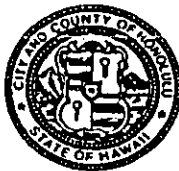


DEPARTMENT OF DESIGN AND CONSTRUCTION  
**CITY AND COUNTY OF HONOLULU**

650 SOUTH KING STREET, 11TH FLOOR  
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JEREMY HARRIS  
MAYOR



GARY Q. L. YEE, AIA  
DIRECTOR

ROLAND D. LIBBY, JR., AIA  
DEPUTY DIRECTOR

CDEP 00-0008

October 11, 2000

Ms. Genevieve Salmonson, Director  
Office of Environmental Quality Control  
235 South Beretania Street, Suite 702  
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: Finding of No Significant Impact (FONSI) for  
ALA WAI CANAL WATERSHED PROJECT  
Manoa Valley District Park Streambank Improvements,  
TMK 2-09-36: 03, Honolulu, Oahu, Hawaii

OFFICE OF ENVIRONMENTAL  
QUALITY CONTROL

00 OCT 11 P2:36

RECEIVED

The Department of Design and Construction of the City & County of Honolulu has reviewed the comments received during the 30-day public comment period which began on September 8, 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 October 23, 2000, OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form and four copies of the final EA. Please call Gregory Sue at 527-6304 if you have any questions.

Very truly yours,

A handwritten signature in black ink, appearing to read "Gary Q. L. Yee".  
GARY Q. L. YEE, AIA  
Director

135

OCT 23 2000

2000-10-23-0A-FEA-

**FILE COPY**

**Final Environmental Assessment**

**\*(ALA WAI CANAL WATERSHED PROJECT)\*  
Manoa Valley District Park Streambank Improvements**

Honolulu, Oahu, Hawaii  
Tax Map Key: 2-09-36: 03



Department of Design & Construction  
City and County of Honolulu

Prepared for:  
Walters, Kimura, Motoda, Inc.

Prepared by:  
Wil Chee - Planning, Inc.

October 2000

**FINAL ENVIRONMENTAL ASSESSMENT**

*for*

**Ala Wai Canal Watershed Project  
Manoa Valley District Park Streambank  
Improvements**

**Honolulu, Oahu, Hawaii  
Tax Map Key: 2-09-036:03**

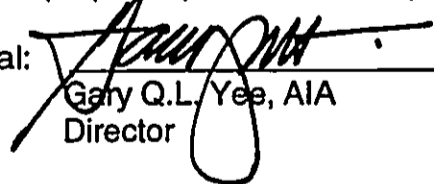
*Proposing Agency:*

Department of Design & Construction  
City and County of Honolulu  
650 South King Street  
Honolulu, HI 96813

City Contract # F-736040

This document is prepared pursuant to Chapter 343, Hawaii Revised Statutes.

Responsible Official: \_\_\_\_\_

  
Gary Q.L. Yee, AIA  
Director

Date: Oct 11, 00

October 2000

**ORIGINAL**

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### A Technical Reports

- *Aquatic resources survey for streamside Improvements at Manoa Valley District Park on Oahu*, by AECOS, Inc. (AECOS Report No. 955A), August, 2000.
- *Preliminary Findings & Recommendations Ala Wai Canal Watershed - Manoa Stream Improvements*, by Ernest K. Hirata & Associates, Inc., December, 1999.

### B Correspondence, Comments & Responses

## 1.0 INTRODUCTION AND SUMMARY

### 1.1 Overview.

The Manoa Valley District Park Streambank Improvement Project described and assessed in this document is a Vision Team Capital Improvement Project for Fiscal Year (FY) 2000. It is part of the City & County of Honolulu's overall planning effort entitled "21<sup>st</sup> Century Oahu: A Shared Vision for the Future." This process was implemented in 1998 with the intention of involving citizens directly in the planning of their individual communities. The shared vision process provides a public forum in which members of each community can come together and discuss their community values and their desired quality of life.

Once a vision statement has been developed, capital improvement projects (CIP) can be appropriated to help bring the communities' shared vision to reality. CIP projects can involve land use, public safety, transportation, preservation and enhancement of the natural environment, and park improvements for Oahu's communities. Some of the projects may be long-range, evolving over a number of years, or short term when immediate results are warranted. In the shared vision process, Manoa Stream falls within Region 5, Vision Team #10: Makiki/McCully-Moiliili/Manoa. Region 5 also includes Downtown/Chinatown, Ala Moana/Kakaako (Vision Team #3), Kalihi/Palama (Vision Team #6), Nuuanu/Punchbowl/Alewa and Papakolea/Liliha (Vision Team #12).

The Manoa Valley District Park Streambank Improvement Project also ties into another major community-based planning endeavor, the Ala Wai Canal Watershed Improvement Project, an ongoing effort including participants from federal, state, and city agencies as well as citizen's groups. Manoa Stream is one of three natural tributary streams, which flow into the Ala Wai Canal, thus forming one of urban Honolulu's major water and drainage systems. The other two tributary streams are Makiki and Palolo.

Construction of the Ala Wai Drainage Canal was completed in 1928. Its sole purpose was to alleviate flooding from streams originating high in the Koolau mountains and to make the wetlands created by the natural streams available for permanent development. This drained land is the site of present-day Waikiki. Prior to the building of the Ala Wai Canal, much of Waikiki was comprised of swamp land and wetlands used for rice and taro cultivation. The Ala Wai Canal provided an effective man-made means of collecting water from the tributary streams and emptying these waters into the Pacific Ocean at the present-day Ala Wai Boat Harbor (Dashiell, 1998). This essential function is still being served by the canal, however over the last 70 years other problems have arisen such as water pollution and accumulation of debris. The Ala Wai Canal Watershed Improvement Project addresses these problems and seeks to provide mitigation measures to improve water quality and environmental conditions in general within the streams, canal, and watershed area.

The Ala Wai Watershed Water Quality Improvement Project is summarized in the publication *Management & Implementation Plan, Volume 1*, April 1998. As stated in the



executive summary, the basic purpose of the plan is "to improve the water quality of the Ala Wai Canal, tributary streams (Makiki, Manoa and Palolo) and related groundwater flows." Included as Appendix A of the same publication is a list of 22 "Projects for Funding." These projects are proposed as Best Management Practices (BMPs) to improve water quality in the Ala Wai Canal and tributary streams. Project no. 2 in this list entitled "Manoa Recreation Center--Manoa Stream Bank Erosion Control" is the origin of the subject action assessed in this EA. The description of the project is as follows:

This project would create a landscaped stream bank which is now severely eroding. It is an excellent site for a pilot project to evaluate alternative non-concrete methods of stream bank stabilization. The proposed amount is for a design and build contract which would provide a "turnkey" solution, including an environmental assessment, all permits, design and construction in a single contract to expedite the solution. Methods might include wire mesh box gabions filled with rocks, or large boulders. There might be opportunities for volunteers to assist, depending upon the methods of bank stabilization to be employed. Volunteers could help with landscaping. The County Department of Parks and Recreation (DPR) is the land owner so responsibility might be shared with the County Department of Public Works (DPW). (Dashiell, 1998)

This is the link or relationship between the Ala Wai Watershed Water Quality Improvement Project and the proposed action. The project has evolved as described above, except that gabions were not selected as a design solution, and the entire project has been included in the City & County of Honolulu's Vision 2000 program for funding and assigned to the Department of Design and Construction for implementation. Since the project is one of many whose common goal is to improve water quality in the Ala Wai Canal watershed area, no negative impacts are expected on the subject action from other projects in the program. And as will be demonstrated in this EA, the project will have only positive influences on the environment except in the short-run during construction. The ultimate cumulative effect of all of these projects will be to improve water quality to such a point that the vision for the Ala Wai Canal and its tributaries as a clean and attractive setting providing abundant opportunities for recreation and enjoyment of nature may be realized.

#### The Vision Statement

A vision statement or summary was prepared by Vision Team #10 representing Makiki, McCully, Moiliili, and Manoa. The vision summary "is intended to be a 'living document' to reflect the interests and ideals of the various neighborhoods within the district, and to help guide planning, land use, and budget priorities and decisions made by public and private agencies and persons that affect the natural, built, and social environments of an area." (City & County of Honolulu, 1999).

Specific items from the Vision Summary for Vision Team #10 that are most relevant to the subject project include the following (City & County of Honolulu, 1999):

- 5.2 Promote pedestrian and bicycle-friendly accessibility. Make roadways more pedestrian-friendly...

- 6.2 Preserve, protect, and enhance view and wind corridors from mauka to makai--maintain open spaces and vistas of mountains and ocean. Provide more greenways and open space, street trees, and landscaping.
- 6.3 Promote community-based cooperative planning. People and agencies must be mutually informed, communicative, and strongly encouraged to cooperatively participate in planning and implementation activities.
- 6.11 Responsibly and regularly maintain all public rights-of-way and facilities. Consistent and timely maintenance is safer, cheaper, and more efficient.
- 7.1 Make watercourses a natural focal point of neighborhood design -- improve public accessibility and use of watercourses as historic, educational, cultural, and recreational features of the community. Streams and canals should be revitalized as recreational greenways, with special attention given to the Ala Wai Canal watershed, which encompasses the area from Tantalus and Punchbowl to Maunalani Heights, Kaimuki, Kapahulu, and Diamond Head.**
- 8.1 Provide more parks, open space, and facilities for recreational purposes for persons of all ages, especially in more densely populated apartment areas...
- 8.3 Develop a strategy for land acquisition for small "pearl" parks along watercourses or throughout a residential district.

"The proposal by the Makiki/McCully-Moiliili/Manoa Vision Team #10 is intended to implement a planning study started in 1999. The project would include landscaping improvements, streambank restoration, erosion control, creation of vegetative buffer strips and public accessibility to streams/drainageways where these improvements are feasible." (Fujiki, 2000)

"According to the Ala Wai Canal Watershed Water Quality Improvement Project...the entire length of the streambank along Manoa Stream adjacent to the Manoa Valley District Park is badly eroding. This section provides an excellent opportunity to reconstruct, beautify, landscape, and plant trees along the streambank provided that the trees are located out of the floodway. Additionally, a jogging path could be included in the design. The streambank reconstruction, landscaping, tree plantings and possible addition of a jogging path would reduce soil erosion, be more attractive and accessible to the public, and hopefully instill an environmental ethic that would discourage littering." (Fujiki, 2000)

#### Streambank Improvements vs. Other Improvements for Manoa Valley District Park.

Although this environmental assessment only addresses the approximately one-acre of streambank improvements along Manoa Stream at the eastern boundary of Manoa Valley District Park, these improvements are an integral part of the larger master plan

for the park and should not be viewed as a separate entity. (See Figure 5.) It should be noted that the park as a whole has also been the subject of recent planning activities and improvement projects. These efforts have been addressed in a separate environmental assessment. (See PBR Hawaii, 2000)

The streambank improvements are being assessed separately because they are part of the Ala Wai Watershed Improvement Project and funding comes from the City's Vision Team program. Also, the planning and design process for the streambank improvements was initiated after the other park improvements, so it was not possible to include them in the larger environmental assessment. Nevertheless, since the streambank is an integral part of the larger park, the document *Manoa Valley District Park Final Environmental Assessment* by PBR Hawaii, dated July, 2000, is hereby incorporated by reference. As described in the January 8, 2000 issue of *The Environmental Notice*, published by the State of Hawaii Office of Environmental Quality Control, "The project consists of numerous improvements to Manoa Valley District Park, the most significant of which is the construction of a new multi-purpose building/gymnasium located between the existing gymnasium and the blacktop area of Manoa Elementary School. This site requires the demolition and removal of an existing wooden classroom building."

The streambank project described in this document is based on conceptual design schemes and 60% complete construction documents.

## 1.2 Scope and Authority.

This EA is prepared pursuant to Chapter 343, Hawaii Revised Statutes (HRS) and associated Title 11, Chapter 200, Hawaii Administrative Rules. Use of government owned land (city) and funds (city) require the preparation of an EA. The intent of the document is to ensure that systematic consideration is given to the environmental consequences of the proposed Manoa Valley District Park streambank improvements.

## 1.3 Project Information.

General project information is listed below.

### THE APPLICANT:

Department of Design and Construction  
City & County of Honolulu  
Gary Q.L. Yee, AIA, Director

### APPLICANT'S REPRESENTATIVE:

Walters, Kimura, Motoda, Inc.  
Landscape Architects / ASLA  
1148 3<sup>rd</sup> Avenue  
Honolulu, Hawaii 96816  
TEL (808) 739-5591, FAX (808) 739-5595

**TMK AND RECORDED FEE OWNERS:** Tax Map Key 2-09-036:03

**LAND AREA:** Total Park Area: 29 acres  
Stream Improvement Area: 1 acre  
City & County of Honolulu

**AGENCIES CONSULTED:** See Section 9.0 of this document.

**REQUIRED PERMITS & APPROVALS:**

- Environmental Assessment (Office of Environmental Quality Control, State of Hawaii)
- Grading and Drainage Plan (Dept. of Planning and Permitting)
- Department of the Army Permit (U.S. Army Corps of Engineers)
- Stream Channel Alteration Permit (Commission on Water Resource Management, State of Hawaii)

**ACCEPTING AUTHORITY:** Department of Design and Construction  
City & County of Honolulu,  
650 South King Street  
Honolulu, Hawaii 96813

## 2.0 DESCRIPTION OF THE PROPOSED ACTION

### 2.1 Project Location.

Manoa Valley District Park is located adjacent to Manoa Elementary School within the City and County of Honolulu's Primary Urban Center. The park is located in Manoa Valley bounded by Manoa Road, Lowrey Avenue, Manoa Stream, and Kahaloa Drive. (Figures 1 & 2.) Access to the park is from Manoa Road, Kaaipu Avenue, and Kahaloa Drive. The most convenient access to the streambank area is via Kahaloa Drive. There is a large parking area just ewa (west) of the Kahaloa Drive bridge, which crosses Manoa Stream from East Manoa Road. The project site is approximately 4.4 km (2.75 mi.) upstream of the mouth of Manoa Stream at the Ala Wai Canal. (AECOS, Inc., 2000)

### 2.2 Project Site Description.

Manoa Valley District Park is located on a portion of a 44 acre parcel (TMK: 2-09-036: 03) which is owned by the City and County of Honolulu. An agreement between the City and the State Department of Education assigns 29 acres to the district park and 15 acres for Manoa Elementary School. The park includes a gymnasium, swimming pool, outdoor tennis, basketball, and volleyball courts, restrooms, a playground, a pavilion, playing fields, and parking lots. Manoa Road borders the parcel to the northwest, to the northeast is Manoa Gardens Senior Housing Project. To the southeast just across the stream there are private single-family residences, and to the southwest there are also private residences. Manoa Marketplace is the closest commercial center and is approximately one half mile to the southeast.

The district park slopes roughly from north to south, from 209 feet above mean sea level (msl) to 148 feet above msl in the southern portions. The slope is greatest to the northwest and the gradient decreases to the southeast. The streambank project will be on the eastern edge of the park bordering Manoa Stream. It will extend from the center line of the stream to as much as 100 feet into the existing park land. (See Figures 5, 6 and 7.) The rest of the park and facilities will be usable throughout the construction phase of the streambank project.

Upstream of the park and opposite the Manoa Gardens Senior Housing development, the streambed is narrowest and incised into the valley floor between 3 and 4 meters. This area is heavily vegetated with many large trees that form a closed canopy in most places. The stream section south of Kahaloa Drive (the project site) is less incised into the valley floor (between 2 and 3 meters) and is substantially wider (bank full width is nearly 20 meters across; active streambed is up to 8 meters or more). A small grove of Formosan koa (*Acacia confusa*) affords some afternoon shading to this section of the stream which is otherwise composed entirely of grasses and ruderal weeds along the banks (AECOS, Inc., 2000). (See Figure 11.)

The streambed is a mixture of gravel, cobbles, sand, and silt. Manoa Stream downstream of Manoa Valley District Park is directed into a massive concrete-lined channel where the water is forced to spread out as a shallow sheet partially covering a smooth concrete bed confined between high vertical walls. This concrete-lined segment ends at East Manoa Road where the streambed is again unlined and composed of natural streambed materials (AECOS, Inc., 2000)

## 2.3 Project Features.

### 2.3.1 TECHNICAL CHARACTERISTICS.

The basic objective of the subject action is to stabilize the streambank by reducing the steep existing slope. Grading, grubbing, and the excavation of approximately 2,600 cubic yards of earth that may be removed from the park will accomplish this. The site sections in Figures 8, 9, and 10 illustrate the amount of earth to be removed at six stations along the streamcourse. (See Figure 7 for location of these stations and sections.) The existing unrestrained streambank has undergone much erosion. The resulting reduction in slope will facilitate the introduction and long-term maintenance of sustainable natural cover and will provide increased opportunities for passive recreational activities such as walking, jogging, picnicking, and educational opportunities by improved accessibility to the watercourse.

The schematic plans and sections shown in Figures 14 through 19 illustrate the proposed design solution for the riparian area. Design features are:

- Vehicular access is provided via Kahaloa Drive. A large parking area immediately after crossing the bridge is an existing source of parking for the riparian area.
- East of the parking lot and south of the Kahaloa Drive bridge is a large picnic area circumscribed by an 8 ft wide concrete walkway (Figures 7, 14 and 17). There will be a total of six picnic tables in this area, one of which will be handicap-accessible (see Figures 7, 14 and 17). In the center and close to the parking lot is a covered BBQ pavilion (see Figures 7, 14 and 19).
- Just east of the picnic area is an open terraced amphitheater that overlooks Manoa Stream (see Figures 7, 14 and 18). Each level or rise will be edged with an 18" high moss-rock wall and capped with a concrete seating band. The surface between the concrete cap and the next higher level will be grassed. The amphitheater is intended for gatherings such as class visitations, team meetings, and storytelling. This will provide the community with a better means of making Manoa Stream a focal point of valley activity as recommended by the Vision Team (City & County of Honolulu, 1999).
- The 8 ft. wide pathway continues south from the picnic area in a curvilinear pattern that roughly follows the finish contours of the site (Figures 7, 14 and 15). It will then join the park perimeter pathway (not part of this project) at the southern end of the

streambank improvement site. The park perimeter pathway was described in the Vision Team's project/funding worksheet as the creation of a "lei" around the full perimeter of the park complex (City & County of Honolulu, 1999).

- Just below the 8 ft. wide pathway will be a smaller 4 ft. wide pathway. The smaller pathway will loop down towards the stream from the large pathway providing closer visual access to the stream waters, but not near enough for humans to actually be able to touch the water. Although the 8-ft. wide pathway located on the higher elevations of the streambank will be concrete, it is proposed that the smaller 4 ft. wide pathway be constructed of Poly Pavement™. This product is a natural liquid soil solidifier and can be installed by ground maintenance crews using available equipment. The liquid product is sprayed onto compacted soil or can be sprayed onto loose soil and then compacted. The mixture makes the pathway look more natural. Also, as the smaller pathway traverses the lower reaches of the streambank and is more susceptible to inundation during heavy storm conditions, damaged pathways can be more easily repaired or replaced than concrete paving. (Figures 7, 14, 15, and 16.)
- Proposed new plantings are all native Hawaiian species or introduced by ancient Hawaiians. All of the proposed species are especially appropriate to riparian environments and can be found in abundance along more pristine streams in the upper slopes of Hawaii's mountains.
  - Ground cover proposed is naupaka and or pohinahina. These are hardy species whose dense and high growth will insure that pedestrians stay on the pathways provided. This will deter humans from damaging or polluting the natural streamcourse and at the same time will protect humans from any dangerous life forms which may be present in the water. For instance, a warning sign from the State Department of Health was observed on the streambank noting the possible presence of leptospyrosis.
  - Two tree species are proposed, hala and kukui nut. These are both found along streambanks in more natural riparian environments upstream of the urban center and are very appropriate to the project site. Both species are also expected to be more resistant to termite infestation than some of the existing trees along Manoa Stream such as the octopus tree (*Brassia actinophylla*). Several of these existing trees exhibited extensive termite damage.
  - Grassed lawns will be planted on the upper reaches of the streambank and will blend in with the existing park lawn
  - The existing chain length fence, which separates the streambank from the existing ball fields, will have to be moved further into the park to accommodate the expanded riparian zone, but the relocation is not expected to interfere with the required ball field dimensions.

### 2.3.2 ECONOMIC CHARACTERISTICS.

The preliminary cost estimate for the Manoa Valley District Park Streambank Improvements project including labor, equipment and materials, and a 10% contingency factor, is \$508,706.11. The appropriated construction budget for this project in FY 2000 is \$100,000 and \$155,000.00 for FY 2001 for a total of \$255,000.00. Therefore, additional funds will have to be allotted in the next fiscal year to complete the project. During the construction phase this project will provide short-term jobs for construction workers. The entire construction period will last approximately four months.

Maintenance of the streambank is presently being handled by the City's Department of Facility Maintenance (DFM), Division of Road Maintenance. DFM, and community members of the *Manoa Subwatershed Group of the Ala Wai Canal Watershed Project*, have prepared the *Manoa Stream Maintenance Plan* (April, 1999) which contains best management practices (BMP) for streambank maintenance. When the streambank improvements are completed, maintenance of the riparian zone will be jointly handled by DFM, the Manoa Valley District Park grounds staff and volunteers from the Manoa Valley community.

### 2.3.3 SOCIAL CHARACTERISTICS.

Manoa Stream is a part of the Ala Wai Canal Watershed Water Quality Improvement Plan. The restoration of Manoa Stream will improve the aesthetic resources of Manoa Valley and provide a natural environment for human recreation and enjoyment (Ala Wai Canal Watershed Management and Implementation Plan, 1998). Presently there is a chain link fence and 1-3 foot tall weeds between the streambank and the usable portion of the park. To view the streambed at a close distance, one must walk through the weeds to the top of the streambank; and currently there is only one steep and slippery dirt path to the water's edge.

The proposed Manoa streambank improvements will provide more recreational space with a shaded picnic area and a landscaped path along the streambank and a lower path closer to the water's edge. Benches will be placed along the path to provide places to sit and enjoy the beauty of the restored setting.

### 2.3.4 ENVIRONMENTAL CHARACTERISTICS.

The Ala Wai Canal Watershed Water Quality Improvement project is concerned with improving the water quality of the Ala Wai Canal and its tributaries. In order to do this; the entire fluvial system must be addressed. Manoa Stream is one of the major streams in the Ala Wai Canal Watershed, and the streambank in Manoa is targeted as a part of the system that can be improved.

Currently the bottom of the stream is covered with cobbles and gravel and is relatively natural. The streambank is overgrown with weeds and there are a few small landslides that may periodically send dirt into the channel. These slides add to the sediment load



in the Ala Wai Canal. Also this portion of Manoa Stream is identified as flood plain on the Flood Insurance Rate Maps (see Figure 3).

The proposed streambank alteration would decrease erosion and increase the volume of the streambed. Cutting the bank back and decreasing the angle of the slope will remove the small slides and the loose easily eroded material. Not only will this eliminate the sediment load from small landslides, but it will also increase the volume of the stream forming an overflow channel allowing the stream course to hold more water. During winter storms the increased volume of the stream will hold more water, slow the velocity of the flow as the water spreads over the entire channel, thus allowing more water to percolate into the ground. This design should allow convenient maintenance access by crews and equipment. Routine maintenance would not disturb the aquatic habitat and stream life, which reside in the low flow channel.

### **3.0 AFFECTED ENVIRONMENT OF THE PROPOSED ACTION**

#### **3.1 Geology and Topography.**

##### **3.1.1 GEOLOGY**

Manoa Valley District Park is located in Manoa Valley, which is an erosional feature of the Koolau Mountain Range. The Koolau Mountain Range formed during the late Tertiary-early Pleistocene (from 12 to 1 million years ago). When the volcanic activity stopped, erosion decreased the elevation of the volcanic dome by 1,000 feet. Erosion and fluvial activity resulted in deep valleys being cut into the mountain range. Subsequent episodes of deposition and erosion corresponding with sea level fluctuations resulted in thick layers of sediment in these valleys. (Stems and Chamberlain, 1967.)

Above Round Top, Sugarloaf volcanic vent erupted about ten to twenty thousand years ago. This resulted in a flow of magma that went down the western slope of the valley, and spread out across the valley floor. This changed the drainage of Manoa Valley when the stream flow was deflected to the eastern side of the valley. This also changed the gradient of the stream, which caused the deposition sediment in the upper part of the valley until it formed a continuous slope with the lava flow near the mouth of the valley. (Macdonald and Abbot, 1970.)

##### **3.1.2 TOPOGRAPHY**

Manoa Valley District Park slopes gently from the north at 209 feet above msl to 148 feet above msl in the southern corner. The slope gradient is largest near the northern portion of the park and decreases near Manoa Stream. The tennis courts and the basketball courts were graded to level the sites, while the baseball fields appear to be naturally level. (PBR Hawaii, 2000.)

Portions of the site are located in the floodway on the Federal Flood Insurance Rate Map (see Figure 3). It appears that the southern parts of the park along Manoa Stream are within the 100-year and 500 year flood plain.

#### **3.2 Soils.**

Three separate soil studies have been prepared for Hawaii; each describes the soils and the productivity of the soils. These are: (1) the U.S. Department of Agriculture Soil Conservation Service Soil Survey (SCS); (2) Land Bureau Detailed Land Classification; and (3) the Agricultural Lands of Importance to the State of Hawaii (ALISH). Only one of these three references includes the soils in Manoa Valley District Park.

According to the U.S. Department of Agriculture Soil Conservation Service, the Manoa Valley District Park is located on soils that are classified as the Hanalei Silty Clay (HnA).

Commonly this soil is found at elevations from sea level to 300 feet, on stream bottoms and in flood plains adjacent to streams. The soil is derived from eroded igneous rocks and is deposited on the gently sloping flood plains adjacent to streams. Often this soil type is deep and is underlain by peat or marine clays. Permeability is moderate and runoff is very slow so the erosion hazard is negligible. The only major hazard is flooding. Hanalei Silty Clay is used to grow taro, pasture, sugarcane, and vegetables. Native vegetation on these soils are guava, sensitive plants, paragrass, honohono, and Java plum.

