147 was described as "a small walled *heiau* of *poʻokanaka* class" (McAllister 1933:110). The *heiau* is understood as being located on the ridge between Lualualei and Nānākuli.

Recently, religious sites have been found in upper Nānākuli Valley which lies outside of the project area, but the oral and early historical records make no mention of *heiau*, religious shrines and sites in the valley (Cordy 1997:10). The draft Archaeological Inventory Survey report for the Camp Andrews site (McDermott to Collins letter, 8/8/00:2) did not identify any religious shrines or above surface sites within or near the proximity of the proposed project area.

Other Archaeological and Historical Concerns

The remains of Camp Andrews itself was identified as a historic property. The site is significant under State and National Registers of Historic Places Criterion D, for its information content regarding World War II era military installations in the Pacific. It has been recommended that Camp Andrews be assigned a state site number (McDermott, *et al.*, 1999:26).

There were no other historic properties and stone alignments identified within the proposed project area.

VI. SUMMARY

This assessment has attempted to look at the effects the proposed construction of the Nānākuli IV Elementary School, Head Start facility and Hawai'i Public Library may have on Hawaiian culture relating to specific practices and traditions. The specific areas studied included sink features, burials, access to Hawaiian trails, native Hawaiian hunting and gathering practices, religious sites and other archaeological and historical concerns such as historic properties. No Hawaiian trails were identified within the Camp Andrews area. Though no specific hunting/ gathering practices were identified, the discovery of extinct faunal remains does raise the question of past hunting and gathering practices within the project area. Information is inconclusive at this time. Of primary concern is the many sink features found within the Camp Andrews area. Beside the faunal remains, a human burial was identified in one of the two sink holes that was tested. It is clear that the many sink features may be valuable for interpreting past history, past life and environmental patterns. The proposed construction of the Nānākuli Elementary School has the potential to impact the sink features and any burials located within the project area. This report concurs with McDermott (8/8/00:4) that further testing be required to satisfy any historic property significance evaluations and recommendations for mitigation of impacts to any historic properties. It is further recommended that mitigation procedures to protect and/or preserve the sink features during construction, as well as, a Burial Treatment Plan, be in place prior to any clearing, grading or grubbing within the project area.

Within the proposed school site, two native Hawaiian plants were identified, the *'ilima (Sida spp.)* and the *'uhaloa (Waltheria indica)*; as well as two introduced plants with Hawaiian names, the *'āheahea* (*Chenopodium murale*) and the *honohono* (*Commelina benghalensis*). As discussed in the "Native Gathering Practices" section of this report, these plants were used traditionally in Hawaiian culture and they continue to be used by cultural practitioners today. However, this study concludes that the proposed school site will not have an impact on these plants or on Hawaiian practices and traditions for the following reasons. The Camp Andrews site is dominated by alien plants such as *kiawe (Prosopis pallida)*, *koa haole (Leucaena leucocephala)* and assorted introduced grasses, weeds and shrubs. The four above mentioned plants do not constitute any cultural concerns nor are any of the plants threatened or endangered (U.S. Fish and Wildlife Service 1999). All four plants are occasionally or locally abundant and are commonly found in similar environmental conditions. Furthermore, within the proposed camp site, no gathering practices specific to these plants or the project area were identified. This finding was corroborated by interviews and "talk story" with community members. Based on the above, it is unlikely that Hawaiian practices and traditions in relation to plant gathering will be impacted within the proposed project area.

During the *Māhele*, there were no *kuleana* (commoner) claims awarded within the project area and, for that matter, no claims were awarded within the *ahupua'a* of Nānākuli. The absence of *kuleana* claims is by no means an indication of the lack of Hawaiian activity. The one unawarded claim from the *Māhele* indicated a pond, a cultivated *kula* (open field or pasture) and a valley planted in *uauke*. Early mid-19th century tax records from 1855 indicate at least eight people were living in Nānākuli at the time. It is obvious from this record that Hawaiian cultural activity was taking place, even if only on a limited basis. Two things most likely impacted late 19th century population statistics for Nānākuli, the development of the sugar industry at Wai'anae Valley which drew people away from the dry, unproductive lands in Nānākuli, and the leasing of large tracts of land for cattle grazing and ranching. It is a great loss that pre-historic and early historic information regarding Nānākuli is almost non-existent.

The proposed Camp Andrews site is in an area that has been utilized for ranching activity for many decades. In the early 20th century, the present project area was designated a U.S. military reservation by Presidential Executive Order. In 1940, the Navy constructed and opened a recreation camp for enlisted men. The camp continued in operation during World War II. Following the war, the camp was phased out and many of its buildings dispersed throughout the community for use by a church and by Nānāikapono School. In the 1950's, the camp parcel was returned to the State of Hawai'i and has since remained undeveloped. Currently, the only visible remnants of Camp Andrews are a concrete bunker, two coral block columns at the former entrance to the camp, miscellaneous concrete foundations, and an unpaved roadway through the project area. It has been recommended that Camp Andrews be designated a state site number based on Criterion D under the State and National Register of Historic Places (McDermott, *et al.*, 1999:26). It is also recommended that further research might include the gathering of additional oral interviews from former military personnel and *kama'āina* Nānākuli residents.

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APPENDIX A: Transcripts of Interview with Fred Cachola

Interview with: Fred Cachola (FC)
Date: June 3, 1999
Place of Interview: Hale Aliʻi oʻIolani
Interviewer: Kaʻohulani Mc Guire for Cultural Surveys Hawaiʻi (CSH)

CSH: Fred, could you give me your full birth name?

FC: My birth name on the birth certificate is Frederico Cachola Jr. Then my grandmother gave me another Hawaiian name when I came back from college. It was Keakaokalani.

CSH: How do you translate the meaning of that?

FC: *In the shadows within the realm of heaven.* It's *within the realm of heaven or being part of them — being embraced by heaven, in the shadow of heaven.*

CSH: It's a beautiful name.

FC: It is.

CSH: Can you tell me who your parents were and where were they from?

FC: My mother was Esther ʻUʻu. She was from Maui. My father was Frederico Cachola Sr., and he was from the Philippines. My grandmother (mother's side) was Dora Piʻohiʻa ʻUʻu and my great-grandmother was Mele Piʻohiʻa, and my great-great-grandfather was Piʻohiʻa. My great-grandfather was Lokana Kepani, and then my great-great-great grandfather was from Kohala. That's where I was born and raised. His name was Kupaianalua, and Halulukamanawaululanipili was the wahine (wife). And they would be like my great-great-great-great grandparents. And so my grandmother was saying that since I was born in Kohala, she always chuckled that the line went back to Kohala, because that's where I was born. But, I went to Waiʻanae in 1960 when I came out of college. It was my first teaching assignment — at Waiʻanae Intermediate. Although, we were housed at the Waiʻanae Elementary School campus. And that's where I first became interested in the history of that area. Because being a *malihini* (newcomer) to that area, and having to teach Hawaiian History in the seventh grade, I thought the best thing to do was to learn as much as I can about the history and culture of that area and try to incorporate it into the curriculum as much as I could. But much to my dismay, I quickly found out that most of the children that were in my class, and even their parents, were strangers to that area, too. There were very few people that I would call "natives", really *kamaʻāina* (people who were born and raised there). But you know, I lived there for over 30 years, in the Waiʻanae area and I was very involved in many different kinds of community activities — the Lion's Club, the PTA, the Waiʻanae JC's, and the Waiʻanae Community Action Council Program and the Waiʻanae Hawaiian Civic Club. So I got to meet some of these folks. It was intriguing because gradually what unfolds is a district that is quickly losing its cultural roots because many of those people who did establish those roots, or had the roots to establish it, are gone. And they are going very quickly. Ah Ching Poe is one of them. His brothers are still around. Genevieve Nahulu, Marie Olsen, Raphael Christ. You know, these are people who knew Nānākuli like nobody else could. I mentioned Jay Landis, Kekahuna. They're all there. Alvin and his brother Blackie Kekauoha — they're all down there. So that's where I learned some of those things that were not written in history books. I don't know if I'm getting ahead of myself here.

CSH: Oh no. That's fine.

