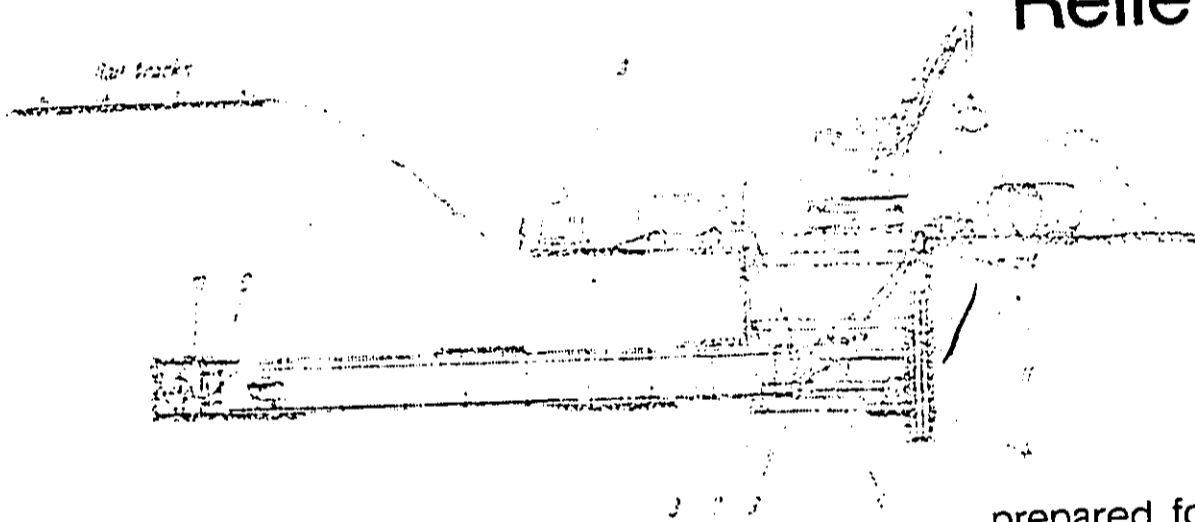


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Final
ENVIRONMENTAL
IMPACT
STATEMENT

for
Sewer
Tunnel
Relief



prepared for:
Department of Public Works
City & County of Honolulu

prepared by:
Wilson Okamoto
& Associates, Inc.

OA
343

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FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE PROPOSED
SEWER TUNNEL RELIEF
Honolulu, Hawaii

TMK: 2-4:01, 02, 08-14, 17, 19-25, 29, 30
2-8:07, 09, 12-18, 23, 27-30
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This Environmental Document is Submitted
Pursuant to Chapter 343, Hawaii Revised Statutes


Proposing Agency:

Division of Wastewater Management
Department of Public Works
City and County of Honolulu

Accepting Authority:

Governor, State of Hawaii
Department of Land Utilization
City and County of Honolulu

Responsible
Official:


RUSSELL L. SMITH, JR.
Director and Chief Engineer

Date:

9/9/85

Prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.

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PREFACE

This environmental document is prepared pursuant to the requirements of Chapter 343, Hawaii Revised Statutes, and Environmental Impact Statement Regulations.

SUMMARY

Proposing Agency: Department of Public Works, Division of Wastewater Management, City and County of Honolulu

Proposed Project: Sewer Tunnel Relief

I. PROPOSED ACTION

- A. Progressive structural degradation, declining capacity, and difficulty in maintenance of the existing Manoa-Kaimuki Interceptor Sewer pose a potential threat to public health and safety. To alleviate this problem and adequately serve the existing and projected needs of the public, a new Sewer Tunnel Relief is proposed. The proposed project shall include construction of the new relief sewer.

II. PROJECT DESCRIPTION

- A. The proposed Sewer Tunnel Relief is divided into four increments (see Figure 2). The project corridor extends from the intersection of South Beretania Street and Ward Avenue (beginning of Increment 1-B) to the intersection of Keanu Street and Palolo Avenue (end of Increment 4) in Kaimuki.
- B. Major construction methods considered are the cut and cover method and tunneling. The cut and cover method represents the traditional trenching method of excavation. Tunneling is anticipated to be used for deeper excavation and where use of the cut and cover construction method would be impractical or more costly.
- C. The discussion of construction operations also includes the following topics: Portals, Shafts, and Manholes; Construction Yards and Portal Sites; Disposal of Spoils; Temporary Construction Easements; and Control of Operations.

III. DESCRIPTION OF ENVIRONMENT

- A. The City and County of Honolulu is highly urbanized, and serves as the major commercial, financial, and governmental center of the State. The tributary areas for the proposed Sewer Tunnel Relief are contained within two City and County of Honolulu Development Plan areas. The East Honolulu Development Plan area extends from Aina Koa Ridge to Makapuu Point, and is identified by the County General Plan as part of the "urban fringe". Limited growth is prescribed for this area. The Primary Urban Center Development Plan area extends from the Waialae-Kahala area to Pearl City. Increased urbanization is provided for this area.