Ernest K. Hirata & Associates, Inc. performed exploratory test borings within the streambank project area (see Appendix A). Their findings were as follows. "The surface soil encountered...consisted of dark brown and dark grayish brown silty clay. The soil was in a stiff condition and extended to depths ranging from about 8 to 10 feet. Underlying the silty clay was mottled brown clayey silt mixed with sand, gravel, cobbles and boulders. The clayey silt was in a medium stiff to stiff condition extending down to the maximum depths drilled. Groundwater was encountered in our borings at depths of about 11.8 to 14.8 feet."

The most serious environmental problem related to this site is soil erosion. The streambanks are relatively steep and no retention elements, either man-made or natural, have been put in place to counteract this destructive process. Figure 12 shows evidence of erosion-related problems along the streambank. Figure 13 shows a severely eroded situation along the stream where the root systems of trees and shrubs at the edge of the streambank have been completely exposed.

### 3.3 Hydrology.

As part of the Ala Wai Watershed area, Manoa Stream is one of the major natural streams within urban Honolulu. According to the Flood Insurance Rate Map Panel Number 150010120C, the southern portion of the park along Manoa Stream is within the 100 year flood zone and a small strip in the 500 year flood zone (see Figure 3). The flood zone on the park site is used for an open grassed area and a baseball field. A flood elevation analysis was prepared by Fukunaga & Associates, Inc. fully addresses the flood potential on the site.

Manoa Valley District Park currently uses overland sheet flow, swales, on site ditches, drain inlets, and underground drain lines to accommodate on site generated runoff. This runoff is discharged into Manoa Stream through the use of two outlets into the stream.

As part of their aquatic resources survey for the streambank project, AECOS, Inc. sampled and analyzed the waters of Manoa Stream at several locations. Water quality at the two stations sampled near Manoa Valley District Park is generally consistent for most of the parameters measured. The pH is within normal range, perhaps lightly elevated by photosynthesizing algae. The dissolved oxygen (DO) values are high,

close to saturation, probably also the consequence of midday photosynthesis of benthic algae. Turbidity was low moderate. Conductivities were relatively low.

### 3.4 Climate

Manoa Valley has a moderate climate with warm days (85° F), cool nights (70° F) and frequent late afternoon and early morning showers. The nearest rain gauge at the University of Hawaii has recorded an average of 7-14 inches of precipitation per month, with more during the cooler winter months. Typically further up the valley, precipitation increases and can exceed 150 inches per year at the top of the Koolau Range.

Strong winds and heavy precipitation associated with storm systems can be expected. During these large storms stream flow increases dramatically and can result in flash floods and the stream flowing over its banks.

### 3.5 Air Quality.

The State of Hawaii Department of Health operates a network of air quality monitoring stations at various sites around the state. Currently there are no stations located in Manoa Valley. Data from other locations on Oahu indicate that both state and national ambient air quality standards are currently being met in the area. The only exception to this is possibly the state standard for ozone. Ozone is produced by a photochemical reaction of automobile emissions and solar radiation. Congested areas with heavy traffic may have concentrations of carbon monoxide that are higher than state and federal standards. Manoa Valley is not one of these highly congested areas and there is usually a breeze that would serve to dissipate any air quality problems.

### 3.6 Noise Quality.

Measurements of noise levels conducted for the Final Environmental Assessment for Manoa Valley District Park indicate that the park is currently exposed to low ambient noise levels from 45 dBA to 59 dBA. Traffic on local roadways and occasional aircraft flybys are the dominant sources of noise. Sporting events, parking lot activities and lawn mowing are sources of park generated noise. Occasionally rowdy behavior and associated noises are heard in the parking lots late at night.

The Manoa Neighborhood Board No. 7 has asked the City to close the park from 12:00 a.m. to 5:00 a.m. This change is expected to take place in 2000 and should eliminate the noises from rowdy behavior.

Sound produced in the proposed multi-purpose building/gymnasium (crowd noise and the public address system) will propagate through the louvers and may impact the school and nearby residences. Events in the multi-purpose building will primarily take place after school hours (late afternoon to early evening). Air conditioning and operation noise from the multi-purpose building may impact the Manoa Gardens Senior

Housing Project during late evening and early morning hours when ambient noise levels are low. (PBR Hawaii, 2000).

### 3.7 Flora.

AECOS, Inc. performed an aquatic resources survey for the subject project area that included flora. It found that grasses and herbaceous weeds on both sides of the stream mostly characterize the open stream segment bordering the District Park. Formosan koa (*Acacia koa*), octopus tree (*Shefflera actinophylla*), satin leaf (*Chrysophyllum oliviforme*), and coral tree (*Erythrina* sp.) are planted in this part of the park in addition to lawn grasses, with only the Formosan koa actually shading a part of the stream. Mostly found here is a variety of common, exotic ruderal weeds. This area appears to be maintained as an open field, and the streambank are dominated by species that colonize disturbed sites (AECOS, Inc., 2000).

In the more open area of the stream, the wetland grass, Job's tears, is again prominent, along with a number of weedy species occupying soil bars in the streambed. At a point just before where the stream enters the concrete channel, there occur several large beds of the grass-like aquatic plant, *Vallisneria* sp. A stringy green algae (*Cladophora* sp.) is also conspicuous in this unshaded part of the stream (AECOS, Inc., 2000).

For a complete listing of plant species found on the project site, see Table 4 at page 11 of AECOS, Inc.'s report in Appendix A of this document.

No known threatened or endangered botanical species or habitats have been identified at the project site. A total of 96 different plant species have been identified from the survey area. Of these only 6 species (6%) are considered native (indigenous, endemic, or of early Polynesian introduction). None is a listed species or otherwise considered of special concern to any government agency.

### 3.8 Fauna.

AECOS, Inc. performed an aquatic resources survey for the subject project area that included fauna.

Birds. Several species of birds were observed during the riparian zone survey: common mynah (*Acridotheres tristis*), zebra dove (*Geopelia striata*), and common waxbill (*Estilda astrild astrild*) were most often seen. Red whiskered bulbuls (*Pyconotus jocosus*) were also present. A clutch of young ducks (probably *Anax platyrhynchos*) lives on the pond formed behind the low-head dam at Kahaloa Drive.

Aquatic Animals. Fishes are numerous in this part of Manoa Stream, but the fauna consists largely of poeciliids (top minnows) -- introduced (that is non-native) species that now dominate the biomass of nearly all streams on Oahu. Most abundant here is the Mexican short fin mollie (*Poecilia mexicana*). This fish is so adapted to the conditions in

altered streams that large numbers can be observed within the shallow sheet of water flowing through the concrete-lined channel at the downstream side of the project site. These fishes are feeding on algae and small insect larvae (most non-biting midges) that cover the wetted channel bottom. Larval toads (*Bufo marinus tadpoles*) are also numerous in this shallow water.

For a complete listing of faunal species found on the project site, see Table 5 at page 15 of AECOS, Inc.'s report in Appendix A of this document.

The only native aquatic species recorded by AECOS, Inc. in the project area was a goby (*'o 'opu nakea*). No aquatic species listed as endangered, threatened, or proposed as a candidate species by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973 as amended (ESA), or by the State of Hawaii under its Endangered Species program were detected during the course of the survey. The most likely "listed" species to occur in the surveyed environment is the black-crowned night heron. This species is listed as "indigenous" under State of Hawaii Administrative Rules and is thus protected from hunting, capture, or export (AECOS, Inc., 2000).

### 3.9 Historical, Archaeological and Cultural Resources.

Manoa Valley District Park, Manoa Elementary School, and the surrounding area have been extensively modified from their natural state for park, school, and residential uses. The region along the stream may have once been used for agricultural purposes prior to urbanization. A review of the National and Hawaii Registers of Historic Places and site inspections conducted indicate that there are no natural or man-made historical or archaeological resources known to exist on the project site (PBR Hawaii, 2000).

In conformance with Act 50 (HB 2895, HD1) regarding cultural impact, an effort was made to determine if any significant cultural practices exist in or close to the project site. Both Neighborhood Board No. 7 and the Office of Hawaiian Affairs (OHA) were contacted for information on current cultural practices. Mr. Tom Heinrich of Neighborhood Board No.7 indicated that there are no significant cultural practices within the project site. However, on the southern boundary of Manoa Valley District Park approximately 500 feet from the project site is a small privately tended lo'i. This lo'i is presumed to have been planted by the owners of the residential property bordering the park in what is believed to be a natural tributary which drains into Manoa Stream just south of the project site. The approximate location of the lo'i is shown in Figure 5, in the southeastern boundary of Makiki Valley District Park. No indication of current agricultural practices have been found within the project site itself.

### 3.10 Land Use.

Manoa Valley District Park and Manoa Elementary School are on a parcel owned by the City and County of Honolulu. This parcel is split zoned. The school area is in Residential 7.5 (R7.5) zone and the park site is zoned as General Preservation (P2). General Preservation Zone is designated to preserve and manage major open space,

recreation, scenic, and other natural resource values. The surrounding Residential 7.5 zone allows for a range of residential densities, however, non-dwelling uses that support and complement residential neighborhood activities are also permitted. The existing uses of the park and school on the parcel are appropriate uses under the respective zoning (see Figure 4).

### 3.11 Aesthetic Considerations.

The existing steep weedy exposed streambanks are not aesthetically pleasing. Currently there is a chain link fence obstructing views of the stream, and there are exposed drainpipes extending out from the streambank in two locations. Much of the bank top and slope is covered with weeds and a few trees whose roots have been undercut by erosion thrust out and loop back into the bank. This makes it difficult to get close to the stream. The area from the crest of the bank to approximately 10 feet into the park is covered with 1-3 foot high weeds. Also there are very few shady spots and places to sit and enjoy views of the stream. The area needs to be improved. People cannot take full advantage of panoramic views of the valley and stream under the present site conditions.

### 3.12 Circulation and Traffic.

There are two primary access roads to and from Manoa Valley District Park. Manoa Road on the Ewa side of the park provides access to the upper northwestern part of the park. East Manoa Road on the Koko Head side of the park provides access via Kahaloa Drive. Two east-west connections between Manoa Road and East Manoa Road and park access are provided by Kahaloa Drive and Lowrey Avenue via Kaaipu Avenue. All of these roads are two lane undivided roadways.

On Manoa Road there are three access points and each only has stop signs to control traffic. One point located opposite Olopuia Street provides access to Manoa School and park parking. From East Manoa Road park access is provided by Kahaloa Drive. A signal light controls traffic at this intersection. Park access from Lowrey road is gained via Kaaipu Avenue. Traffic here is controlled by a stop sign on Kaaipu Avenue.

A traffic impact analysis for the Manoa Valley District Park Environmental Assessment indicates that all intersections currently operate very well during peak park traffic hours. (PBR Hawaii, 2000.) The most direct access to the stream project area is from East Manoa Road via Kahaloa Drive.

### 3.13 Public Services and Facilities

#### 3.13.1 WATER SYSTEM

The water system that supplies water to Manoa Valley District Park is owned and operated by the City and County of Honolulu Board of Water Supply. Water distribution

lines for the park tie into the Manoa 405 system at Kahaloa Place. A two-inch water meter serves the park.

### 3.13.2 WASTEWATER SYSTEM

The City and County of Honolulu own and maintain the existing wastewater system. The main collector pipe for the park facilities is an existing eight-inch sewer main that runs through the park. This is connected to a 10-inch sewer line that continues down Kaaipu Avenue to Lowrey Avenue.

### 3.13.3 SOLID WASTE DISPOSAL

Trashcans are placed around the park, and park employees gather solid waste and place it in proper receptacles. All solid waste is then collected by the Refuse Division of the City and County of Honolulu and hauled to landfills, the incinerator, or transfer systems.

### 3.13.4 DRAINAGE SYSTEM

Manoa Valley District Park and Manoa Elementary School currently use overland sheetflow, swales, on-site ditches, and drain facilities to intercept on-site generated runoff. The runoff that accumulates is discharged into Manoa Stream through the use of two outlet structures located along Manoa Stream.

### 3.13.5 ELECTRICAL AND COMMUNICATION SYSTEMS

Electrical, telephone, and cable television service for Manoa Valley District Park and Manoa Elementary School are available. Hawaiian Electric Company (HECO), Verizon Hawaii (formerly GTE Hawaiian Telephone) and Oceanic Cablevision are provided by overhead facilities along Kaaipu Avenue. From there an underground system routes these lines to the park and its facilities.

## 3.14 Socio-Economic Conditions.

The following summarizes a few of the main points from a socio-economic impact assessment for the Manoa Valley District Park Final Environmental Assessment (PBR Hawaii, 2000). The Manoa Neighborhood Area extends from the H-1 Freeway to the back of Manoa Valley. Education is the major economic activity in the lower part of the valley, the site of the University of Hawaii at Manoa, East-West Center, Mid-Pacific Institute, St. Francis School, and Punahou School, among others.

Manoa Valley District Park is located in Central Manoa Valley in a residential community. Economic activities include a neighborhood shopping center, a commercial district along East Manoa Road and Woodlawn Drive, and public and private educational and research facilities. Using the U.S. Census figures and comparing Manoa to the rest of the island, Manoa residents tend to be older, college-educated, and work in professional occupations. The community consists of predominately owner-



occupied single-family residential homes with a few small multi-family units. The park serves as a community and regional recreation center and offers open space for the passive enjoyment of the park and panoramic views.

## 4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

### 4.1 Geology and Topography.

The proposed action will significantly alter the topography of the existing site by decreasing the slope of the streambank and making it less susceptible to erosion. This alteration will not adversely impact the integrity of the existing geology and topography in the vicinity, therefore, with the exception of possible erosion during construction, no mitigation is required in regard to geology and topography.

### 4.2 Soils.

In the long run the project is designed to mitigate erosion by reducing the slopes of the streambank and planting appropriate species to bind the soil naturally. The greatest short-term environmental problem related to the proposed action is the potential for erosion and sedimentation during the construction phase of the project.

#### MITIGATION (AECOS, Inc., 1997):

The following measures may be chosen as applicable by the contractor to mitigate erosion.

#### General construction practices:

- Minimize earth movement.
- Minimize impervious coverage.
- Minimize vegetation removal.
- Avoid steep slopes.
- Retain the natural drainage system as much as possible.
- Treat cut/fill slopes as early as practicable.
- Use proper excavation and embankment construction operations.

#### Non-Structural Controls:

- Schedule grading and clearing to avoid high rainfall events.
- Phase construction clearance such that only the area under construction is exposed.
- Clear essential areas only and keep adjacent areas undisturbed.
- Retain natural drainage systems.
- Locate potential polluting sources away from areas that drain directly into waterways.
- Keep construction traffic to existing roads and disturbed areas of construction activity.
- Protect the natural vegetation from damage by construction equipment.
- Stockpile and protect salvageable topsoil or soil for use in reclamation of cleared surfaces and to prevent erosion.

#### Structural Controls:

- Structural Controls, Vegetation.
  - a. Mulch/Mats
  - b. Sodding
  - c. Filter strips
  - d. Grassed waterways and outlets
- Structural Controls, Diversions.
  - a. Runoff interceptor trench or swale
  - b. Diversion dike
  - c. Level spreader
- Structural Controls, Sediment Retention.
  - a. Siltation or filter berms
  - b. Silt fences
  - c. Sediment barriers
  - d. Sediment basins
  - e. Rock-lined ditch or swale.

#### 4.3 Hydrology.

The proposed project would significantly benefit Manoa Stream. By drastically reducing erosion and, therefore, sedimentation, the overall water quality of the stream will be greatly enhanced downstream of the site. No adverse impact is expected regarding hydrology and no mitigation measures subsequent to construction are warranted.

#### 4.4 Climate.

The proposed action is not expected to generate measurable adverse impacts to the climate in the short- or long-term. No mitigation measures with respect to climate are warranted or proposed.

#### 4.5 Air Quality.

The only expected negative impacts on air quality may come from construction activities such as fugitive dust and particulate emissions. These impacts are short-term in nature. Pollutant concentrations from construction vehicle activity are expected to increase at the project site and along affected existing streets.

**MITIGATION:** Fugitive dust impacts due to construction activities can be effectively mitigated via the employment of adequate dust control measures during the construction period. A recommended method is the frequent watering of unpaved roads and areas of exposed soils. "The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50 percent" (U.S. Environmental Protection Agency, 1996). It is also recommended that the landscaping of completed areas be accomplished as soon as possible.

#### 4.6 Noise Quality.

No known long-term noise impacts are expected from the subject action. Unavoidable, short-term, and temporary noise impacts are expected to occur during the construction period.

MITIGATION: The contractor will be required to obtain a noise permit if noise levels are expected to exceed allowable levels as specified in the State Department of Health's Public Health Regulations, Title 11, Chapter 43. The contractor is responsible for properly maintaining construction equipment to minimize noise levels. All internal combustion engines will be required to have mufflers or other noise suppression devices in proper working order. Heavy vehicles required for construction must comply with the State Department of Health's regulations for vehicular noise control.

#### 4.7 Flora.

The existing flora on the site will be replaced with more attractive and hardy species that are appropriate to the riparian environment and easy to maintain. Twenty trees will need to be removed, and 34 new trees will be planted. Elimination of erosion in the long run will provide a more stable base for both flora and fauna in the area. The new planting will provide habitat for species, which once thrived in similar natural environments. No adverse impacts to flora are anticipated and no mitigation measures are warranted.

#### 4.8 Fauna.

The proposed action will greatly benefit indigenous fauna, particularly aquatic species. The reduction in erosion and sedimentation will improve water quality and provide a more stable environment for the growth of aquatic species. No adverse impacts to fauna are anticipated and no mitigation measures are warranted.

#### 4.9 Historical, Archaeological and Cultural Resources

No known historical or archaeological resources exist at the project site. Construction activities (i.e., grading, excavation, trenching, etc.) by nature have the potential to adversely impact archaeological or historical resources in the short- and long-term if any such resources are present at the project site. However, discovery of such resources is considered unlikely at the project site due to the extensive development of the environs over the years.

In terms of cultural resources, the lo'i described in section 3.9, approximately 500 feet southwest of the project site, will not be impacted by the proposed action. The natural tributary that feeds the lo'i drains into Manoa Stream just before the concrete channel begins south of the project site, therefore drainage from the lo'i will not be affected by

the proposed stream bank improvements. No mitigation is warranted for cultural resources.

**MITIGATION:** Mitigation of any potential adverse impacts to historic/cultural resources that may be discovered during construction will require immediate coordination with the Hawaii State Historic Preservation Office and the Advisory Council on Historic Preservation to determine the most appropriate actions to protect these resources.

#### **4.10 Land Use.**

The proposed action, the restoration of the streambank environment and provision of additional park areas for passive recreation, is in keeping with all applicable land use laws and regulations. No adverse impact is expected regarding land use and no mitigation measures are warranted.

#### **4.11 Aesthetic Considerations.**

The proposed action will greatly enhance the aesthetic resources of the stream zone. Unsightly ruderal plants and blighted trees will be replaced with more hardy native species such as naupaka, hau and kukui trees. Views will be enhanced through the clearing of nonindigenous plants and reducing the steep slope of the existing grade. No adverse impacts are anticipated regarding aesthetic resources and no mitigation is warranted.

#### **4.12 Circulation and Traffic.**

The fact that the proposed streambank improvements foster informal passive recreational activities instead of large organized events such as team sports would imply little long-term negative impacts to vehicular traffic and circulation. It is also assumed that the majority of the users of the new riparian area would be Manoa residents who might be more inclined to walk or bike to the park. Therefore, no long term negative impacts related to circulation and traffic are expected to result from the proposed action.

In the short-run circulation and traffic in the vicinity of the site may be affected by increased use of existing nearby roads by construction vehicles.

**MITIGATION:** Scheduling of construction activity, use of vehicles entering or leaving the site, and travel routes through the valley, should be given careful consideration by the contractor to minimize negative impacts to traffic and circulation in the surrounding neighborhoods, and any negative effects on park or school scheduled activities.

#### **4.13 Public Services and Facilities**

Most of the public services required for the proposed action involve the BBQ pavilion. A proposed sink as well as a drinking fountain will require potable water. These can be tapped from the existing water supply lines within the district park. Water supply will also be needed for irrigation of the new plantings. The sink in the BBQ pavilion will also require a wastewater line, which can be connected to the park's existing sewer lines. An existing sewer manhole will have to be rebuilt to accommodate the new finish grade. Solid waste removal will be required but can easily be included in the existing park refuse program. Drainage of the streambank will be by natural means. No artificial culverts or drainage devices are anticipated. Any electrical and communication services needed (e.g., lights, outlets, and pay telephones) can be connected to the existing lines in the adjacent areas. No adverse impacts are anticipated regarding public services and facilities, and no mitigation measures are warranted.

#### **4.14 Socio-Economic Conditions.**

The streambank improvement project will provide short-term employment and profit for the contractor during the construction phase of the project. When the proposed action is completed, it will provide great social benefit to the Manoa community. It will make productive use of a previously unsightly and inaccessible site. Most importantly, it will provide additional opportunities for educational and passive recreational activities in a unique natural riparian environment. This is a rare occurrence in densely urbanized Honolulu and will give Manoa Valley a unique natural resource as a showcase for ecological restoration and development.

### **5.0 ALTERNATIVES TO THE PROPOSED ACTION**

#### **5.1 Alternative A: Channelization.**

Channelization of Manoa Stream adjacent to Manoa Valley District Park would be a radically different alternative to the action proposed. From a pure engineering point of view this would probably be an efficient way of channeling storm waters quickly through an urban area. However, this alternative totally ignores the ecological superiority of a natural riparian zone. Stream modification through concrete channelization would move water quickly through the area but would exclude both aquatic life and humans from any use or enjoyment of a potentially valuable environmental resource (AECOS, Inc., 2000). This alternative to the proposed action was, therefore, ruled out as unacceptable.

#### **5.2 No Action.**

No action would result in the continued deterioration of the streambank due to erosion. This would have the cumulative impact of siltation further downstream all the way to the Ala Wai Canal. The need for dredging of the canal would increase, and therefore cost

to the taxpayer would increase. If erosion is allowed to continue unchecked, many of the existing trees at the edge of the streambank would eventually die and fall into the stream -- bringing increased amounts of soil and rocks into the streambed. The additive effect of this accumulation of debris would be damming of the streamcourse which may cause flooding upstream of the project site. No action would also deprive the Manoa community of a rare opportunity to create a successful riparian restoration within the urban center of Honolulu. The site also has the added attributes of being part of an existing public park, and adjacent to a public elementary school.

## 6.0 FINDINGS AND DETERMINATIONS

The results of this assessment are that the negative impacts that have been identified in this document shall be adequately minimized by the suggested mitigation measures. Therefore, the proposed action will result in no significant impact on the environment. It has been determined that an Environmental Impact Statement (EIS) is not required for the proposed project. A Finding of No Significant Impact (FONSI) is anticipated and determined to be in order.

### 6.1 Findings and Reasons Supporting Expected Determination

- (1) *Involves an irrevocable commitment to loss or destruction of any natural or cultural resources;*

Manoa Valley District Park and Manoa Elementary School, along with the surrounding area has been extensively modified from its natural state for park, school, and residential uses. Prior to development the area may have been agricultural land, particularly taro cultivation because of the stream. Studies for the Manoa Valley District Park indicate that the proposed streambank improvements will have no effect on any known historic property.

If any archaeologically significant artifacts, bones, or any other indications of earlier activity are uncovered during the stream bank improvements, all efforts will be made to assure compliance with the requirements of the Department of Land and Natural Resources, State Historic Preservation Division.

The improvements to the streambank and adding a picnic area and an amphitheater will not result in a loss or destruction of any natural resources.

- (2) *Curtails the range of beneficial uses of the environment;*

The site is currently used as a district park and a school and these uses will not change in the near future. The proposed streambank improvements are consistent with current uses and zoning. Construction activity will temporarily close off a small portion of the park along the Streambank, however once completed the range of beneficial uses of the environment will increase due to the added paths, amphitheater and picnic area.

- (3) *Conflicts 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.*

As proposed the Manoa Valley District Park streambank improvements are consistent with the Environmental Policies established in chapter 344, HRS and the National Environmental Policy Act. This project is also part of the Ala Wai Canal Watershed improvement Project and is a Vision Team Capital Improvement Project, part of the City and County of Honolulu's overall planning effort entitled "21<sup>st</sup> Century Oahu: A Shared Vision for the Future."

- (4) *Substantially affects the economic or social welfare of the community or state;*

Adding paths, a picnic area and an amphitheater will improve the social welfare of the Manoa community by increasing passive recreational opportunities. Benches will be placed along the path to provide places to sit and enjoy the beauty of the restored setting. The restoration of Manoa Stream will improve the aesthetic resources of Manoa Valley and provide a natural environment for human recreation and enjoyment (Ala Wai Canal Watershed Management and Implementation Plan, 1998)

Economically there will be the cost of labor and equipment for construction phase of the project, which will also create short-term jobs for construction workers. When the stream bank improvements are completed, maintenance will be handled jointly by the Manoa Valley District Park grounds staff and volunteers from the Manoa Valley community.

- (5) *Substantially affects public health;*

Temporary effects during the construction phase of this project may affect public health. This would be in the form of noise, dust, and sediment causing minor water quality impacts, however these will be short-term effects and are minor when weighed against the long-term benefits.

- (6) *Involves substantial secondary impacts, such as population changes or effects on public facilities;*

The proposed improvements to the streambank and the addition of an amphitheater, picnic area and streamside paths will not result in population growth or put an additional load on existing public facilities.

- (7) *Involves substantial degradation of environmental quality;*

Manoa Valley District Park Stream bank improvements should not involve any degradation of environmental quality on the site or in the surrounding area. Once the project is completed the streambank improvements and landscaping will enhance the



park environment and decrease the sediment level in both Manoa Stream and the Ala Wai Canal.

- (8) *Is individually limited but cumulatively has considerable effect upon the environment or involves commitment for large actions;*

The proposed streambank improvements are meant to satisfy a part of the long-term goals of the Ala Wai Canal Watershed Water Quality Improvement Plan and will directly improve the water quality in the watershed. The commitment of financial resources for the project is a one-time obligation. Maintenance of the streambank, landscaped areas, paths, amphitheater and the picnic area will be the responsibility of Manoa Valley District Park grounds staff and volunteers from the Manoa Valley community.