FC: That was a long answer to a short [question]. "What is your name?" [Laughs.]

CSH: One more thing. When were you born?

FC: I was born in November, 1935 at Kapaʻau, Kohala.

CSH: So when you first moved to Waiʻanae, what school did you teach at?

FC: Waiʻanae Intermediate, which was located at the Elementary campus. That's where I taught, at Waiʻanae Intermediate, seventh grade. And, stayed there for seven or eight years, then I became a Vice-Principal at Nānāikapono Elementary, then I became Principal. And then I was a model schools coordinator for the Model Schools Program. And then I left in 1971 to go to Kamehameha as a director of their Community Education Programs. And then I stayed there in that capacity for 25 years. Then I retired a couple of years ago. Now I enjoy taking people on historical tours to Waiʻanae and Kohala, and [I'm a] docent at ʻIolani Palace. But still very much involved with Hawaiʻi's history and culture and traditions. I do take a lot of people on tours to Kohala. And I've served on the State Historic Preservation Board, and OHA's Historic Preservation Council. History, for me, is kind of a lifelong interest. I don't consider that as a [separate thing]. It's just part of me. I enjoy learning more and there's always more to learn. Fascinating. Hawaiʻi's history is fascinating.

CSH: What have you heard about the meaning of "Nānākuli"?

FC: All the meanings are there in the books. But, when I was a principal at Nānāikapono, I was intrigued with the name, "Nānāikapono". And so I asked my secretary, who was living down there for many, many years, Mrs. Brown. I said, "Mrs. Brown, can you tell me about how this school got its name Nānāikapono?" which inadvertently gave me the meaning of Nānākuli. And she said, "Oh, I'll ask Mrs. Eli to come down and talk to you, because she's the old timer here and she knows all what happened here." So, a couple of days later Mrs. Eli walked into my office. I was just a young principal. I was about 30 years old. I was maybe 32, 33 [years old]. And she came in sort of sheepishly and, very respectful, and she sat down in my office and I asked her, "Can you tell me about Nānāikapono?" And she sort of looked around, as if nobody was listening, kind of a thing, you know. I said, "Oh-oh, here comes something that I know is going to be a little different from what I heard." So, she said that the first principal of that school was a Reverend Awai and that he knew that the tradition of that area, Nānākuli, had a Hawaiian hidden meaning which she told me was "Nānā-i-ka-ule". I was kind of smiling. And she said, "Yeah, because that's how in the old days this place was known for its promiscuity. It got this name from ancient times. And it might have something to do with the mountain range. Look at your map. Look at your map. The one that you were showing me. Because you can see the *ule* over there. See?

CSH: This one? I have other O'ahu maps.

FC: Yeah, there it is. See the testicles over here, and the penis sticking out there. So it could be [in] reference to that. If you down in here, you always looking at that. It reminds people of that, so its Nānāikaule, which literally means *looking at a man's testicles, looking at his penis*. And so, Reverend Awai was not gonna let his school be named after something like that. No way! And so he said this is not gonna be called Nānākuli Elementary, no way. So he named the school "Nānāikapono", which of course, means *look to the way of righteousness*, as opposed to Nānāikaule. So I was sort of pleasantly surprised. But, to me, Hawaiians have this thing about names. You have to look at names and all of its ramifications and all of its contexts. Of course, the one about looking at the knees, and standing there looking deaf, and all that kind of stuff, which is part of the nice tradition. But all of that might have been camouflage. You know, people don't want to say, "Our place means *looking at a man's penis*." They're not gonna say [that]. They're gonna create other things. And so, I thanked her for that and I shared this with several people too, but I have never seen this written anywhere. I have never seen this written anywhere. I think that's why, Mrs. Brown, my secretary, knew what it was going to be. She didn't want to tell me, so she asked Mrs. Eli to come down and tell me. [Laughs.] And so she did. That's one of the interpretations for the name. And, it's very Hawaiian. To me, it's a very Hawaiian thing, very Hawaiian.

CSH: That's the first time I heard that story.

FC: This is actually Mrs. Eli's story, not mine, and I'm just telling you what she told me. She was a well [spoken with emphasis] respected homesteader. She was down there for many, many years. She was like a matriarch of that community. And there were many others down there too. See, this was like back 30 years ago, 40 years ago.

CSH: What can you tell me about the *menehune* stones?

FC: Up in Nānākuli Avenue, what they call First Road, turn to the right. You see these two stones. They're known as *menehune* stones, they're known as *kahuna* stones. But what is interesting about them is that during the construction of that street, according to Black Ho'ohuli and others who told me the story about those rocks, they had to realign the street because strange things happened. Like, they couldn't move the big one, and they moved the small one and it came back. The bulldozer workers and the operator and the people who were building down there said, "Man, these are very special stones. We have to move around it." And so you'll see that they're in cement on the side and they haven't been moved. They don't have any labels, they don't have any inscriptions. Except for the few things that I am telling you, I really don't know much more about them. I think it would be really interesting if we could research the City and County construction records for that homestead area when they were putting in that street. And, there might be some other notes in the daily papers about it. Because I'm sure that it may have attracted attention. But on the other hand, it may not have. Because Hawaiians are not the kind to go out and publish these things. They don't go out and say, "Wow, we've got this new *kahuna* stone in Nānākuli. It's on First Road." They don't do that. So, Black Ho'ohuli and I went to visit the stone once, and I just wanted to test it. I said, "You know, Black, one of my *kahuna* friends who I worked with on the restoration of Kū'ilioloa, said that if the stone is warm, is hot, it's still *alive*." You know, the *mana* is still there. And, so we went. We said, "Well, let's go check it out." It was evening, and the sun was down. It was not in the mid noon-day. And we put out hand on that small one, it was warm [spoken with emphasis]! He and I said, "Oo, wow!" Now, this stone is still alive, it's got *mana*. And so I haven't gone back to test it yet, but maybe I should one of these days to see if it still has that kind of warmth. It was definitely, between the big one and the small one, the big one didn't have anything, but the small one had definite heat coming out.

CSH: Do you know if the stones have any particular names?

FC: I'm sure they had, but I wouldn't know what they are. I've never heard. I'm sure they would have names.

CSH: And that lot, is that private land?

FC: No, that's all part of Hawaiian Homestead. As a matter of fact, I think another interesting thing to check is the Hawaiian Homes Commission records when they were developing the homesteads there. Whether or not that was mentioned in the lot, that particular lot. It might have been. I don't know.

CSH: Do you know anything about Lyman Ranch at the end of Nānākuli Avenue?

FC: No, that's something new. You know, I worked down there for about 5, 6 years before I went to Kamehameha. I got to know that place very well, but Lyman Ranch was never mentioned down there. Well, that whole area *mauka* of where the highschool is now, that was all *kiawe* (*Prosopis pallida*) and brush. It was all just raw land up there. There was a Nānākuli Ranch. The one that's below, across what is now known as Zablan Beach, right on the Honolulu side of St. Regis church. There was a little Nānākuli Ranch in there. But, Lyman Ranch, never heard of it. So, if it is indeed a ranch, maybe it's a relatively new acquisition. Maybe a person got a homestead up there. I really don't know. But I think the Hawaiian Homes Commission records should have something on that — if it's a lease. But I know nothing about that. Black Ho'ohuli used to play as a kid. He used to tell me he used to go up there and pick up oranges and fruit. It was his playground up there. So I'm sure he would know. He would know anything about that. He certainly would.

CSH: Can you tell me about Nānākuli High School and how that came to be.

