BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET

HONOLULU, HAWAII 96843

January 8, 1992

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OFC. OF ENVIRON... QUALITY CO...

Mr. Brian Choy, Director
Office of Environmental Quality Control
State of Hawaii
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Choy:

Subject: Notice of Negative Declaration for the McCully/Waikiki 30-Inch Water Main

We submit a Notice of Negative Declaration for the proposed subject project. As per 11-200-11(c) of Chapter 200 of Title 11, Department of Health Administrative Rules, the following information is provided:

1. Proposing Agency: City and County of Honolulu, Board of Water Supply.

2. Accepting Authority: City and County of Honolulu, Board of Water Supply.

3. Description of Proposed Action: The Board of Water Supply is proposing to install a 30-inch water main from the intersection at Young Street and McCully Street to the intersection at Kuhio Avenue and Kalakaua Avenue. The proposed routing of the main will be within existing street rights-of-way with the exception of the crossing at Ala Wai Canal which will be within the canal, adjacent to the McCully Bridge. Total length of piping will be approximately 5,700 linear feet.

4. Determination: Upon completing an assessment of the potential environmental effects resulting from the proposed project, it has been determined that the project will not have any significant adverse impacts on the environment.

5. Reasons Supporting the Determination:

(a) The proposed action will not present any change in the use of the project area. The entire site will be restored to its original condition once construction is completed.

(b) The proposed action will not adversely affect the physical or social environment. There will be no adverse impacts on public facilities.

(c) There are no known endangered species of animals or plants in the vicinity of the project.

(d) There will be no permanent degradation of existing ambient air and noise levels. During construction operations, air quality and noise levels are expected to be affected; however, the impacts will be short-term and minor.

(e) There will be no permanent degradation of the water quality in the Ala Wai Canal. Temporary increases in turbidity and suspended sediment materials are expected in the vicinity of the construction activity; however, application of approved mitigation measures will minimize the impact on adjacent waters.

(f) Temporary traffic inconveniences will occur as a result of construction activities; however, the inconveniences will be temporary and will be eliminated once work is completed.

(g) No residences or businesses will be displaced by the project.

(h) Archaeological deposits that could yield samples suitable for dating and reconstruction of earlier environments may be encountered during trenching operations. A monitoring program will be established to insure that appropriate actions are taken should sites be uncovered.

(i) The project conforms with the City and County of Honolulu Land Use Ordinance.

(j) The project will provide a long-term benefit to the public in the form of improved water service to the Waikiki District.

Enclosed are four copies of the supporting environmental assessment and a completed Form 91-1, Document for Publication in the OEQC Bulletin, as required. We request that this Negative Declaration be published in the next OEQC Bulletin.

Should you or your staff have any questions concerning this submittal, please call Bert Kuioka at 527-5235.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

Enclosures

1992-01-23-OA-FEA-McCully/Waikiki 30-Inch Water Main

ENVIRONMENTAL ASSESSMENT for the

McCULLY/WAIKIKI 30-INCH WATER MAIN

Honolulu, Hawaii

DECEMBER 1991

PREPARED FOR:

Board of Water Supply
City and County of Honolulu

RMTC

R. M. Towill Corporation

420 Waiakamilo Rd., Suite 411
Honolulu, Hawaii 96817-4941
(808) 842-1133 • Fax: (808) 842-1937

Environmental Assessment

for the

McCULLY/WAIKIKI 30-INCH WATER MAIN

Honolulu, Hawaii

Prepared For:

Board of Water Supply
City and County of Honolulu

DECEMBER 1991

Prepared By:

R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

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PROJECT DESCRIPTION

1.1 PURPOSE OF PROPOSED ACTION

The City and County of Honolulu Board of Water Supply is proposing to install a 30-inch water main from the intersection at Young Street and McCully Street to the intersection at Kuhio Avenue and Kalakaua Avenue. Total length of piping will be approximately 5,700 linear feet. The purpose of installing the new main is twofold: 1) to replace a deteriorating existing 16-inch main that currently serves Waikiki and 2) to implement the initial system improvement action towards increasing the overall service capacity to Waikiki. The 16-inch main being replaced is old and currently experiences frequent breaks. With the installation of the 30-inch main, the public will benefit from the increased water service capacity and less service interruptions.

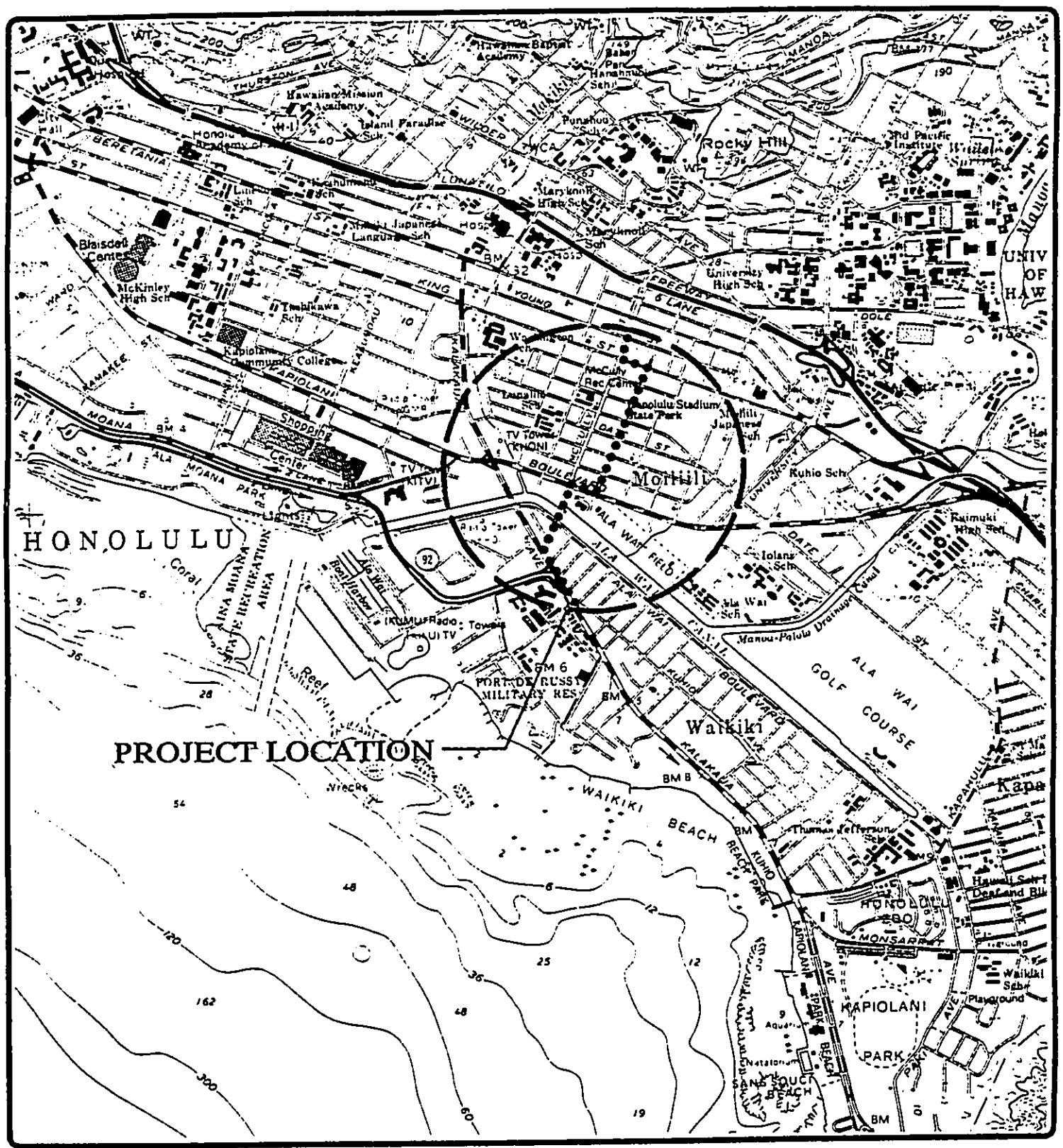
1.2 LOCATION

The proposed routing of the 30-inch water main will be through portions of the McCully-Moiliili and Waikiki Districts of Honolulu, see Figure 1. Specifically, the water main route will follow McCully Street from Young Street to King Street; King Street from McCully Street to Wiliwili Street; Wiliwili Street from King Street to Kapiolani Boulevard; Kapiolani Boulevard from Wiliwili Street to McCully Street; McCully Street from Kapiolani Boulevard to the Ala Wai Bridge; across Ala Wai Canal adjacent to the bridge to Ala Wai Boulevard; Ala Wai Boulevard back to McCully Street; McCully Street from Ala Wai Boulevard to Kalakaua Avenue; and Kalakaua Avenue from McCully Street to Kuhio Avenue. Figure 2 shows the proposed water main route. With the exception of crossing the southwest corner of Ala Wai Park and the Ala Wai Canal, the water main will be installed within roadway rights-of-ways.

1.3 DESCRIPTION OF PROPOSED ACTION

1.3.1 Proposed Action

The proposed 30-inch water main will be connected to an existing 42-inch water main that extends from Beretania Street to Young Street and connects up to a 24-inch main at Kuhio Avenue, which is the other main that serves Waikiki. A total of approximately 5,700 linear feet of pipe will be installed. Most of the proposed routing will be within existing street rights-of-ways. Exceptions to this will be the Ala Wai Canal crossing, which will also necessitate crossing the southwest corner of Ala Wai Park, TMK 2-7-36:5. Easements will



MCCULLY/WAIKIKI
30-INCH WATER MAIN

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City and County of Honolulu

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Figure 1
Location Map

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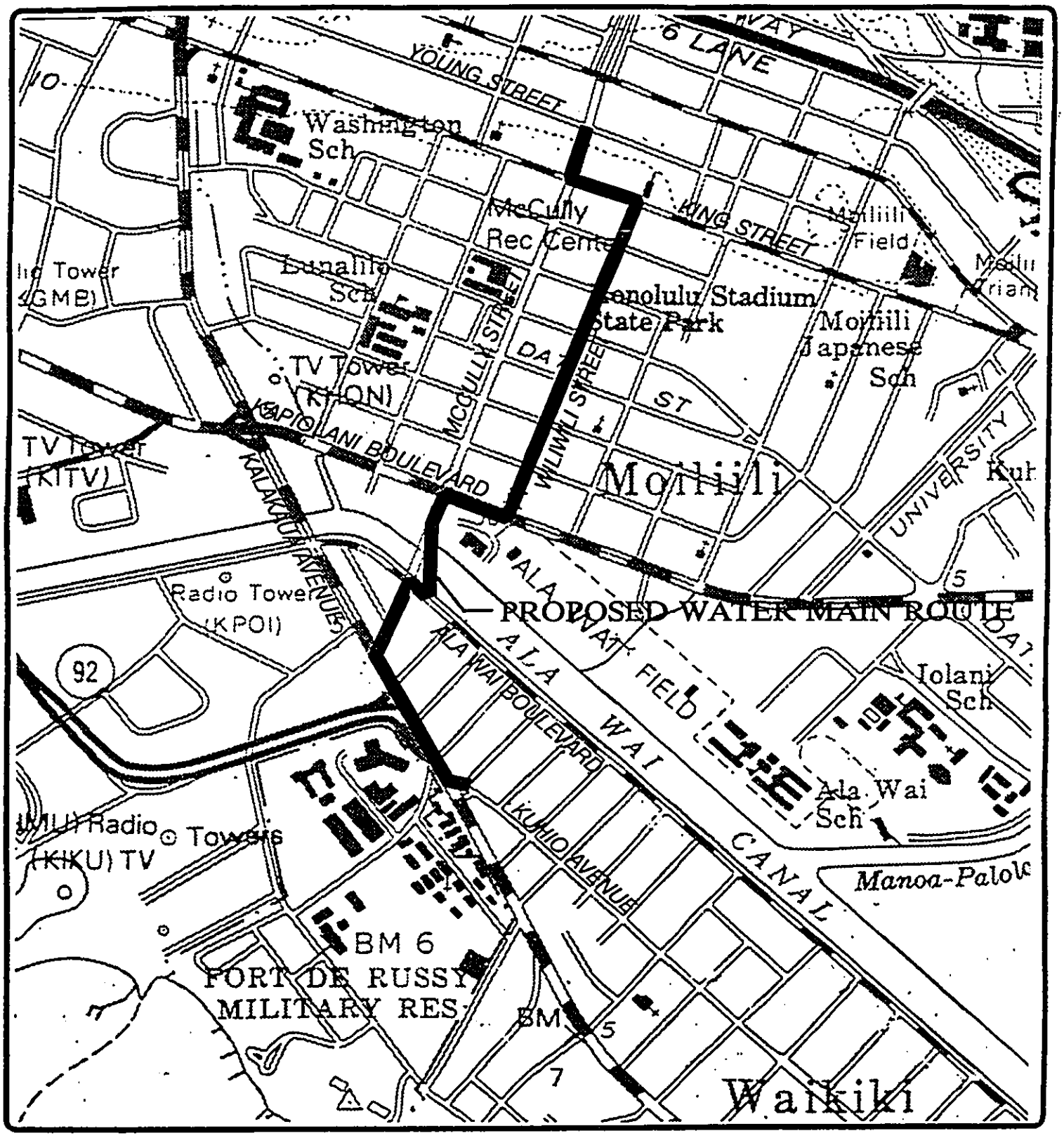