- (9) *Substantially affects a rare, threatened or endangered species, or its habitat.*

Manoa Valley District Park and the surrounding area has been altered significantly by urbanization and the Streambank are covered by non-native plants and weeds. AECOS, Inc. performed a biological survey for the project area and determined that no known or threatened or endangered botanical species, or aquatic species have been identified at the project site.

- (10) *Detrimentially affects air or water quality or ambient noise levels;*

During the construction phase the quality of air, water and ambient noise levels will be affected. Heavy equipment used to modify the slope of the streambank will be the major source of noise, exhaust, increased sediment load in the stream and possibly some dust. Mitigation measures will be used to minimize these effects.

Once construction is completed this project as proposed will have no long-term effects on air and water quality or ambient noise levels.

- (11) *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;*

All of the project area for Manoa Valley Streambank Improvements is in the flood plain and currently streambank erosion contributes to the sediment load of both Manoa Stream and the Ala Wai Canal. As a part of the Ala Wai Water Watershed Project the proposed alterations to Manoa streambank will increase the volume of the stream allowing the stream to better accommodate floodwaters. Also the modifications, streambank stabilization and landscaping will decrease erosion thus improving the water quality of the Ala Wai Canal Watershed.

- (12) *Substantially affects scenic vistas and view planes identified in county or state plans or studies;*

Currently the streambank is covered with weeds and other non-indigenous trees. The proposed action will replace the weeds and unhealthy trees with hardy native species and plants more typical of a riparian corridor. Views will be greatly improved with the reduced slope and landscaping creating an attractive inviting atmosphere.

*(13) Requires substantial energy consumption.*

Construction of the amphitheater, picnic area, paths and grading for the alterations of the streambank will require a small amount of energy. Once the project is completed there will be no increase in energy consumption.

## 7.0 REFERENCES CITED

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## 8.0 LIST OF PREPARERS

<u>PREPARER</u>	<u>AFFILIATION</u>	<u>RESPONSIBILITIES</u>
Higashi, Irvin	Walters, Kimura, Motoda, Inc.	Project Manager
Nishimura, John, P.E.	Fukunaga & Associates, Inc.	Civil Engineer
McGerrow, Richard S.	Wil Chee - Planning, Inc.	EA Writer/Coordinator

## 9.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED

Federal Government  
U.S. Army Corps of Engineers

State of Hawaii  
Department of Education  
Department of Health  
Department of Land and Natural Resources  
Office of Environmental Quality Control

City & County of Honolulu  
Board of Water Supply  
Department of Design & Construction  
Department of Facility Maintenance  
Department of Parks & Recreation  
Department of Planning and Permitting  
Division of Road Maintenance  
Manoa Neighborhood Board No. 7  
Vision Team No. 10 - Makiki, McCully, Moiliili, Manoa

Organizations  
Ala Wai Watershed Association  
Malama o Manoa  
Manoa Gardens Senior Housing Residents Association

### Persons

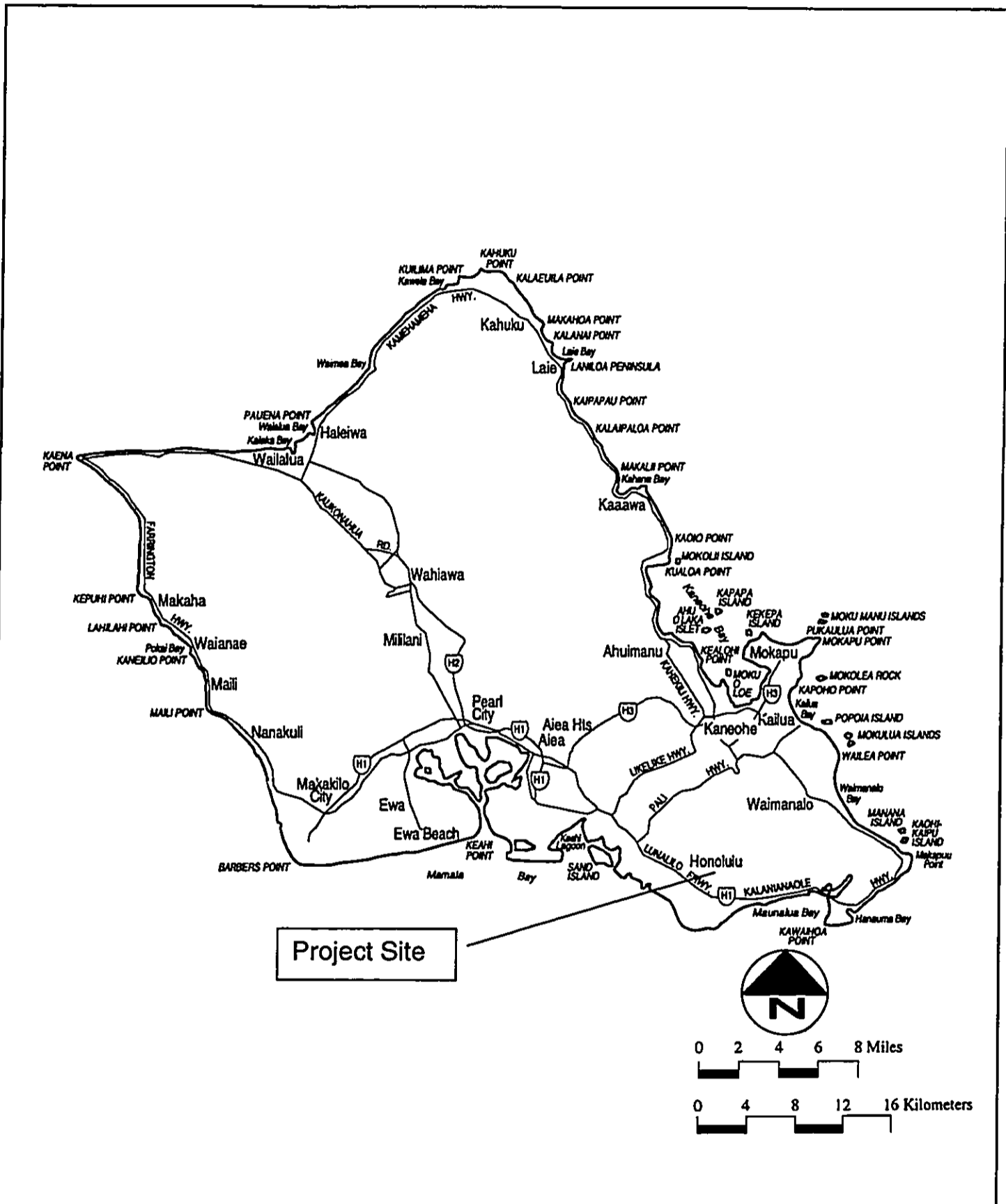
George Arizume  
Traver Carroll  
Eric DeCarlo  
David Chun

Tom Heinrich  
John Kato  
Peter Radulovic  
John Steelquist

200

**Figures**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

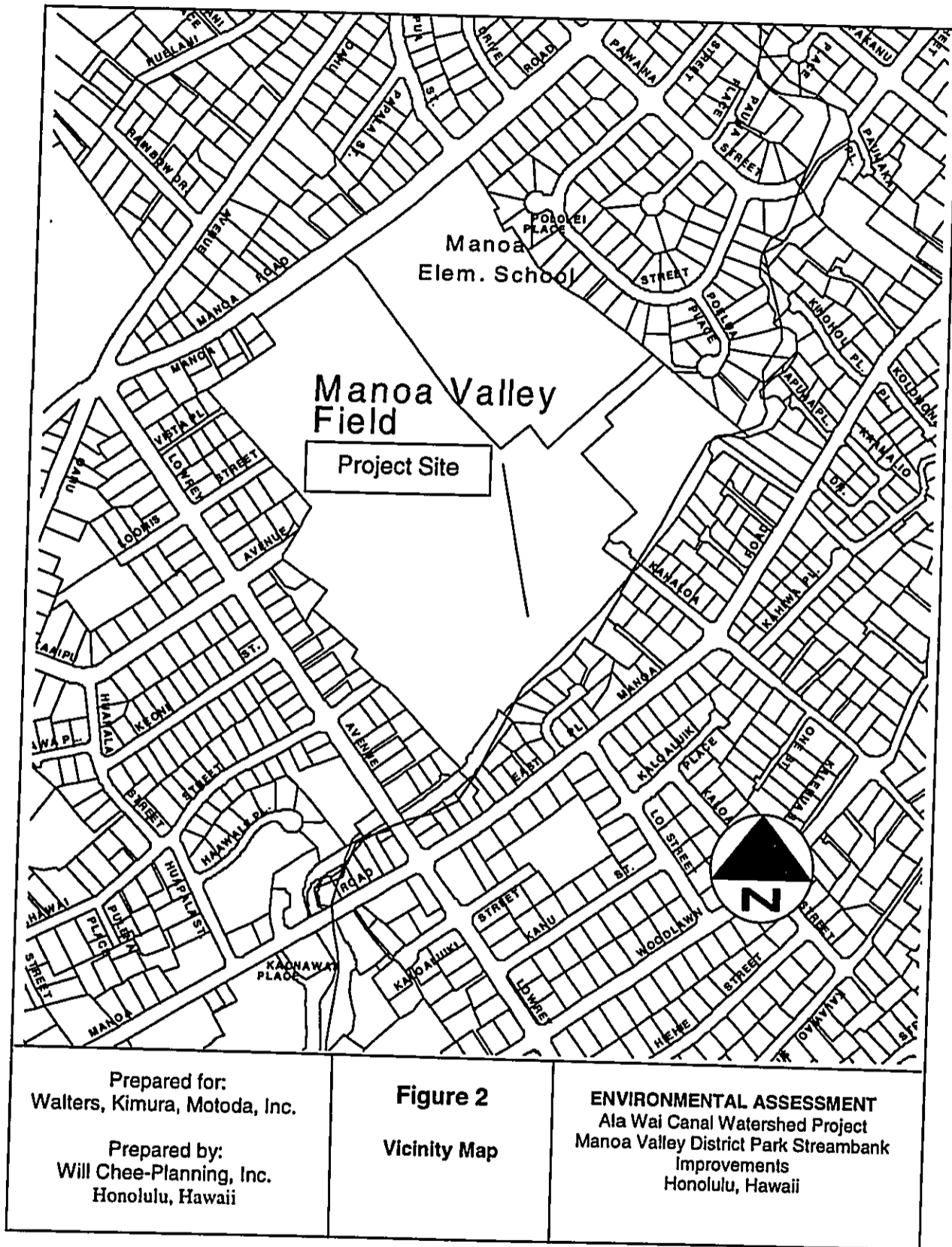


Prepared for:  
**WALTERS, KIMURA, MOTODA, Inc.**

Prepared by:  
**Wil Chee-Planning, Inc.**  
 Honolulu, Hawaii

**Figure 1**  
**Location Map**

**ENVIRONMENTAL ASSESSMENT**  
 Ala Wai Canal Watershed Project  
 Manoa Valley District Park Streambank  
 Improvements  
 Honolulu, Hawaii

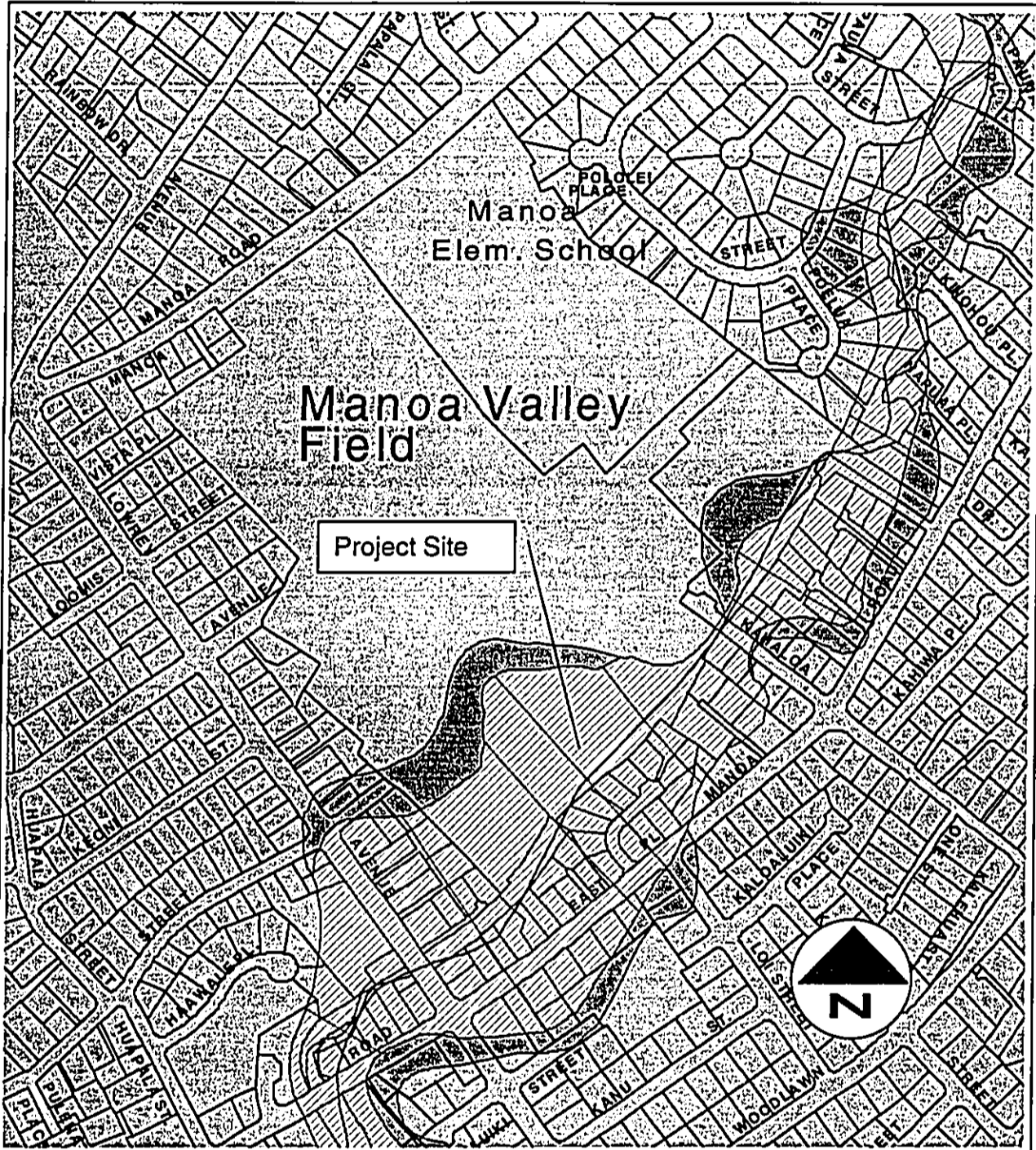


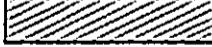

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Prepared by:  
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Honolulu, Hawaii

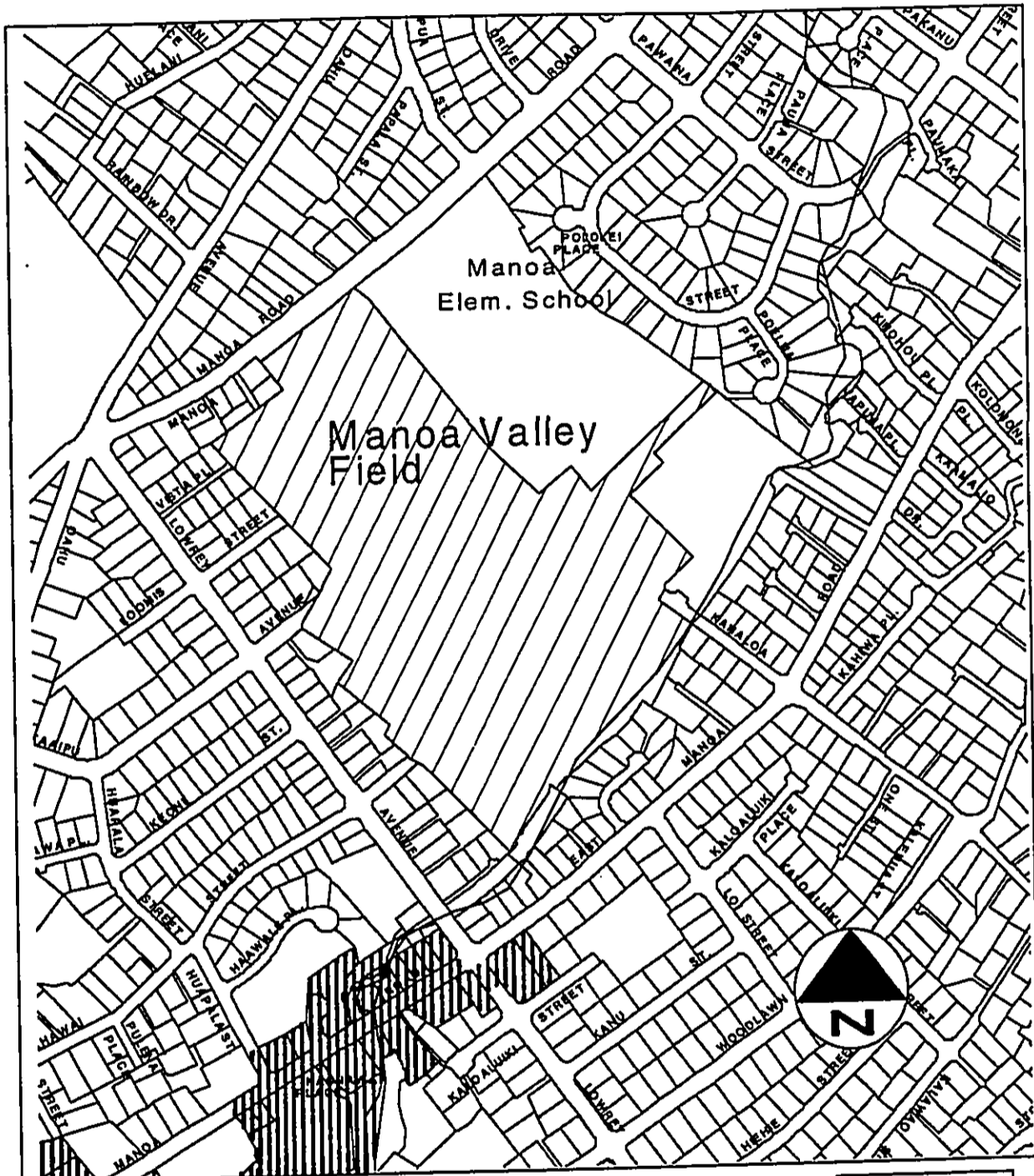
**Figure 2**  
Vicinity Map

**ENVIRONMENTAL ASSESSMENT**  
Ala Wai Canal Watershed Project  
Manoa Valley District Park Streambank  
Improvements  
Honolulu, Hawaii

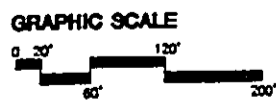
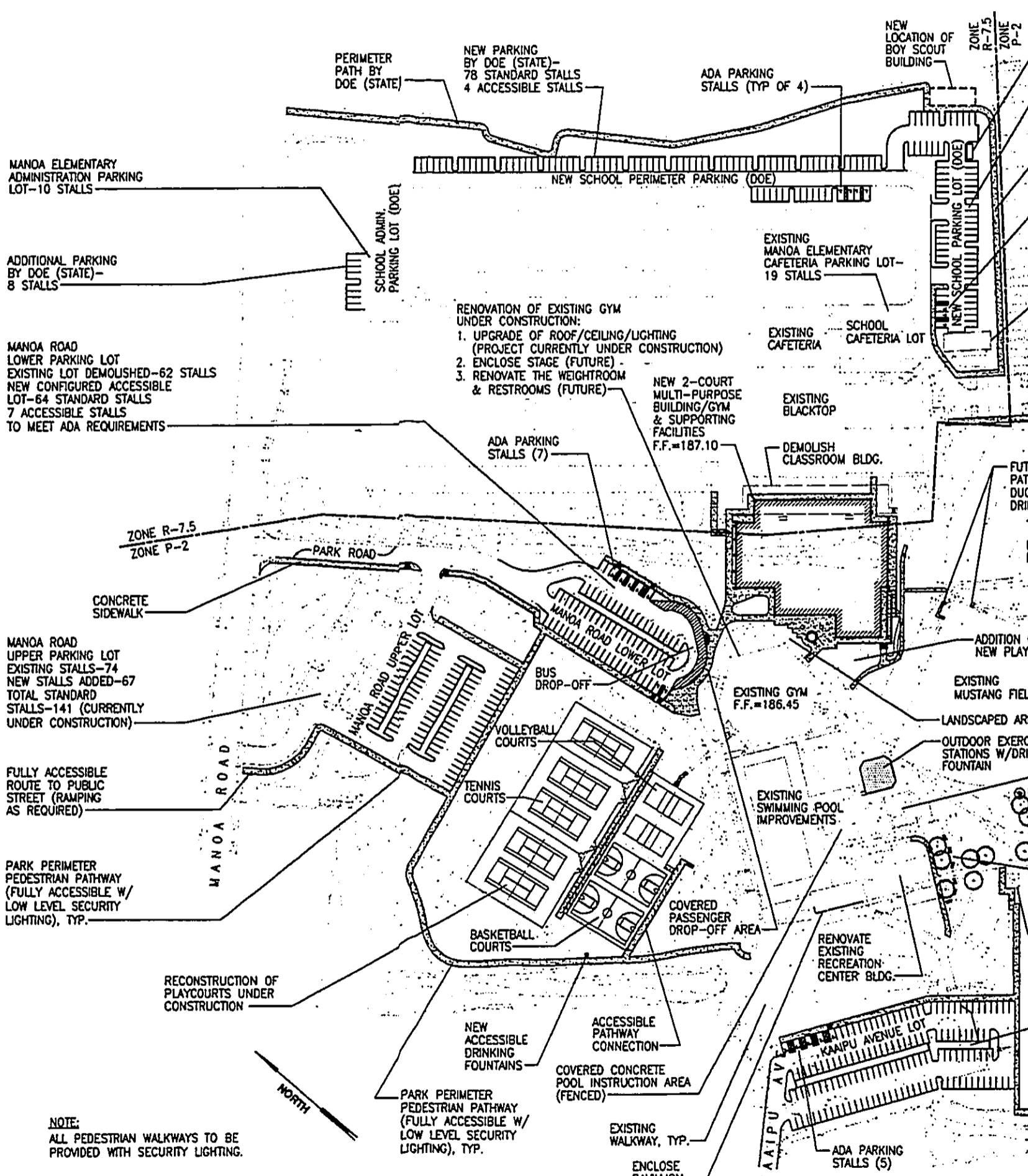


<p>100 year Flood Plain</p> 	<p>500 year Flood Plain</p> 	
<p>Prepared for: Walters, Kimura, Motoda, Inc.</p> <p>Prepared by: Wil Chee-planning, Inc. Honolulu, Hawaii</p>	<p><b>Figure 3</b></p> <p><b>Flood Zone Map</b></p>	<p><b>CONCEPTUAL MASTER PLAN REPORT</b> Ala Wai Canal Watershed Project Manoa Valley District Park Streambank Improvements Honolulu, Hawaii</p>



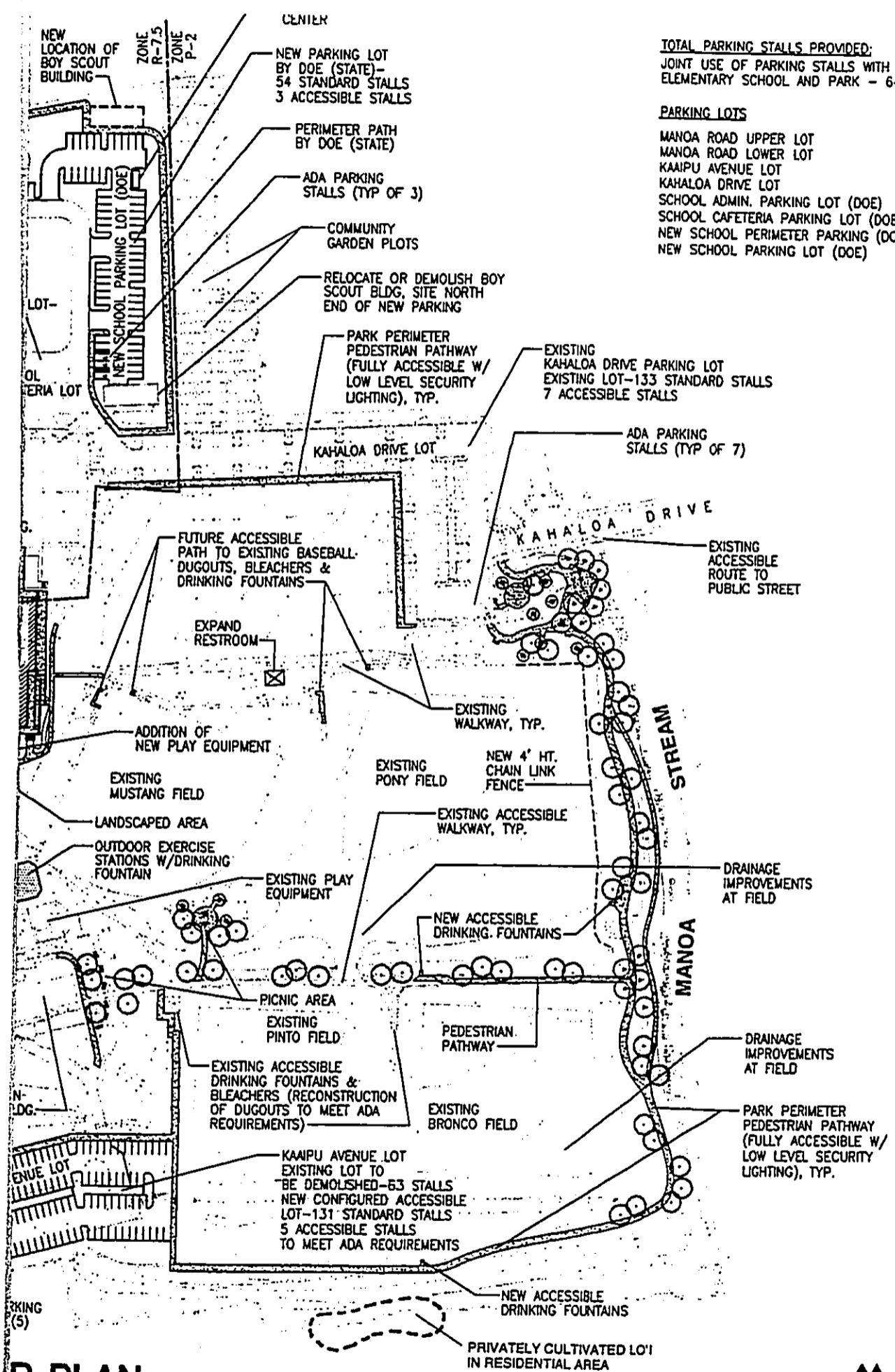


General Preservation P-2		Residential R-7.5	
Business	B-1		
<p>Prepared for: Walters, Kimura, Motoda, Inc.</p> <p>Prepared by: Will Chee-Planning, Inc. Honolulu, Hawaii</p>	<p><b>Figure 4</b></p> <p><b>Zoning Map</b></p>	<p><b>ENVIRONMENTAL ASSESSMENT</b> Ala Wai Canal Watershed Project Manoa Valley District Park Streambank Improvements Honolulu, Hawaii</p>	