FC: Nānākuli High School. This was the days when the people were in awe of the government and the power of politics, etc. And, Nānākuli Highschool was on the grounds of Nānāikapono Elementary. There's 13 acres in that whole campus, and there were over 2000 students squeezed into 13 acres on a tsunami-zoned beach front. And so it got kind of crowded. The principal of the High School was Ray Miyasato. He said, "We've gotta do something about this." But the government's answer was to put more portables in that small, little 13 acre lot. And so, as part of the Model Schoo's Program we had this community council that we talked to. They volunteered and said, "Maybe we ought to go see the Governor." And we were both young, new principals. It was his first school and it was my first school too. So, we came here, rather nervously, to 'Iolani Palace, where the Governor was, his office was right up there in what was the King's bedroom, and has now been restored as the King's bedroom. That was the Governor's office, Governor Burns. We were with some parents and the student body president for the high school. I think he was a sophomore at that time, Leonard Kwan. He is now teaching at Kamehameha. But I remember Leonard saying, "We all made comments about the need for the high school and the need for another campus, and how things are so bad down there, and how that whole community has always been neglected. It seems like nobody even wants to think about the problems down there, or to address the problems." And Ray Miyasato and I made the case that we're doing the very best we could. But Leonard said to the Governor, "You know, in school we've been taught to have faith and trust in government and every time we've been hearing about this high school, we've been hearing about it for years and years, and I don't know if I can believe or have faith in this government anymore." And I am telling you, Governor Burns was stunned. And he looked at Leonard, and said, "Young man, God willing and I am still alive, your high school will be built." And he picked up the phone and called for the DAGS [Department of Accounting and General Services] and right then and there he moved the priority for Nānākuli High from number six to number one. Much to the chagrin of the people of Pearl City, because Pearl City was number one, and they got shoved down. And Nānākuli High was not only moved up to priority number one, but it was one of the rare occasions where the highschool was built at one time. They didn't go in phases, they built everything one crack. They just built as much as they could. And so, Leonard deserves a lot of credit for speaking his piece and the parents, Marie Olsen, Raphael Christ, these are the old timers, Rose Jackman. These were tough ladies, man. I mean, they'd go up against anybody. I find Wai'anae, Nānākuli has that kind of a — if you look deeply into the people, they may not say much, but when they do, they do it with conviction. They do it with determination. And it was one of those meetings. So, that's how Nānākuli got the high school.

CSH: What year was the school actually built, or when did construction start?

FC: I think we broke ground in 1965. I can't remember now, its been so long. It was such a wonderful occasion, because Ray Miyasato and I wanted everybody to break ground. So we got these big shovels, we had a lot of shovels, and everybody there took turns turning the ground, from students to parents. This was not gonna be just one or two people. We wanted the whole — this was gonna be a community ground breaking. And, everybody went and broke ground. It was a big day for Nānākuli, a great day!

CSH: Tell me about how the local kids call the streets in Nānākuli. They don't use the names on the street signs.

FC: No, they don't. It's easier for them to say First Road, Second Road. "Where do you live?" Third Road, Fourth Road, Fifth Road. It means from Farrington Highway, the first street, the second street from the highway, and that's how the kids call it. I don't know if they still do it today, but that's the way they used to do it. Used to call 'em by numbers, not by names. First Street, Second Street. No, not "street", "road". It was First Road, Second Road. And who knows, maybe that goes back to the days when there were no streets. I've been curious about that too. Maybe when the homesteads were first laid out there were just roads. Maybe that's what they were officially called, First Road, Second Road, Third Road, before the streets were actually put in and given names. And that kind of labeling stuck, First Road, Second Road, Third Road. I'm not sure whether the kids still refer to it like that yet.

CSH: Tell me your interest in Māui and Māui's connection to Nānākuli.

FC: As part of my research down there, of course, I got to the Sites of O'ahu and McAllister and, in there, I think it's site number 148 for the Wai'anae District, he sited this Māui rock. An unusually big boulder or rock said to be where Māui landed. And I was really intrigued because I didn't realize that in other citations McAllister talked about that whole Māui tradition. That's where his brothers were born, and that's where they made fire, that's where his famous hook was made, and that's where they used it at Ulehawa. And I said, "Where is this stone?" There was the little "x" on the map which nobody could [locate] because McAllister's map is notorious. It's just a scratch on the map. You wouldn't know where it's at. So I went to my friend Black. It was early in the evening [and] I was coming back from work at Kamehameha. I stopped by his house and said, "Hey Black, you know this place? Have you ever seen a huge rock that looks so unusual that it looks like it doesn't belong there?" And he thought for a while and says, "Oh, yeah, down by the old haunted house." And I said, "Where?" He said, "Well, come, come, lets go take a look." And so we drove down there, I knew what house he was talking about because there was this old mansion and this big banyan tree and it was choke with weeds and you couldn't even see the stone. Now I know why nobody could see the stone, because it was sort of like on the side of the house and there was all this underbrush covering it. So, it was early in the evening when we got there and we parked the car. By then it was nightfall already and we started walking to the stone. There was construction going on. They were building these condos down there. And all this construction equipment and materials, lumber, supplies all over the place, and all of a sudden we heard this guy, "Hey, what are you guys doing?" It was the night watchman. So we said, "Oh, we just want to look for this stone, this big rock." And he said, "Oh, you mean Māui Rock?" And [I thought,] eh, how did this guy [know]? He read McAllister or what? And, obviously, this was an elderly *kupuna*, Hawaiian man. And, he said, "Come, come. I show you guys." So he took out his flashlight and we walked maybe about another 20 or 30 yards from where he was parked. And he shone it, and we saw it. He put his light on it. I said, "Oh my God." 'Cause it was huge. It was bigger than a car, and it was really big. You seen it. And there were, on the top of the boulder, were all these tiny, tiny rocks. Small little uprights. There were many there. They were kind of like scattered around the place, on the top [and] which are now gone. I don't know what happened to them. And so, we started talking about it and he said, "Yeah, you know, over here all the night watchmen quit from the company because nobody like work over here." I said, "So, what's the problem?" And he just said one word, "*pō kāne*". I said, "Yeah, *pō kāne*! Wow, you mean the night walkers?" He said, "Yeah, they come from right over here." And he pointed to this small little sapling, this little banyan tree. He said, "They come from over here, then they walk straight down to the beach. And sometimes I park my truck and, whoa, they move 'em up, they move so much I spill my coffee. So I just said, 'Okay, okay, I not scared of them! I swear at them, but I gotta move my truck." Because he's in the way. So, he said, "Yeah, they come from over here, they go down to the beach." But, he said he was hired in the middle of the night, because the watchman there was the sixth person to quit and they were desperate. I don't know how they got hold of him or if somebody called him, because he wasn't afraid. But all the other night watchmen said in that area strange things happen. Things start flying around, and things start moving. All these unusual events going on and they see things too, so nobody wanted to work there. And then he said, "Eh, you folks wanna see Māui? You like see Māui?" And I said, "You cannot see Maui from here." I thought he meant the island Maui. "How can you see Maui from here?" By then I didn't want to question him. And he said, "Come early tomorrow morning, come just before sunrise when the sun is coming up. I'll show you guys Māui." And I looked at Black, Black look at me and said "OK." So, the next morning, sunrise, I was down at Black's house and we went right back to that site where we met him the night before and he took us to the rock. There were no buildings there then. You could see the whole mountain range very clearly. As the sun was coming up he says, "There's Māui." And I looked up and I was stunned! It was one of those moments. I said, "Wow!" It was this magnificent silhouette of a sleeping man. Huge! I was telling your group, people brag about the sleeping giant on Kaua'i. That sleeping giant is like a *menehune* compared to this one. This is a giant. This is worthy of Māui. And it's Māui sleeping there. And that's why if you

look at McAllister, he said Māui is reposing, the rock that he reposed on, yeah? He rested on this rock. And then I said, "Maybe not, maybe from that rock you can see Māui reposing." From that rock, that rock marks the spot where early in the morning you can see that whole [silhouette of] Māui sleeping. So, who knows whether or not the Māui rock is called Māui because of that or that rock was the place from which you could see most clearly. Because if you go too far to the left or too far to the right, the silhouette changes. You cannot see it. It's right from that rock that you can see it most clearly. It's just outstanding. It's a silhouette of a huge sleeping person, Māui. And, all these mountain ranges are there, but it's a composition of different mountain ranges. But when the sun is coming up, in the back of them, it looks like one silhouette. And it's just beautiful! But when the sun rises, then it disappears. You only see it early in the morning when you see that silhouette. So, we never got that man's name, by the way. And Black never met him. We just said, "Who was this guy?" We don't know. It was one of those things where, darn it! Why didn't I get his name?

CSH: Did you go back and try to find him?