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Figure 2
Proposed Route

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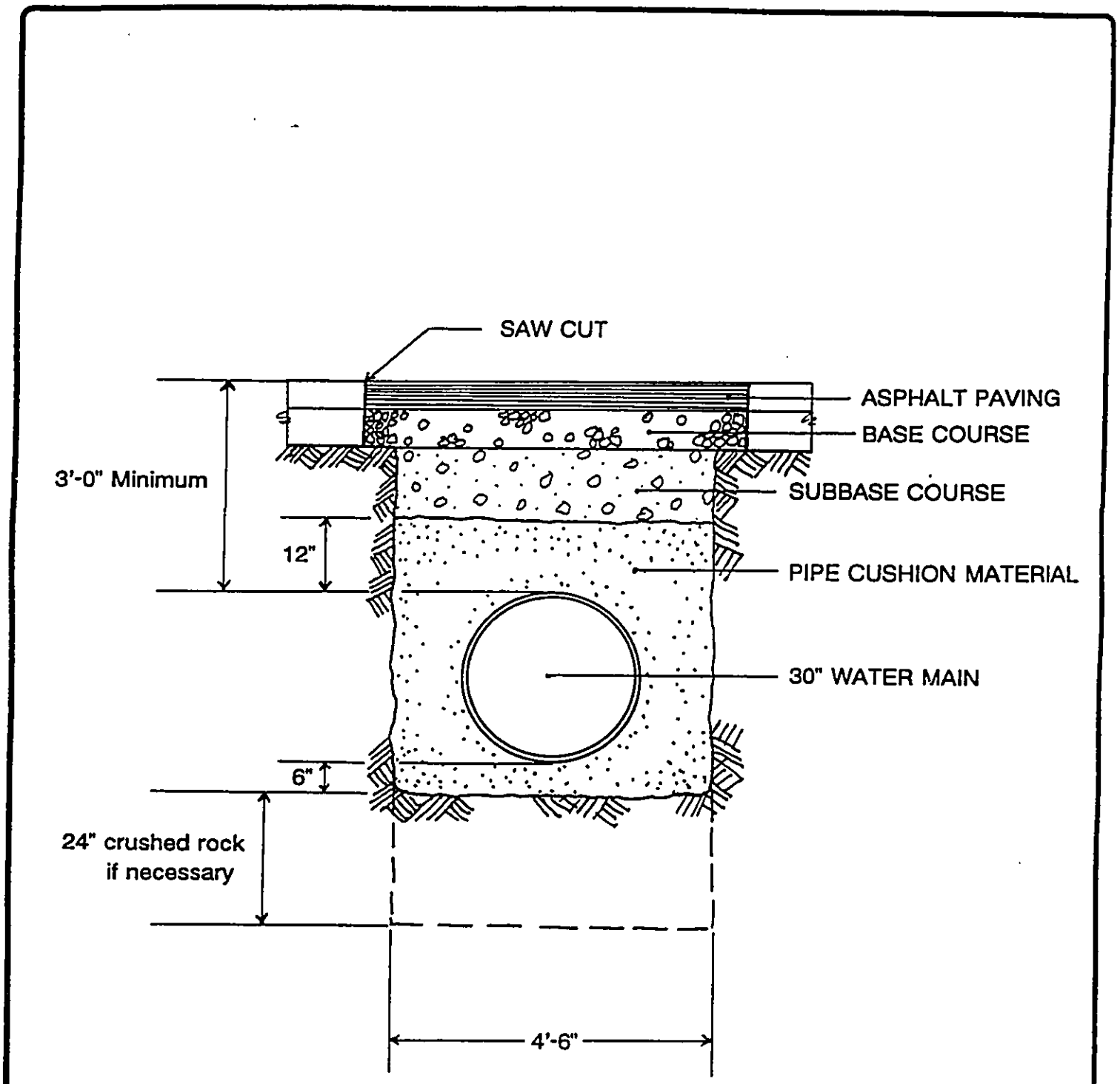
be obtained for the water main crossing at these locations. The project will be designed and installed in accordance with the City and County of Honolulu Board of Water Supply water systems standards.

1.3.2 Construction Material and Methods

The water main will be concrete cylinder, PVC or poly-wrapped ductile iron pipe. Valves and associated manholes and valve boxes will be located along the main. The depth of the water main will vary depending upon the existing conditions and location of other utilities; however, the minimum cover over the pipe will be 3 feet. Figure 3 illustrates a typical cross sectional view of the water main installation which is in accordance with Board of Water Supply City and County design standards. Construction will be separated into five phases. Typical work operations will include pavement removal, trenching, pipe placement, backfilling, compaction and surface restoration. A maximum of 150 linear feet of roadway will be trenched during any one period. The trenches will be approximately 4 feet wide. Up to two lanes of roadway may need to be closed to allow for trenching and maneuvering space for construction activity. It is anticipated that ground water may be encountered during construction. When such conditions occur, dewatering efforts will be required. An approved dewatering system will be required to insure the removal of heavy sediment from the water being discharged. Monitoring of water discharge will be accomplished to insure applicable water quality standards are being met. All work will follow applicable City and County specifications and standards.

Provisions will be made for adequate access to and from driveways to businesses and residences, and public streets during construction. A traffic control plan will be developed to provide the most efficient movement of traffic through the construction area using lane coning, directional signs, flagmen and police officers to direct traffic. A minimum of two through traffic lanes will be required during working hours. During non-working hours, open trenches on streets will be covered with non-skid steel plates and all lanes opened for traffic. All work on City or City-maintained streets will be accomplished between 8:00 a.m. and 3:30 p.m., Monday through Friday, unless otherwise permitted by the City and County of Honolulu, Department of Transportation Services.



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30-INCH WATER MAIN

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Figure 3
Typical Trench Section

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The proposed water main crossing at Ala Wai Canal is shown on Figure 4. The method of crossing Ala Wai Canal will entail the laying of the water main along the bottom of the canal. Excavation of the bottom of the canal will be required to allow the laying of the pipe into the hard coral layer in the canal. It is estimated that approximately 4,000 cubic yards of material will have to be removed. The removal of the silt and debris from the canal bottom may require the erection of temporary piers or floatation of portable barge to enable equipment to reach portions of the canal inaccessible from land. Excavated material will be transported from the project site to an approved disposal site. Pipe will be laid along the base of the channel crossing in a trench excavated in the hard coral layer. Boltless, flexible joint ductile iron pipe will be used for the portion of the main within the canal. The portion of the main at the canal crossing will be concrete jacketed. Figures 5 and 6 illustrate the conceptual profile and typical section of the water main crossing at the Ala Wai Canal. Pipe assembly and laying operations may temporarily restrict passage for a few days through the construction area in the canal for a few days.

As part of the work provisions, the contractor will be required to take all necessary precautions for the protection, convenience and safety of the public. This includes such actions as the installation and maintenance of signs, lights, flares, barricades, markers, cones and other protective facilities.

1.4 ESTIMATE CONSTRUCTION SCHEDULE AND COST

The construction period for the proposed project is expected to last approximately 12 to 15 months beginning in September 1992. Current estimated construction cost of the project is $4.1 million.

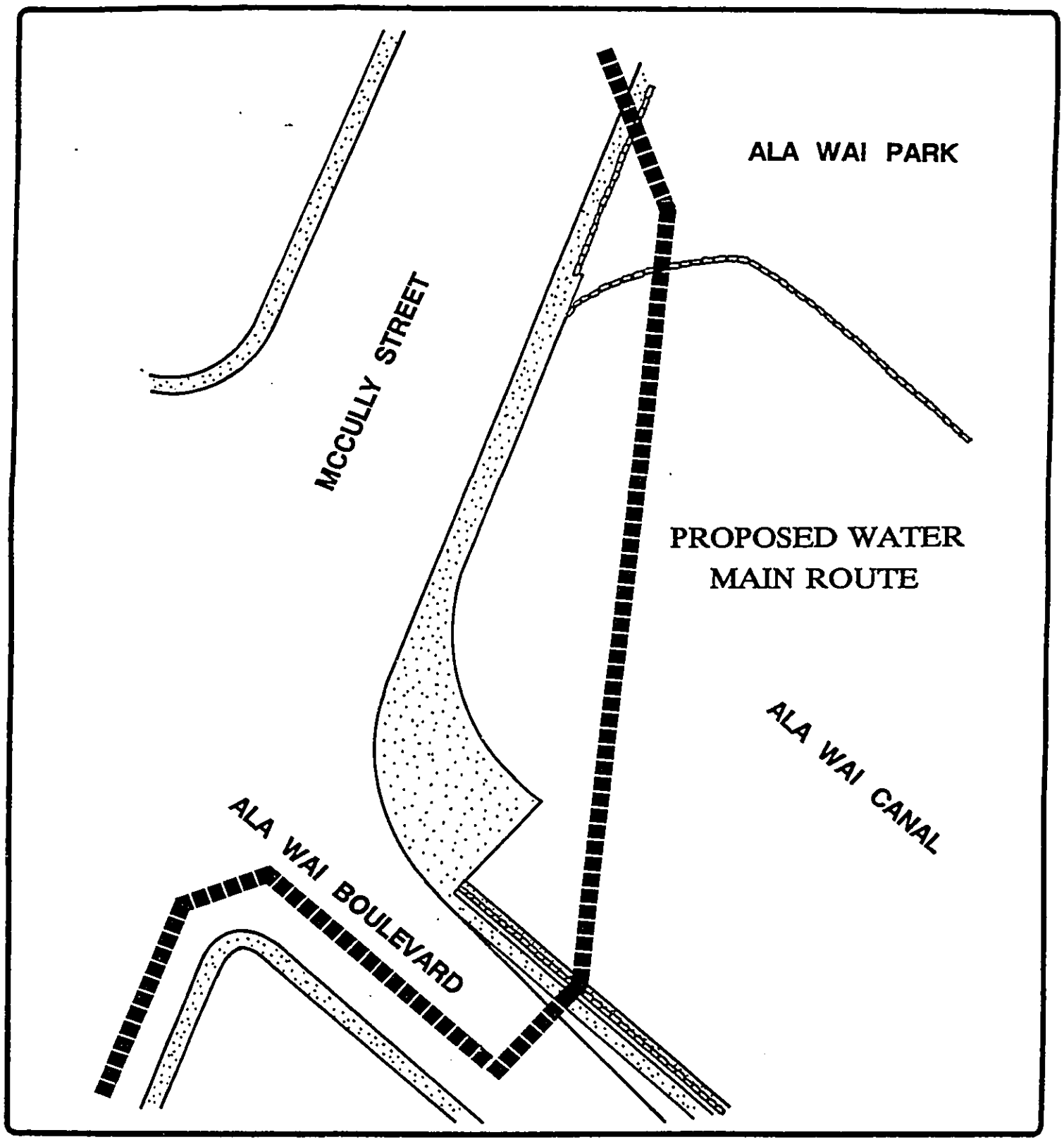

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Figure 4
Proposed Ala Wai Crossing

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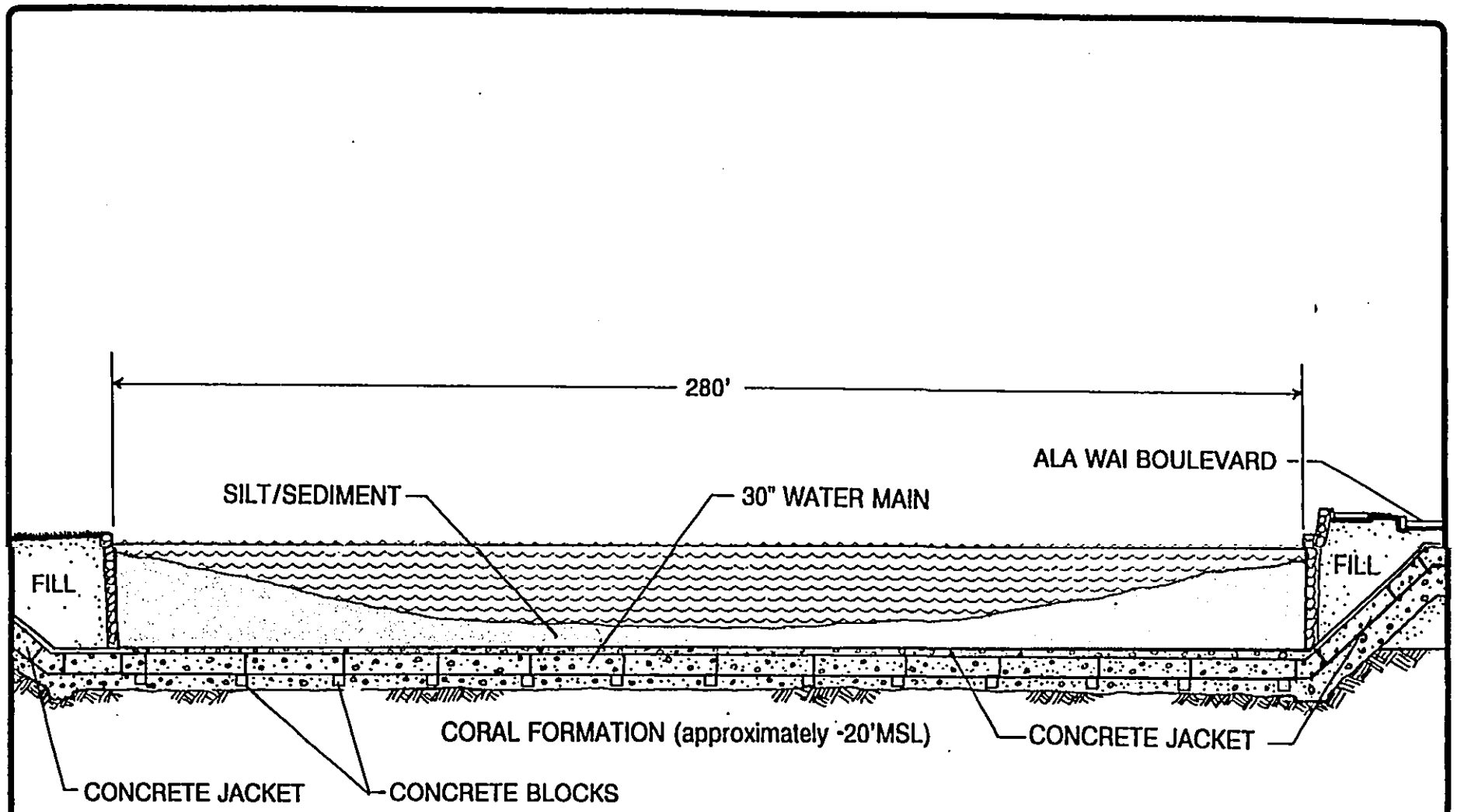