JULY 2000  
REVISED JULY 24, 2000

# MASTER PLAN MANOA VALLEY DISTRICT PARK / MANOA



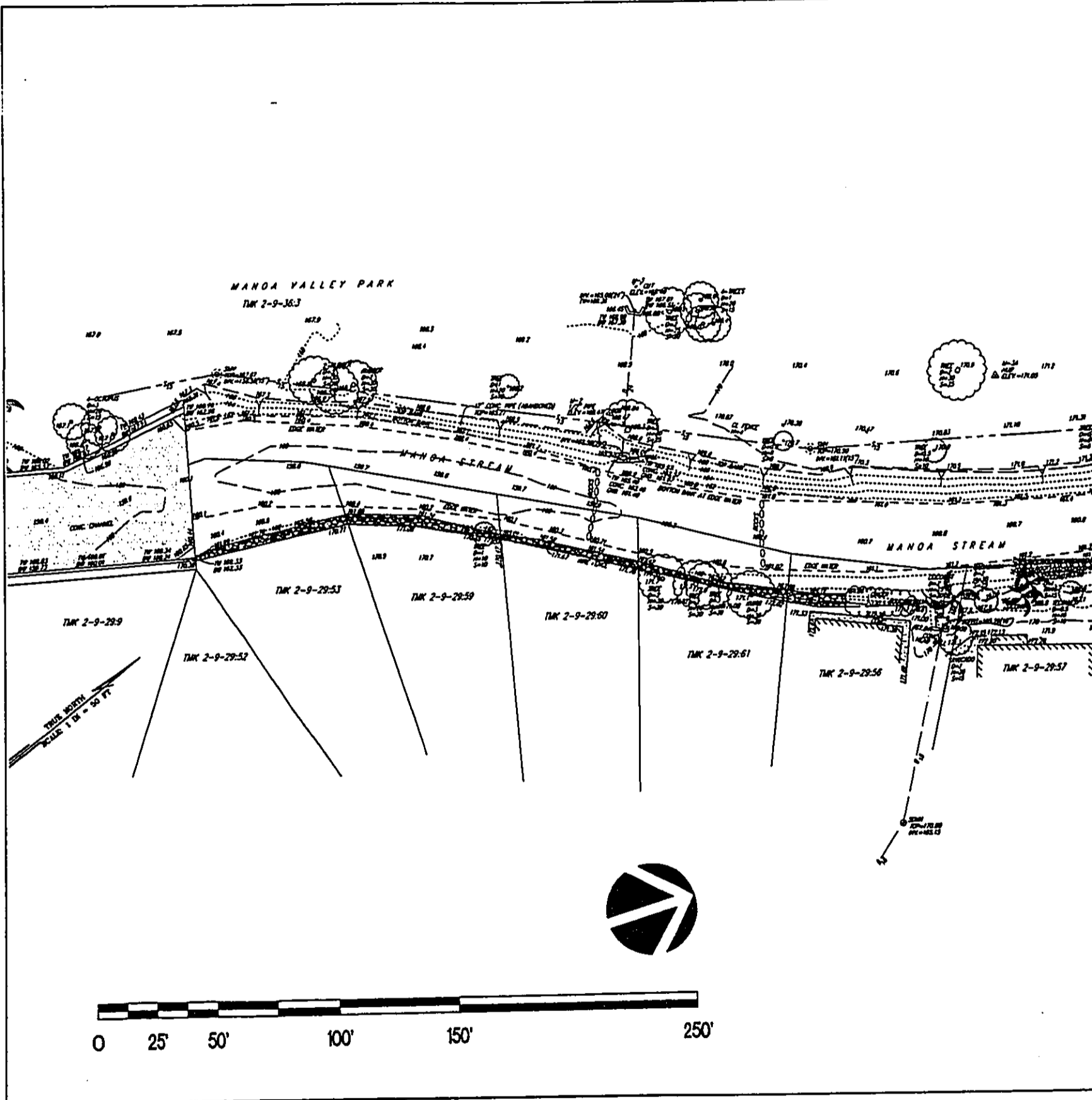
TOTAL PARKING STALLS PROVIDED:  
 JOINT USE OF PARKING STALLS WITH MANOA  
 ELEMENTARY SCHOOL AND PARK - 645 TOTAL STALLS

PARKING LOTS	STANDARD	ACCESSIBLE	TOTAL
MANOA ROAD UPPER LOT	141	0	141
MANOA ROAD LOWER LOT	64	7	71
KAHAIPI AVENUE LOT	131	5	136
KAHALOA DRIVE LOT	133	7	140
SCHOOL ADMIN. PARKING LOT (DOE)	18	0	18
SCHOOL CAFETERIA PARKING LOT (DOE)	19	0	19
NEW SCHOOL PERIMETER PARKING (DOE)	78	4	82
NEW SCHOOL PARKING LOT (DOE)	54	3	57
	638	26	664

Environmental Assessment  
 Ala Wai Canal Watershed Project  
 Manoa Valley District Park Streambank Improvements  
 Honolulu, Hawaii

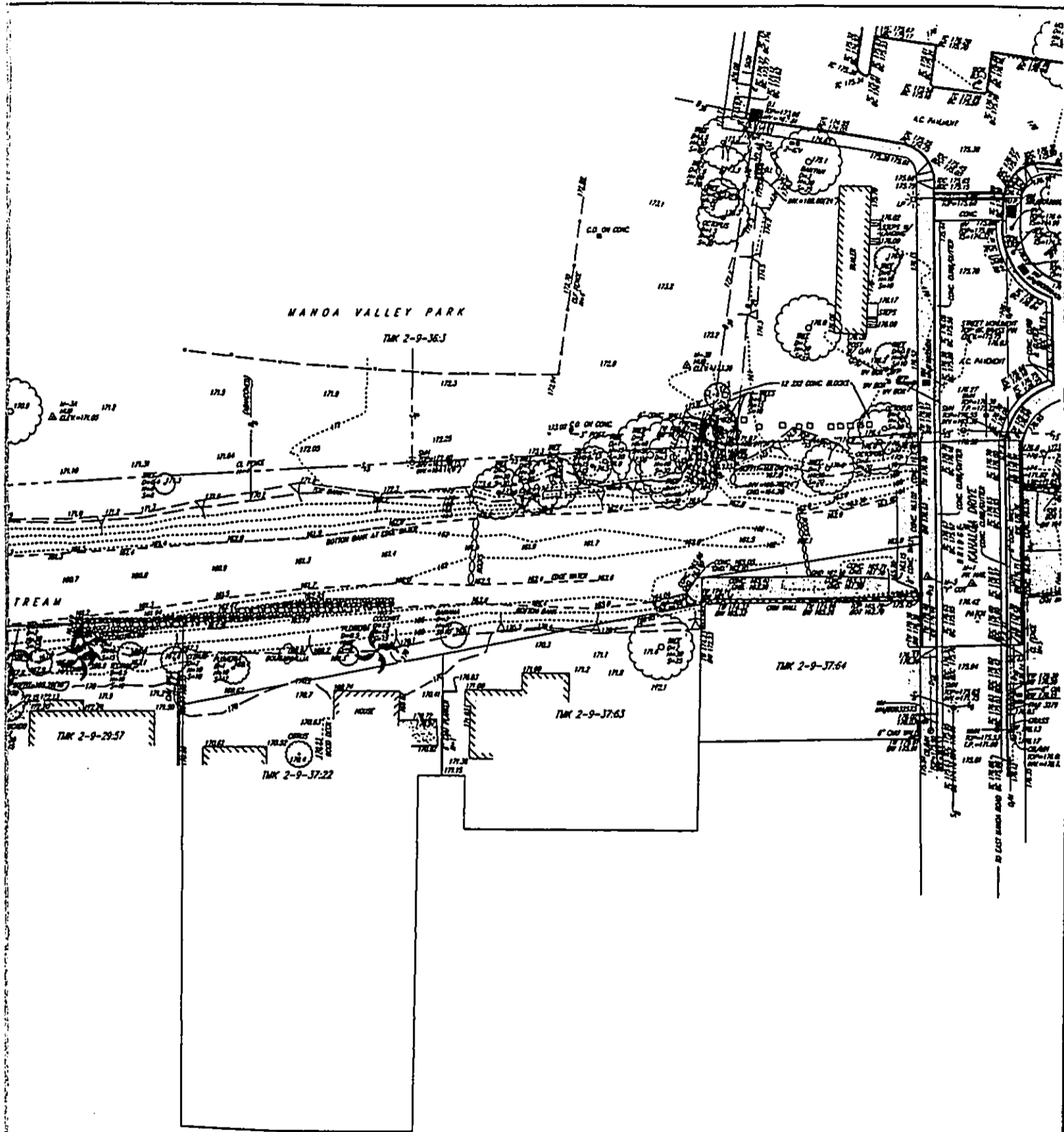
Figure 5  
 Master Plan for Manoa Valley District Park /  
 Manoa Elementary School

**MASTER PLAN**  
**MANOA ELEMENTARY SCHOOL**

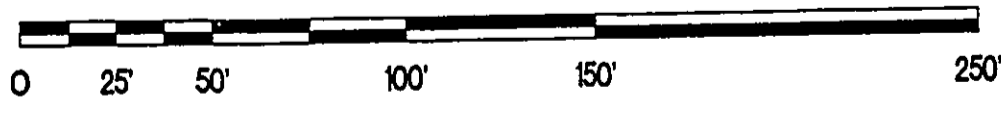
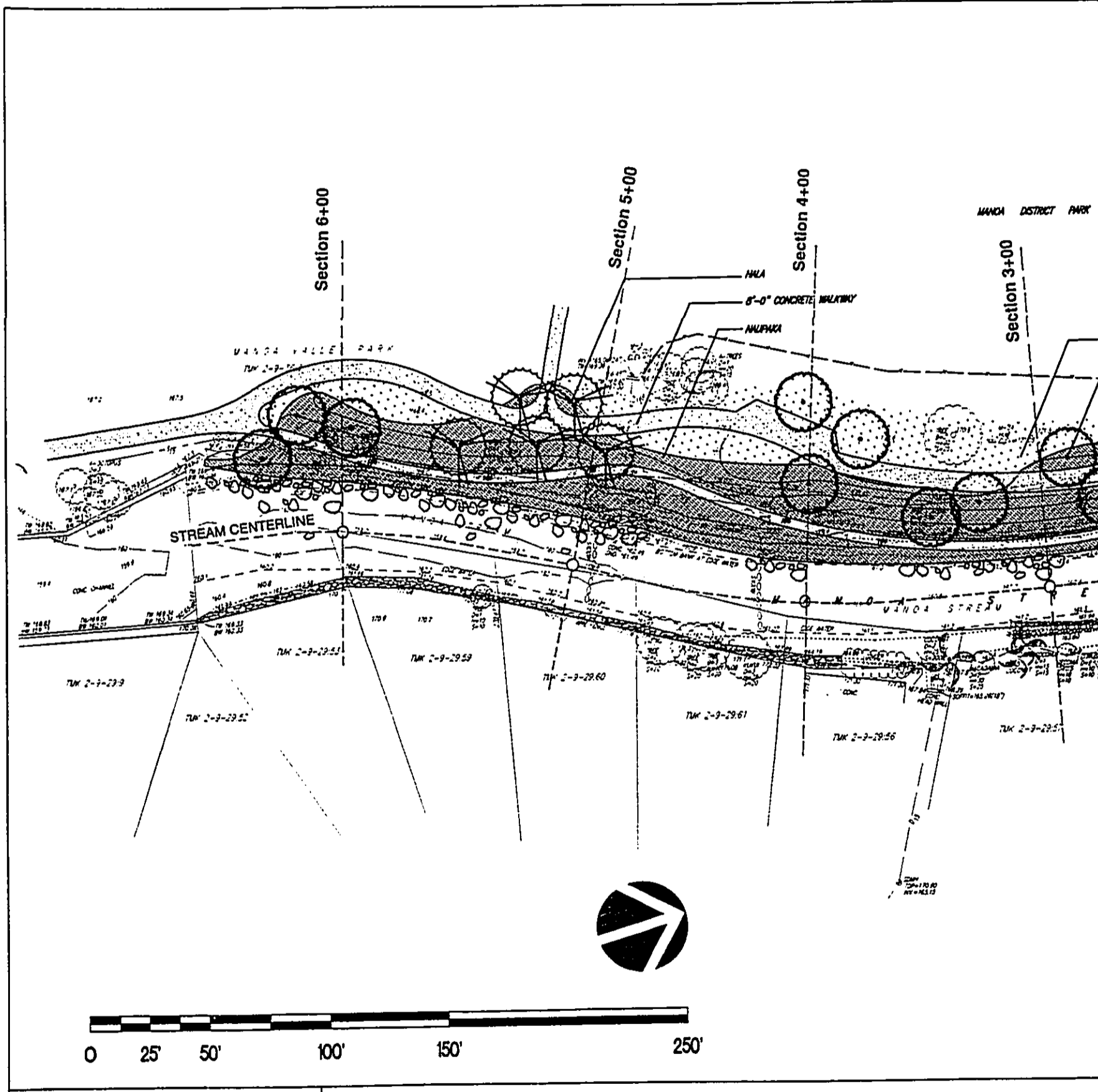


Topographic Survey Map  
 prepared by :  
**CONTROL POINT SURVEYING, INC.**

**Figure 6**  
**Existing Manoa Streambank Site Plan**



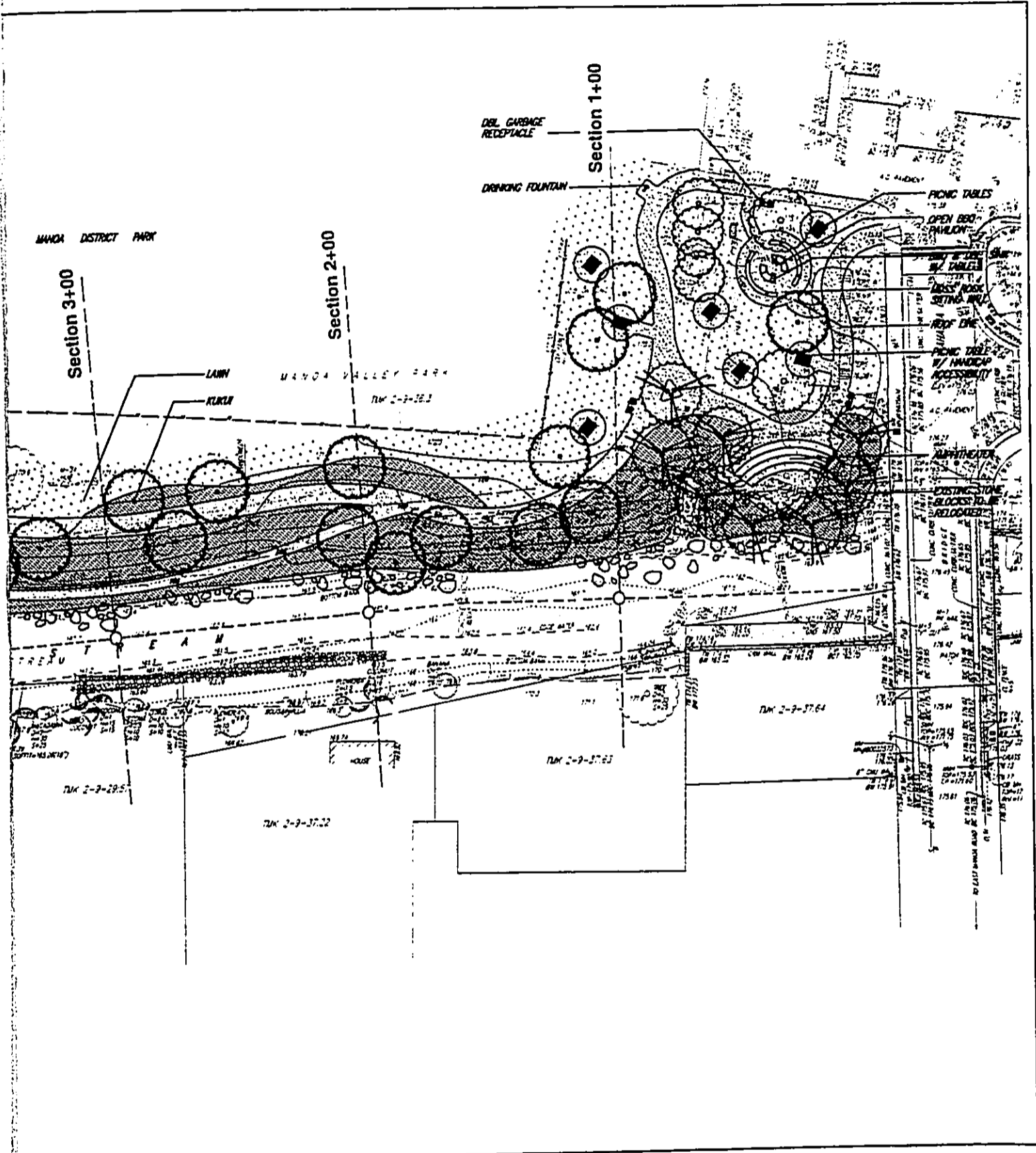
Environmental Assessment  
 Ala Wai Canal Watershed Project  
 Manoa Valley District Park Streambank Improvements  
 Honolulu, Hawaii



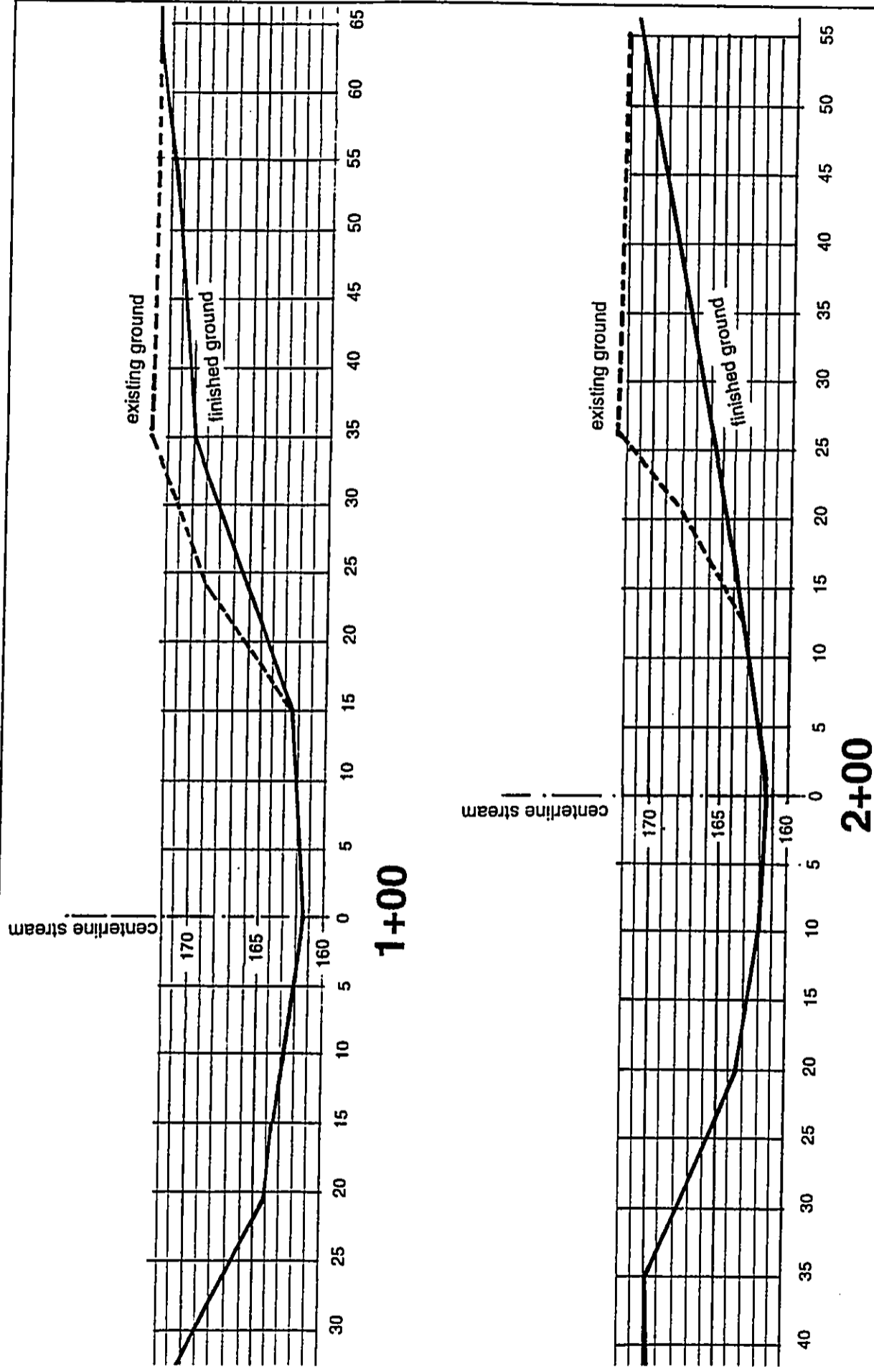
Prepared by:  
WALTERS, KIMURA, MOTODA, Inc.

Prepared for:  
City and County of Honolulu  
Department of Design & Construction

**Figure 7**  
**Manoa Streambank Improvement Plan**



Environmental Assessment  
 Ala Wai Canal Watershed Project  
 Manoa Valley District Park Streambank Improvements  
 Honolulu, Hawaii



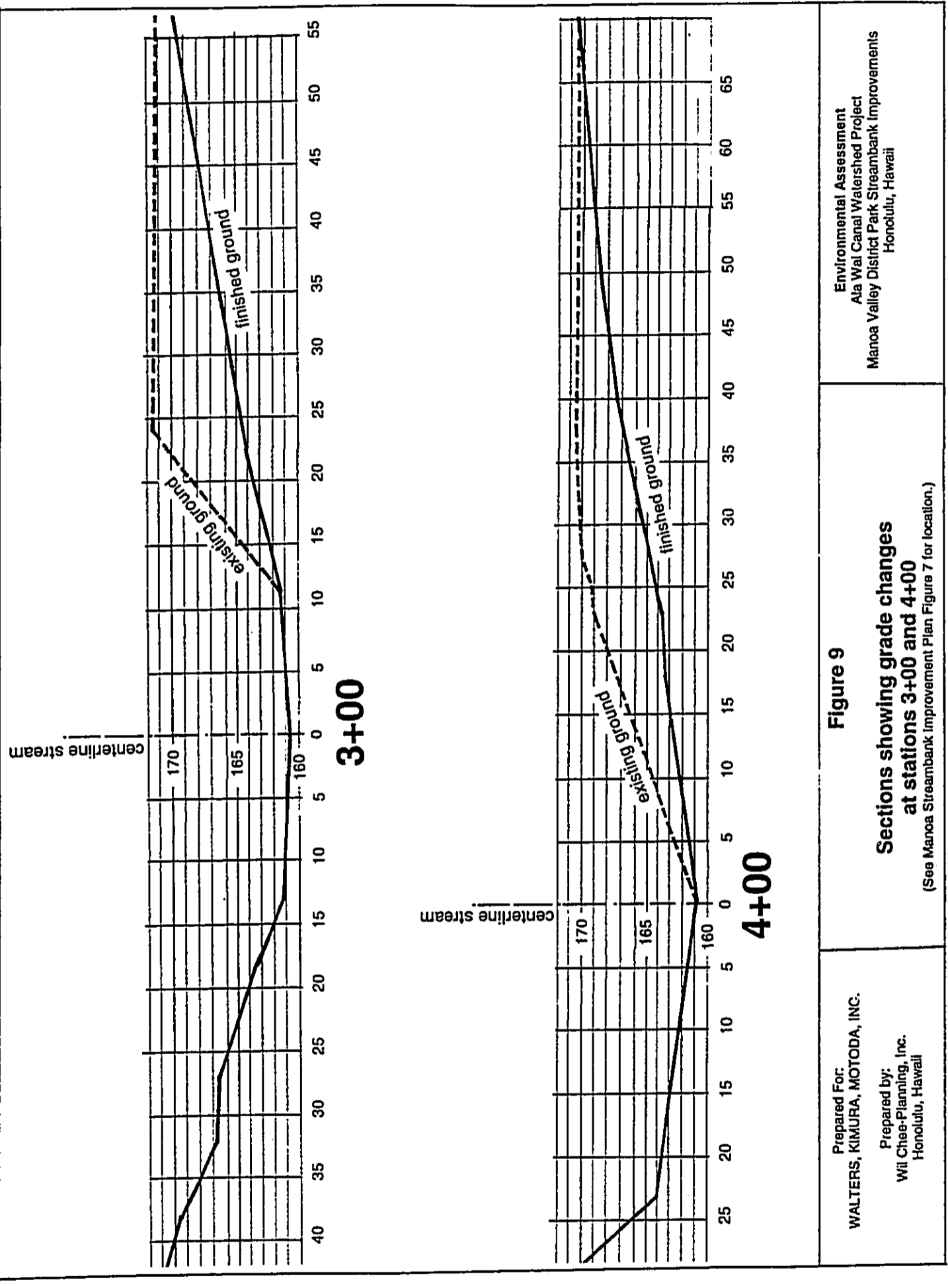
Prepared For:  
**WALTERS, KIMURA, MOTODA, INC.**

Prepared by:  
**Wil Chee-Planating, Inc.**  
 Honolulu, Hawaii

**Figure 8**  
**Sections showing grade changes**  
**at stations 1+00 and 2+00**  
 (See Manoa Streambank Improvement Plan Figure 7 for location.)