FC: No, we didn't. I guess we were — we're not professional historians and archaeologists — we just *nīele* [curious]. We just wanted to know. He wanted to know, too. He had lived there all his life and he didn't know about that. Black didn't know about that, which told me that the whole Māui thing as annotated and as documented in McAllister is relatively unknown, even to the people who were born and raised there. Now why is that? There might be many reasons. Maybe the person who owned that property there just didn't want anybody to know about this [and] just let the whole thing die. But, that silhouette is still there. It will be there for eternity, unless somebody levels that whole mountain range.

CSH: Can you still get a good view of it from the rock today or are there buildings in the way?

FC: No. There's buildings in the way, there's trees in the way. And so to get kind of a glimpse at it you have to either go in front of those buildings or go way across the road to the beach and then you can still see it. You can see over the buildings.

CSH: How many mountain ranges or ridges do you think it's comprised of?

FC: It's comprised of Pu'u Heleakalā, Hālona Ridge — it's about four or five mountain ridges there. It's composed of Pu'u Heleakalā, which is the body. And then the foot is down here by Kahe. The chest, the abdomen is up in here at Pu'u Heleakalā, and over here is the Pāhoa Cliffs, Hālona Ridge, all this is part of it. And maybe even some of this over here — Pali Kea. No, I doubt it. No, because that's on the back side. So it's mostly Pu'u Heleakalā, Hālona Ridge and the Pāhoa Cliffs. These three, especially those. They're the ones that make up the silhouette. And from that Māui rock, boy, I'm telling you, I wish sometimes I had taken a picture before those buildings went up, because you cannot do it now, not from the rock. But, maybe you can go from behind those buildings. I don't know what's behind those condos. Maybe you can still see it. But from the rock, you cannot see it. But, boy, it was really awesome! When I saw that I said, "Oh, wow!" And then I said, this is the whole Māui legend and then you dig into McAllister and you find out Ulehawa Stream is the stream where [Māui was born] and the cave, the famous cave up at Pu'u Heleakalā where she [Māui's mother] made *kapa* overlooking the stream down there. And that's where all his brother's were born and the hook, and that's where they tried — they rowed out in their canoes out at Ulehawa to join up the islands. All these legends come from down there and I said, "Jeez, you know, Māui, the Hawaiian Superman is from Ulehawa. He's from Nānākuli. He's from Wai'anae." And Pu'u Heleakalā, according to Kawena Pukui, Heleakalā means *the snaring of the sun*. But it could also mean *the scattering of the sun rays* — *hele* (to go, move, cause motion). Hele-a-ka-lā. *Hele* means "to snare", "snare the sun". And so, I think people on Maui made up their myths about [Māui] because the island is called Maui, and Haleakalā, "house of the sun" and about Māui capturing the sun over there. And I said, "Well, I don't know. Maybe he captured the sun down here at Ulehawa, not at Haleakalā. Maybe he captured the sun from the top of that *pu'u*, Heleakalā. That's where he did it." So, we might have to challenge some myth making up on the island of Maui. But, I would encourage you to write up as much as you can about that, because Ulehawa was where he was born. That's where he came [from]. That was his home. That was his place. So, it's really interesting that very few people know about that. So every time I drive by every once in a while, early in the morning, I say, "Yeah, there's Māui. He's still there." I've taken some Wai'anae students [there to see Māui], and I think they took some photographs of it, too. But, to me, the more people that know about it, the better it is. Those traditions will go on forever. But if we don't share them, it won't.

CSH: Have you heard any other stories about Nānākuli during the time that you lived there, or just from talking to people?

FC: There's a lot of historic places up in Lualualei. And because it was a naval ammunition depot, it was *kapu* for civilians. A lot of those sites are still there and I'd really like to go and see them. According to McAllister, there's different battles that occurred down there. And one of the *heiau* is associated with Kākuhihewa. Kākuhihewa is — who knows — that was back in the 12th century, maybe. Way back. So the whole district really needs to be looked at very carefully. Maybe yours can be one of the first chapters about the history of that district. It deserves to be written. It deserves to be said. No, I really don't know much more than what I shared with you.

CSH: Have you looked at any sites in your exploring?

FC: Down in Wai'anae, yeah. Eric Komori, who's the State archaeologist and my daughter, who is studying archaeology. I took them to what I thought was a *hōlua* slide on Pu'u Pāhe'ehe'e out in Wai'anae and they confirmed that it was.

CSH: What year was that?

FC: They did a mapping of the slide. [I] forget when it was now. This was maybe about six years ago. But finding that *hōlua* — Ted Kinney and I, when we were restoring Kū'ilioloa *heiau* — we noted that there were other *heiau* up in Pu'u Pāhe'ehe'e. There was a Pāhe'ehe'e *heiau*. And so we were going to look for it, and we kind of found where it was. And we started looking around on the hills up there and all of a sudden we saw this — it looked like a low stone wall from one side, but when you go on the other side it becomes very obvious that it's a *hōlua* slide. So, we got pretty excited, took some pictures. I'm glad the archaeologist came and verified it. But, it's one of the few that I know of on O'ahu. And it's out there, still there. It's on the ridge, and that's why "Pāhe'ehe'e" makes sense. You know, the slippery sliding. So, to me, place names can tell you a hell of a lot, if you know the context in which it was given. So, I hope you can dig out some more information in your interviews, and if you can talk to these other folks. It would be nice.

CSH: Can you think of any other people in Nānākuli that I could talk to who would be knowledgeable about the area?

FC: Charles Naone and Solomon Naone. Did I mention Alvin Kekauoha?

CSH: Yes, you did. Alvin and Blackie.

FC: I think Blackie passed away, you know. I don't know if Alvin is still around. I think Raphael Criste is still around. I saw him a couple of years ago and he really has aged. Ah Ching Poe.

CSH: Is he related to Sonny Poe?

FC: Yeah, that's his father. Sonny is Ah Ching Jr. He was in my class too. He was in one of my classes in Wai'anae. They are old timers up from Wai'anae Valley. You know Sonny, Ah Ching? Maybe I'm the only guy that calls him Ah Ching, I don't know. But when he was in my class he was "Ah Ching". I think he was one year before Henry.

CSH: Anyone else you can think of?

FC: Not right now.

CSH: Okay. What about Ulehawa side? Do you know any history or any stories about that area?

FC: No, except the Māui one. No, I really don't; I really don't.

CSH: Have you heard about any Hawaiian villages being on the beach there?

FC: Nope. No, I really don't know. I think that you have to go beyond — before the homestead. Those are the *kūpuna* that are gone. It's so sad because you just can't find 'em anymore. Even a lot of the names that I'm giving you, they weren't born and raised there before the homestead. I'm talking pre-homestead now.

CSH: Which was like pre-1930's?

FC: Yeah. Like Ah Ching, his family has been there, and the Pililā'aus. Oh, James Pililā'au, that's another name. He's from Wai'anae. And his wife Agnes Pililā'au. See, these Pililā'aus, and the Ah Ching folks were there before the homesteads were there. That's the kind of people I'm talking about. And, who knows of families that were living in Wai'anae, Nānākuli before the homestead? I don't know. Maybe Jay Landis would know. Jay Landis would know. Well, it's been nice chatting with you.

CSH: Thank you so much.

(Interview ends and we're just sitting around talking story.)