McCULLY/WAIKIKI
30-INCH WATER MAIN

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Figure 5
Profile of Canal Crossing
(Conceptual)

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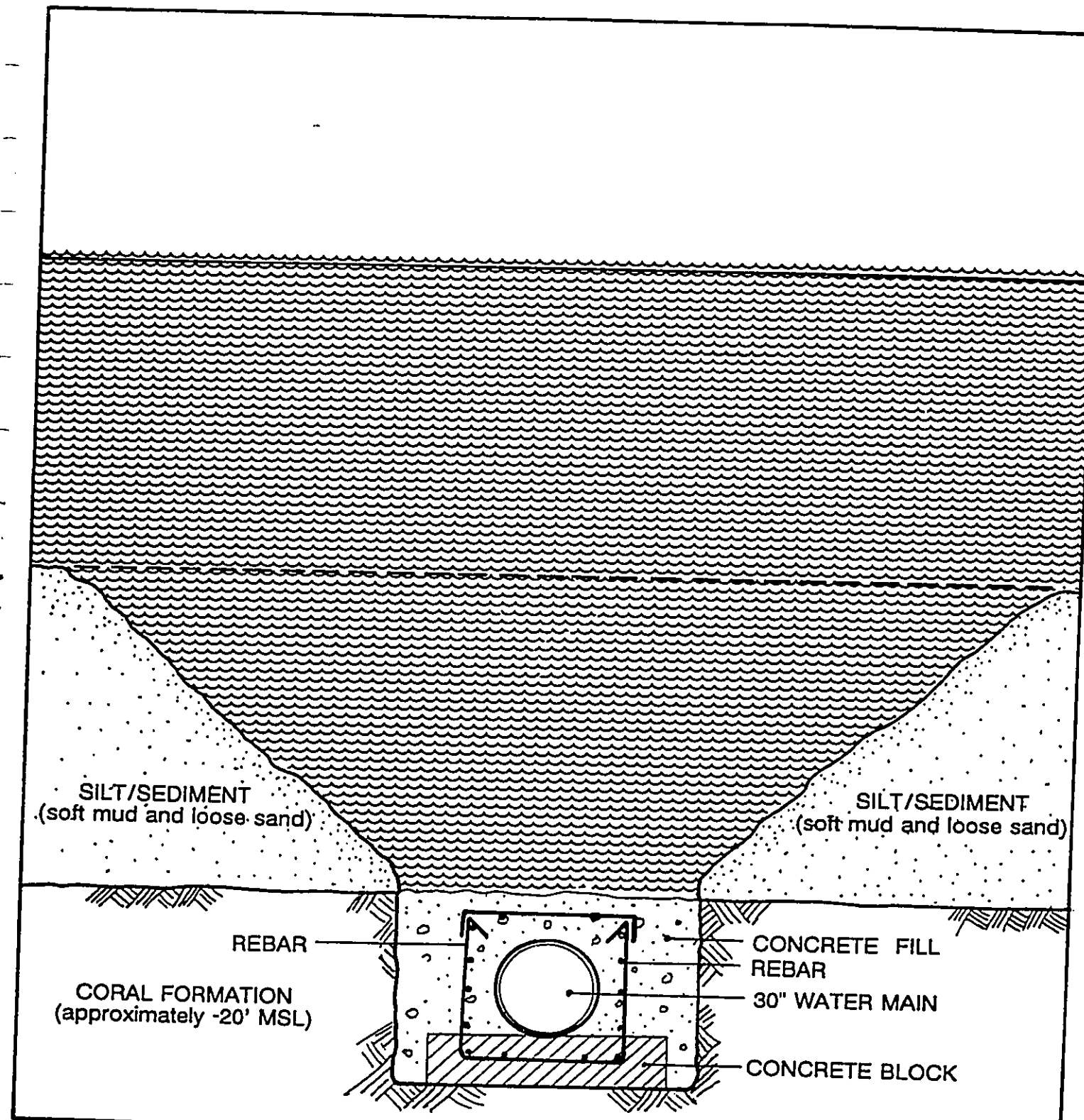

McCULLY/WAIKIKI
30-INCH WATER MAIN

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Figure 6
Section of Canal Crossing
(Conceptual)

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SECTION 2

AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS AND MITIGATION MEASURES

AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS AND MITIGATIVE MEASURES

2.1 EXISTING LAND USE

The entire project lies within the McCully-Moiliili and Waikiki Districts of Honolulu. The state land use designation for the immediate surrounding area is Urban. Most of the proposed routing of the water main will be within roadway rights-of-ways. Portions of the routing will affect the following major thoroughfares: McCully Street (1,200'), King Street (400'), Kapiolani Blvd. (400'), Ala Wai Blvd. (150') and Kalakaua Ave. (1,000'). Figure 7 depicts the proposed routing in relation to the existing land use zoning in the area. The initial 1,000-foot segment of the water main will run through a community business mixed-use zoned district. A major section of the main, approximately 2,200 feet, will cross through a residential area which is zoned as a medium density apartment district. Approximately 300 feet of the main will cross the fringe of the Diamond Head Special District. This segment follows the McCully Street approach to the McCully Street Bridge then crosses the corner of Ala Wai Park prior to entering Ala Wai Canal. Approximately 280 feet of the water main will lay on the bottom of Ala Wai Canal. The canal functions as a public drainage facility and is also used for canoeing/boating and fishing/crabbing. The final 1,600 feet, which will extend from Ala Wai Boulevard along McCully Street and Kalakaua Avenue to Kuhio Avenue, will be within a resort commercial precinct of the Waikiki Special District. This last segment has a number of businesses, commercial activities, apartments and resort hotels located along the roadways.

Impacts and Mitigation Measures

There will be no changes to existing land uses in the project vicinity. Surrounding land uses will still remain the same.

2.2 TOPOGRAPHY AND SOILS

The topography over the entire route of the proposed water main is relatively flat. According to the *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, issued August 1972, most of the soils along the proposed route consist of mixed fill land. About 200' of the initial portion of the main on Young Street lies in an area with the soils type identified as Makiki Clay Loam (MkA). The topsoil is about 20 inches thick and is made up of dark-brown clay loam. The subsoil is similar with a subangular blocky

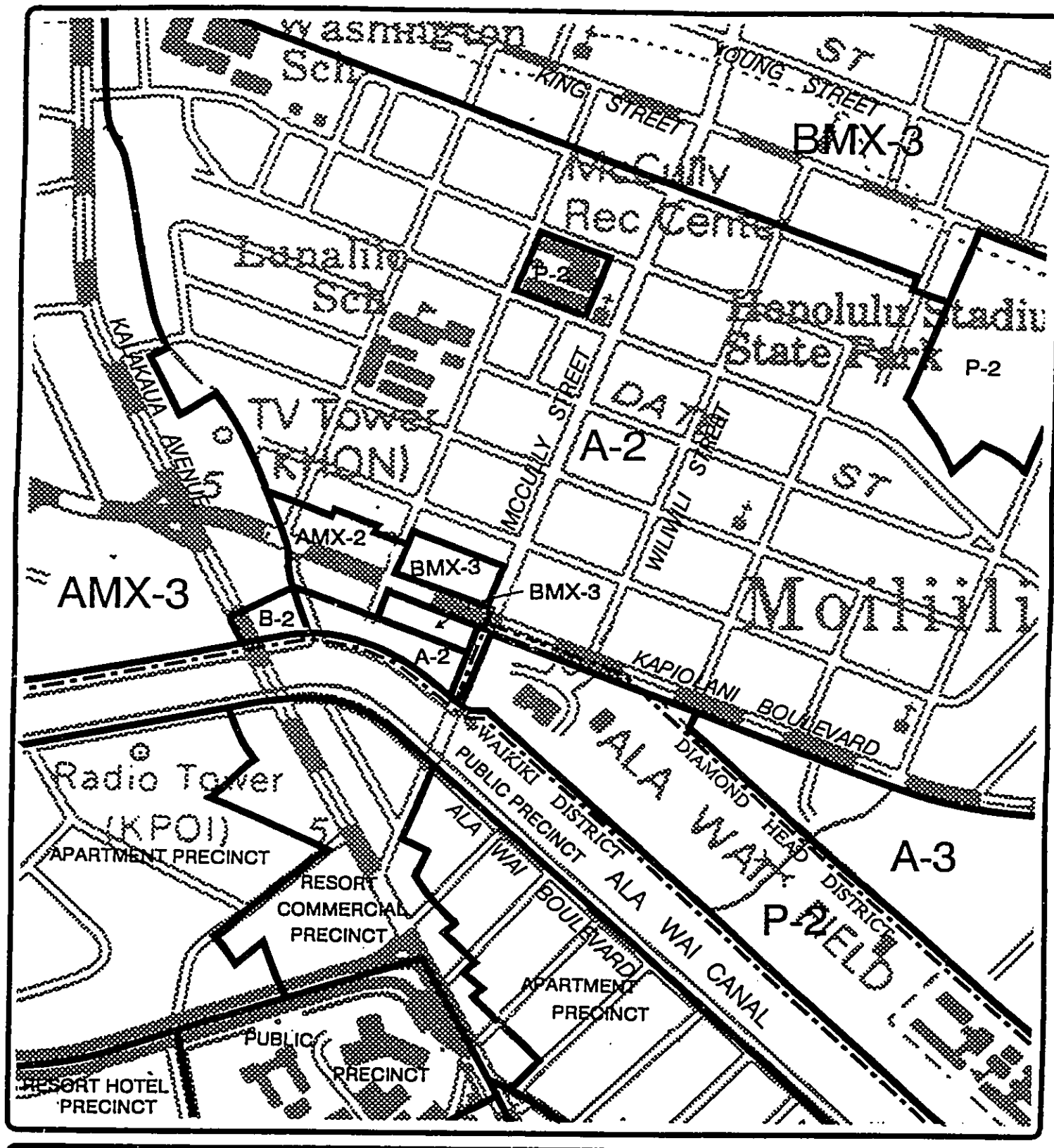

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Figure 7
Existing Zoning

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structure and is about 10 inches thick. The subsoil is underlain with similar material that is massive and stratified, about 24 inches thick. The only other soil type present is the Ewa Silty Clay Loam, which is characteristic along portions of King Street (about 150') and Wiliwili Street (about 750'). This soil has a dark reddish-brown silty clay surface layer that ranges up to 18 inches thick. The subsoil is of similar material, except with a subangular blocky structure. A coral limestone substratum is encountered at a depth of 20 to 50 inches.

Impacts and Mitigation Measures

The installation of the proposed water main will have minimal impact on the topography and soils since most of the work will occur within the existing street rights-of-ways. Alterations will be temporary in nature with existing site conditions being restored upon completion of construction. Impacts will include the demolition and restoration of the asphaltic concrete pavement along existing public streets, and the disruption of existing soil conditions from excavation and backfill operations. It can be expected that some backfill material will be imported in the form of crushed rock and pipe cushion material replacing existing soil; however, there should be no adverse consequences of this action since most of the soils along the project routing consists of fill material. In addition, surfaces will be restored to their original condition.

2.3 SURFACE WATER

Ala Wai Canal is the only surface water feature in the vicinity of the project. The canal, which was constructed between 1921 and 1926, is nearly 2 miles long from Ala Wai Boat Harbor to its terminus. The proposed water main crossing is adjacent to the McCully Street Bridge, about 3,000' from the Ala Wai Boat Harbor. The canal is approximately 280 feet wide at the proposed crossing and about 10 feet deep at its deepest point.

An analysis of the sediment material in the vicinity of the proposed water main crossing at the Ala Wai Canal was conducted to determine levels of heavy metal contaminants in the sediment. This analysis was conducted as recommended by the State of Hawaii, Department of Health, Solid and Hazardous Waste Branch to obtain baseline information to assess

potential environmental and health concerns. Findings of the analysis indicated that no concentrations of the various metals were detected at levels which equaled or exceeded designated 1991 EPA Toxic Characteristic Leaching Procedure (TCLP) levels. The analysis report is included as Appendix A of this report.

Impacts and Mitigation Measures

Several short-term impacts on the canal are expected as a result of construction activities related to the proposed action. These include:

* removal of sediment and debris from the bottom of the canal along the alignment of the water main,
* temporary increase in the turbidity in the vicinity of the project due to the removal of sediment and debris,
* temporary suspension of recreational boating and fishing in the vicinity of the alignment due to construction activities, and
* destruction or temporary dislocation of some aquatic plants and animals in the vicinity of the project.