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 Ala Wai Canal Watershed Project  
 Manoa Valley District Park Streambank Improvements  
 Honolulu, Hawaii





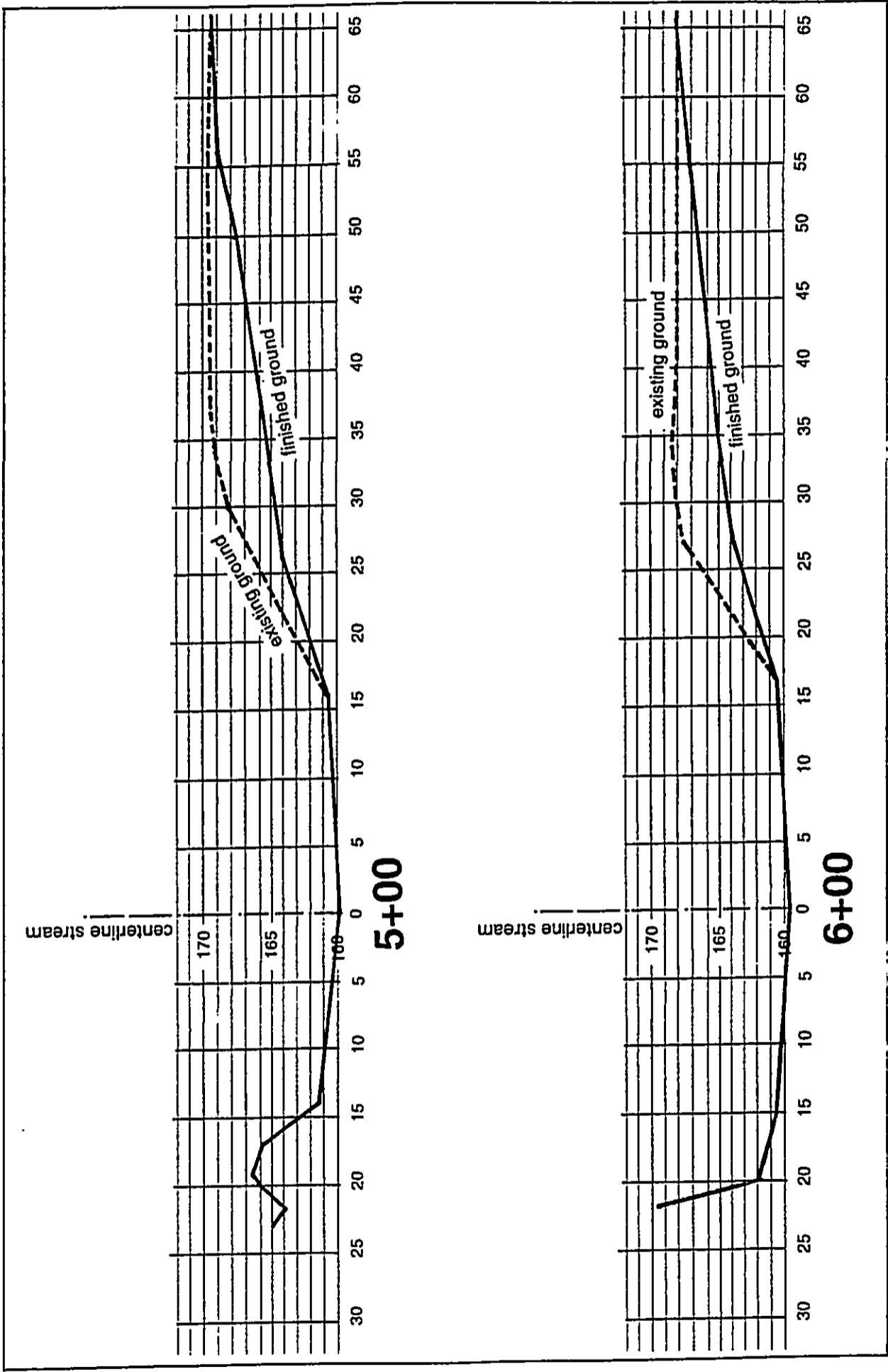
**Figure 9**

**Sections showing grade changes at stations 3+00 and 4+00**

(See Manoa Streambank Improvement Plan Figure 7 for location.)

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**WALTERS, KIMURA, MOTODA, INC.**  
 Prepared by:  
**Wil Chee-Planning, Inc.**  
 Honolulu, Hawaii

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 Manoa Valley District Park Streambank Improvements  
 Honolulu, Hawaii



**Figure 10**  
**Sections showing grade changes**  
**at stations 5+00 and 6+00**  
 (See Manoa Streambank Improvement Plan Figure 7 for location.)

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**WALTERS, KIMURA, MOTODA, INC.**

Prepared by:  
**Wil Chee-Planning, Inc.**  
 Honolulu, Hawaii

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 Ala Wai Canal Watershed Project  
 Manoa Valley District Park Streambank Improvements  
 Honolulu, Hawaii



View of Manoa Stream facing upstream (northeast).  
The improvement project will be on the bank pictured at the left.



View of Manoa Stream facing downstream (southeast).  
Improvements will be on the bank pictured at the right.

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WALTERS, KIMURA, MOTODA, INC.

Prepared by:  
Wil Chee-Planning, Inc.  
Honolulu, Hawaii

**Figure 11**

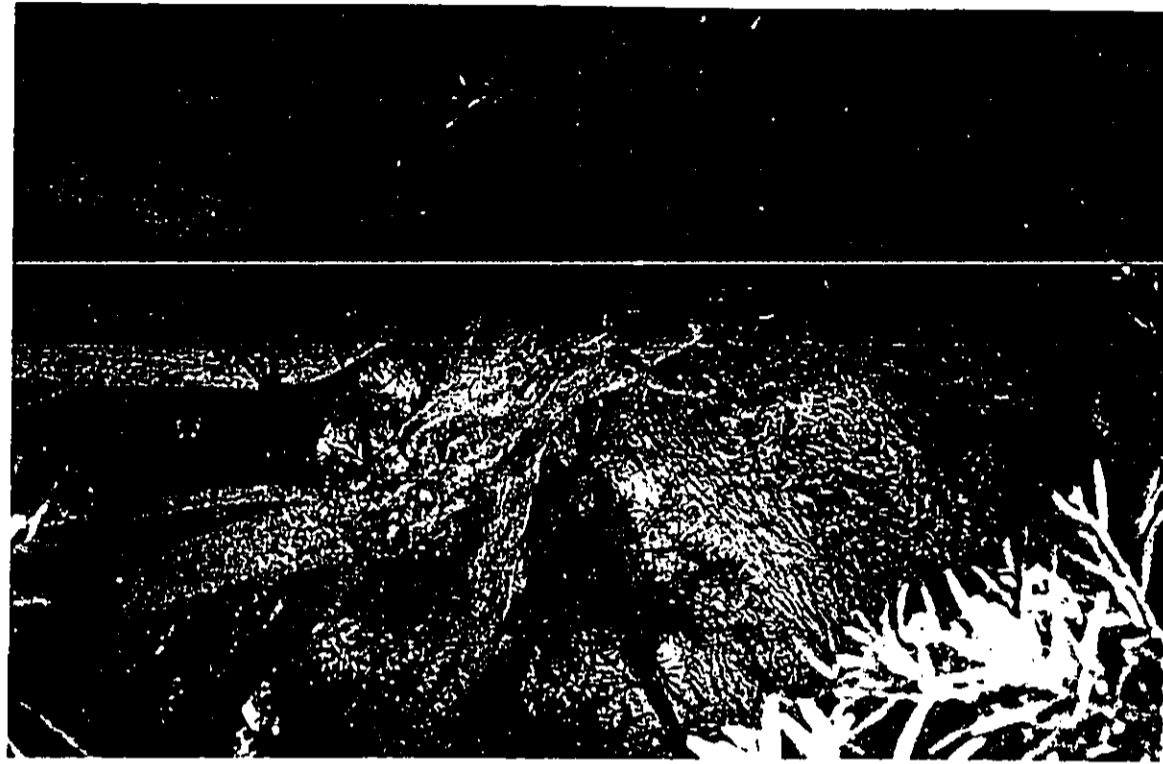
**Existing Stream Conditions**

Environmental Assessment  
Ala Wai Canal Watershed Project  
Manoa Valley District Park Streambank Improvements  
Honolulu, Hawaii



Example of a detachment scarp for one of the small landslides along the river bank. A section of earth has fallen away leaving the exposed earth pictured here.

Example of an existing tree (Formosan Koa) along the streambank that has been undercut by erosion.



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WALTERS, KIMURA, MOTODA, INC.

Prepared by:  
Will Chee-Planning, Inc.  
Honolulu, Hawaii

**Figure 12**

**Evidence of erosion-related problems along the streambank at Manoa Valley District Park**

Environmental Assessment  
Ala Wai Canal Watershed Project  
Manoa Valley District Park Streambank Improvements  
Honolulu, Hawaii



Severely eroded streambank exposing tree and shrub root systems.

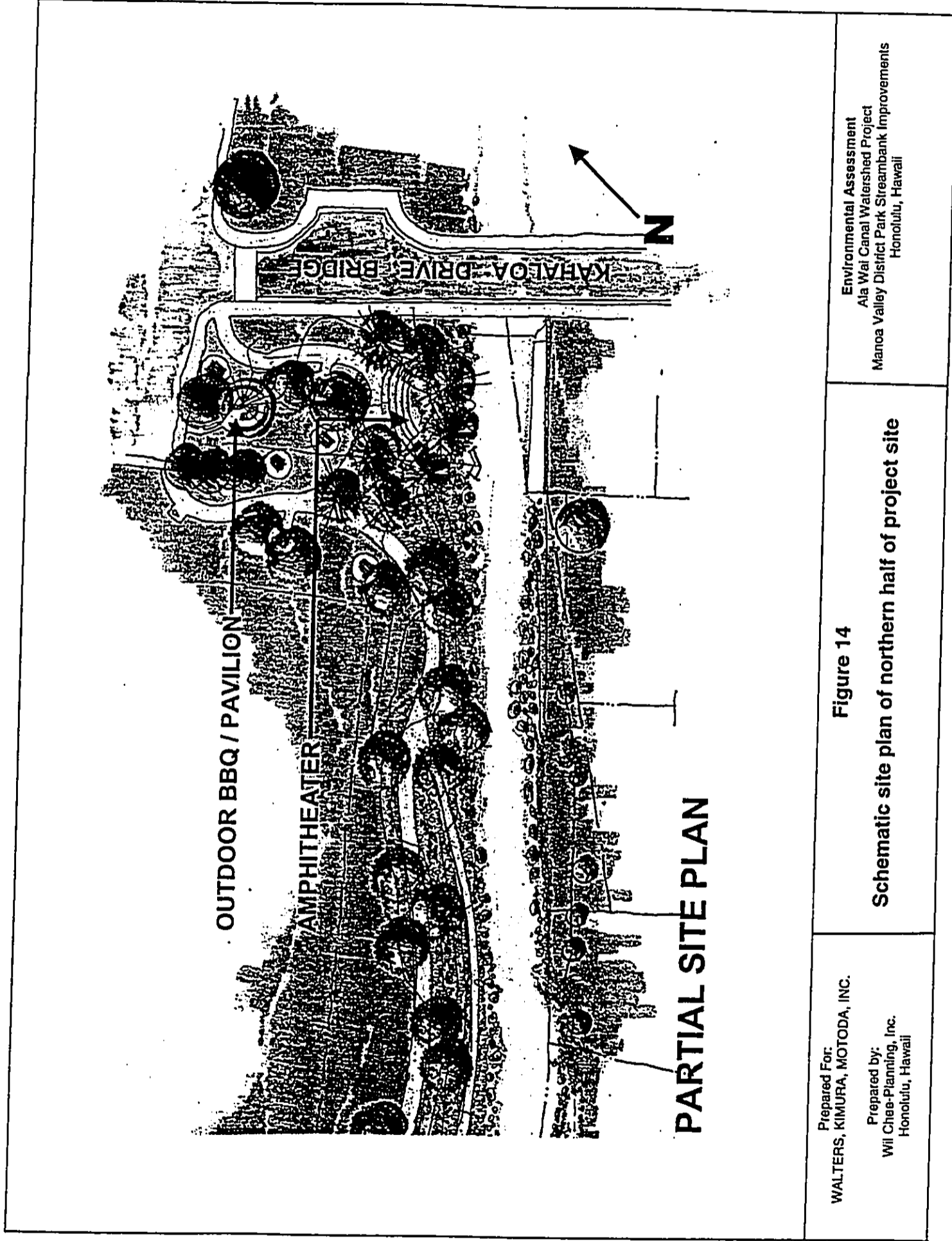
Prepared For:  
WALTERS, KIMURA, MOTODA, INC.

Prepared by:  
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Honolulu, Hawaii

Figure 13

Results of severe streamside erosion

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Ala Wai Canal Watershed Project  
Manoa Valley District Park Streambank Improvements  
Honolulu, Hawaii



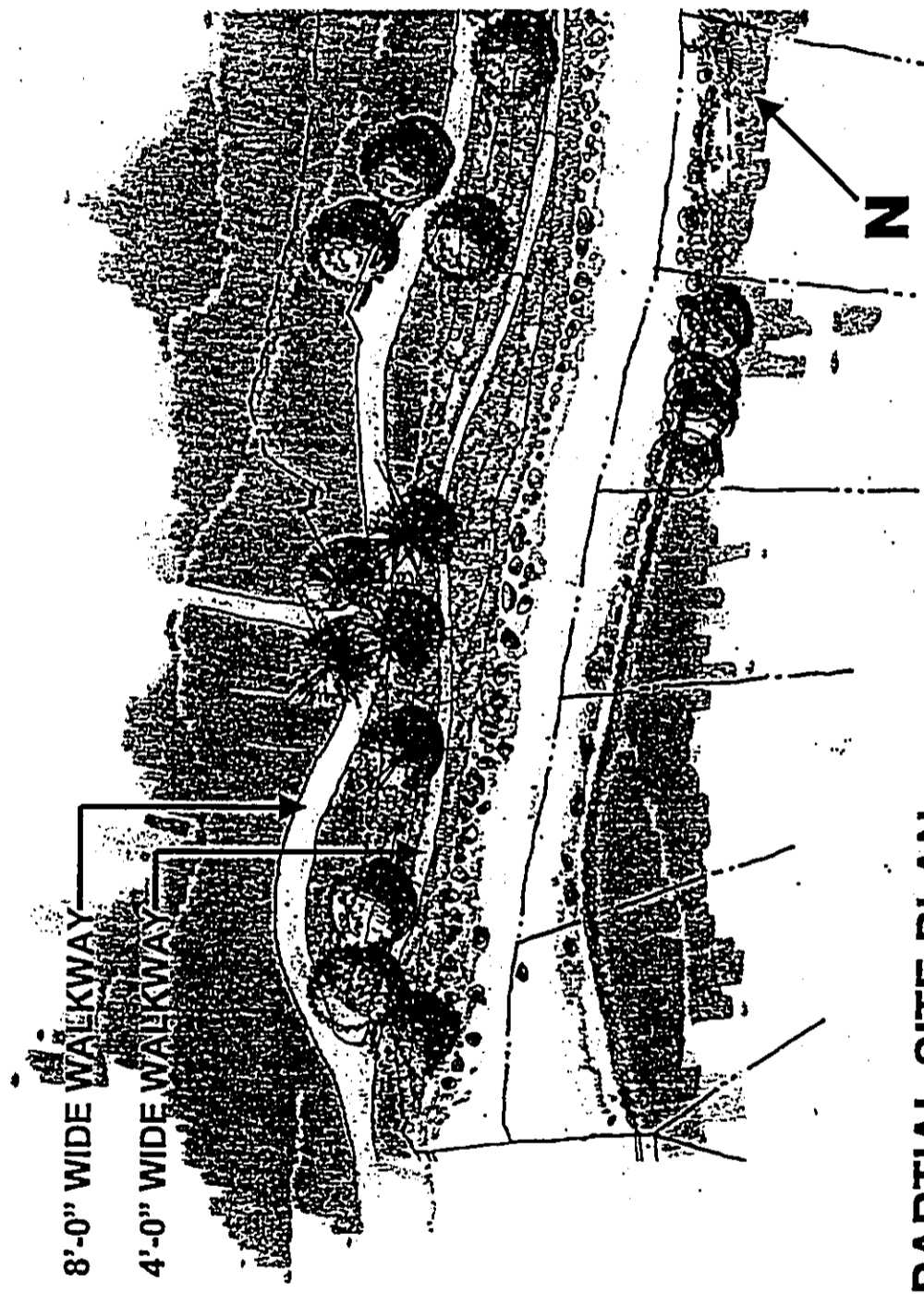
Prepared For:  
WALTERS, KIMURA, MOTODA, INC.

Prepared by:  
Will Chee-Planning, Inc.  
Honolulu, Hawaii

Figure 14

Schematic site plan of northern half of project site

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Manoa Valley District Park Streambank Improvements  
Honolulu, Hawaii



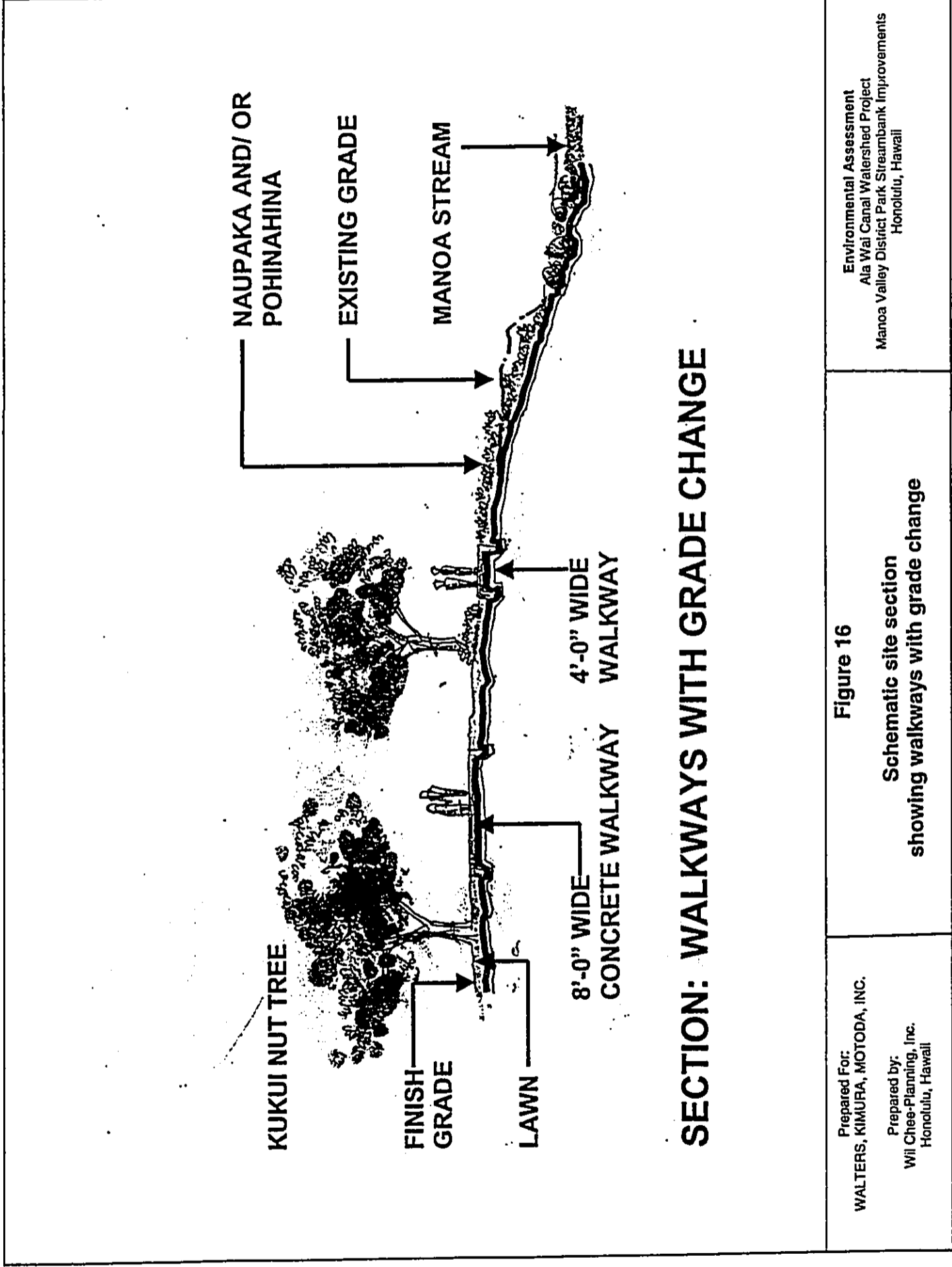
**PARTIAL SITE PLAN**

Prepared For:  
**WALTERS, KIMURA, MOTODA, INC.**

Prepared by:  
**WJI Chee-Planning, Inc.**  
 Honolulu, Hawaii

**Figure 15**  
 Schematic site plan of southern half of project site

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 Ala Wai Canal Watershed Project  
 Manoa Valley District Park Streambank Improvements  
 Honolulu, Hawaii



Environmental Assessment  
 Ala Wai Canal Watershed Project  
 Manoa Valley District Park Streambank Improvements  
 Honolulu, Hawaii

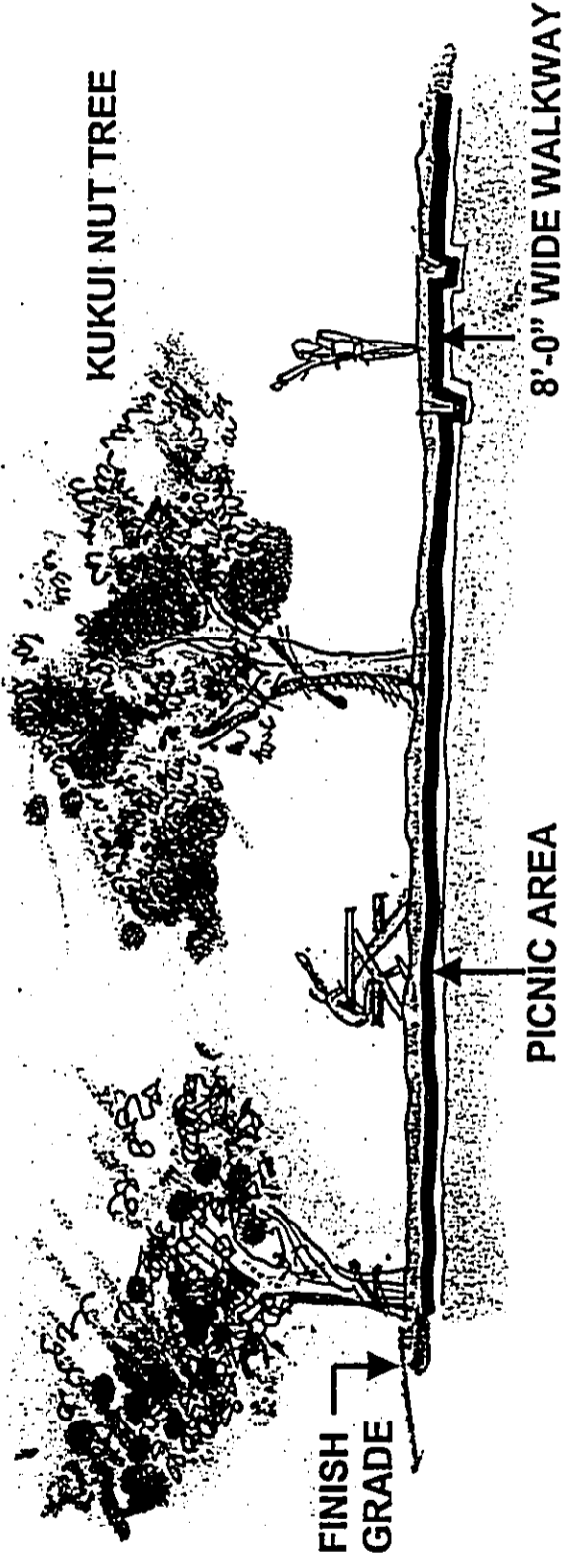
**Figure 16**  
 Schematic site section  
 showing walkways with grade change

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 WALTERS, KIMURA, MOTODA, INC.