FC: There was a period when I was going all over the place looking for these historic sites. I mean, they were there in McAllister, but his map was so rough that you couldn't find them by looking at the map. But he gave you a clue to where they were. And so there was one in particular, there was one entry that intrigued me. It said Punanaula *heiau*, Kūmaipō, Wai'anae. Then in parentheses "still exists?". I said, "Yeah, well let's go find 'em. Does it still exist?" And so, my friends and I walked up there, hiked up in that area and we could not find it. Looking at a map is one thing. Going up in the actual terrain, you see gullies and gulches and big trees. You cannot see [if you're] looking for a *heiau*. So, I noticed that there was a Bishop Museum negative number on that entry in McAllister. It said "BM number something". I said, "Oh, this is a Bishop Museum negative." And so I went down there and Marion Kelly, bless her heart, I got to talk to her and meet her. I told her what I was trying to do. And she said, "Yeah, I can get this photograph for you." And so she did. And now we were armed with a photograph. But we took the first one up there, and fortunately the photographer who took the picture of the *heiau* was shooting from *mauka - makai*, towards the ocean. He had this old Hawaiian man standing on a corner, and he was on the other corner and he was shooting along the front line. So, you could see the horizon and you could see where the horizon intersected with the mountain ranges, like Pu'u Pāhe'ehe'e. And so I said, all we got to do is follow, go up where we can see the same intersecting of the horizon and those lands 'cause the horizon hasn't changed and some of those *pu'us* haven't changed. They're still there. But the outline was so faint. So I called Marion and said, "Marion, can you give me another one? I need the horizon darker. I need to see the horizon." So she did. She made another one. We used that. And after about four or five trips up in Kūmaipō we found 'em. It was exciting! I said, "Wow, there it is! There it is!" It was really exciting! We were there. Now, I had a picture. And I'm standing on there and I look up there and I said, "Yep, the same silhouette. The same horizon and the mountains all intersecting. This is it, man, this is real proof. This is it." And so, in the original picture from the Bishop Museum there was this Hawaiian man standing and the photographer was there and there was a bit of cactus where he was in the foreground. So, I put one of my friend's kids to stand on the same spot. So I went back so I could take the picture just about where the same place where that photographer stood many, many years ago. And just before I took the picture I looked down and there was this cactus stump, it was still there, this dried-up cactus stump. And I said, "Wow!" So I took the picture. And it showed — he was standing on the same spot. And to me that was really exciting because now we proved that it was there. And, in Sites of O'ahu, do you have one? Is this the latest edition. Try take a look, does it still say "still exists?" They should have taken that out. It does exist. And I told Dr. Emory and I showed him my photographs. Did they take it out? [Looking through *Sites of O'ahu*] See? It <u>does</u> [spoken with emphasis] exist! They should take that out!

CSH: They didn't take it out.

FC: They didn't take it out, and I showed 'em my photographs and all that. Maybe I gotta go back again and show them all this stuff. I drew it, I mapped it. But you know, during the restoration of Kū'ilioloa, the reason why I went to look for this *heiau* is that this *kahuna* told me that Kū'ilioloa is like the central command for all the *heiau* in the area. Because of that, the restoration work gotta include reconnecting with those *heiau*. And even that is another story.

CSH: I'd like to hear that.

FC: Maybe some other time, 'cause I gotta go.

CSH: Okay. Thank-you very much for your time.

[End of interview.]

APPENDIX B: Transcripts of Interview with Black Ho'ohuli

Interview: Black Ho'ohuli (BH)
Date: June 28, 1999
Place of Interview: Nānākuli
Interviewer: Ka'ohulani Mc Guire for Cultural Surveys Hawai'i (CSH)

CSH: Can you tell me your full name and give me some background about yourself?

BH: How about "Black"?

CSH: Is that your nickname?

BH: My name is Josiah L. Ho'ohuli. [I was] born in Wai'anae, raised in Nānākuli, December 30, 1938. Went to school in Nānākuli. Attended Waipahu High, [but] did not graduate. [I] went into the United States Marine Corps. Got out, finished school at Nānākuli High — GED.

CSH: So how old were you when you came to Nānākuli? You came right after you were born?

BH: Raised here. Yeah.

CSH: So, the homestead was here already when you came?

BH: Uh huh.

CSH: But that was still the early years of the homestead?

BH: I think the homestead here opened up in 1930.

CSH: What was the homestead area like when you were growing up here?

BH: Not like now. Everybody had half an acre, I think. Some places was a little bigger. I guess it depends on the way the property was. Some was bigger.

CSH: And what was the vegetation like in the area? The trees, the plants?

BH: Oh, all *kiawe* (*Prosopis pallida*), all *kiawe*. I remember to get our yard clean, we had to chop down *kiawe* and the stumps. I remember us in tents.

CSH: Before your house was built?

BH: Yeah. I think my dad's first place was on Manu Street. And what I remember was, when we moved to the highway and that's when I know we were kind of cleaning our yards. And I only seen a picture of my dad's first place.

CSH: So this lot where you're living now is not your original lot?

BH: No. This was my uncle's place and for some reason he just didn't want to stay in the house, I guess, so I asked him if I could take care of the place for him. So while I was taking care of it, I guess he see that I was doing a good job and he gave it to me.

CSH: And back then, did you have water?

BH: We had to go to the park and get water. Water was kind of scarce down here.

CSH: Which park?

BH: Nānākuli Park. Actually the park name is "Kalaniana'ole Park".

CSH: Right down here, yeah.

BH: Everybody knows that park as "Nānākuli Park".

CSH: So you had no running water, or had a little bit? Just drinking water?

BH: We had. Yeah, it was very, very little. If down neighbors using the water, we had to kind of wait so we get the pressure. It wasn't easy. I don't know, for some reason, I miss that. Because, I guess, today it's so easy, it's wasteful. I notice the way everybody lives today, to me, its wasteful. I don't mind going back in the bushes and live.

CSH: I wanted to know what you know about the *makai* area of Nānākuli and anything else you are willing to share with me. Well, let's do that for starters.

BH: Like I say, Ulehawa is out of my district. Not much to talk about. Good fishing grounds. In our time, it was a real good fishing ground. Lot of squid, right outside Ulehawa. It was good squid ground. But other than that, Ulehawa wasn't my district.

CSH: You said that Ulehawa was good squid grounds?

BH: Yeah.

CSH: Which part of Ulehawa?

BH: Right outside the canal.

CSH: By the drainage?

BH: Yeah. All that side straight out going towards Wai'anae. That's where all the reef is. You go towards the left, it's mostly all sand. Good for trolling, I mean, not trolling, but casting. Lot of people cast out there.

CSH: So, if people are going to fish, that's the area they would go to along Ulehawa, more that side?

BH: Yeah.

CSH: What about *limu* [edible seaweed]?

BH: *Limu*, they had *limu* out there. We used to get our *limu kala* [*Sargassum echinocarpum*] from there. Lot of *limu kala*, some *līpoa* [*Dictyopteris plagiogramma*]. *Limu kohu* [*Asparagopsis taxiformis*], you gotta know the spots. If you don't, you're not gonna get it. And the best time to go get *limu* is right after the good rough, when the water is rough. Nobody's down the water. And maybe right after that, the rough, right after that, everybody is on the water, so you gotta be there, too to get some. But, like today, I don't know, for some reason, a lot of the *limus* are disappearing. I don't know if it's chemicals in the water, or — couldn't be too much people, because today I don't think there's enough Hawaiians to clean it out. 'Cause not too much of them even remember the type of *limus* out there. Only the regular families that lived in the area know.

CSH: Have you heard any stories about Ulehawa area?

BH: No, just that that's where Māui was born, and the Māui rock that is there, which is connected to Pu'u Haleakala [Heleakalā]. That's why one side of Pu'u Haleakala [Heleakalā] is barren. Because of the sun. Well, actually, the sunset, yeah. But they say that when Māui's mom felt that the sun was going too fast to dry her *kapa*, he held the sun. Held it enough to burn that whole side of Pu'u Haleakala [Heleakalā]. That's why it's barren. But when you look at it, that's how the sun sets. Like right now, that's the only way the sun is hitting, right there.

CSH: 'Cause Palikea is the other side, yeah?

BH: Yeah, Palikea is on this side. Palikea, Palikapu, then I think we get — I know we get one more in there. Pālehua.

CSH: Now, how did you know about the Māui rock? When did you first hear about it?

BH: I didn't know that was Māui's rock until they tried to develop.

CSH: Garden Grove?

BH: Uh huh. But I knew about the rock. The only thing that I knew about the rock was the rock had a lot of *mana* [energy], you know. In what way? We didn't know. I didn't know. And, the old people that was staying there — it was very — that whole area was always dry, grassy. You couldn't go in there without the old man's permission. My parents used to go in there so I used to ride on the car. I used to see the rock, you know. But I didn't know anything about it. But, after they tried to start developing it, the first owners, and then after that they started to tell the history about that rock. That's about all I know about it. But I always made it a point that whenever I get guests from any place on the Pacific, I always take them there because every Pacific Islander has Māui. I make sure that they understand where I coming from. Some of them claim Māui is theirs. Maybe this must be the brother or the cousin or something. With these guys [referring to a Maori group he is hosting], I've taken them. I've taken all the Maori there.