The removal of sediment will result in a long-term positive impact as it will help clean-up some of the undesirable deposits from the bottom of the canal. Other impacts as a result of construction activities such as increased turbidity and suspended solids will be temporary in nature. The Board of Water Supply will arrange for sampling and content analysis of silt material to be removed prior to commencement of excavation activities. As part of construction requirements, the contractor will be required to employ methods of minimizing and controlling turbidity. If necessary, suspended sediment containment procedures will be employed to isolate the related impacts from adjacent waters. Although initial analysis of sediment showed heavy metal contaminants did not exceed TCLP levels, further analysis may be conducted as required on excavated sediment to obtain chemical profiling for hazardous characterizations. Also if required, tests on the acute toxicity of the canal water could

be conducted during excavation operations to determine affects of suspended sediments on freshwater organisms.

There will only be minimal impact upon recreational activities as the construction work will only temporarily affect a very small portion of the canal. Other areas of the canal will still be available for continued recreational use.

It is anticipated that the impact on the aquatic communities will be minor as these communities exist throughout other portions of the canal. Once construction is complete, these communities should be able to reestablish in the area affected by the proposed activity. There are no expected long-term affects on the canal.

2.4 FLORA AND FAUNA

There are no significant plant or animal resources located along the alignment of the proposed water main. Portions of the main will cross an open grassed area at the corner of Ala Wai Park and the narrow landscaped strip on the makai side of the canal.

Impacts and Mitigation Measures

Temporary construction related activities will affect the limited landscaped areas along the proposed route. Upon completion of construction work, the affected areas will be restored to their present condition.

2.5 NOISE

The principal source of community noise in the vicinity of the project is from motor vehicle traffic. Other noise sources include occasional aircraft flyovers, people talking or shouting in the streets, trash collection operations, and other construction activities in the area.

Impacts and Mitigation Measures

Temporary increases in local noise levels are expected when construction activities are in progress. Noise exposure from construction activities at any one location will

be in the order of one to two weeks as the improvements progress past that location. Primary noise sources during constructions are expected to be from pavement cutting operations, backhoes, loaders, miscellaneous trucks, jackhammers and pumps. Mitigative measures taken to minimize the impact will include limiting noise generating construction activities to the daytime hours. In addition, proper maintenance of construction equipment and the coordination of construction activities to minimize noise impacts will be required to efficiently complete the work with the minimum of disturbance to the community. Occupants of adjacent properties will be given notice of pending construction activities so that they will be made aware of likely increased noise levels during periods of construction.

2.6 AIR QUALITY

Air quality in the vicinity of the project route is generally influenced by emissions from motor vehicle traffic.

Impacts and Mitigation Measures

Ambient air quality may be affected during the construction period by fugitive dust from construction activities and hydrocarbon emissions or exhaust fumes from construction equipment. Impacts from these are expected to be minimal as construction activities in any one area will be relatively short in duration. Temporary, short-term increased traffic congestion is anticipated when construction occurs along major thoroughfares, which in turn will affect the air quality. To minimize the increase in vehicle emissions caused by traffic congestion, routing of the water main along major thoroughfares was avoided where possible. In addition, work will be prohibited during morning and afternoon peak traffic periods to minimize disruption to peak traffic flows.

2.7 RECREATION

A number of recreational resources are in the immediate vicinity of the proposed water main route. These include Ala Wai Park, Frank C. Judd Park, Waikiki Gateway Park and

Ala Wai Canal. Ala Wai Park is a 27.5 acre park located along Ala Wai Canal, stretching from the corner of McCully Street and Kapiolani Boulevard to Ala Wai Elementary School. Park facilities in the vicinity of the proposed route include a clubhouse, canoe launch facility, parking lot and an exercise station. Frank C. Judd Park covers approximately 16,000 square feet and is located at the corner of McCully Street and Kapiolani Boulevard across from Ala Wai Park. It is a well landscaped passive neighborhood park with a small tot lot. The Waikiki Gateway Park, also a well landscaped passive park, is a half acre in size and is located at the intersection of Kuhio Avenue and Kalakaua Avenue. The Ala Wai Canal, primarily a drainage facility, is also used for canoe racing, boating, and recreational fishing and crabbing.

Impacts and Mitigation Measures

Impacts on all of the recreational facilities in the vicinity of the project will be temporary and occur only during the times when construction activities are taking place next to those locations. Judd Park and Waikiki Gateway Park will mainly be affected by increased noise from construction work and possibly higher levels of airborne dust and exhaust fumes. The proposed water main crossing at the southwestern corner of Ala Wai Park may necessitate temporary closing of a small exercise station for safety reasons. Temporary increases in noise levels and degradation in air quality may also become an occasional minor irritant to those using the clubhouse when construction is in progress. Some restrictions on boating/canoeing and fishing/crabbing activities in the vicinity of canal crossing during construction will be necessary for safety.

2.8 Historic and Archaeological Resources

The State Historic Preservation Division has indicated that the portion of the water main route makai of the Ala Wai Canal is in the Waikiki Archaeological District, Site 50-80-14-2872. They have indicated that there have been recent findings of prehistoric habitations, burials, fishponds and taro patches buried beneath the existing fill material in areas close to the proposed alignment. An archaeological literature and archival review was conducted to evaluate the potential for buried archaeological resources along the route of the proposed

water main. The conclusions of the research indicate that there exists a potential for significant buried historic and prehistoric resources within the proposed pipeline corridor. Although there is no conclusive information concerning land use along much of the proposed route, significant buried resources are suggested, particularly the corridor approaches to Waikiki and Kalakaua Avenue. The archaeological literature and archival review of the project area is included as Appendix B.

Impacts and Mitigation Measures

It is anticipated that archaeological resources will be encountered along the proposed routing of the water main. Deposits could be exposed that may yield samples suitable for dating and reconstruction of earlier environments. Should deposits be found, provisions will be made to collect and analyze charcoal, plant microfossils and pollen samples. Arrangements will be made to have an archaeologist on call during periods when trenching is being accomplished. Monitoring will not be continuous; however, will combine inspection and sample collections from open trenches at regular intervals. Areas of high sensitivity, specifically near King Street and the approach to Kalakaua Avenue, will be monitored more closely. Should archaeological remains be discovered during construction, the trenching activity will be diverted to allow the archaeologist time to evaluate the deposit and to consult with the State Historic Preservation Division.

2.9 AESTHETIC VALUE

Typically the visual scene from the street rights-of-ways in which the proposed water main is to be installed include parked cars, sidewalks, driveways, street lights and overhead lines, landscaping strips along roads, traffic signs and controls, and adjacent single and multi-story buildings. The roadways also provide north-south and east-west view corridors. These views include the Koolau Mountains, Diamond Head and adjacent parks and open spaces.

Impacts and Mitigative Measures

Construction activities will have a temporary negative impact on the visual amenities provided by the view corridors. Although the construction work will detract from the

normal visual scene, it will only affect limited portions of the route for the duration of construction of that segment of the project. Also, due to the type of construction activity involved, views at most will only be partially obstructed for short periods of time.

2.10 ECONOMIC ACTIVITY

As discussed earlier, portions of the proposed water main will be routed through areas that contain a variety of business and commercial activities. These activities include convenience stores, specialty shops, eating establishments, hotels, banks, offices and other service oriented businesses. People being served by these activities include local residents from both immediate and outlying areas and visitors.

Impacts and Mitigation Measures

Some short-term negative impacts may occur during the construction period as vehicular access to businesses along the proposed route may be temporarily altered causing some inconveniences to customers. Also, increased traffic congestion may discourage some potential customers from passing through the area. A means of mitigating the possible impact of some loss in business would be minimizing the length of time of construction activity in the vicinity. This can be done by extending work hours in those areas and/or working during periods, i.e. nights, when most businesses are closed. A positive affect of the project will be the economic benefits realized by contractors and material suppliers from construction activities.

2.11 UTILITIES

Roadways in which the water main will be installed contain numerous existing water, sewer, drain, electrical, communication, cable television and gas lines. These range from large main lines to small local service lines.

Impacts and Mitigation Measures

The proposed water main will be routed to avoid all existing in-place utilities. Coordination with utilities agencies and companies will be accomplished to insure that

they are aware of scheduled work activities and to resolve any possible conflicts with other future projects.

2.12 ROADWAYS AND TRAFFIC

Roadways in which the proposed water main is to be installed are McCully Street, King Street, Wiliwili Street, Kapiolani Boulevard, Ala Wai Boulevard, Kalakaua Avenue and Kuhio Avenue.

Portions of McCully Street that will be affected by the proposed project are from Young Street to King Street, Kapiolani Boulevard to McCully Bridge, and Ala Wai Boulevard To Kalakaua Avenue. The segment from Young Street to King Street has a right-of-way 80 feet wide. This portion of the street accommodates two-way traffic and has five travel lanes and a parking lane on the Diamond Head side. The travel lanes include two lanes in both directions with a center turning lane. The segment from Kapiolani Boulevard to Ala Wai Bridge has an 82-foot right-of-way and has the same number of lanes as the Young Street to King Street segment. The first two segments have designated bike routes on both sides of the roadway. The Ala Wai Boulevard to Kalakaua Avenue segment has a 60-foot right-of-way and is one way in the makai direction. There are four travel lanes and one parking lane that accommodates five metered stalls.

The affected portion of King Street between McCully and Wiliwili is a one way street in the Diamond Head direction with a 90-foot right-of-way. There are four travel lanes and two parking lanes.

Wiliwili Street is primarily a residential roadway with a 56-foot right-of-way. It is a two-way road with two travel lanes and accommodates on-street parking between the numerous driveways along the entire length of the street.

The short segment of Ala Wai Boulevard affected by the project is a one way road with three travel lanes moving in the Ewa direction with one of the travel lanes splitting to join

an additional lane that is a dedicated turning lane. The right-of-way at the location where the proposed water main is to be routed is 84 feet wide.

Kalakaua Avenue at the intersection with McCully Street has four travel lanes in the Diamond Head direction and one bus lane in the Ewa direction. The bus lane also serves as a bike route. The right-of-way at this point is 82 feet wide. At its intersection with Kuhio Avenue, one of the travel lanes changes to a dedicated turning lane on to Kuhio Avenue and another provides a dual straight through and turning option.

The final segment of the water main extends about 100 feet onto Kuhio Avenue. This portion of Kuhio Avenue has a 70-foot right-of-way and contains two vehicular traffic lanes continuing from Kalakaua Avenue in the Diamond Head direction, a landscaped traffic island and a bus lane that enters onto Kalakaua Avenue.

Recent traffic volume counts were made by the City and County of Honolulu, Department of Transportation Services at the following intersections:

* Young Street and McCully Street
* King Street and McCully Street
* Wiliwili Street and Citron Street
* McCully Street and Kapiolani Boulevard
* McCully Street and Ala Wai Boulevard
* McCully Street and Kalakaua Avenue
* Kalakaua Avenue and Ala Moana Boulevard
* Kalakaua Avenue and Keoniana Street

Table 1 summarizes the traffic volume data at these various locations along the proposed water main route.

Traffic along much of the proposed water main route is heaviest during the daytime working hours. Although the traffic is typically heavy during peak traffic periods before 8:00 a.m.

and after 3:30 p.m., it should be noted that some peak hour traffic counts along the proposed route occurred at different times during the day, not necessarily at the times that are normally thought of as morning and afternoon peak hour times. In addition, it should also be noted that the major roadways and intersections affected have a very high volume of traffic during the early evening hours.

Impacts and Mitigation Measures

Project impacts on roadways and traffic will be temporary and focused only at the area under construction at the time. Construction will close various sections of traffic lanes as the work progresses. It is anticipated that as much as two lanes may need to be closed during work hours. This could be a combination of a parking lane and a travel lane or two travel lanes. Lane closures will impede through-traffic as well as traffic attempting to turn into properties adjacent to work areas or to cross streets. The closure of lanes, open trenches, and movement of construction equipment and workers will pose hazards, slowdowns and inconveniences to vehicles and pedestrians. To help alleviate some of the adverse impact on traffic, construction activities will not be allowed during morning and evening peak traffic periods. A minimum of two through lanes will be required to be opened to traffic during working hours. During non-working hours, open trenches will be covered with non-skid steel plates and all lanes will be reopened to traffic. Additional mitigative measures will include the implementation of an approved traffic control plan. The plan will include provisions for adequate access to adjacent businesses, residences and public streets affected by construction activities. It will also provide for the most efficient movement of traffic through the use of lane coning, directional signs, flagmen and police officers to direct traffic. Notification of construction activities and schedule will be given to MTL (The Bus) for coordination of any temporary routing or bus stop relocation, if needed.

2.13 POLICE, FIRE AND EMERGENCY SERVICES

Police, fire and emergency services rely on roadways affected by the project to access adjacent properties as well as provide primary routes to other areas. The provision of

adequate service is dependent upon the roads remaining passable throughout the construction period.

Impacts and Mitigation Measures

Short-term impacts relating to construction activities will include reduced level of service provided by the roadways and thus increased traffic congestion and travel times. These impacts can be mitigated through sufficient public notice and proper traffic controls during working hours. In addition, no roadways will be completely closed off and there are numerous alternate traffic routes available in the affected areas. Police, fire and emergency service agencies will be notified of planned construction activities and schedule so that they can make necessary adjustments in responding to calls in the area.