Prepared by:  
 Wil Chee-Planning, Inc.  
 Honolulu, Hawaii



EXISTING TREE  
TO REMAIN



**SECTION: PICNIC AREA**

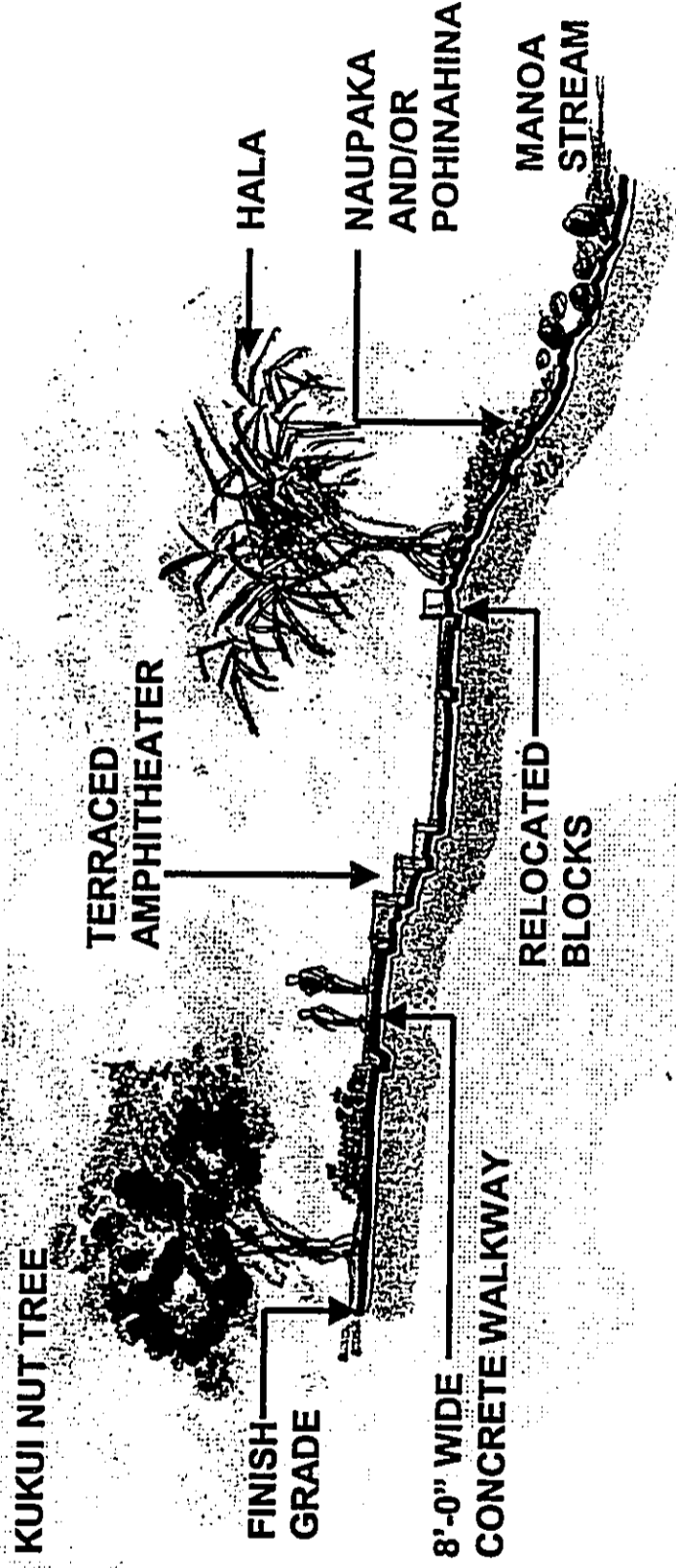
Prepared For:  
WALTERS, KIMURA, MOTODA, INC.

Prepared by:  
Wii Chee-Planning, Inc.  
Honolulu, Hawaii

Figure 17

Schematic site section at picnic area

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Ala Wai Canal Watershed Project  
Manoa Valley District Park Streambank Improvements  
Honolulu, Hawaii

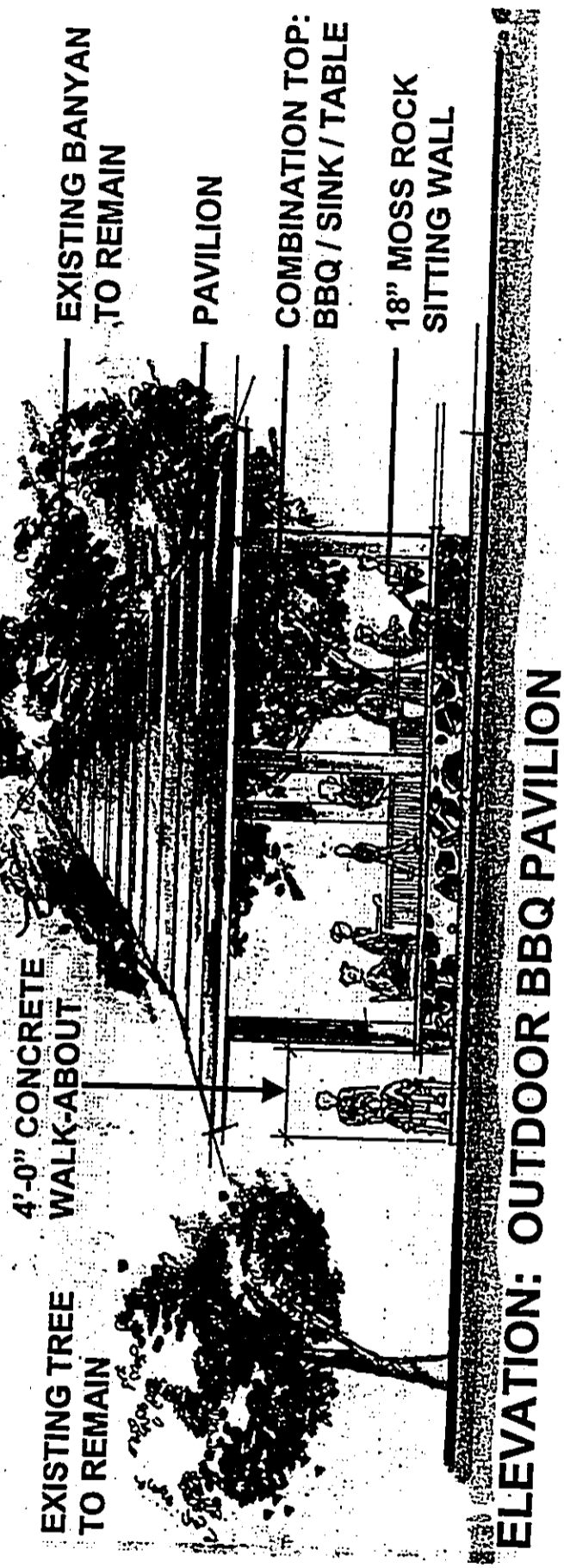


**SECTION: TERRACED AMPHITHEATER**

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**WALTERS, KIMURA, MOTODA, INC.**  
 Prepared by:  
**Wit Chee-Planning, Inc.**  
 Honolulu, Hawaii

**Figure 18**  
 Schematic site section at terraced amphitheater

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 Manoa Valley District Park Streambank Improvements  
 Honolulu, Hawaii



**ELEVATION: OUTDOOR BBQ PAVILION**

<p>Prepared For: WALTERS, KIMURA, MOTODA, INC.</p> <p>Prepared by: Wil Chee-Planning, Inc. Honolulu, Hawaii</p>	<p><b>Figure 19</b></p> <p><b>Schematic site section at BBQ pavilion</b></p>	<p>Environmental Assessment Ala Wai Canal Watershed Project Manoa Valley District Park Streambank Improvements Honolulu, Hawaii</p>
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10/10/10

**Appendix - A**  
Technical Reports

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AECOS No. 955A

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Aquatic resources survey  
for streamside improvements  
at Manoa Valley District Park  
on O`ahu

---



AECOS, Inc., 970 N. Kalaheo Ave., Suite C311  
Kailua, Hawai'i 96734

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# Aquatic resources survey for streamside improvements at Manoa Valley District Park on O`ahu<sup>1</sup>

---

October 10, 2000

AECOS No. 955A

AECOS, Inc. 970 N. Kalaheo Ave., Suite C311  
Kailua, Hawai'i 96734

Phone: (808) 254-5884 Fax: (808) 254-3029 Email: [guinther@aecos.com](mailto:guinther@aecos.com)

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## Introduction

The Manoa Stream Improvement Project involves bank stabilization, and flood risk and erosion reduction planning and implementation, aimed at improving the relationship between the stream and Manoa Valley District Park (also known as Manoa Valley Field), where the stream forms most of the eastern boundary of the Park. In essence, the existing banks along the stream would be reduced in slope and then landscaped with plantings and paved walkways.

## Methods

**Field Survey** — The field reconnaissance surveys for this report were conducted over several days between August 7 and August 10, 2000 by biologists Eric Guinther and Rodger Douglas. The survey area was defined as Manoa Stream from just above the pedestrian walkway bridge connecting the east end of Pawaina Street with Paumaka Place to the upper end of the concrete culvert structure at the southeast corner of the District Park (Figure 1)<sup>2</sup>. During our survey, the stream banks and bed were hiked along to identify both aquatic biota and riparian plants. Water samples were collected to characterize water quality in the project area. Finally, recording temperature devices were deployed and retrieved at selected locations. In addition

---

<sup>1</sup> Report prepared for Wil Chee Planning, Inc. for an environmental assessment entitled: "Manoa Stream Improvements" This report will become part of the public record.

<sup>2</sup> The location of the stream with respect to property boundaries (and its actual location) is highly inaccurate in this map as provided to us. We adjusted the stream's location where we knew it to be wrong, but in all cases the stream as depicted in Figure 1 is only approximate.

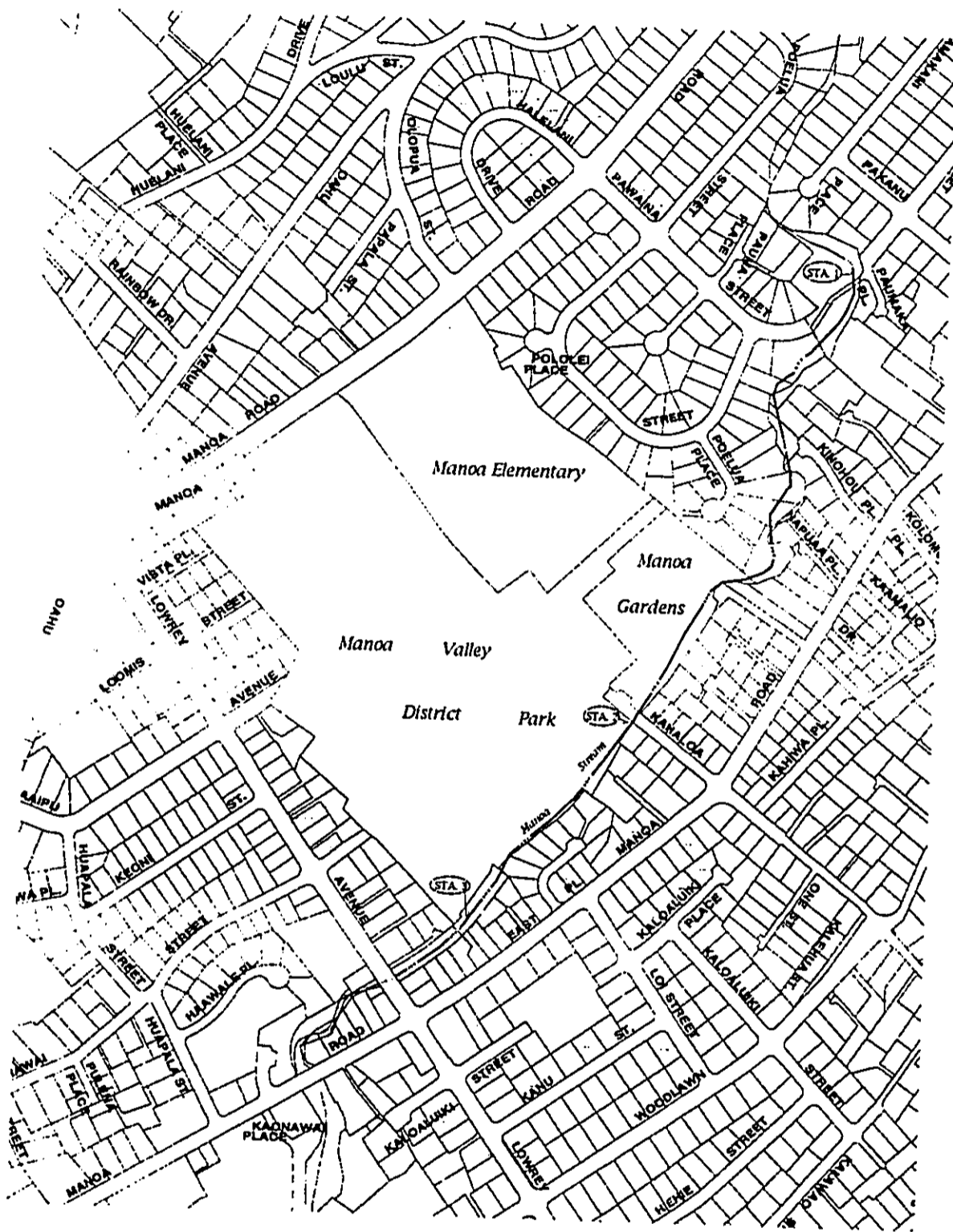


Figure 1. Map showing location of Manoa Stream, Manoa District Park, and 3 of 5 water quality sample locations in Manoa Valley, O`ahu.

to the project area, several other parts of Manoa Stream were visited to establish aquatic resource values existing downstream of the project. Specifically, observations and, in some cases, water quality measurements, were made close to bridges over Manoa Stream for Woodlawn Drive, Dole Street, and Kapiolani Boulevard.

**Biological Survey** — Our botanical survey attempts to list most of the vascular plants seen within or adjacent to the stream bed in the survey area and to provide rough estimates of relative abundance. Particular attention was paid to whether native plants were present, and especially listed species (CFR, 1999). The reader is cautioned, however, that a botanical survey conducted at a specific point in time is limited to discovering those plant species thriving at the time of the survey. Depending upon when the survey is conducted, some species present might be dormant. This is not a particularly serious problem for upper Manoa Valley which is generally wet, however it is to be expected that a survey conducted in the wet months or spring could reveal additional species in the same area simply not observed during our brief survey. Plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner, et al., 1990), except some non-naturalized species (e.g., ornamentals) that are named as they appear in Neal (1965) or horticultural sources. Fern names follow Wilson (1996).

Aquatic biota was sampled by direct observation and by using hand-nets. In general, conditions were excellent for this approach, with the exception that within the heavily shaded stream segment, observations of somewhat cryptic fishes was difficult due to low light levels. More intrusive sampling methods (fish poison, electric shocker, kick-seine) would likely reveal additional species not observed by us.

**Water Quality** — Water quality measurements were made in several locations (Figure 1), primarily to characterize the aquatic environment. With the exception of the recorded temperature (August 7-10), all measurements represent conditions at a single point in time and may not be representative of average conditions. At Station 1, water was collected from a pool one meter upstream of a concrete low-head dam (sewer or water pipe crossing) and a recording temperature device (Optic Stowaway recorders by Onset Computer Corporation) was setup here near the left bank in about 25 cm of water. Station 2 was located just downstream of the bridge on Kahaloa Drive, in the center of the project area. Station 3 (DO and temperature only) was located just upstream of the point where Manoa Stream enters a concrete lined channel near the southeast corner of the Park. Station 4 (DO and temperature only) was approximately 10 m upstream of the bridge at Woodlawn Drive. Station 5 was some 50 m downstream of the Dole Street bridge on the Campus of the University of Hawaii, collected off the right bank.



The methods pertaining to these water quality analyses are given in Table 1. All collected samples (assigned laboratory Log No. 13288) were returned to AECOS laboratory soon after collection and, either preserved or analyzed immediately as required by standard methodology for each analysis. Temperature and dissolved oxygen were measured with probes *in situ*.

Table 1. Analytical methods and instruments used for the August 7-10, 2000 sampling in Manoa Stream.

Analyses List	Method	Reference	Instrument
Ammonia	alkaline phenol	Koroleff in Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Conductivity	Method 2510B (EPA 120.1)	Standard Methods 18th Edition (1992)	Hydach pH/conductivity meter
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 57 DO meter
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
pH	EPA 150.1	EPA (1979)	Orion SA 250 pH meter / Ross combination electrode
Temperature	thermister calibrated to NBS cert. Thermometer (EPA 170.1)	EPA (1979)	YSI Model 57 DO meter
Total Nitrogen	persulfate digestion /EPA 353.2	D'Elia et al. (1977) / EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	persulfate digestion /EPA 365.1	Koroleff in Grasshoff et al. (1986) / EPA (1993)	Technicon AutoAnalyzer II
Total Suspended Solids (TSS)	Method 2540D (EPA 160.2)	Standard Methods 18th Edition (1992); EPA (1979)	Mettler H31 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 18th Edition (1992); EPA (1993)	Hach 2100P Turbidimeter

D'Elia, C.F., P.A. Stendler, & N. Corvin. 1977. *Limnol. Oceanogr.* 22(4): 760-764.

EPA. 1979. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency, EPA 600/4-79-020.

EPA. 1993. Methods for the Determination of Inorganic Substances in Environmental Samples. EPA 600/R-93/100.

EPA. 1994. Methods for Determination of Metals in Environmental Samples, Supplement 1. EPA/600/R-94/111. May 1994.

Grasshoff, K., M. Ehrhardt, & K. Kremling (eds). 1986. Methods of Seawater Analysis (2nd ed). Verlag Chemie, GmbH, Weinheim.

Standard Methods. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. 1992. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1100 p.

## Environment Description

The project location is approximately 4.4 km (2.75 mi) upstream of the mouth of Manoa Stream (at the Ala Wai Canal: State ID No. 3-3-07). At the time of the survey, in the project area, the stream itself was characterized by widths on the order of 3 to 10 m with good flow over a mostly basalt cobble and dark sand bed. Upstream of the park and opposite the Manoa Gardens development, the stream bed is

narrowest and incised into the valley floor between 3 and 4 m. This area is heavily vegetated with many large trees that form a closed canopy in most places. Yards of houses border the stream on both sides, and rock walls (loose or CRM) are present in some areas. Otherwise the banks are well covered by herbaceous plants under the tree canopy; the only exceptions being some places behind houses where the soil banks are too steep or too shaded to support other than a sparse growth of mosses, hornworts, and small ferns.

Conditions as described above extend to a low-head dam immediately upstream of the bridge for Kahaloa Drive, which marks the start of the segment within Manoa Valley District Park. Downstream of Kahaloa Drive, the stream is less incised into the valley floor (between 2 and 3 meters) and is substantially wider (bank full width is nearly 20 m across; active stream bed is up to 8 m or more). A small grove of Formosan koa (*Acacia confusa*) affords some afternoon shading to this segment, which is otherwise all grasses and ruderal weeds along the banks (riparian zone; Figure 2). The stream bed is a mixture of gravel, cobble, sand, and silt.



Figure 2. Looking downstream at segment of Manoa Stream (middle reach) within Manoa Valley District Park (on right bank).

Manoa Stream beyond the segment described above and pictured in Figure 2, is directed into a rather massive concrete-lined channel where the water is forced to spread out as a shallow sheet partially covering a smooth concrete bed confined between high vertical walls (Figure 3). This segment was not surveyed beyond the Park boundary, but appears to extend to East Manoa Road, where the stream bed is again one of natural bed materials.



Figure 3. Looking downstream in the concrete-lined channel opposite the southeast corner of Manoa Valley District Park (on right).

## Water Quality

Basic water quality measurements are useful for characterizing a stream reach, although measurements taken at a single point in time are of limited interpretive value unless combined with other measurements made at other times and under different conditions of flow and season. Nonetheless, these results tell us something about Manoa Stream in the project area at the time of the survey that can be useful to the project environmental assessment.

The results of our analyses on water quality samples obtained on August 7 are presented in Table 2. Results from three stream locations are presented: one above the project area (Station 1), one within the project area (Station 2), and one well downstream of the project area (Station 5 at the University of Hawaii, Manoa Campus); this latter station was intended to measure conditions where Manoa Stream flows out of Manoa Valley onto the coastal plain. Note that temperature and DO were measured at several points between uppermost Stations 1 and Station 5 on Manoa Stream at Dole Street on August 10.

Water quality at the two locations sampled near Manoa Valley District Park is generally consistent for most of the parameters measured. The pH is within normal range, perhaps slightly elevated by photosynthesizing algae. The dissolved oxygen (DO) values are high, close to saturation, probably also consequence of midday photosynthesis of benthic algae. Turbidity was low moderate. Conductivities were relatively low.

Table 2. Water quality characteristics of the middle reach of Manoa Stream from samples obtained August 7-10, 2000.

	Time	Temp. (°C)	pH	DO (mg/l)	DO Sat. (%)	Cond. (µmhos)	Turbidity (ntu)
Sta. 1	08-07-00 1400	24.5	7.7	7.68	92	143.0	6.82
	08-10-00 1215	23.4	--	7.9	93	--	--
Sta. 2	08-07-00 1435	24.8	7.7	7.91	96	145.2	7.90
Sta. 3	08-10-00 1150	23.0	--	12.4	145	--	--
Sta. 4	08-10-00 1140	25.4	--	11.7	143	--	--
Sta. 5	08-07-00 1510	24.9	7.9	7.37	89	152.8	17.6

		TSS (mg/l)	Ammonia (µg N/l)	Nitrate + nitrite (µg N/l)	Total N (µg N/l)	Total P (µg P/l)
Sta. 1	08-07-00 1400	5.3	4	98	253	30
	08-10-00 --	--	--	--	--	--
Sta. 2	08-07-00 1435	6.2	7	119	312	36
Sta. 3	08-10-00 --	--	--	--	--	--
Sta. 4	08-10-00 --	--	--	--	--	--
Sta. 5	08-07-00 1510	16	21	129	484	66

Downstream (at UH Manoa; Station 5) showed higher turbidity and total suspended solids (TSS) on this date, but otherwise had only slightly higher pH and conductivity and slightly lower DO. These differences may not mean much, except that some source of turbid water was possibly entering the stream above Dole Street at the time of the sampling. Note that on this date, oxygen saturation was close to 90% at all three water quality stations.

Nutrient (ammonia, nitrate, total nitrogen, and total phosphorus) results show a clear trend of increasing concentrations downstream, suggesting inputs are occurring from the urban watershed. High nutrient concentrations can promote nuisance algal growth in the stream and in nearshore waters (e.g. the Ala Wai channel and waters off Waikiki) if carried in the discharge at the coastline. With respect to nutrient concentrations, results obtained on August 7 suggest Manoa Stream is not in compliance with State of Hawaii, water quality standards (DOH, 1992).

An assessment of the spot temperatures taken during water quality sampling (Table 2) reveals additional information about water temperature in Manoa Stream. It is notable that the biggest jump in temperature occurs between Stations 3 and 4 where the riparian zone is mostly missing and the stream bed is smooth concrete. A 2.4 C° rise in temperature is shown over the distance between the upper end of the concrete-lined section (Station 4) and Woodland Drive (Station 5). The latter is some 250 m (800 ft) downstream of the fully channelized section and partly shaded, so some cooling may have occurred as the water moved between the concrete channel and Woodlawn Dr. The temperature measurement made at Dole Street on August 7 indicates water temperature is not as elevated as at Woodlawn Dr., the water cooling somewhat as it passes through the University of Hawaii, Manoa Campus.

Table 3. Summary of temperature (°C) data collected by recording probes setup at Station 1 (middle reach of Manoa Stream; S/N 270051) and lower reach of Manoa Stream (S/N 309026) for August 7-10, 2000.

RECORDING PROBE	MEAN ± STD. DEV.	MIN	MAX	N ~ (DAYS)
Manoa Stream (Sta. 1)	22.60 ± 0.75	21.8	24.7	281 ~ (4)
Manoa Stream (lower reach)	24.48 ± 1.99	22.2	29.0	275 ~ (4)

The results of recording water temperature at two locations in Manoa Stream are presented as a graph in Figure 4. These data are summarized in Table 3 (above).

Not surprisingly, the water temperature at Pawaina Street (water quality Station 1) is, on average, a couple of degrees (Celsius) cooler than the temperature downstream in urban Honolulu. The significant difference between the two locations, however, is in the maximum temperature reached each day: under 25 °C (77 °F) in the project area and 29.0 °C (84.2 °F) on both late afternoons recorded where recorded under the Kapiolani Blvd. viaduct.

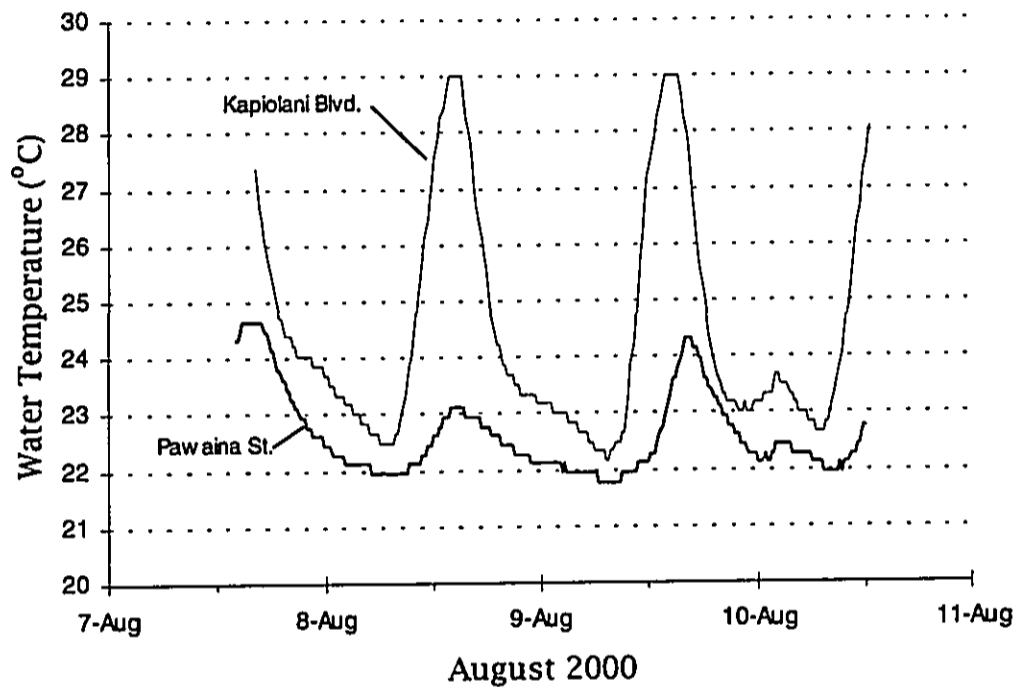


Figure 4. Temperature record for two locations in Manoa Stream over several days in August, 2000.