CSH: Can you tell me the story about the Māui Rock?

BH: No. That's about it that I know of, besides all the stories they got on the Rock. And, who wrote all those things? I wouldn't know who did that. 'Cause like I said, when I knew the rock, there wasn't anything on the rock.

CSH: Oh, the other *pōhaku* [stones], and stuff. Is that what you're talking about?

BH: No. The whole rock was one when I knew the rock. It was one piece. But for some reason, within the past ten, fifteen years, it just open up.

CSH: Do you think it's because of the roots? There's plants growing all over it.

BH: Could be, could be. Maybe it's not well taken cared of, that's why. Maybe it's not natural, I don't know. But, when I remember the rock, it was one piece.

CSH: So the split occurred in the last ten, fifteen years?

BH: I see it that way. And it looks like it's getting wider. It looks like it's really getting wider. The only thing next to that is the quarry. You know where Princess Kahanu is? That's the quarry. See, I used to work in there. And that is why I know the ocean must have been all the way in the valley. 'Cause if you go in there now, all on the side of the houses where the cliffs are, you can see all the fossils. There's a lot of fossils in there.

CSH: On the side of the cliff?

BH: Yeah. That's how I — when Fred was a teacher at Wai'anae, we were drinking, talking about things like that. And I told him, "Eh, come to my job." I used to work there as a truck driver. I was telling him about all the different types of fossils. You know, right down the wall. They were all — and get some of the stuffs still today, but way down deep, eh. I know there were — I think they found a couple of bones in there, so we don't know how long, you know. I think that was about 1970.

CSH: When you say, "in there", what do you mean?

BH: In the quarry.

CSH: In the quarry area?

BH: I know they found a couple bones in there. I'm not sure if they said it was old or new, but I know they found some.

CSH: Have you heard of any burials on the beach side?

BH: No. Haven't heard anything like that on the beach side.

CSH: What about a possible old habitation site? Or old village, Hawaiian village on the coast, the Ulehawa coast?

BH: No. Not that I know of. Actually, I think, all the way from here, I don't think they had [burials]. Maybe way before our time. But, I didn't hear anything like that. Actually, the beach wasn't like that anyway. The sand dunes was higher. They were heavy with *kiawe* trees, all on the beach.

CSH: Could you see through the *kiawe* trees and see the ocean then?

BH: No, you got to get over them.

CSH: Over the top?

BH: All the way. All the way down to Mā'ili was always like that. And for us, before we used to go and camp. Was real good. But you're camping all in the *kiawes*.

CSH: And what about the [19]46 tidal wave? Did that change the coast or the beach line at all?

BH: No. I think the worst that was hit is Wai'anae, Pōka'i Bay. I don't think that [Ulehawa] side got damaged. No, no damages right up to Nānākuli Park, on this side. Not that bad, but it came on the road.

CSH: So, when did the dunes change? About when? They must have cut down the trees then. You said had all *kiawe* trees, the sand dunes.

BH: Actually, the worst one that really knocked down everything was Hurricane 'Iwa. Hurricane 'Iwa cleaned it out. It pushed everything almost level with the beach. It

just came right across the road. I think that was the worst. But anyway, that was something. That was the first time in my lifetime that sand ever come across the road. No matter how big the waves was, it wouldn't come across. But, other than that, I don't remember anything on the beach. All I know it was a good place to camp. Fish — there was plenty fish. People can go dive, enough to eat. Not today.

CSH: What kind fish you used to catch over there?

BH: Oh, just about any fish they wanna eat. Not today. I guess, when they came out with all this Cloroxing things, spoil the holes, they use tanks now. It's not like before. You dive to your limits. Today, you can dive and talk story with the fish for a while and kill 'em.

CSH: And what about the war years? Were you here during the war years?

BH: I remember the war, but we were limited, too. Can't be outside. I remember everything on the housing. We used to close up all the windows with these Army blankets. Black-outs. I guess that's what they call "Black-out".

CSH: Cannot have the lights showing.

BH: Yeah. I mean the whole valley, I remember all the Armies, they just park in your yard if they wanted to. All the big tanks going around.

CSH: And what about the bunkers down on the beach?

BH: I remember those. I even remember the whole beach barbed-wired.

CSH: Oh, from where to where?

BH: All the way down to Mākua. Where you can go is barbed-wires I remember all those. I remember all the ships outside there.

CSH: So, Ulehawa beach had barbed-wire down it?

BH: All the way. Every beach had barbed-wire. 'Cause Mā'ili Point was two guns over there, too. Where they had 'em on the hill. If you look up where the civil defense sign is?

CSH: Yeah, there's a pill-box up there.

BH: Oh, that's two, two big guns.

CSH: And what about the pill-boxes on the beach? When did they use that?

BH: Those, I think, were machine guns. I think they got one in the front of Faststop. I think they still got one. One at Ulehawa, I think, get one more, canal. And right on Pōhakunui got one. Mā'ili, I think, right where the park's gonna end. Right where the *haole* housing. I think right there.

CSH: The *haole* housing?

BH: Yeah. Where *Presidente* Henry Peters lived. They got one there. I know there's one there.

CSH: And what about Nānākuli side? What have you heard about the two stones on First Road?

BH: You heard that one too, eh?

CSH: I've heard some different things about it, so I wanted to know what you heard about it.

BH: Tell me about it and I'm gonna tell you something.

CSH: No, I want to know what you heard, first.

BH: No, you gotta tell me yours [we laugh]. Because I gotta know who telling you stories. If was Fred? Fred gotta tell you what I told him. See, I told Fred.

CSH: Well, he told me a story but, then, also Lehua Kapaku told me a story that was a little different.

BH: Like what?

CSH: That it was a brother and the sister. That they're buried there and that they're related to the same family that owns the lot now.

BH: George Kea, I think. He just died. I think it's Kea. Something like that.

CSH: I wanna know what you heard about it.

BH: And that's all they said?

CSH: She didn't know too much about it really. That's just kind of what she heard. And she just said — 'cause Fred called it the *menehune* stones — and so I asked her if she heard that. She goes, "Oh, yeah". But she didn't really know the story of why it was called that.

BH: Okay. I will give you my side of the story. The story of the rock is not because it's two sisters or brother and sister or, I don't know. The story of the rock is when they

moved it, it got back. That's the story of the rock. When they built this homestead, that's when they made each road. Now, the people that moved the rock was plantation people. What is his name now? Not Willie. Bolo. Henry, all I know Henry is by Bolo Kekauoha. Now he was the working foreman at that time.

CSH: For which sugar company?

BH: Wai'anae.

CSH: Wai'anae Sugar Company.

BH: And I don't know if it was — I forget the name — anyway, he was the foreman and, see, I'm getting the story from him. How he did when he had to cut the road. So, what they did, they felt the road wasn't that big, so they didn't want to use the big bulldozer to push that rock away. What they did was they harnessed a jackass, and they had two jackasses pull 'em across. And the way they pulled is down to the end of the road, on the side.

CSH: Oh, from the beginning of the road to the end?

BH: Right. Now, where the rock is to the end of the road down by the bush.

CSH: Oh, yeah.

BH: Now, before, if you look the road going up the Ranch from the highway. It wasn't there. It used to be from there. To drive in the Ranch, you come in that way, you go into the Ranch. Until they made the train. When the train came in.

CSH: Nānākuli Ranch?