SECTION 3

ALTERNATIVES TO THE PROPOSED ACTION

ALTERNATIVES TO THE PROPOSED ACTION

3.1 NO ACTION

The no action alternative was not considered feasible as it would perpetuate the problems currently being faced with frequent breaks along the existing 16-inch water main that is to be replaced under the proposed action. Without replacement of the existing main, water service reliability to the Waikiki area will further decline as disruptions to service will increase with the continued deterioration of the existing system.

3.2 ALTERNATIVE INSTALLATION METHOD

The primary alternative considered to the proposed action was to follow the same routing, but to cross the Ala Wai Canal attaching the proposed 30-inch main to the existing bridge structure. A structural feasibility study was conducted by Nakamura and Tyau, Inc. to evaluate various methods of accomplishing this alternative. The following paragraphs summarize the findings of the study.

3.2.1 Description of Existing McCully Street Bridge

The McCully Street Bridge, built in 1957, is a four lane concrete bridge that provides vehicular and pedestrian access across the Ala Wai Canal. It is supported on concrete bents that are spaced approximately 29 feet on center with 16" x 16" concrete piles at varying spacing. The existing 16-inch water main crosses the bridge in a covered concrete enclosure on the upstream side of the bridge adjacent to the pedestrian guardrail. The top of the covered enclosure is flush with the bridge sidewalk.

3.2.2 Scheme A

Scheme A was to attach the proposed 30-inch water main in a new concrete enclosure constructed adjacent to the existing 16-inch water main enclosure, on the outside edge of the bridge. This scheme was not deemed feasible since the existing enclosure is not capable of supporting the loads that would result from attaching the new main.

3.2.3 Scheme B

Scheme B was to suspend the proposed water main below the bents along the edge of the bridge. This scheme was determined to be not feasible because of the lack of clear space between the piles for the 30-inch main and the angular direction the main would intersect

some of the bents. Also, some portions along the edge of the bridge were not designed to support the loads of the proposed water main.

3.3.3 Scheme C

Under this scheme the proposed main would be located beneath the bridge towards the centerline where the pile spacings are approximately 48 inches on center (32 inches clear space). The problem with this scheme is that the alignment of the main must be perpendicular to the bents and the main must be able to span between bents. A careful survey would be required to ascertain that there are adequate clearances. From existing plans, it appears that several offsets in the main would be required to maintain a perpendicular alignment to the bents. With these conditions, the main would need to be suspended from the bridge deck slab for additional support. Based on the assumption that supports would have to be spaced 10 feet apart, the structural analysis indicated that the existing bridge deck is not designed to support the additional concentrated loads that would result from hanging the proposed main.

3.3.4 Disadvantages of Alternative

Based on the following disadvantages, this alternative was determined to be undesirable:

* Limited working space, making construction difficult.
* The hanging assembly would be continually exposed to the hazardous environment.
* Headroom clearance under the bridge would be considerably reduced.
* Significant disruption of traffic would occur during installation.

3.3 ALTERNATIVE ROUTING

The only other alternative routing considered was a more direct alignment that would bring the proposed main straight down McCully Street instead of diverting it along Wiliwili Street. This alternative was considered highly undesirable because McCully Street carries a heavy volume of traffic and there are portions of McCully Street where the rights-of-way narrows down, reducing the number of travel lanes. Construction activities along the additional portions of McCully Street would significantly increase traffic congestion. Therefore, the

ALTERNATIVES TO THE PROPOSED ACTION

Wiliwili Street alignment was considered as there is considerably less traffic volume on that street.

SECTION 4

DETERMINATION

DETERMINATION

After completing an assessment of the potential environmental affects of the proposed project, it has been determined that an Environmental Impact Statement is not required. Therefore, this document constitutes a Notice of Negative Declaration. The following reasons are provided in support of the Negative Declaration:

* The proposed action will not present any change in the use of the project area. The entire site will be restored to its original condition once construction is completed.
* The proposed action will not adversely affect the physical or social environment. There will be no adverse impacts on public facilities.
* There are no known endangered species of animal or plants in the vicinity of the project.
* There will be no permanent degradation of existing ambient air and noise levels. During construction operations, air quality and noise levels are expected to be affected; however, the impacts will be short-term and minor.
* There will be no permanent degradation of the water quality in the Ala Wai Canal. Temporary increases in turbidity and suspended sediment materials are expected in the vicinity of the construction activity; however, application of approved mitigating measures will minimize the impact on adjacent waters.
* Temporary traffic inconveniences will occur as a result of construction activities; however, the inconveniences will be temporary and will be eliminated once work is completed.
* No residences of businesses will be displaced by the project.
* Archaeological deposits that could yield samples suitable for dating and reconstruction of earlier environments may be encountered during trenching operations. A monitoring program will be established to insure that appropriate actions are taken should sites be uncovered.
* The project conforms with the City and County of Honolulu Land Use Ordinance.
* The project will provide a long-term benefit to the public in the form of improved water service to the Waikiki District.

SECTION 5

AGENCIES CONSULTED

AGENCIES CONSULTED

The following agencies were consulted in preparation of this assessment:

Federal

* U.S. Department of Interior, Fish and Wildlife Service, Office of Environmental Service
* U.S. Army Corps of Engineers, Honolulu District, Operations Branch

State

* Department of Health, Clean Water Branch
* Department of Health, Solid and Hazardous Waste Branch
* Department of Health, Environmental Planning Branch
* Department of Land and Natural Resources, Division of Water Resource Management
* Department of Land and Natural Resources, State Historic Preservation Office
* University of Hawaii, Environmental Center

County

* City and County of Honolulu, Board of Water Supply
* City and County of Honolulu, Department of Transportation Services
* City and County of Honolulu, Department of Land Utilization, Urban Design Branch

APPENDIX A

Analyses of Benthos Sediment Samples Collected from the Ala Wai Canal for Heavy Metals Analyses

for the

McCully/Waikiki 30-Inch Water Main

Honolulu, Hawaii

Prepared For:

Board of Water Supply
City and County of Honolulu

July 16, 1991

Prepared By:

R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

R. M. TOWILL CORPORATION

420 Waiakamilo Rd. #411 Honolulu, HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

This letter report discusses the collection and analyses of benthos sediment samples from the Ala Wai Canal in support of the McCully/Waikiki 30-Inch Water Main. The project objective, sampling methodology, sample analyses, data interpretation, recommendations and mitigative measures are briefly described below.

PROJECT OBJECTIVE

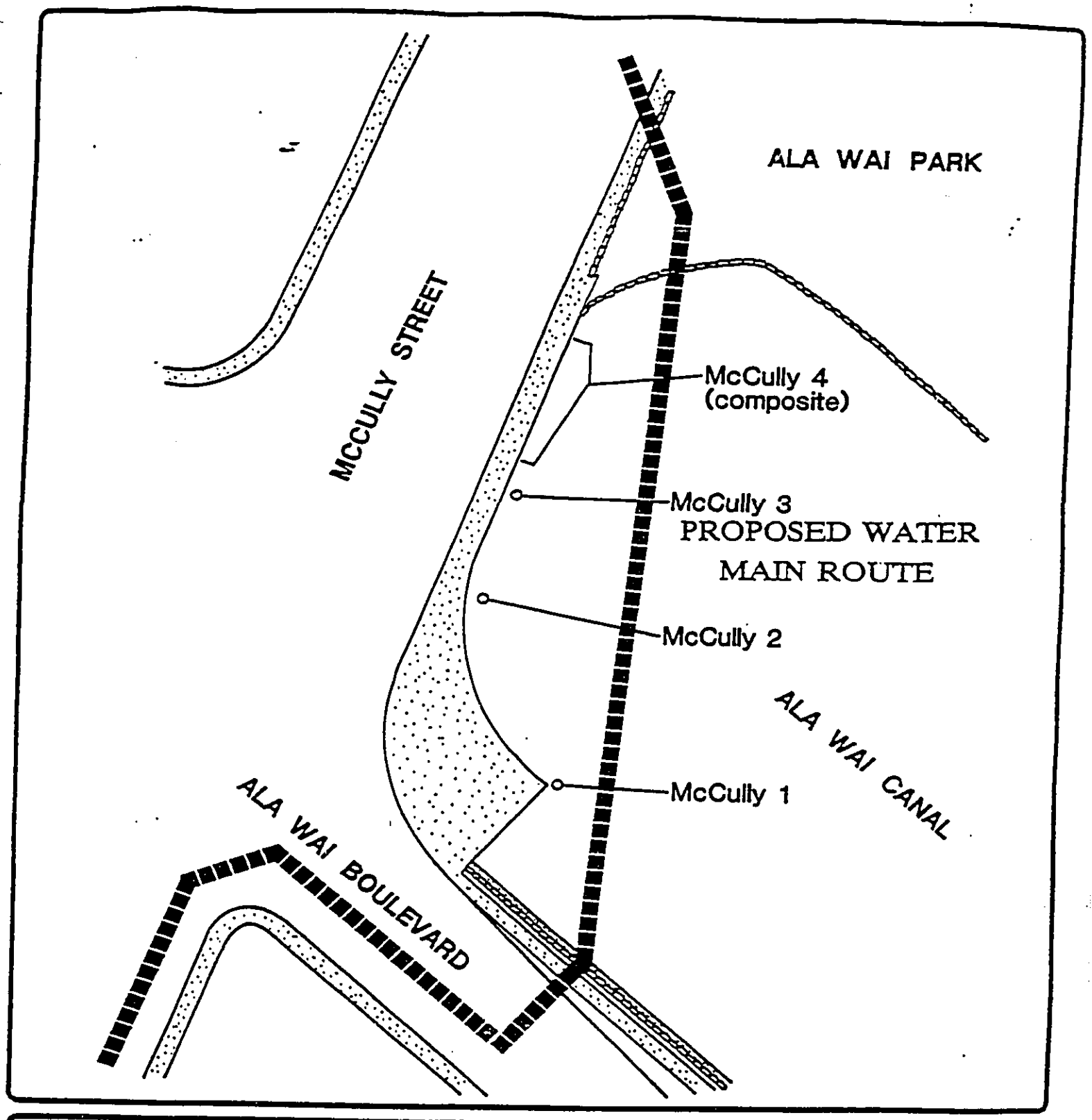
On June 6, 1991, personnel from R. M. Towill Corporation's Engineering Department collected a total of four (4) grab samples from the benthos sediment of the Ala Wai Canal (Canal) as a means of assessing suspected heavy metal contaminants along the proposed McCully/Waikiki 30-Inch Water Main right-of-way. Sample analyses was performed by Brewer Environmental Laboratories, Papaikou, Hawaii. Laboratory data interpretation was completed by R. M. Towill Corporation's Engineering Department, in accordance with the State of Hawaii, Department of Health, Solid and Hazardous Waste Branch (SHWB). The SHWB feels that heavy metals, particularly lead, are the contaminants of concern that may have accumulated in the benthos sediment. The data generated from this sampling program are intended to provide baseline information for worker health and safety only, and are not intended to be used for chemical profiling that may be necessary prior to disposal of excavated materials.

SAMPLING METHODOLOGY

The Ala Wai Canal is approximately 200 to 250 feet wide at the point where the McCully Bridge crosses the Canal. This location coincides with the location of the proposed excavation for the McCully/Waikiki 30-Inch Water Main. The sampling methodology involved sampling at four (4) locations across the Canal at approximately 50-foot intervals (See Figure 1). The distribution of sampling locations was based in principle on environmental sampling protocol established by the American Chemical Society (1988). The McCully Bridge is the approximate location for the 30-inch water main right-of-way which crosses the Ala Wai Canal.

Grab samples (McCully 1 through 3) and a composite sample (McCully 4) were collected using a stream/lake bottom sampler lowered by rope into the Canal from the McCully Bridge (see Figure 1). The sampler penetrated the benthos to approximately one (1) foot, depending on the composition of the Canal bed. A concrete bed along the north bank of the Canal precluded the collection of a sample from that location.

Upon retrieving the sample, field personnel placed the sample (minimum of 500 grams) into a clean, 1-liter, wide-mouth glass jar. The jar was labeled, wrapped in a plastic bag, and logged under strict Chain-of-Custody protocol as described in the United States Environmental Protection Agency (EPA) document SW-846 (1986a). The samples were transported to Brewer Laboratory, Honolulu.



MCCULLY/WAIKIKI
30-INCH WATER MAIN

Board of Water Supply
City and County of Honolulu

NOT TO SCALE

Figure 1
Proposed Ala Wai Crossing
and Benthos Sampling Locations

R. M. Towill Corporation

SAMPLE ANALYSIS

Based on recommendations from the SHWB, the samples were analyzed in accordance with the Toxic Characteristic Leaching Procedure (TCLP; EPA 1991) for eight (8) heavy metals only. The EPA views the TCLP as a subsurface fate and transport model that measures the potential of toxic constituents in a waste to leach and contaminate the ground water causing environmental or health concerns (NUS 1990). In light of this fact, and the objective of the sampling program, analyses of Canal benthos samples by the TCLP was the most appropriate. Brewer Laboratory of Papaikou, Hawaii, conducted the sample preparation, extraction and analyses.

DATA INTERPRETATION

The data interpretation is based on the following designated TCLP levels (EPA 1991), listed in milligrams per liter (mg/l), for the respective metals:

Arsenic: 5.0 mg/l
Barium: 100.0 mg/l
Cadmium: 1.0 mg/l
Chromium: 5.0 mg/l
Lead: 5.0 mg/l
Mercury: 0.2 mg/l
Selenium: 1.0 mg/l
Silver: 5.0 mg/l

McCully 1: Analytical results for this sample, collected adjacent to the south bank of the Canal, revealed no concentrations that equaled or exceeded the respective TCLP levels.