## Biological Survey

**Plants** — The riparian zone in the forested section of the survey area (essentially upstream of Kahaloa Drive) is dominated by large trees: albizia (*Paraserianthes flacataria*), macaranga (*Macaranga tanarius*), kukui (*Aleurites moluccana*), gunpowder tree (*Trema orientalis*), and monkey pod trees (*Samanea saman*) provide considerable shade all along the stream here. The understory is dominated by wedelia, white shrimp plant (*Justicia betonica*), umbrella sedge (*Cyperus alternifolius*), day-flower (*Commelina duffusa*), palm grass (*Setaria palmifolia*), and a variety of ornamental plants either planted here or escaped from adjacent gardens. Stands of giant bamboo (*Bambusa vulgaris*) occur in some yards bordering the

stream. In the stream bed, umbrella sedge and Job's tears (*Coix lachryma-jobi*) are conspicuous. One small area of hau (*Hibiscus tiliaceus*) was noted. A listing of all the species observed in this area is given as Table 4. Relative abundances are provided under the "forested riparian" (FR) column.

The open stream segment bordering the District Park is mostly characterized by grasses and herbaceous weeds on both sides of the stream (Figure 2). Formosan koa (*Acacia koa*), octopus tree (*Shefflera actinophylla*), satin leaf (*Chrysophyllum oliviforme*), and coral tree (*Erythrina* sp.) are planted in this part of the park (in addition to lawn grasses), with only the Formosan koa actually shading a part of the stream. Species from this open riparian zone in the survey area are listed in Table 4, with relative abundances indicated under the "open riparian/ruderal" (OR) column. Mostly found here is a variety of common, exotic ruderal weeds. Ruderal because this area appears to be maintained as an open field, and the stream banks are dominated by species that colonize disturbed sites (i.e., ruderal plant species).

In the more open area, the wetland grass, Job's tears, is again prominent, along with a number of weedy species occupying soil bars in the stream bed. At a point just before where the stream enters the concrete channel, there occurs several large beds of the grass-like aquatic plant, *Vallisneria* sp. A stringy green alga (*Cladophora* sp.) is also conspicuous in this unshaded part of the stream. Herbaceous vegetation in the stream bed must be periodically cut, removed, or sprayed with herbicide or species like Job's tears would otherwise rapidly overgrow this open area.

**Birds** — Several species of birds were observed during the riparian zone survey: common mynah (*Acridotheres tristis*), zebra dove (*Geopelia striata*), and common waxbill (*Estilda astrild astrild*) were most often seen. Red-whiskered bulbuls (*Pycnonotus jocosus*) were also present. A clutch of young ducks (probably *Anax platyrhynchos*) lives on the pond formed behind the low-head dam at Kahaloa Drive.

**Aquatic Animals** — A listing of the aquatic fauna of the middle reach of Manoa Stream is given in Table 5. Included in this table are our observations as well as animals reported in other studies but not observed by us, as indicated by the QC Code. Fishes are numerous in this part of Manoa Stream, but the fauna consists largely of poeciliids (top minnows) — introduced (that is, non-native) species that now dominate the biomass of nearly all streams on O`ahu. Most abundant here is the Mexican short-fin mollie (*Poecilia mexicana*). This fish is so adapted to the conditions in altered streams, that large numbers can be observed within the shallow sheet of water flowing through the concrete-lined channel at the downstream end of the project site. These fishes are feeding on algae and small insect larvae (mostly non-biting midges) that cover the wetted channel bottom. Larval toads (*Bufo marinus* tadpoles) are also numerous in this shallow water.

Table 4. Checklist of plants found along Manoa Stream in the vicinity of the District Park, central Manoa Valley, O`ahu.

Species	Common name	Status	ABUNDANCE		
			FR	AQ	OR
<b>MOSSES AND ALLIES</b>					
MUSCAE					
indet. moss	moss		O	O	--
ANTHOCEROTAE					
?Anthoceros sp.	hornwort		U	--	--
<b>FERNS</b>					
BLECHNACEAE					
<i>Blechnum occidentale</i> L.	hammock fern	nat.	R	--	--
LINDSAEACEAE					
<i>Odontosoria chinensis</i> (L.) J. Smth	lace fern, <i>pala`a</i>	ind.	--	--	R
NEPHROLEPIDACEAE					
<i>Nephrolepis</i> cf. <i>multiflora</i> (Roxburgh) Jarrett ex Morton	swordfern	nat.	O	--	--
POLYPODIACEAE					
<i>Phymatosorus grossus</i> (Langsd. & Fischer) Brownlie	<i>laua`e</i>	nat.	R	--	--
THELYPTERIDACEAE					
<i>Thelypteris</i> sp.	wood fern	nat.	U	--	--
<b>FLOWERING PLANTS</b>					
<b>DICOTYLEDONE</b>					
ACANTHACEAE					
<i>Justicia betonica</i> L.	white shrimp pant	nat.	AA	--	--
<i>Odontonema strictum</i> (Nees) Kuntze	odontonema	esc.	C	--	--
<i>Ruellia brittoniana</i> Backer	Mexican petunia	nat.	U	O	--
AMARANTHACEAE					
<i>Amaranthus spinosus</i> L.	spiny amaranth	nat.	U	--	O
<i>Amaranthus viridis</i> L.	slender amaranth	nat.	R	--	R
ANACARDIACEAE					
<i>Mangifera indica</i> L.	mango	nat.	U	--	--
APOCYNACEAE					
<i>Plumeria acuminata</i> Ait.	frangipani	orn.	R	--	--
ARALIACEAE					
<i>Schefflera actinophylla</i> (Endl.) Harms.	octopus tree	orn.	O	--	O
<i>Schinus terebinthifolius</i> Raddi	christmasberry	nat.	U	--	--
ASTERACEAE (COMPOSITAE)					
<i>Ageratum conyzoides</i> L.	<i>maile hohono</i>	nat.	R	--	R



Species	Common name	Status	ABUNDANCE		
			FR	AQ	OR
<b>ASTERACEAE (continued)</b>					
<i>Bidens pilosa</i> L.	ki	nat.	U	--	C
<i>Emilia fosbergii</i> Nicolson	Flora's paintbrush	nat.	--	--	O
<i>Pluchea symphytifolia</i> (Mill.) Gillis	sourbush	nat.	R	--	--
<i>Sonchus oleraceus</i> L.	sow thistle	nat.	--	--	U
<i>Wedelia trilobata</i> (L.) Hitchc.	wedelia	nat.	AA	--	O
<b>BALSAMINACEAE</b>					
<i>Impatiens wallerana</i> J. D. Kook.	busy-lizzy	nat.	R	--	--
<b>BEGONIACEAE</b>					
<i>Begonia hirtella</i>		esc.	R	--	--
<b>BRASSICACEAE</b>					
<i>Lobularia maritima</i> (L.) Desv.	sweet alysum	nat.	--	--	O
<b>BUDDLEIACEAE</b>					
<i>Buddleia asiatica</i> Lour.	dog tail	nat.	R	--	--
<b>CONVOLVULACEAE</b>					
<i>Ipomoea alba</i> L.	moon flower	nat.	U	--	--
<i>Ipomoea obscura</i> (L.) Ker-Gawl		nat.	O	--	U
<i>Merremia tuberosa</i> (L.) Rendle	wood rose	nat.	U	--	--
<b>CUCURBITACEAE</b>					
<i>Momordica charantia</i> L.	balsam apple	nat.	R	--	R
<b>EUPHORBIACEAE</b>					
<i>Aleurites moluccana</i> (L.) Willd.	kukui	pol.	O	--	--
<i>Chamaesyce hirta</i> (L.) Millsp.	garden spurge	nat.	--	--	U
<i>Chamaesyce hypericifolia</i> (L.) Millsp.	graceful spurge	nat.	O	--	C
<i>Macaranga tanarius</i> (L.) Müll Arg.		nat.	C	--	--
<i>Phyllanthus debilis</i> Klein ex Willd.	niruri	nat.	R	--	U
<b>FABACEAE</b>					
<i>Acacia confusa</i> Merr.	Formosan koa	orn.	--	--	U
<i>Cassia fistula</i> L.	golden shower	orn.	R	--	--
<i>Crotalaria incana</i> L.	fuzzy rattlepod	nat.	R	--	U
<i>Desmanthus virgatus</i> (L.) Willd.	virgate mimosa	nat.	R	--	--
<i>Erythrina</i> sp.	coral tree	orn.	--	--	U
<i>Indigofera spicata</i> Forssk.	creeping indigo	nat.	--	--	O
<i>Leucaena leucocephala</i> (Lam.) deWit	koa haole	nat.	U	--	U
<i>Macroptilium lathyroides</i> (L.) Urb.	cow pea	nat.	U	--	O
<i>Mimosa pudica</i> L.	sensitive plant	nat.	--	--	U
<i>Paraserianthes falcataria</i> (L.) I. Nielsen	albizia	nat.	O	--	--
<i>Samanea saman</i> (Jacq.) Merr.	monkeypod	nat.	U	--	--
<b>LYTHRACEAE</b>					
<i>Cuphea carthagenensis</i> (Jacq.) Macbr.	tarweed		R	--	R

Species	Common name	Status	ABUNDANCE		
			FR	AQ	OR
<b>MALVACEAE</b>					
<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon, <i>ma'o</i>	nat.	R	--	--
<i>Hibiscus tiliaceus</i> L.	<i>hau</i>	ind.	--	U	--
<b>MELASTOMATACEAE</b>					
<i>Clidemia hirta</i> (L.) D. Don	Koster's curse	nat.	R	--	--
<b>MORACEAE</b>					
<i>Ficus microcarpa</i> L. fil.	Chinese banyan	nat.	U	--	U
<b>MYRTACEAE</b>					
<i>Eugenia uniflora</i> L.	Surinam cherry	orn.	R	--	--
<i>Psidium guajava</i> L.	guava	nat.			
<i>Syzygium cuminii</i> (L.) Skeels	Java plum	nat.	O	--	U
<b>ONAGRACEAE</b>					
<i>Ludwigia octovalvis</i> (Jacq.) Raven	primrose willow	nat.	--	U	--
<b>PORTULACACEAE</b>					
<i>Portulaca oleracea</i> L.	pigweed	nat.	--	--	R
<b>RUBIACEAE</b>					
<i>Paederia scandens</i> (Lour.) Merr.	<i>maile pilau</i>	nat.	O	--	R
<b>SAPOTACEAE</b>					
<i>Chrysophyllum oliviforme</i> L.	satin leaf	nat.	--	--	R
<b>SOLANACEAE</b>					
<i>Lycopersicon esculentum</i> Mill.	cherry tomato	nat.	R	--	R
<i>Solanum americanum</i> Mill.	<i>popolo</i>	?ind	R	--	R
<i>Solanum seaforthianum</i> Andr.		nat.	U	--	R
<b>ULMACEAE</b>					
<i>Trema orientalis</i> (L.) Blume	gunpowder tree	nat.	U	--	--
<b>URTICACEAE</b>					
<i>Pilea microphylla</i> (L.) Liebm.	artillery plant	nat.	O	--	U
<b>VERBENACEAE</b>					
? <i>Verbena litoralis</i> Kunth	verbena	nat.	R	--	--
<b>MONOCOTYLEDONES</b>					
<b>ARACEAE</b>					
<i>Alocasia macrorrhiza</i> (L.) Schott.	<i>'ape</i>	pol.	O	R	--
? <i>Livistonia chinensis</i> (Jacq.) R. Br.	juv. fan palm	esc.	R	--	--
<i>Philodendron selloum</i> C. Koch		orn.	R	--	--
<i>Scindapsus aureus</i> (Lind. & Andre) Engl.	pothos, taro vive	nat.	O	--	--
<b>ARECACEAE</b>					
<i>Cocos nucifera</i> L.	<i>niu</i> , coconut palm	pol.	U	--	U
<i>Ptychosperma macarthuri</i> (Wendl.) Nichols.	Macarthur palm	esc.	R	--	--

Species	Common name	Status	ABUNDANCE		
			FR	AQ	OR
<b>COMMELINACEAE</b>					
<i>Commelina diffusa</i> Burm. f.	dayflower, <i>honohono</i>	nat.	A	A	O
<i>Dichorisandra thyrsiflora</i> Mikan	blue 'ginger'	esc.	U	--	--
<b>CYPERACEAE</b>					
<i>Cyperus alternifolius</i> L.	umbrella sedge	nat.	A	AA	--
<i>Cyperus rotundus</i> L.	nut sedge	nat.	--	--	R
<i>Kyllinga nemoralis</i> (Forst.) Dandy ex Hutch. & Dal.	<i>kili`o`opu</i>		O	--	--
<i>Pycnus polystachyos</i> (Rottb.) P. Beauv.			O	O	O
<b>HYDROCHARITACEAE</b>					
<i>Vallisneria</i> sp.		nat.	--	O	--
<b>HELICONIACEAE</b>					
<i>Heliconia</i> sp.	heliconia	orn.	O	--	--
<b>LILIACEAE</b>					
<i>Asparagus</i> sp.	asparagus 'fern'	esc.	--	--	R
<b>POACEAE (GRAMINEAE)</b>					
<i>Bambusa vulgaris</i> var. <i>auro-variagata</i>	golden-stemmed bamboo	orn.	O	--	--
<i>Chloris barbata</i> (L.) Sw.	swollen fingergrass	nat.	U	--	C
<i>Coix lachryma-jobi</i> L.	Job's tears	nat.	--	AA	--
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	nat.	C	--	--
<i>Digitaria ciliaris</i> (Retz.) Koeler	Henry's crabgrass	nat.	--	--	U
<i>Digitaria insularis</i> (L.)	sourgrass	nat.	R	--	R
<i>Echinochloa colona</i> (L.) Link	jungle rice	nat.	U	U	U
<i>Eleusine indica</i> (L.) Gartn.	wiregrass	nat.	R	--	R
<i>Eragrostis</i> sp.	lovegrass	nat.	--	--	R
<i>Leptochloa uninervia</i> (K. Presl.) Hitchc. & Chase	sprangletop	nat.	--	--	U
<i>Panicum maximum</i> Jacq.	Guinea grass	nat.	U	--	O
<i>Paspalum conjugatum</i> Bergius	Hilo grass	nat.	C	--	O
<i>Paspalum fimbriatum</i> Kunth	fimbriate paspalum	nat.	--	--	O
<i>Setaria palmifolia</i> (J. König) Stapf	palmgrass	nat.	O	--	U
<i>Setaria verticillata</i> (L.) P. Beauv.	bristly foxtail	nat.	--	--	R
indet. grass			R	--	--
<b>ZINGIBERACEAE</b>					
<i>Alpinia purpurata</i>	red ginger	orn.	O	--	--

## Legend to Table 4

Status =	distributional status
end. =	endemic; native to Hawaii and found naturally nowhere else.
esc. =	escaped; an ornamental (exotic) plant, appearing naturalized in this location; seeding naturally, and not tended by man, although not known to be naturalized in Hawai'i.
ind. =	indigenous; native to Hawaii, but not unique to the Hawaiian Islands.
nat. =	naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
orn. =	exotic, ornamental or cultivated; plant not naturalized (not well-established outside of cultivation); in this location, probably planted as a landscape element.

Table 4 (continued).

pol =	Polynesian introduction before 1778.
Abundance =	occurrence ratings for plants by section (as defined in text)
R - Rare -	only one or two plants seen.
U - Uncommon -	several to, at most, a dozen plants observed.
O - Occasional -	found regularly, but not abundant anywhere.
C - Common -	an important part of the vegetation and observed numerous times.
A - Abundant -	found in large numbers; may be locally dominant.
AA - Abundant -	abundant and dominant; a defining vegetation type.
P - Present -	noted just outside of study area; abundance not recorded.

Table 5. Checklist of aquatic fauna observed or previously reported from the middle reach Manoa Stream.

Species	Common name	Status	QC Code	Abundance
<b>INVERTEBRATES</b>				
(mollusks)				
MOLLUSCA, GASTROPODA				
THIARIDAE				
<i>Melanoides tuberculata</i> (Müller)	melanid snail	nat	10	A
MOLLUSCA, BIVALVIA				
CORBICULIDAE				
<i>Corbicula fluminea</i> Müller	Asiatic flume clam	nat.	10	A
ARTHROPODA, CRUSTACEA				
ATYIDAE				
<i>Atyoida bisulcata</i> Randall	'opae kala`ole	end.	11	C*
<i>Neocaridina denticulata sinensis</i> (de Haan)	Taiwan blue shrimp	nat.	21	C
CAMBARIDAE				
<i>Procambarus clarki</i> (Girard)	crayfish; crawdad	nat.	10	A
ARTHROPODA, INSECTA				
ODONATA, LIBULELLIDAE				
<i>Pantala flavescens</i> (Fabricius)	globe skimmer, adult	nat.	10	U
<b>VERTEBRATES</b>				
(fishes)				
VERTEBRATA, PISCES				
CYPRINIDAE				
<i>Cyprinus carpio</i> L.	carp	nat.	11	R
GOBIIDAE				
<i>Awaous stamineus</i> (Eyedouxi & Souleyet)	'o`opu nakea	ind.	10	R
LORICARIIDAE				
<i>Ancistrus cf. temminckii</i>	bristle-nosed catfish	nat.	10	U
POECILIIDAE				
<i>Gambusia affinis</i> (Baird & Girard)	mosquitofish	nat.	20	U
<i>Poecilia mexicana</i> (Steindachner)	Mexican mollie	nat	10	A
<i>Pecilia reticulata</i> Peters	guppy, rainbow fish	nat.	10	C
<i>Xiphophorus helleri</i> Heckel	green swordtail	nat.	10	U
VERTEBRATA, AMPHIBIA				
BUFONIDAE				
<i>Bufo marinus</i>	marine toad, tadpole	nat.	10	A
RANIDAE				
<i>Rana catesbeiana</i> Shaw	bullfrog, tadpole	nat.	10	C

Table 5 (continued).

## KEY TO SYMBOLS USED:

## Status:

nat. - naturalized. An introduced or exotic species.

ind. - indigenous. A native species also found elsewhere in the Pacific.

end. - endemic - A native species found only in the Hawaiian Islands.

## QC Code:

10 - Observed in the field by aquatic biologist on August 7-10, 2000.

11 - Reported in Timbol and Maciolek (1978) for upper Manoa Valley.

20 - Collected; identified in the laboratory; specimen(s) not saved.

21 - Collected; identified in the laboratory; voucher specimen(s) saved.

## Abundance categories:

R - Rare - only one or two individuals seen.

U - Uncommon - several to a dozen individuals observed.

C - Common - Seen everywhere, although generally not in large numbers.

A - Abundant - found in large numbers and widely distributed.

P - Present - noted as occurring, but quantitative information lacking.

\* - Abundance in 1978.

Present in somewhat lesser abundance in the stream are guppies (*P. reticulata*) and swordtails (*Xiphophorus helleri*). Also caught in our hand nets or observed in the water were armored catfish (*Ancistrus* cf. *temmineckii*), mosquitofish (*Gambusia affinis*), and native 'o'opu nakea (*Awaous stamineus*). None of the latter three species was abundant. The fact that armored catfish were not very common is somewhat unusual, as these exotic fishes tend to become very abundant once established. Both *Ancistrus* sp. and another armored catfish species (*Hypostomus* sp.) were observed to be moderately abundant in Manoa Stream at Kapiolani Blvd.

Both the relatively recently introduced atyid shrimp, *Neocaridina denticulata*, and the snail, *Melanoides tuberculata*, were abundant in the project area, seemingly more so in the open reach than in the forested reach. Timbol and Maciolek (1978) reported the native atyid (*Atyoida bisulcata*) as common in Manoa Stream at a location upstream of the project area. While this latter species may still be in upper Manoa Stream, the presence of large numbers of an exotic atyid might also indicate that native atyids are now rare or absent here.

**Listed Species** — A total of 96 different plant species have been identified from the survey area (Table 4). Of these only 6 species (6 %) are considered native (indigenous, endemic, or of early Polynesian introduction). None is a listed species or otherwise considered of special concern to any government agency. The only native aquatic species recorded by us in the project area was a goby ('o'opu nakea). No aquatic species listed as endangered, threatened, proposed or as a candidate species by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973 as amended (ESA), or by the State of Hawai'i under its endangered species

program (State DLNR, 1996; CFR, 1999; Federal Register 1999) were detected during the course of our survey. The most likely "listed" species to occur in the surveyed environments is the black-crowned night heron. This species is listed as "indigenous" under State of Hawaii, Administrative Rules (State DLNR, 1996) and is thus protected from hunting, capture, or export (HAR §13-124-3(a)).

## Impacts of the Project on the Aquatic Environment

Stream Bank Improvements — This project entails some grubbing and substantial grading of slopes that are part of or directly adjacent to Manoa Stream. Ultimately, the right bank of the stream from Kahaloa Drive to near the upper end of the concrete-lined channel would be altered to a more gently sloping surface and landscaped with trees and pathways. The primary purpose is to create a park setting that incorporates rather than excludes Manoa Stream. The long term benefit of this approach from an environmental perspective is tremendous and certainly far outweighs any adverse water quality problems that might attend construction so close to the stream. Standard BMPs could be employed to minimize runoff of soil into the stream if rains occur during the construction period, or anytime up until vegetation cover is established on the new surfaces.

The addition of trees to the riparian zone in this area will also provide habitat improvement and should reduce stream bed maintenance requirements within the now very open reach bordering the District Park. Because the levy is being pulled back, trees in the new riparian zone will not contribute to flood problems up or down stream as long as the trees themselves are regularly trimmed of dead branches and maintained in a healthy state.

Existing Concrete Channel — This engineered channel is an excellent example of the worst environmental treatment that could be given to stream habitat in an urban setting. Termed a "Type 1" stream modification in Timbol and Maciolek (1978), this structure serves only the purpose of moving water quickly through the area (thus it satisfies flood control concerns), while excluding both aquatic life and humans from any use or enjoyment of a potentially valuable environmental resource. The massive size of this structure suggests that a considerable safety factor for water flow was applied to its design. Thus, it might well be a good candidate for considering an alternative bed treatment to support a more natural aquatic/riparian ecosystem. This could be accomplished without removing the side walls, which would likely never come down anyway without removing residences along the channel.

Jurisdictions — Several jurisdictions apply to stream sites that must be considered in relation to the proposed project. Streams and wetlands come under

the jurisdiction of the federal government, administered by the U.S. Army Corps of Engineers (Corps), as well as the State of Hawaii, notably the Department of Land and Natural Resources (stream channel alteration) and the Department of Health (water quality issues).

The U.S. Army (DA) regulates dredging and fill in waters of the United States (as defined at 33 CFR 328) under both the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and the Clean Water Act, Section 404 (33 U.S.C. 1344). Manoa Stream within the project area is not a palustrine wetland, but a riverine system regarded as waters of the U.S. between the jurisdictional stream banks (a line on each bank known as the *Ordinary High Water mark* or OHW; 33 CFR 323). The OHW mark is difficult to establish with any certainty at this location because the banks are artificial levees and both vegetation and debris tend to be maintained (the slopes are mowed). Immediately downstream, the bank is a vertical concrete wall. Consequently, there is unlikely to be any "natural" line on the existing banks to providing guidance for a jurisdictional determination. However, the project does not include placement of fill, nor is any dredging proposed within the stream itself. What is proposed is to pull back the artificial bank. This might or might not involve a small portion of the jurisdictional boundary, possibly even expanding the stream cross-section within the OHW marks. Although our conclusion would be, that under these circumstances, a DA permit is not required, only the local Corps District can make this decision.

The State of Hawaii also regulates construction within streams. State jurisdiction is established by definitions similar to those of the Corps, although less specific with regard to the boundary establishing the upper limit of the banks of a stream; see Hawaii Administrative Rules (HAR) §13-167. This project does not entail any alteration of the stream bed or diversion of the stream course, and would not require a Stream Channel Alteration Permit (SCAP; HRS, Sec. 174C-93, et seq.). The project does have some potential, during the construction phase, to impact on stream water quality. Therefore, project plans should be reviewed by the Department of Health to establish if an NPDES permit as defined under HAR §11-55 is required. If the area of disturbance by land grading is under 5-acres in area, an NPDES storm water associated permit would likely not be required (HAR §11-55, App. C).

### Literature Cited

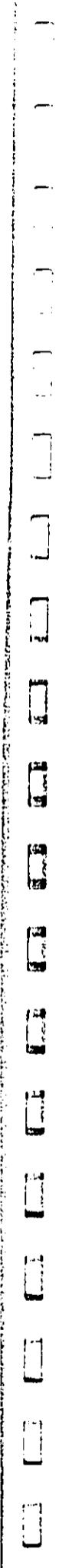
Code of Federal Regulations (CFR). 1999. Title 50 - Wildlife and Fisheries, Part 17 - Endangered and Threatened Wildlife and Plants, Subpart B - Lists. 50 CFR §17.11 and §17.12. U.S. Government Printing Office. 37 pp. (Also URL: <http://endangered.fws.gov>).

- Federal Register. 1999. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions. *Federal Register*, 64 (205 (Monday, October 25, 1999)): 57534-57547.
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10/10/10

**Appendix - B**  
Correspondence,  
Comments & Responses



**ERNEST K. HIRATA & ASSOCIATES, INC.**

99-1433 Koaha Place • Aiea, Hawaii 96701-3279

Phone: (808) 486-0787 • Fax: (808) 486-0870  
E-mail: eha@aloha.net

**FAX MEMORANDUM**

**TO:** Irvin Higashi  
Walters Kimura Motoda Inc.  
FAX 739-5595

December 21, 1999  
W.O. 99-3243

**FROM:** Con Truong *CT*

**RE:** Preliminary Findings & Recommendations  
Ala Wai Canal Watershed - Manoa Stream Improvements

Our fieldwork for the subject project was completed on November 22, 1999. Three exploratory test borings were drilled on top of the stream bank to depths of about 18.5 feet. Attached are draft copies of the boring logs and boring location plan.

The surface soil encountered in our borings consisted of dark brown and dark grayish brown silty clay. The soil was in a stiff condition and extended to depths ranging from about 8 to 10 feet. Underlying the silty clay was mottled brown clayey silt mixed with sand, gravel, cobbles, and boulders. The clayey silt was in a medium stiff to stiff condition extending down to the maximum depths drilled. Groundwater was encountered in our borings at depths of about 11.8 to 14.8 feet.