BH: Yeah. So, when the train came in, then they opened that road over there. But the whole story was, when he moved that rock, he had two Filipino old men tie up the rock and moved it. The next morning they came back, the rock was back there. Now they saying, "Wait a minute, you cannot just move rocks like that." So, I think they moved it again. When they came back, the Filipinos said they ain't movin' 'em again. So they went and get the tractor, to push it with the tractor. Came back, they left it there. And they said they would not touch that stone no more. So they had to build that road a little farther, going around. Now, 1974, I think, you can check with Hawaiian Homes, when they went build the roads. I think it was [19]74, maybe [19]73, they was gonna build this road. See the road now? Make sidewalks, make driveways. And they started off from there. So, they had a Euclid bulldozer, that's equivalent to a D-9. They had that [spoken with emphasis] to move the rock. They couldn't [emphasized] move the rock. What happened was, that machine break down. Major break down! Major [emphasized]! And they just couldn't understand a big machine like that went go fool around with this rock and when they came back, it broke right there. Then the people on the road started to tell the contractor that you cannot touch that rock. So, I guess that's when sisters, or lovers or whatever came out. But already we [emphasized] knew that you move the rock, the rock came back. So, don't touch it already. And I think for some reason the company and the bosses agreed that they'll do something and make a big *lūʻau* for the whole road, for the people to come. And the job went on fine [emphasized], and that's when they left it there. And they cement 'em around 'em that thing now.

CSH: How did the name "*menehune*" become attached to it?

BH: Now, that I don't know.

CSH: What does everyone in the neighborhood call the rocks?

BH: I really don't know. That's what I am saying.

CSH: Everybody make their own story?

BH: Must be. See, my thing about the stone is, the *kaona* behind my story, the *kaona* behind that is they moved it and it came back. Now, I'm not going to worry about who is that. Is that the family's *ʻaumakua*. My concern is, the *kaona* is you moved it, it came back. Who brought it back? That's my story. I no need dig no more. It's telling me something. Leave me alone, I've been here for — maybe, maybe it is somebody's family. I don't know Just like the rock Māui, you know. You get one scratch paper?

CSH. Yeah You can draw it on here.

BH: This is Farrington Highway, you going inside like this. When you go in like this, okay, like this is all the parking lot, yeah. Come like that, something like that. Over here is the rock. Over here is the tree. Now, for some reason, when they were building this over here, developing over here, for some reason — now, you want good stories, you go back find out who was the developers, who were the contractors. And you find out who were the guards over there. All the guards who guard over there. Go up to the last guard, now. The thing I am getting from everybody, the guards especially, is the *mana* is in the tree, now. Because, while they were building — that's why I say you got to talk to all the general contractors — now, this is how the story is. They find their machines on the beach. Yeah, they call the cops, they try and find out [the] fingerprints, who's taking 'em.

BH: It ends up half of the buildings are all built, it ends up all in the building. All the machines. Now, the security guards are panicking because even them is getting the vibe to quit the job, to leave the place. And that's why I say, you gotta get the story from them. See, they only telling me what's happening. I don't wanna talk for them. But, what I am telling you is that's what is happening over there at that time. In other words, I would think the *mana* is all in the stone, but when they put the dogs, and tie 'em up by the tree, the dog cannot handle it. So you know darn well the *mana* is in the tree. But you can talk to all the guards, that's the best. Gee, I don't know if they are still living, but check with Albert Silva. Did you hear of him, Albert Silva?

CSH: I've heard of other Silvas but maybe not that one. Albert Silva?

BH: Well, it was his brother, I think. His brother or his uncle was one of the guards. But they had to go get this kind of people because they used to with that. But, they had all kind of different guards over there and they just couldn't handle it. Now, if you can talk to them, you going know why, but that's what I'm telling you. So, down here, that's why I said this rock over here, the *kaona* to the rock is they went move 'em and it came back. That's the same story they said up in Kolekole Pass. Well, Kolekole Pass is like this, but the road was coming up here, to come down. But when they came up here, had one big rock too. They pushed the rock off. The next morning the rock was back. They get one other operator, asked him [to] push the rock over. The Hawaiian guy that pushed it first, he said "No, he had to quit his job." One other operator went push 'em. He went push him [and] he died. So, you know what I mean, everybody looks back "Hey, that rock is still there." So, today that rock is still there. But, the way the rock is, the rock is just like this. And that's just something like that, the rock is. It has a bowl on it. And everybody is saying this is where they bust the guy's head, you know. I don't know. For me, I don't know, but I'm not gonna go argue. You know, one time they tell me they went push the rock over, that's why they had to reroute the road. Eh, if the *haole* went reroute the road because of that, that tells you something, you know. I don't wanna argue with them guys because I respect anything I go through, you know.

CSH: Do you know anything else about the Māui legends and how they're related to this area, the Ulehawa area?

BH: I tell you true fact, like I said, I only knew the rock. I never know anything about that rock until 'til them guys went start developing 'em and they went put 'em on top there and they said this is Māui's Rock. I said, "I wish I knew that when I was small kid because we used to play around that rock." But I didn't know the *kaona* on 'em.

CSH: When you were small did it have — you know in Sites of Oʻahu, it says that there used to be smaller rocks — like people would leave rocks there?

BH: I've seen that.

CSH: So that was when you were small?

BH: Yep, I've seen that.

CSH: But, then what happened to those rocks?

BH: I really don't know.

CSH: They're not there now.

BH: No, before the rock cracked. Before the rock cracked, I seen all those rocks just like *tikis*. Just like *tikis*, was all on top there.

CSH: Piled? Stones piled one on top of the other, or one single rock?

BH: No, one single rock, look like *tikis*. Look like small figures. Look like was all on top the rock. I don't know if somebody's putting 'em, but I've seen it. I ain't going tell everybody 'cause everybody going say, "Whoa, this guy he's punchy or what." That's why I say, when I talk something, I've been there, or I've seen it. I even can say when I feel 'em. But I don't need anybody telling me that — see, when somebody tell me about something else I just say, "No, no. You go right ahead and you tell what you know, 'cause I only gonna say what I know."

CSH: Let me show you the map of the project area in Nānākuli.

BH: This is Nānākuli Avenue?

CSH: Right here.

BH: This the Ranch.

CSH: Lyman Ranch is here. So, it looks like they're going get to it from here. And then make the access road from there. From here, the end of the street to there.

BH: You know if they got a EPS on this?

CSH: No, I don't.

BH: I wonder why they putting a reservoir in there? Let me see that again.

CSH: It's two streets before the end.

BH: Right.

CSH: I think it might be actually on Lyman Ranch property, but I'm not sure. I haven't researched that part yet.

BH: Lyman go like this. Regardless, like that is still Lyman's. This side is Nānākuli Ranch.

CSH: So, what do you think? Do you know anything about that area?

BH: No.

CSH: Did you used to play up there when you were little, maybe?

BH: Oh yeah. I play up all over this place. But the thing is, it was just bushes. But, right now, right here, must be on the flats.

CSH: Yeah, it looks pretty level there.

BH: 'Cause, you see, there's a big [emphasized] gully coming around like this. A big [emphasized] gully. I don't know if it hit this inside here or go around.

CSH: Yeah, I haven't been up there to look around. I'm gonna have to do that one day this week. But you're familiar with the area, you think? Or not sure until you go up there?

BH: All bushes, that's all it is. All bushes.

CSH: Do you recall seeing any stone walls or any stone structures up there?

BH: No, because if this is where I think, when the water went rain, the water just come down. 'Cause this is all in the ditch already. In the ditch.

CSH: Do you know anyone who might go up there for any reason, whatsoever? Like hunting or —

BH: There's nothing to hunt here anyway. It's just some pass through to get out.

CSH: To get to the better areas?

BH: Yeah. That's all it is. But the hunters, they get their own trails already. They try not to work too hard before they get to the pig [laughs]. No, not much. You don't have it — because right now I tell you there's a big [emphasized] river come down here. A big dry river come down. Did you talk to Lyman?

CSH: No, I haven't talked to them yet. I'm gonna give them a call tomorrow.

BH: Yeah, talk to him. If you see him, maybe he would even take you up there. Take you all inside [there]. He would have more to say because he's been in there quite some time already and he's been all over, all over in there. I have a worker that works for me. He hunts in there. He's come across a lot of things.

CSH: So, do you think he knows this area?

BH: No. I don't know, but like I say, it's just a passing through. If there's anything over there, it must be broken already. If the water running through there it's all broke. All the big boulders just going roll right in there.

CSH: When was the last time the water — that it has rained really hard like that?