McCully 2: Analytical results for this sample, collected approximately 75 feet north of the south bank of the Canal, revealed no concentrations that equaled or exceeded the respective TCLP levels.

McCully 3: Analytical results for this sample, collected approximately 100 feet north of the south bank of the Canal, revealed no concentrations that equaled or exceeded the respective TCLP levels.

McCully 4: Analytical results for this sample, collected as a composite between approximately 150 to 200 feet north of the south bank of the Canal, revealed no concentrations that equaled or exceeded the respective TCLP levels.

The Laboratory Analysis Report, along with the Chain-of-Custody form, is included as Attachment 1.

These data are intended to provide baseline information to assess potential environmental or health concerns relating to heavy metals contamination in the upper 1-foot of the benthos sediments. The data indicate that no concentrations of the various metals were detected at levels which equal or exceed the respective TCLP levels.

RECOMMENDATIONS AND MITIGATIVE MEASURES

The data indicate, based on the number and depth of the samples collected, that none of the metals of interest were detected at concentrations equal to or greater than the respective TCLP levels. Based on the data, the top 1-foot of benthos sediment in the Ala Wai Canal, along the proposed McCully/Waikiki 30-Inch Water Main right-of-way, does not appear to cause environmental or health concerns from heavy metals contamination.

In accordance with Title 40 Code of Federal Regulations Part 261 (40 CFR 261), waste generators have primary responsibility for determining whether wastes exhibit hazardous charateristics. These characteristics, listed in 40 CFR 261, include ignitability, corrosivity, reactivity, and toxicity. Sediments generated from excavating the Canal may be required to be placed in bulk container storage pending chemical profiling for hazardous characterization. Dispostion of the excavated sediments may then be based on the analytical results.

The SHWB expressed concern for the acute toxicity of the Canal water to freshwater organisms. The analyses required to determine the acute toxicity of freshwater is presented in EPA publication: "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms" (1985). If designated by the SHWB, the test could be conducted during the excavation phase to assess the impact of suspended bethos sediments on the freshwater organisms. If conducted, it is recommended that an upstream station be tested simultaneously for quality control/quality assurance purposes.

The acute toxicity standards for freshwater are defined by Title 11 Hawaii Administrative Rule Chapter 54 (11 HAR 54). The following State of Hawaii freshwater standards are presented in micrograms per liter (ug/l); and converted to milligrams per liter (mg/l); for reference purposes only:

Arsenic: 360 ug/l or 0.360 mg/l
Barium: no standard developed
Cadmium: 3 ug/l or 0.003 mg/l
Chromium: 16 ug/l or 0.016 mg/l
Lead: 29 ug/l or 0.029 mg/l
Mercury: 2.4 ug/l or 0.0024 mg/l
Selenium: 20 ug/l or 0.020
Silver: 1 ug/l or 0.001 mg/l

During construction, silt screens should be placed upstream and downstream of the proposed water line trench to inhibit the migration of disturbed benthos sediment. Workers directly involved with the excavation project may be required to have received Occupational Safety and Health Administration Training for hazardous materials workers as promulgated under 29 CFR 1910.120.

GAF/GRC:wpc3

Enclosures

cc: GRC Project File 1668-00-0
GRC Chron
RMTC Project File

REFERENCES

American Chemical Society, 1988, "Principles of Environmental Sampling," Chapter 4: Geostatistical Approaches to the Design of Sampling Regimes (Flatman et al.), Washington , D.C.

Casarett, L. and J. Doull, 1986, "Toxicology: The Basic Science of Poisons," Macmillan Publishing Company, New York, 974 pages.

NUS Laboratory Services Group, 1990, "NUS Analytical Control; TCLP: Final Regulation Adds 25 Compounds," Volume 15, Number 1, Pittsburgh, PA.

State of Hawaii Department of Health, 1982, "Water Quality Standards," Title 11 Hawaii Administrative Rules Chapter 54, Honolulu.

State of Hawaii Senate Bill Number 3109, April 6, 1990, "A Bill for an Act Relating to Environmental Statutes," State Committee on Judiciary; State Committee on Planning, Energy, and Environmental Protection, Honolulu, Hawaii.

United States Environmental Protection Agency, March, 1985, "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms," EMSL, Cincinnati, Ohio, Document Number EPA/600/4-85/013.

United States Environmental Protection Agency, 1986, "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", U.S. EPA Office of Solid Waste and Emergency Response, Washington D.C., Document Number SW-846.

United States Environmental Protection Agency, June 29, 1991, "Toxic Characteristic Leaching Procedure", Title 40 Code of Federal Regulations Part 261, Government Printing Office, Washington D. C.

ATTACHMENT 1

LABORATORY ANALYSIS REPORT
AND
CHAIN-OF-CUSTODY FORM

BREWER ENVIRONMENTAL SERVICES
a Department of Brewer Environmental Industries
P.O. BOX 552 PAPAIKOU, HAWAII 96781 PHONE: 964-5522 FAX: 964-5309

LABORATORY ANALYSIS REPORT (2)

JOB NO. 4271
DATE JUNE 11, 1991
PAGE 1 OF 1

TO: GEO/RESOURCES CONSULTANTS ATTN: MR. GARY FLOYD
ADDRESS: 420 WAIAKAMILO RD., SUITE 411 PHONE:
HONOLULU, HAWAII 96817
SAMPLES OF: SLUDGE
SAMPLED BY: G. FLOYD SAMPLING DATE: 06/06/91 TIME: AS NOTED
RECEIPT DATE: 06/07/91 TIME: 0715

DATE SAMPLE ANALYZED			06/11/91	06/11/91	06/11/91	06/11/91
TIME SAMPLE ANALYZED						
SAMPLE TYPE						
SAMPLE DESCRIPTION	UNITS		McCULLY 1 (1425)	McCULLY 2 (1350)	McCULLY 3 (1545)	McCULLY 4 (1520)
TCLP METALS						
ARSENIC	mg/l		<0.002	0.003	0.006	0.005
BARIUM	mg/l		<0.5	<0.5	<0.5	<0.5
CADMIUM	mg/l		0.02	0.02	0.02	0.03
CHROMIUM	mg/l		0.06	<0.05	0.13	0.13
LEAD	mg/l		<0.1	<0.1	0.3	0.3
MERCURY	mg/l		<0.002	<0.002	<0.002	<0.002
SELENIUM	mg/l		<0.002	<0.002	<0.002	<0.002
SILVER	mg/l		0.01	<0.01	0.03	0.03

LABORATORY REMARKS: Samples analyzed according to "Test Methods for the Evaluation of Solid Waste Physical/Chemical Methods", SW-846, U.S. EPA Office of Solid Waste, Washington, DC 20460.

Jana Malcolm-Brew

Geo/Resource Consultants, Inc.
GEOLOGISTS / ENGINEERS / ENVIRONMENTAL SCIENTISTS
851 HARRISON STREET, SAN FRANCISCO, CALIFORNIA 94107

CHAIN OF CUSTODY RECORD

PROJECT NO. 1168-[illegible]
DATE [illegible] PAGE 1 OF 1

PROJECT NAME [illegible]
Client [illegible]
Address
SAMPLERS (SIGNATURE) [illegible]
LABORATORY [illegible]

ANALYSIS REQUESTED

SAMPLE NO.	DATE	TIME	LOCATION	EPA NO. [illegible]	EPA NO. [illegible]	EPA NO.	EPA NO.	EPA NO.			[illegible]	[illegible]	NO. OF CONTAINERS	COMMENTS/ CONTAINER TYPE
[illegible]-1	6/6/91	1425	S. BANK [illegible]	✓							✓		1	[illegible]
[illegible]-2	6/6/91	1350	~75' N. of S. BANK	✓							✓		1	" "
[illegible]-3	6/6/91	1515	~100' N. of S. BANK	✓							✓		1	" "
[illegible]-4	6/6/91	1520	~150-200' N. of S. BANK	✓							✓		1	" "
[illegible]-5			N. BANK [illegible]	CONCLUDE: UNABLE TO COLLECT							N/A		N/A	" "

1 RELINQUISHED BY:	DATE	3 RELINQUISHED BY:	DATE	5 RELINQUISHED BY:	DATE
Signature [illegible]	[illegible]	Signature Armand D. Carlos	6-6-91	Signature	
Printed Name [illegible]	TIME 1122	Printed Name ARMAND D. CARLOS	TIME	Printed Name	TIME
Company [illegible]		Company Brewer Environmental Ind.	1629	Company	

2 RECEIVED BY:	DATE	4 RECEIVED BY:	DATE	6 RECEIVED BY (LAB):	DATE
Signature Armand D. Carlos	6-6-91	Signature		Signature [illegible] Napoleon	6/7/91
Printed Name Armand D. Carlos	TIME	Printed Name	TIME	Printed Name [illegible] Napoleon	0715
Company Brewer Environmental Ind.	1622	Company		Company [illegible]	TIME

TOTAL NUMBER OF CONTAINERS: 4

SAMPLE CONDITIONS
SEALED YES/NO
RECEIVED ON ICE YES/NO

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: [illegible] Call w/ [illegible] 6/11 if [illegible]

SHIPPING TICKET NO.:

SAMPLER-GOLD TRANSPORTER-PINK LAB-YELLOW GRC-WHITE AND GREEN

311 Pacific Street
Honolulu, Hawaii, 96810
BREWER CHEMICAL Ph 808-533-4411, Fax 808-531-9078

Chain of Custody

Date 6-6-91 PAGE 1 OF 2

Job No 1668-00-0 Date 6-6-91
Job Location McCully - Waikiki 30th Main
Samplers Signature

Lab use Only: Chain of Custody X Yes No
BAL Job No _____ R&D log in No 1-53-30
Date/Time Received _____ BY TDC

Name/Company GRO/Resources Consultants	Name/Company
Street/Box 420 Waiakamilo Rd Suite 411	Street/Box
City/State/Zip Honolulu, HI 96817	City/State/Zip
Phone No 842 1133 Fax No 842-1937	Phone No Fax No
CLIENT (X) Yes ( ) No	CLIENT ( ) Yes ( ) No
Results (X) Yes ( ) No	Results ( ) Yes ( ) No
Invoice (X) Yes ( ) No	Invoice ( ) Yes ( ) No

REMARKS/INSTRUCTIONS: SEE ATTACHED

RUSH by June 11 Tues if possible. Call with results

Sample No.	Location Desc/Notes	Date Collected	Time Collected	Sample Matrix*	Container Desc.*	No. of Cont.	ANALYSIS: TCLP metals
	McCully 1	6-6-91		water/Sludge/Liter	1		X
	McCully 2	↓		↓	↓	↓	X
	McCully 3						X
	McCully 4						X

Relinquished By:	Received by:	Date	Time
Relinquished By:	Received by:	Date	Time
Relinquished By:	Received by:	Date	Time
Relinquished By:	Received by:	Date	Time

Sample Matrix* = soil, water, tissue, other
Container Desc.* = 40 ml VOA, 1 liter, Jar, tube, bag, other

APPENDIX B

Archaeological Literature and Archival Review Moiliili and Waikiki Districts, Honolulu

Submitted To:
R.M. Towill Corporation

Submitted By:
ERC Environmental and Energy Services Company, Inc. (ERCE)

July 1991

ERCE

Archaeological Literature and Archival Review Moilili & Waikiki Districts, Honolulu

by:

Allan J. Schilz

Submitted To:

R.M. Towill Corporation
420 Waiakamilo Road
Suite 411
Honolulu, HI 96817

Submitted By:

ERC Environmental and Energy Services Company, Inc. (ERCE)
900 Fort Street Mall
Suite 1550
Honolulu, HI 96813