Although from the geotechnical viewpoint, the stream bank should be stable at existing slope gradient of approximate 1:1 (horizontal to vertical), we understand that a much flatter slope gradient is being considered for erosion control purposes. Based on our exploratory borings, we believe that excavations into the surface silty clay can be accomplished using conventional earth moving equipment.

Please feel free to call if you have any questions.

fc: Jon Nishimura - Fukunaga & Associates  
Fax 946-9339

cc: Boring Logs, Plates B1 through B3  
Boring Location Plan (reduced scale), Plate 2

**ERNEST K. HIRATA & ASSOCIATES, INC.**  
 Geotechnical Engineering

**BORING LOG**

W.O. 99-3243

BORING NO. 83 DRIVING WT. 140 lb. DATE OF DRILLING 11/22/99  
 SURFACE ELEV. 169± DROP 30 in. WATER LEVEL @ 11.8 feet

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CH-MH) - Dark brown, moist, stiff.
5	[Hatched Box]	<input type="checkbox"/>	28	87	31	Siltier from 4 feet.
		<input type="checkbox"/>	30	74	39	
10	[Vertical Lines]	<input type="checkbox"/>	28	101	27	Clayey SILT (MH) - Mottled brown, moist, stiff, with weathered sand, gravel, cobbles, and boulders.
15		<input type="checkbox"/>	21	92	31	
		<input type="checkbox"/>	53	92	31	
20						End boring at 18.5 feet.
25						
30						

**DRAFT**

**ERNEST K. HIRATA & ASSOCIATES, INC.**  
 Geotechnical Engineering

**BORING LOG**

W.O. 99-3243

BORING NO. 82 DRIVING WT. 140 lb. DATE OF DRILLING 11/22/99  
 SURFACE ELEV. 171± DROP 30 in. WATER LEVEL @ 12 feet

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						
5		<input type="checkbox"/>	20	83	33	Silty CLAY (CH-MH) - Dark brown, moist, stiff.  Siltier, with sand, medium stiff to stiff from 3 feet.
		<input type="checkbox"/>	14	76	30	
		<input type="checkbox"/>	13	79	38	
10						Clayey SILT (MH) - Mottled brown, moist, stiff, with weathered sand, gravel, cobbles, and boulders.
15		<input type="checkbox"/>	33	93	34	
		<input type="checkbox"/>	34	113	25	
20						Increase in gravel and cobble content 17 feet.
25						End boring at 18.5 feet.
30						

**DRAFT**

**ERNEST K. HIRATA & ASSOCIATES, INC.**  
Geotechnical Engineering

**DRAFT**

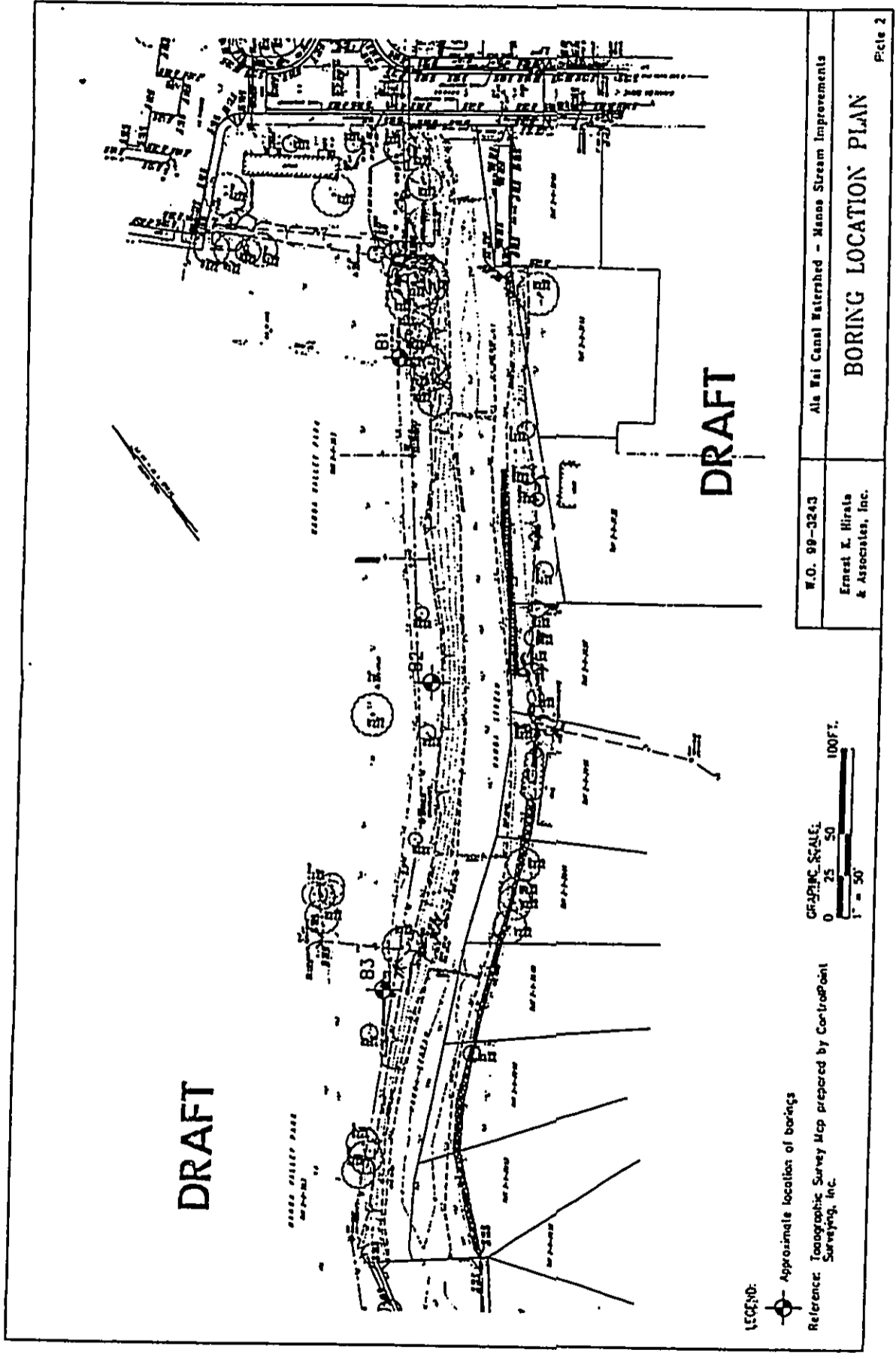
**BORING LOG**

BORING NO. B1 DRIVING WT. 140 lb. W.O. 99-3243  
 SURFACE ELEV. 173±\* DROP 30 in. DATE OF DRILLING 11/22/99  
 WATER LEVEL @ 14.8 feet

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						
5			33	73	42	Silty CLAY (CH-MH) - Dark brown, moist, stiff.  Dark grayish brown color from 4 feet.
			40	79	43	
10			55	79	43	
15			21	66	49	Clayey SILT (MH) - Mottled brown, moist, medium stiff to stiff, with weathered sand, gravel, cobbles, and boulders.
20			6	81	56	
25						
30						

\* Elevations based on Topographic Survey Map prepared by ControlPoint, Inc., dated November 21, 1999.

DOCUMENT CAPTURED AS RECEIVED



W.O. 99-3243  
 Ernest K. Hirstle  
 & Associates, Inc.

GRAPHIC SCALE  
 0 25 50 100 FT.  
 1" = 50'

LEGEND:  
 ○ Approximate location of borings  
 Reference: Topographic Survey Map prepared by ControlPoint  
 Surveying, Inc.

**BORING LOCATION PLAN**

File 2

**DRAFT**

**DRAFT**



DEPARTMENT OF THE ARMY  
U. S. ARMY ENGINEER DISTRICT, HONOLULU  
FT. SHAFTER, HAWAII 96860-4405

ONLY TO  
ATTENTION OF

September 7, 2000

Regulatory Branch

**COPY**

Mr. Gary O.L. Yee, AIA  
Director  
Department of Design and Construction  
City and County of Honolulu  
650 South King Street, 11th Floor  
Honolulu, Hawaii 96813

Dear Mr. Yee:

This letter responds to your request for a review of the draft environmental assessment for the Ala Wai Canal Watershed Project, Manoa Valley District Park Streambank Improvements project. A Department of the Army permit will likely be required for this project since it appears there will be a discharge of dredged or fill material into Manoa Stream, which is a water of the United States.

If you have any questions concerning this determination, please contact William Lennan of my staff at 438-6986 or FAX 438-4060, and reference File No. 200000323.

Sincerely,

*George P. Young*  
George P. Young, P.E.  
Chief, Regulatory Branch

Copy Furnished:

Office of Environmental Quality Control, 235 S. Beretania St., State Office Tower, Suite 702, Honolulu, HI 96813  
Walters, Kimura, Motoda, Inc., 1148 Third Ave., Honolulu, HI 96816, ATTN: Irvin Higashi



WFL OFFICE - PLANNING, INC.

October 11, 2000

Mr. George P. Young, P.E.  
Department of the Army  
U.S. Army Engineer District, Honolulu  
Ft. Shafter, Hawaii 968

Dear Mr. Kippen:

Subject: Draft Environmental Assessment (DEA) for  
ALA WAI CANAL WATERSHED PROJECT  
Manoa Valley District Park Streambank Improvements

On behalf of the Department of Design and Construction and prime design contractor Walters, Kimura, Motoda, Inc., thank you for reviewing the DEA for the subject project. This letter is in response to your letter of September 7, 2000, to Gary O.L. Yee, in which you state that "A department of the Army permit will likely be required for this project since it appears there will be a discharge of dredged or fill material into Manoa Stream, which is a water of the United States."

In a telephone conversation between Mr. William Lennan of your staff and myself regarding this determination, the following points were discussed.

1. Mr. Lennan pointed out that Figure 8 of the DEA shows an area of fill in the site section cut through station 2+00. He added that any project which adds material to a stream bed triggers the need for an Army Corps of Engineers (ACE) permit. I replied that the fill shown was an error in translating the civil engineer's drawings into the section shown in Figure 8. The intent of the project is to NOT add fill material to the stream bed. Figure 8 has been corrected in the Final Environmental Assessment (FEA) to remove the filled section shown in the DEA. This revised figure is attached for your information.
2. Mr. Lennan also mentioned that the existence of wetlands in the project area would trigger the need for an ACOE permit, and that wetlands were not specifically mentioned in the DEA. Subsequently, AECOS, Inc., the ecological consultant that prepared the aquatic resources survey for the project was consulted regarding the existence of wetlands. They have added a statement in their report that will be included in the FEA, that wetlands, as defined by ACOE, do not exist at the project site. This statement is attached for your information.

Given the above discussion and our responses, we request that your determination for an ACOE permit be reconsidered. Should any additional information be required to make this determination, please do not hesitate to call me at 855-6088.

Thank you for your time and interest in the project.  
Sincerely,

*Richard S. McGarrow*  
Richard S. McGarrow  
Senior Planner

Attachments:

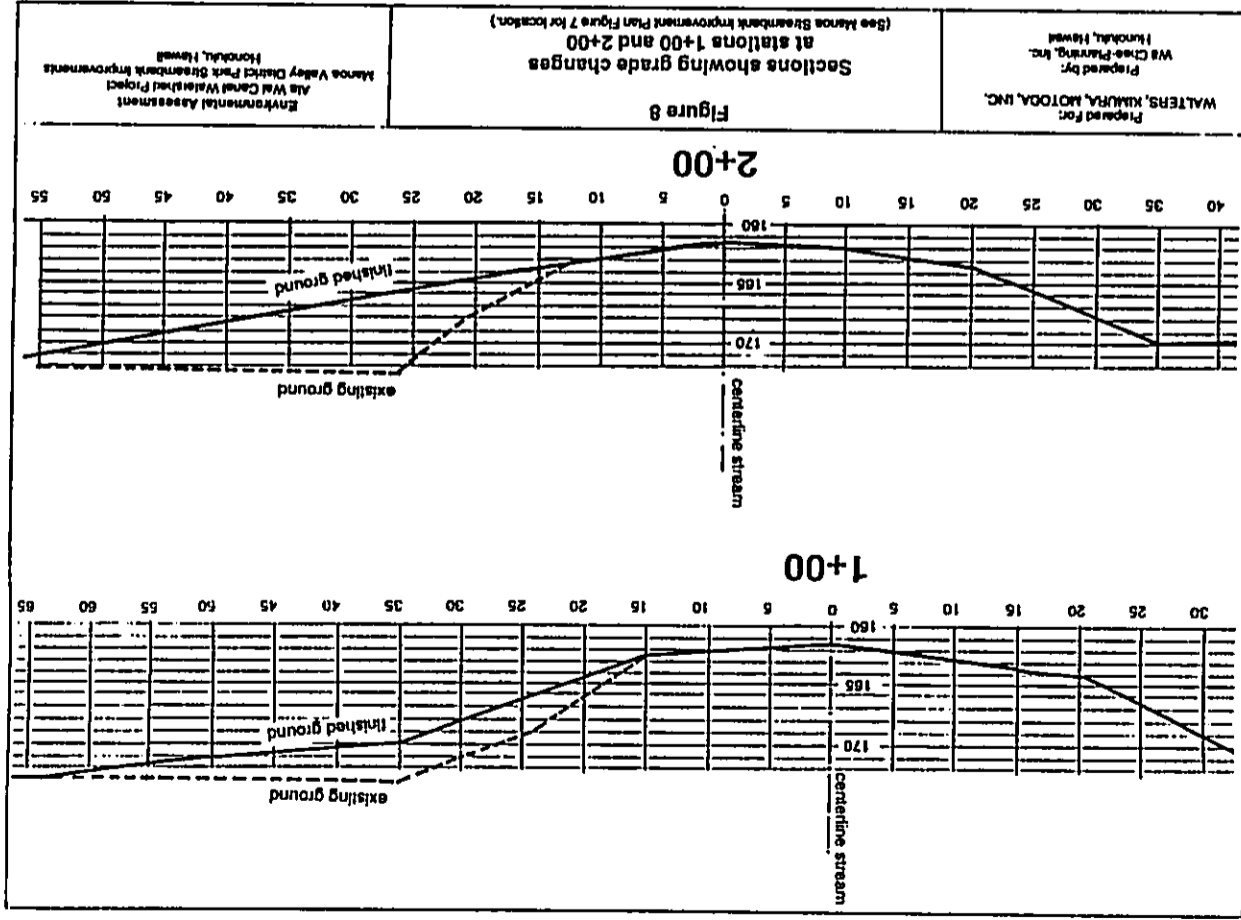
the jurisdiction of the federal government, administered by the U.S. Army Corps of Engineers (Corps), as well as the State of Hawaii, notably the Department of Land and Natural Resources (stream channel alteration) and the Department of Health (water quality issues).

The U.S. Army (DA) regulates dredging and fill in waters of the United States (as defined at 33 CFR 328) under both the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and the Clean Water Act, Section 404 (33 U.S.C. 1344). Manoa Stream within the project area is not a palustrine wetland, but a riverine system regarded as waters of the U.S. between the jurisdictional stream banks (a line on each bank known as the Ordinary High Water mark or OHW; 33 CFR 323). The OHW mark is difficult to establish with any certainty at this location because the banks are artificial levees and both vegetation and debris tend to be maintained (the slopes are mowed). Immediately downstream, the bank is a vertical concrete wall. Consequently, there is unlikely to be any "natural" line on the existing banks to providing guidance for a jurisdictional determination. However, the project does not include placement of fill, nor is any dredging proposed within the stream itself. What is proposed is to pull back the artificial bank. This might or might not involve a small portion of the jurisdictional boundary, possibly even expanding the stream cross-section within the OHW marks. Although our conclusion would be, that under these circumstances, a DA permit is not required, only the local Corps District can make this decision.

The State of Hawaii also regulates construction within streams. State jurisdiction is established by definitions similar to those of the Corps, although less specific with regard to the boundary establishing the upper limit of the banks of a stream: see Hawaii Administrative Rules (HAR) §13-167. This project does not entail any alteration of the stream bed or diversion of the stream course, and would not require a Stream Channel Alteration Permit (SCAP; HRS, Sec. 174C-93, et seq.). The project does have some potential, during the construction phase, to impact on stream water quality. Therefore, project plans should be reviewed by the Department of Health to establish if an NPDES permit as defined under HAR §11-55 is required. If the area of disturbance by land grading is under 5-acres in area, an NPDES storm water associated permit would likely not be required (HAR §11-55, App. C).

Literature Cited

Code of Federal Regulations (CFR), 1999, Title 50 - Wildlife and Fisheries, Part 17 - Endangered and Threatened Wildlife and Plants, Subpart B - Lists, 50 CFR §17.11 and §17.12, U.S. Government Printing Office, 37 pp. (Also URL: <http://endangered.fws.gov>).





Oct 10 00 02:49p

State of Hawaii - DEQC

(808) 586-4186

P.1

BENJAMIN J. CAYETANO  
DIRECTOR



CHRISTIEVE SALMONSON  
DIRECTOR

STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

24 SOUTH BERTHOUD STREET  
SUITE 702  
HONOLULU, HAWAII 96813  
TELEPHONE (808) 586-4186  
FACSIMILE (808) 586-4185

October 6, 2000

Mr. Gregory Sue  
Department of Design and Construction  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Sue:

We have reviewed the Draft Environmental Assessment for the Ala Wai Canal Watershed Project - Manoa Valley District Park Streambank Improvements, Tax Map Key 2-09-363 Honolulu. We submit the following comments for your response and consideration.

1. **CULTURAL IMPACT ASSESSMENT GUIDELINES:** The DEA describes and discusses impacts to historical and archaeological resources. Please find enclosed a copy of Act 50, Section Laws of Hawaii '12, Hawaii Administrative Rules) in relation to their proposed actions. Please provide an analysis of significance under the sections entitled "Findings and Reasons Supporting Expected Determination." An example analysis is attached for your use.
2. **ANALYSIS OF SIGNIFICANCE:** We have been asking all applicants both private and government to provide an objective and non-self-serving analysis of the 13 significance criteria (see Section 11-200-12, Hawaii Administrative Rules) in relation to their proposed actions. Please provide an analysis of significance under the sections entitled "Findings and Reasons Supporting Expected Determination." An example analysis is attached for your use.
3. **OFFICE OF HAWAIIAN AFFAIRS:** Please consult the Office of Hawaiian Affairs.
4. **RELATIONSHIP TO ALA WAI WATERSHED WATER QUALITY IMPROVEMENT PROJECT:** Please discuss the relationship of the Ala Wai Watershed Water Quality Improvement Project to the current project. Please discuss any impacts of the water quality improvement project on the present project.

Again we thank you for the opportunity to comment. If there are any questions, please call me or Leslie Segundo at (808) 586-4185.

Sincerely,

CHRISTIEVE SALMONSON  
Director

c Irving Higashi, Walters, Kimura, Mowda, Inc.



WILSON - PLANNING, INC.

October 11, 2000

Ms. Genevieve Salmonson, Director  
Office of Environmental Quality Control (OEQC)  
State of Hawaii  
235 South Beretania Street, Suite 702  
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: Draft Environmental Assessment (DEA) for  
ALA WAI CANAL WATERSHED PROJECT  
Manoa Valley District Park Streambank Improvements.

On behalf of the Department of Design and Construction and prime design contractor Waiters, Kimura, Motoda, Inc., thank you for reviewing the DEA for the subject project. Your comments in *italics* and our responses to your letter of October 6, 2000, to Gregory Sue are listed below.

1. **CULTURAL IMPACT ASSESSMENT GUIDELINES:** *The DEA describes and discusses impacts to historical and archaeological resources. Please find enclosed a copy of Act 50, Session Laws of Hawaii 2000, which requires that actions need to assess cultural impacts. Also enclosed is a copy of the Cultural Impact Assessment Guidelines issued by the environmental council to assist you in your analysis.*

Thank you for providing the Cultural Impact Assessment Guidelines. As discussed with Mr. Leslie Segundo of your office, we will not need to provide a separate document for cultural impact assessment for this project, but we have included discussions of cultural resources and impacts in sections 3.9 and 4.9 of the Final Environmental Assessment (FEA).

2. **ANALYSIS OF SIGNIFICANCE:** *We have been asking all applicants both private and government, to provide an objective and non-self-serving analysis of the 13 significance criteria (see Section 11-200-12, Hawaii Administrative Rules) in relation to their proposed actions. Please provide an analysis of significance under the section entitled "Findings and Reasons Supporting Expected Determination." An example analysis is attached for your use.*

Thank you for the example analysis. We have added to the FEA subsection 6.1 that lists and discusses the subject project in terms of the thirteen significance criteria.

3. **OFFICE OF HAWAIIAN AFFAIRS:** *Please consult the Office of Hawaiian Affairs.*

We have attempted to consult OHA several times by phone since receiving their comment letter, however, none of our messages were returned. We were able to obtain information concerning cultural resources and impacts from Manoa Neighborhood Board No. 7.

4. **RELATIONSHIP TO ALA WAI WATERSHED WATER QUALITY IMPROVEMENT PROJECT:** *Please discuss the relationship of the Ala Wai Watershed Water Quality Improvement Project to the current project. Please discuss any impacts of the water quality improvement project on the present project.*

We have added a discussion of the relationship between the Ala Wai Watershed Water Quality Improvement Project and the subject project in Section 1.1 of the FEA.

OEQC  
10/11/00  
Page 2

Thank you for your time and interest in the project.

Sincerely,

Richard S. McGerrow  
Senior Planner

Lead Use Planners and Environmental Consultant

WUSA Center • 1400 Kalia Street • Suite 612 • Honolulu, Hawaii 96813 • Fax 808-535-8111 • Fax 808-512-1531 • E-Mail wcp@wusa.net

Sent By: WALTERS, KIMURA, MOTODA, INC.; 808 739 5595;  
SEP-29-2000 13:59 DOC-11E  
PHONE (808) 594-1688

Sep-29-00 2:37PM; 808 527 6183 P.82  
FAX (808) 594-1868

Sent By: WALTERS, KIMURA, MOTODA, INC.; 808 739 5595;  
SEP-29-2000 13:59 DOC-11E

Sep-29-00 2:37PM; 808 527 6183 P.83



RECEIVED

SEP 19 12 12 PM '00  
OFFICE OF HAWAIIAN AFFAIRS  
711 KAPULANI BOULEVARD, SUITE 600  
HONOLULU, HAWAII 96813

SEP 19 2000  
041133

Mr. Gregory Sue  
September 6, 2000  
Page 2

September 6, 2000

If you have any questions, please contact Ken R. Salva Cruz, Policy Analyst, at 594-1847.

Department of Design and Construction  
City & County of Honolulu  
650 South King Street, 11th Floor  
Honolulu, Hawaii 96813  
Attn: Gregory Sue

EIS# 424

Subject: Draft Environmental Assessment for the Ala Wai Canal Watershed  
Project, Manoa Valley District Park Streambank Improvements  
TMC: 2-09-36: 03

Dear Mr. Sue,

Thank you for the opportunity to review and respond to the above-referenced document. As with any project, the Office of Hawaiian Affairs is concerned that subsurface archaeological, historical, and cultural remains may be impacted as well as the cultural integrity of the land.

We have the following comments to offer:

- Effective April 26, 2000, Governor Cayetano signed into law Act 50 (HB 2895, HD1) requiring a cultural impact statement as part of all environmental assessments. Please include one in the Final EA.
- This DEA states: "A review of the National and Hawaii Registers of Historic Places and site inspections conducted indicates that there are no natural or man-made historical or archaeological resources known to exist on the project site." While this may be true, the possibility exists that subsurface remains may be present. Was an archaeological survey done for this area?
- We suggest having an archaeological monitor present during construction.
- We are relying on your commitment to notify the appropriate agencies should inadvertent discoveries be made during construction.

Sincerely,

*Colin C. Klippen, Jr.*  
Colin C. Klippen, Jr.  
Deputy Administrator

cc: Board of Trustees  
Walters, Kimura, Motoda, Inc.  
OEOC  
File



WDEE - PLANNING, INC.

October 11, 2000

Mr. Colin C. Kippen, Jr., Deputy Administrator  
Office of Hawaiian Affairs,  
State of Hawaii  
711 Kapiolani Boulevard, Suite 500  
Honolulu, Hawaii 96813

Dear Mr. Kippen:

Subject: Draft Environmental Assessment (DEA) for  
ALA WAI CANAL WATERSHED PROJECT  
Manoa Valley District Park Streambank Improvements

On behalf of the Department of Design and Construction and prime design contractor Walters, Kimura, Mobda, Inc., thank you for reviewing the DEA for the subject project. Your comments in italics and our responses to your letter of September 6, 2000, to Gregory Sue are listed below.

1. *Effective April 26, 2000, Governor Cayetano signed into law Act 50 (HB 2895, HD1) requiring a cultural impact statement as part of all environmental assessments. Please include one in the Final EA.*

Your information on Act 50 is acknowledged. We have added discussions of cultural resources and impacts in sections 3.9 and 4.9 of the Final Environmental Assessment (FEA).

2. *This DEA states: "A review of the National and Hawaii Registers of Historic Places and site inspections conducted indicate that there are no natural or man-made historical or archaeological resources known to exist on the project site." While this may be true, the possibility exists that subsurface remains may be present. Was an archaeological survey done for this area?*

We concur that the possibility exists that subsurface remains may be present. In section 4.9 of the FEA mitigation measures are proposed in the event of discovery of such remains during construction. An archaeological survey was not done in this area.


3. *We suggest having an archaeological monitor present during construction.*  
Your suggestion is acknowledged.

4. *We are relying on your commitment to notify the appropriate agencies should inadvertent discoveries be made during construction.*

Notification of the appropriate agencies when inadvertent discoveries are made is standard practice on all City & County of Honolulu construction projects.

Thank you for your time and interest in the project.

Sincerely,

  
Richard S. McGerrow  
Senior Planner

WDEE Center - 1188 Kapiolani Street - Suite 500 - Honolulu, Hawaii 96813 - Phone: 808-955-8338 Fax: 808-955-8338