BH: Oh, the last time, the last rain — three years, two years. But, regardless, as long it's a big rain, it runs. Because all the water going gather, going come all — once it starts hitting here, this is the main one. It comes around and it comes down.

CSH: So, you don't think that there's anything in the area that would pertain to cultural use of the area then?

BH: I don't think so.

CSH: Burials?

BH: No. Burials should all be down here, and all up here. [He indicated areas outside of the project area.]

CSH: Old Hawaiian trails? Or gathering of any kind?

BH: Hawaiian trails. I don't know about Hawaiian trails, like I say. Maybe the cows make their own trails already. So you doing the research on it for these guys too, then?

CSH: Yeah.

BH: What's that *haole*'s name doing all the homesteads up here? I forget his name, now. He does all the archaeology for homestead

CSH: Ross Cordy? He works with Lehua [Kapaku]. They are on the same Association.

BH: Because he's on that other board with, he's on the Ukanipō *heiau* [Site 181] one, too. And he's been there with us all the time too.

CSH: So when you were a little boy and you used to play up *mauka*, where did you used play? What side you used to hang out down here? The other side of the gully? Or in the gully?

BH: Well, the only time we used to go this side is when we go get pear [alligator pear or avocado]. That's the only time. But this side was our area. All down here.

CSH: So, you don't know of any sites in the area, or anything like that?

BH: No, the only ones I've heard about is the ones they've picked up here, the housing, but, I don't think it was any *heiau*.

CSH: Have you heard of the *'ircou'eo* stone?

BH: No. See, when I hear stories in our area, I gotta find out who started the story and who they got the story from. 'Cause if the story is coming from outside, I'm not going to listen to them. A lot of Nānākuli people, they know their thing down here. And when you hear all kine new things, me, I question them. Where you got it from? Who told you that? Something new to me.

CSH: What about the *menehune* tree?

BH: Even that, from where?

CSH: Well, do you even know about it, or it is something that only the kids talk story about?

BH: I don't know but, tell me where now.

CSH: I haven't actually looked for it, but I think it's supposed to be, like, when you come around this corner, a big *kiawe* tree on the beach side, I think.

BH: "Menehune" tree?

CSH: Yeah.

BH: In Nānākuli?

CSH: I think so.

BH: Let me give you one other drawing. I don't know where. I don't know what these guys talking, "*menehune* tree". Let's see. This is where the 4-X station is. You know where the 4-X station? This is the bridge, Nānākuli bridge comes down. Now you get driveway here. This is two driveways. Here, something like that. Now, I don't know where your tree is at. Is it up this side or this side?

CSH: I'm not sure. I've only heard one person talk about it and I gotta go back to talk with him again. I haven't interviewed him yet. He just mentioned it, that there's a *menehune* tree in Nānākuli. And then I was curious because people refer to the *menehune* rocks, you know, the stones down on First Road.

BH: No, never did hear about *menehune* rocks or *menehune* tree. The only thing I know is the night marchers, the night walkers, this is their area coming up this way. All down this way. This is the area of the night walkers, because these are the homes that always, today, I no call that the vibes. I tell them guys, you guys lucky that only you folks can communicate with these people. Before, everybody get scared. Was over here [near Hakimo Road, outside of the project area]. And another one is up here, when you coming inside Nānākuli —

CSH: When you're coming inside where?

BH: When you're coming in Nānākuli, there's couple more houses here. This is coming down Nānākuli. See, you come down the hill, you turn, you go inside Pōhakunui, eh. It's the park over here. Now these houses — there is one house over here. The house is Kekahuna. That house is said to be built right on the trail. Certain nights the family used to move the furnitures and then let them walk through, they just go, they walk right through. See, that person used to be one of my workers. While I knew about this during those days, you know, I knew about that during those days.

CSH: So about here, the house?

BH: Maybe this one.

CSH: This one?

BH: Yeah, Kekahuna. Ke-ka-hu-na.

CSH: Over here was — this middle part here?

BH: One, two, three. Actually, all these people feel 'em, but this house was the most. They always said they used to walk down. This is how they said this was their trail to go to the beach.

CSH: This one here?

BH: Yeah. Enos is the name.

CSH: Enos?

BH: Enos.

CSH: And this is where? This is the 4-X station?

BH: Right. Right there.

CSH: How do you spell that?

BH: 4-X

CSH. 4-X

BH: Yeah, 4-X. That's Navy talk. Something to do with, I don't know what the hell is a 4-X 4-X is supposed to be something like "Federal Reserve" or something. Anyway, put down Zablan — that's the park right here, eh. Main thing, I don't know what stream is this, now. There's a name on that bridge. And this Nānākuli Ranch, yeah.

CSH: Not Nānākuli Stream?

BH: Yeah, could be.

CSH: 'Cause there's only Nānākuli Stream and Ulehawa Stream. The only two.

BH: I guess so.

CSH: So the Nānākuli Stream is — or whatever that stream is— you talking about the stream right down here?

BH: Yeah. Let's see if we can find 'em [looking at map].

CSH: Is it on here?

BH: Should be. It's right about here. Yeah, right here. But no name. This is it, coming down.

CSH: Oh, it's only on —

BH: No, it comes all the way from up.

CSH: Oh, they don't have it going all the way up.

BH: That's all right.

CSH: So, where is the stream on your little drawing?

BH: Here, this is the one right here. This is the bridge, eh. It goes like that.

CSH: Yeah, okay. That's Nānākuli Stream where the bridge is.

BH: All this is the park.

CSH: So, where does the trail start from? Have you heard anything about that?

BH: No. It must come from in here. Well, how old is this thing? We don't know where. Because in [19]37 they have a graveyard in there [indicates a location well outside of the project area]. Now that graveyard, I know about it. When I was small, they said they made some burials in there, but people are saying they cannot find anything.

CSH: But you haven't heard anything about night marchers up in this area? In the Board of Water Supply project area? Going through there?

BH: No, I never hear. But hard to say where the hell they're coming from. Because for me, I can tell you, maybe I've heard them walking a couple of times. But, nothing to get excited anymore. But trying to educate my kids on that. They don't want to hear about those things. That's about the only thing I can tell you about Nānākuli, that I know.

CSH: Can you think of any other people that might be knowledgeable about the area I am interested in or anyone who would be good for me to just talk story with briefly? Just ask if they know anything even?

BH: Let me try see if I can get him over here now [speaking of Uncle Eddie Kamanā]. He has a lot of history.

CSH: Do you know anything about gathering that people do as a whole within the region of Nānākuli? What kind of things do people gather? Like for cultural purposes. It could be fishing, it could be plants, etc.

BH: Not too much things, I think, in Nānākuli. When we need plants, we gotta go out. There's nothing here, anymore. The bad part about it is when they have to go in and get permission from the owners. And if the owners don't come from here, they gotta go find out who the owner is. And most of the owners don't want nobody going in to go get things for culture or religious purpose. Besides religious, maybe culturally, trying to get *imu* rocks for the *imu*. Now, *imu* rock don't come from just any place. It comes from the rivers. Just to get in the rivers, you gotta get on the property. To get on the property, you need to go find the owners. Other than that, I don't see any plants in this valley, it's so dry. Maybe trying to get moss rock to build family walls for your house. I think that's culture, but not in the eyes of the owners. For them it's money.

CSH: How do people use Nānākuli valley? Mainly for what purpose?

BH: They never did.

CSH: People go up there hiking?

BH: They just trying to do it now. See, prior to that, they couldn't even go in.

CSH: Because it's private?

BH: Yeah. But, because we have a new — it's a Hawaiian guy — I guess all he's asking for is permission. Ask permission, so I know who's in the valley. But I know the other fella. No ways. You don't go on my land.

CSH: So you don't know how that area was used, even in the last century? What have you heard about that area?

BH: Cattle. As far as I know, it was all cattle up there.

CSH: Okay, I think that's about it. I can't think of anything else.

BH: No. That's why I say, for me to talk, you gotta figure out what you need. If I got it, you got it. If I don't — I never did prepare myself for things like this 'cause I believe you talk what you feel.

CSH: Well, that's the best kine, when you not prepared. Thank you very much for your time.

[End of interview.]