July, 1991

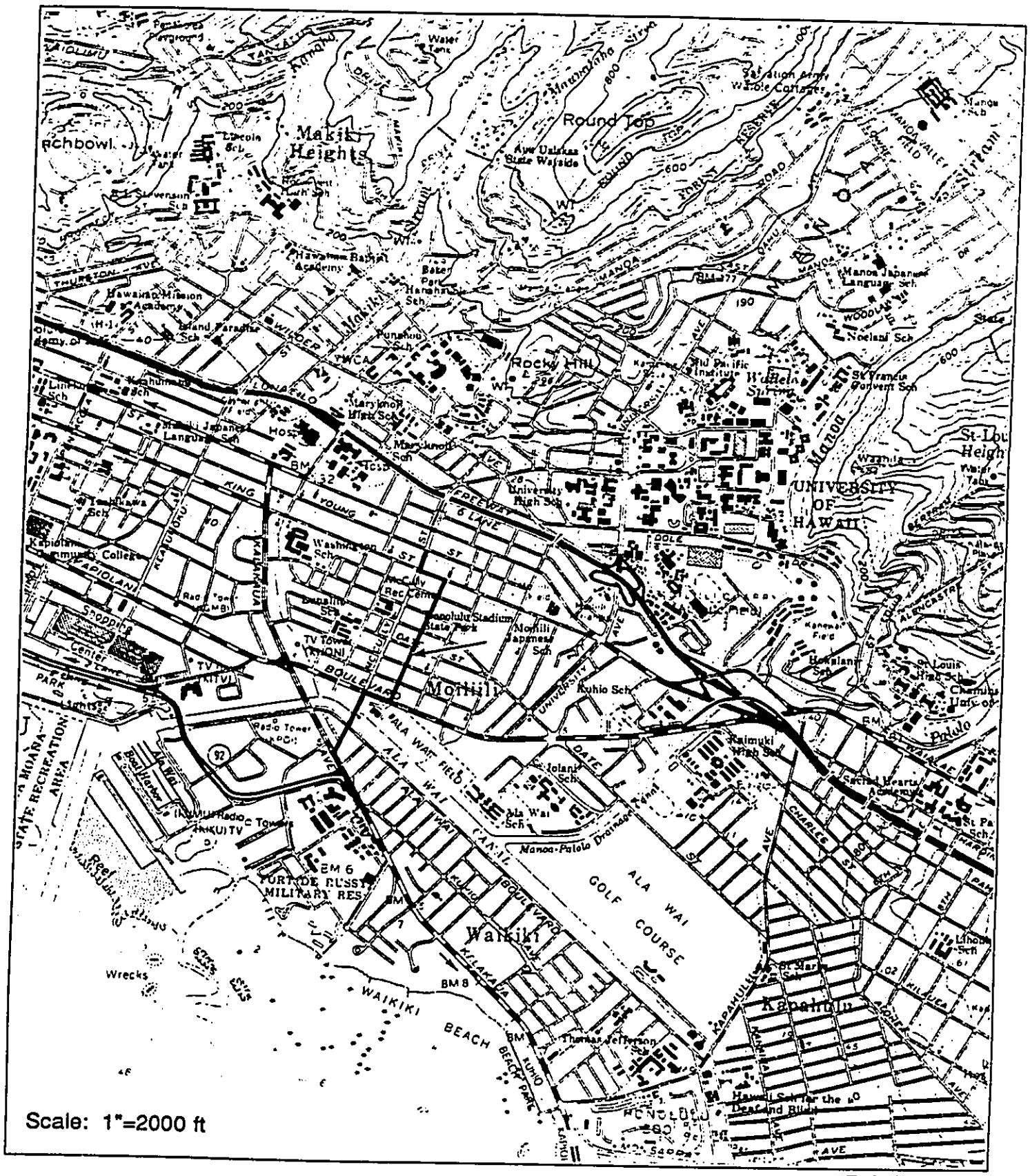
INTRODUCTION

This report presents the results of an archaeological literature and archival review and evaluates the potential for buried archaeological resources within the route of the proposed 30-inch water main through portions of the Moiliili and Waikiki Districts of Honolulu. Specifically, the proposed water main route will follow McCully Street from Young Street to King Street; King Street from McCully Street to Wiliwili Street; Wiliwili Street from King Street to Kapiolani Boulevard; Kapiolani Boulevard from Wiliwili Street to McCully Street; McCully Street from Kapiolani Boulevard to Ala Wai Bridge; across Ala Wai Canal adjacent to the bridge to Ala Wai Boulevard; Ala Wai Boulevard back to McCully Street; McCully Street from Ala Wai Boulevard to Kalakaua Avenue; and Kalakaua Avenue from McCully Street to Kuhio Avenue (Figure 1). With the exception of crossing the southwest corner of Ala Wai Park and the Ala Wai Canal, the water main will be installed within roadway rights-of way.

The investigations were performed by ERC Environmental and Energy Services Company (ERCE), Honolulu, Hawaii, for R. M. Towill Corporation. The scope of the current study focuses on existing literature and records to determine the likelihood of significant cultural resources within the project area, and provide recommendations to mitigate the impacts to those resources. The study includes information collected from the Hawaii State Survey Office, the Bureau of Conveyances, the State Historic Preservation Division, and the State Archives.

Historical Background

The early occupation of Waikiki has been well documented by a number of early European explorers. In 1792, Captain George Vancouver and his surgeon and naturalist, Archibald Menzies, described coastal villages and coconut palm groves; sugar cane, banana, and irrigated taro fields extending inland well into the Manoa and Palolo valleys; and numerous fishponds between the irrigated fields and the coastal villages (Vancouver 1798: I, 161-164; Menzies 1920:23-24). In 1825, Andrew Bloxam, of the English frigate *Blonde*, noted "innumerable" artificial freshwater ponds extending a mile inland from the shore (Bloxam 1925:35-36).



ERCE

Pipeline Corridor

FIGURE

1

The importance of the Waikiki area is indisputable. Beckwith (1940:383) notes that Waikiki was the "...ruling seat of the the chiefs of O'ahu..." by the late 14th century. Kahekili, after his conquest of O'ahu in 1785, made his residence at Waikiki (Kuykendall 1983:34). John Papa I'i (1800-1870) further notes that Kamehameha I maintained a residence in Waikiki after his victory over Kalanikupule at Nu'uanu in 1795 (I'i 1959:15-17).

Protected by a reef, Waikiki was far more important to the Hawaiians than Honolulu; Kamehameha maintained his residence at Waikiki until as late as 1807 (Kuykendall 1983:27). Nevertheless, the harbor at Honolulu was of great commercial interest to foreigners, and the native population was eventually drawn away from Waikiki. By the late 1820's, a number of factors had contributed to the decline of the Waikiki area. Perhaps the most disastrous of these was the introduction of European diseases. Disease and civil warfare contributed much to the decline of the native population. As other industries developed, particularly commercial agriculture, the manpower required to maintain the irrigation system and native fields was not available and they were neglected.

By 1900, only 15 fishponds remained in the Waikiki area and much of the surrounding area supported the cultivation of plantation crops. Europeans and Americans owned much of the land, and imported Chinese and Japanese laborers that dominated the labor force (Cobb 1902:429; Kuykendall and Day 1948:137).

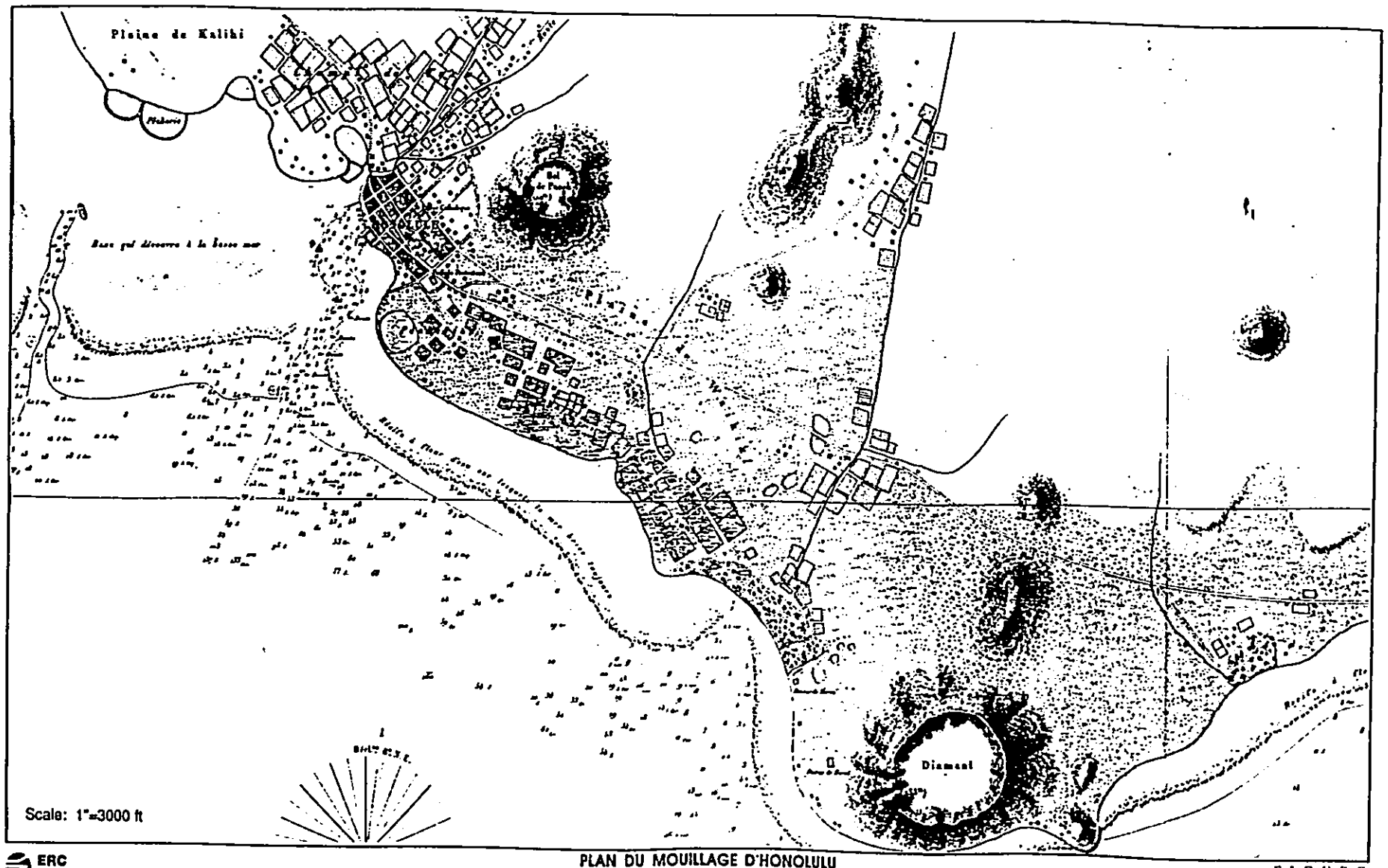
The antiquity of the Waikiki irrigation complex is problematic. Oral tradition, however, suggest that it was constructed in the early 15th century during the reign of chief Kalamakua (Fornander 1919-1920:VI, 314). The available data suggest that Hawaiian settlement of Waikiki was well established at least by the mid-15th century. Analysis of sediments from the Halekulani site further indicate that the beachfront was a stable barrier between Mamala Bay and the inland fishponds. It was on this barrier that the early settlements were located. Therefore, there exists the possibility that intact cultural deposits and natural features have survived modern development.

Historic Land Use

Some insights concerning the historic and prehistoric use of the study area may be gained from historic maps and accounts of early explorers. A map produced in 1855 by Lieutenant de Lapasse indicates a number of fishponds (*Marais et Pecheries*) located along the coast and inland within the Waikiki Plain (*Plaine de Waikiki*) (Figure 2). These ponds are clustered near the coast, but a few isolated ponds are located inland. Also located inland, particularly along Pahoa Stream are clusters of agricultural fields, presumably taro patches. While it is difficult to locate the current project on this early map, it would appear that there was little formal agriculture or aquaculture within the study area. There is, however, a roadway shown on the map that corresponds to the route of Kalakaua Avenue; fishponds are depicted on the map *mauka* of this roadway.

On an 1881 map of Waikiki by S.E. Bishop several fishponds, *'auwai* and taro patches are depicted *makai* of Kalakaua Avenue and east of the pipeline corridor *mauka* of Kalakaua Avenue (Figure 3). With the exception of a stone wall running along King Street, apparently separating the properties of Gulick and Haumea, and fishponds and *'auwai* located *makai* of Kalakaua Avenue, there are no cultural features depicted on the map within the pipeline corridor. Based on the location of fishponds and *'auwai makai* of Kalakaua Avenue, it is suggested that similar features were once located *mauka* of Kalakaua Avenue.

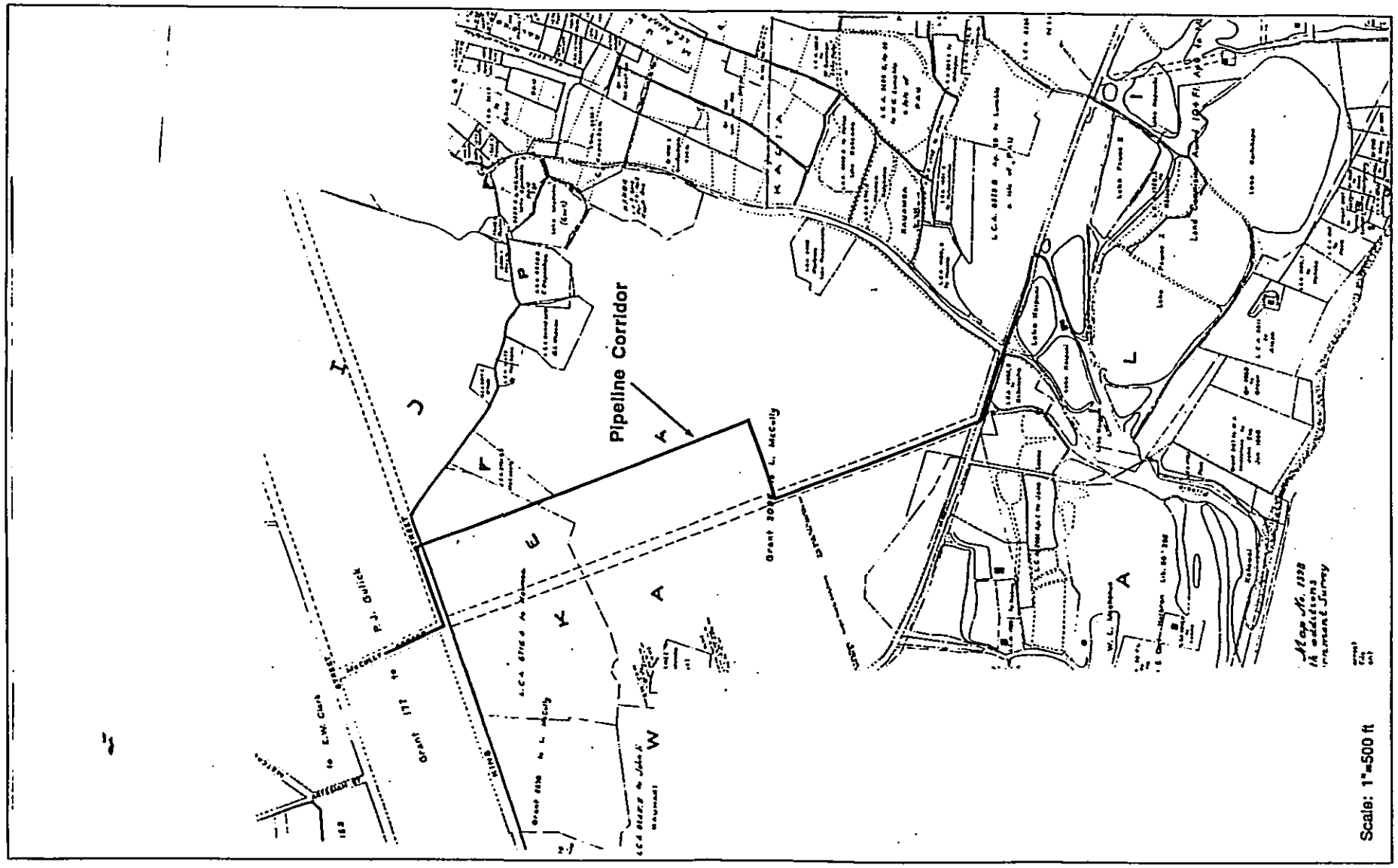
An 1887 map of Honolulu and vicinity by W. A. Wall also shows the fishponds and *'auwai* located in the Waikiki area (Figure 4). Waikiki Road (Kalakaua Avenue) appears to be the *mauka* boundary of the Waikiki fishpond complex, but a single *'auwai* (*'auwai* Alanaio) is shown running inland to a cluster of at least four fishponds and possibly taro patches. This cluster of fishponds and taro patches is east of the proposed pipeline corridor.



ERC Environmental and Energy Services Co.

PLAN DU MOUILLAGE D'HONOLULU
(ILE WOAHOU)
Lieutenant de Lapasse 1855
(Published by Editions Limited, Honolulu)

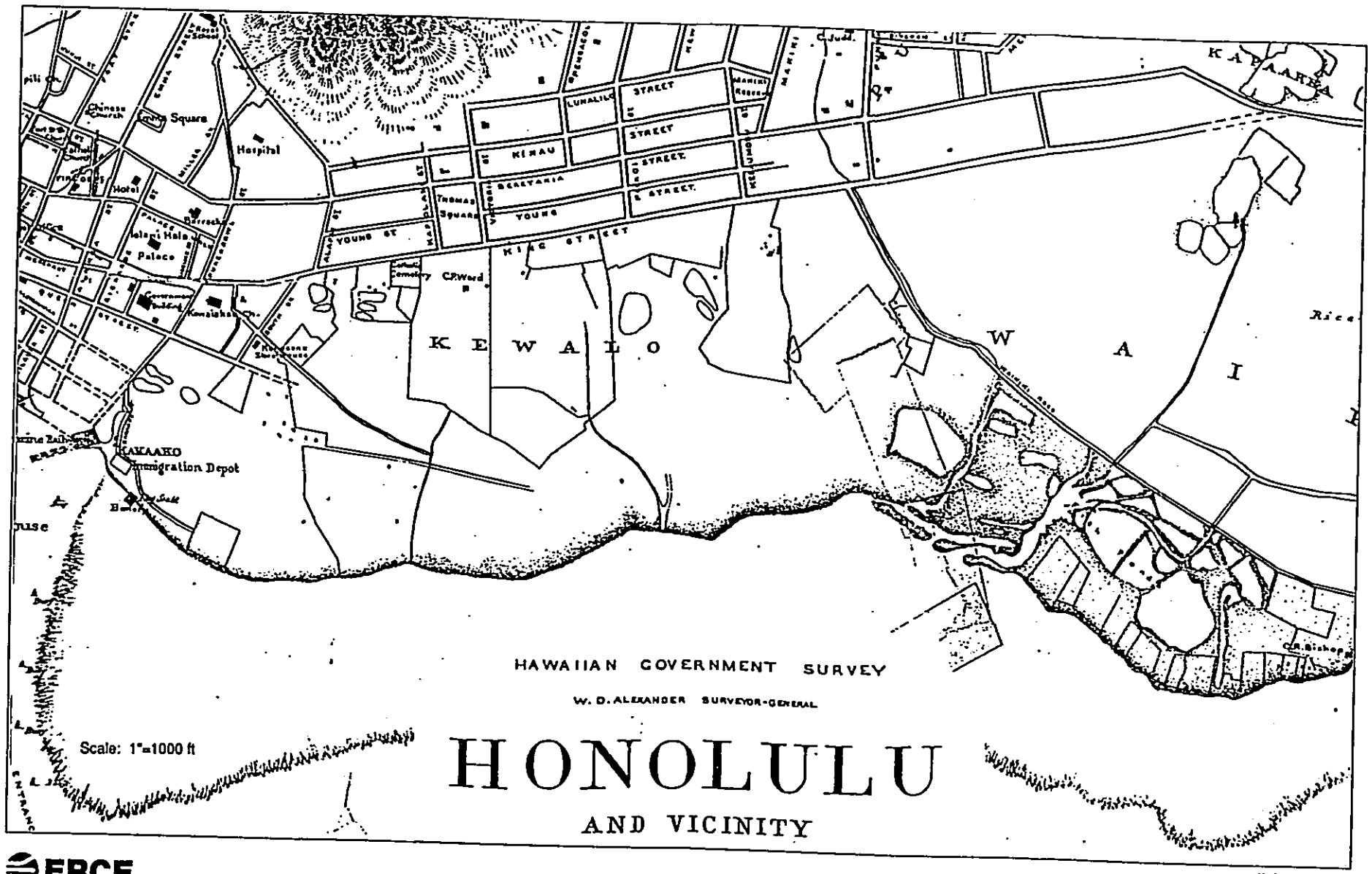
FIGURE
2



ERCE

Map of Waikiki, S.E. Bishop 1988

FIGURE 3



ERCE

Map of Honolulu and Vicinity, W.A. Wall 1887

FIGURE
4

STRATIGRAPHY OF THE WAIKIKI PLAIN

Much of the Waikiki Plain is composed of fill soil overlying earlier prehistoric and historic surfaces. As a result, little is known of these lower strata, particularly *mauka* of Kalakaua Avenue. Two general soil types of the Lualualei-Fill land-Ewa association are represented within the study area: Makiki clay loam and mixed fill (Foote et. al 1972). The segment of the pipeline route along McCully Street from Young Street to King Street consists of Makiki clay loam, 0 to 2 percent slope (Foote et. al 1972:91-92). The upper layer, to a depth of approximately 10 inches, is composed of dark-brown clay loam (7.5YR 3/2 when wet and 7.5YR 4/2 when dry). The soil has a moderate to very fine granular structure and is very hard, firm, very sticky, and very plastic.

The underlying layer, from 10 to 20 inches, is dark-brown clay loam (7.5YR 3/2 when wet and 7.5YR 4/4 when dry). It has a moderate, coarse, subangular blocky structure and is hard, firm, very sticky, and very plastic.

The layer from 20 to 30 inches below the surface is also dark-brown clay loam (7.5YR 3/2 when wet and 7.5YR 4/3 when dry). It has a moderate, fine and very fine, subangular structure and is hard, friable, very sticky, and very plastic. This soil contains cinders and rock fragments.

Finally, the layer from 30 to 54 inches is dark-brown clay loam similar to the previous layer, but is massive and stratified; it is slightly hard, friable, slightly sticky, and slightly plastic. Beneath this layer, at about 60 inches, is gravelly, fine textured alluvium mixed with cinders.

The remaining segments of the pipeline route are located within fill land, mixed (Foote et. al 1972:31). Fill land, mixed is composed of "...material dredged from the ocean or hauled from nearby areas, garbage, and general materials from other sources". Depth of the fill is not discussed in Foote et. al (1972). Nevertheless, it is expected that there is considerable variation; Allen (1989) recorded fill soils from 30cm (12 inches) to in excess of 100cm (40 inches) thick at Fort DeRussy.

Previous Archaeological Investigations

The archaeological sensitivity of Waikiki has been recognized for a number of years, but, until recently, very few systematic archaeological studies have been completed in the Waikiki area, and none have been completed within the Moilili District in the vicinity of the proposed pipeline route. Prior to 1980, archaeological work focused on the analysis of human remains and a few artifacts discovered during various construction projects. A summary of the previous archaeological work in the area is presented by Davis (1989) and need not be repeated here.

The most recent, and perhaps the most comprehensive, study in the area was conducted by Bertell Davis (1989). Under contract to the U.S. Army Engineer District, Pacific Ocean Division, Davis conducted historical/archival research and excavated 20 backhoe trenches and 9-1 x 2m hand excavated units within the Fort DeRussy area. Archival sources indicated that fishponds, *'auwai*, and associated habitation deposits were once located in the area. The results of the archival research were corroborated by the field research; Davis identified buried fishponds, fishpond walls, and *'auwai* in the inland portions of his study area and habitation deposits along the coast.

Of the 29 trenches and units excavated by Davis, trenches 1 and 3 are of particular interest to the current project because they were placed close to Kalakaua Avenue. The description of the stratigraphy of these trenches is taken from Allen (1989:111-114).

Trench 1 was placed within Loko Kaipuni. The upper 135cm of the trench consists of fill soil and included topsoil, humic and non-humic bands, Ala Wai fill. Beneath this layer, and extending to a depth of 157cm, was a layer of windblown sand (2.5Y 6/2 moist) that had been deposited after the fishpond was abandoned. Underlying the layer of windblown sand are bedded silts typical of pond bottom materials deposited by slow-moving water. This layer (Layer III; 5Y 7/1 wet) is 18cm thick.

Layer IVa consists of dark gray silty clay loam (5Y 4/1 moist) characteristic of a wetland, perhaps representing a pondfield. Layer IVb consists of light gray silt (5Y 6/1 wet) subsoil contemporaneous with Layer IVa. Layer IVa is 10cm thick and Layer IVb is 20cm thick.

Finally, Layer V is very dark brown (10YR 2/2 wet) and consists of an earlier ponded topsoil. Unlike the floor sediments recorded by Hammatt et. al (1985) at Nu'upia Ponds in Kaneohe, the sediments in trench 1 are humic, indicated repeated deposition of organic matter, e.g., vegetation and fish remains. Water was encountered at 225cm below the present surface.

Trench 3 was also placed within a historic fishpond and exhibits a similar stratigraphy. Fill soil (Layer I) extends to a depth of 70cm. Layers II and III consist of white silt (2.5Y 8/2 moist) and pale brown sand (10YR 8/3 moist), respectively, and appear to correspond to Layer II of trench 1.

Layer IVa of trench 3, while resembling Layer IVb of trench 1, may correlate temporally with Layer III of trench 1. Regardless, Layer IVa represents pond sediments. Layer IVb consists of a 2-5cm layer of root mat. Layer IVc consists of white and light gray coralline silt, sand, and gravel. Allen (1989:114) believes that the well-sorted coral gravels are cultural and may have derived from slippage of a nearby wall, or other feature.

Layer Va is very dark gray silty clay loam (10YR 3/1 moist), representing pond bottom topsoil. Layer Vb is below the water line. The presence of burrowing snails in this layer suggests that Layer Va may date to post-contact times, but this remains to be demonstrated.

CONCLUSIONS AND RECOMMENDATIONS

Clearly, there exists a potential for significant buried historic and prehistoric resources within the proposed pipeline corridor. While the historic maps do not provide conclusive information concerning land use along much of the pipeline route, significant buried resources are suggested. This is particularly true as the corridor approaches Waikiki and Kalakaua Avenue. The research conducted by Davis (1989), Allen (1989), and others demonstrates the existence and research potential of the buried deposits in Waikiki, and radiocarbon dates indicate an occupation of the area as early as the late 14th century (Davis 1989:74).

There are three major research domains that may be addressed through completion of a monitoring and subsurface sampling program along the pipeline route. These research domains include chronology, site function, and settlement organization.

(1) Chronology

a. Identify and date cultural and natural layers along the pipeline route to refine the relationship of archaeological sites to one another and to the natural strata.

b. Compare the coastal sites with sites located inland to evaluate patterns of exploitation and changes in those patterns.

(2) Site Function

a. Using, and perhaps refining, existing site typologies, establish a pattern of coastal vs. inland land use.

b. Determine whether sites located inland were temporary or permanent.

c. Evaluate the relationship between specific resources and the types of sites located within resource zones.

(3) Settlement Patterns

a. Determine how sites complimented one another in terms of local and regional socioeconomic structures.

b. Evaluate the relationship between coastal settlement, inland settlement, and the natural resources available within these areas.

It is recommended that the pipeline excavations be monitored by a qualified archaeologist. The monitoring need not be continuous throughout the excavations, but should combine inspection and sample collection from the open trench at regular intervals with continuous monitoring at areas of high sensitivity. Specifically, near King Street because of the wall

depicted on the 1881 map by S. E. Bishop, and as the pipeline approaches Kalakaua Avenue.

It is anticipated that deposits will be exposed that may yield samples suitable for dating and reconstruction of earlier environments. Provisions should be made to collect and analyze charcoal, plant macrofossils, and pollen samples.

If, in the event that buried resources are found, trenching should be diverted to allow the archaeologist time to evaluate the deposit and to consult with the State Historic Preservation Division.

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