- B. There are a variety of land uses along the project corridor including residential, industrial, commercial, institutional, recreational and transportation facilities.

IV. ENVIRONMENTAL IMPACTS

- A. Environmental impacts are examined from regional and corridor perspectives. Short-term construction related corridor impacts include those associated with economics, noise, waste spillage and dispersion, air quality, traffic, utilities, hydrology, public safety, blasting and worker safety, archaeological/historic sites and public facilities.
- B. Long-term beneficial impacts of the proposed project include the assurance of greater public health and safety conditions for service area residents and minimal maintenance requirements.

V. RELATIONSHIP TO PUBLIC LAND USE POLICIES AND CONTROLS

- A. Land use considerations pertinent to the project site are as follows:
 1. State Land Use Classification: Urban.
 2. Current Development Plan Designation: Public Facility, Preservation, Residential, Low to High Density Apartment, Commercial and Parks and Recreation.
 3. Zoning: A-1 (PD-H), A-2, A-3 Apartment, B-2 Business, P-1 Preservation, R-4, R-6 Residential, HC & S District No. 3, "The Punchbowl District", and HC & S District No. 5, "Thomas Square/Academy of Arts District."

VI. ALTERNATIVES CONSIDERED

- A. The "No-Action" alternative is considered to be unacceptable as the problems associated with the existing interceptor will increasingly pose health and safety hazards to the public and maintenance personnel.
- B. Reconstruction of the existing tunnel is not as desirable as constructing a new relief sewer because of higher cost and the need to divert existing flows to permit reconstruction.
- C. Because of possible adverse construction conditions which may be encountered through the Regency Park Condominium complex (adjacent to Saint Louis High School and Chaminade University), alternative alignments for the Sewer Tunnel Relief through this area were examined. An alignment along Waiialae Avenue was not considered hydraulically feasible or desirable. The alternative alignment traversing the Regency

Park Condominium complex, continuing along the Gerber Fieldhouse and the St. Louis athletic field was designated the "Lower Route". The "Mauka Route" alignment would straddle residential lots to St. Louis Drive, continue across the Saint Louis/Chaminade University campuses under an existing park and interior road to the athletic field (see Figure 3).

While both the Lower Route and Mauka Route represent viable alternatives, the potential liabilities associated with construction under the Regency Park Condominium make the Lower Route the less desirable alternative. For the purpose of this EIS, therefore, the "Mauka Route" is considered the primary alignment traversing the Saint Louis High School/Chaminade University campuses.

- D. The alignment for the Sewer Tunnel Relief involved consideration of design and maintenance constraints, ground conditions, existing obstructions, and the anticipated short-term impacts of construction along the selected route. Desired features of the proposed relief sewer include an alignment close to the existing interceptor sewer to reduce the need for an extensive diversion and collection system to convey flows to the new relief sewer, an open trench method of construction, an invert elevation above the groundwater table, and sufficient slope. In addition, the proposed Sewer Tunnel Relief will be located in public roadways or accessible easements with manholes located to facilitate easy maneuverability of vehicles and equipment for maintenance. The areas proximate to the new relief sewer should not be adversely impacted by odors. Noise and the obstruction of traffic caused by construction and maintenance operations for the proposed Sewer Tunnel Relief are anticipated adverse impacts.

VII. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

- A. The short-term or construction-related impacts will be temporary and localized. Once construction activities are completed, surface conditions will be restored to pre-construction conditions or better, with no visible impacts of the project. The proposed relief sewer will assure the continued maintenance of public health and welfare as well as facilitate achievement of City Development Plan objectives by providing the necessary additional capacity to allow growth in the Primary Urban Center.

VIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

- A. Irretrievable resources committed to the project will include materials, labor, energy, and funding to implement construction of the new proposed relief sewer. Although intangible, loss of productivity due to construction disruptions may be considered an irreversible and irretrievable resource.

IX. UNRESOLVED ISSUES

- A. Given the present uncertainty as to specific construction methods and contractor requirements, the EIS is unable to provide detailed discussions on site specific impacts. In view of these uncertainties, therefore, a broad range of impacts are evaluated, including probable impacts at sensitive locales such as parks, streams, and schools.

Requirements for construction will be finalized during the design phase of the project (i.e., preparation of construction drawings and specifications). Moreover, the City and County's construction management program will be implemented to be responsive to corridor institutions', businesses' and residents' concerns.

CHAPTER I
PROJECT BACKGROUND

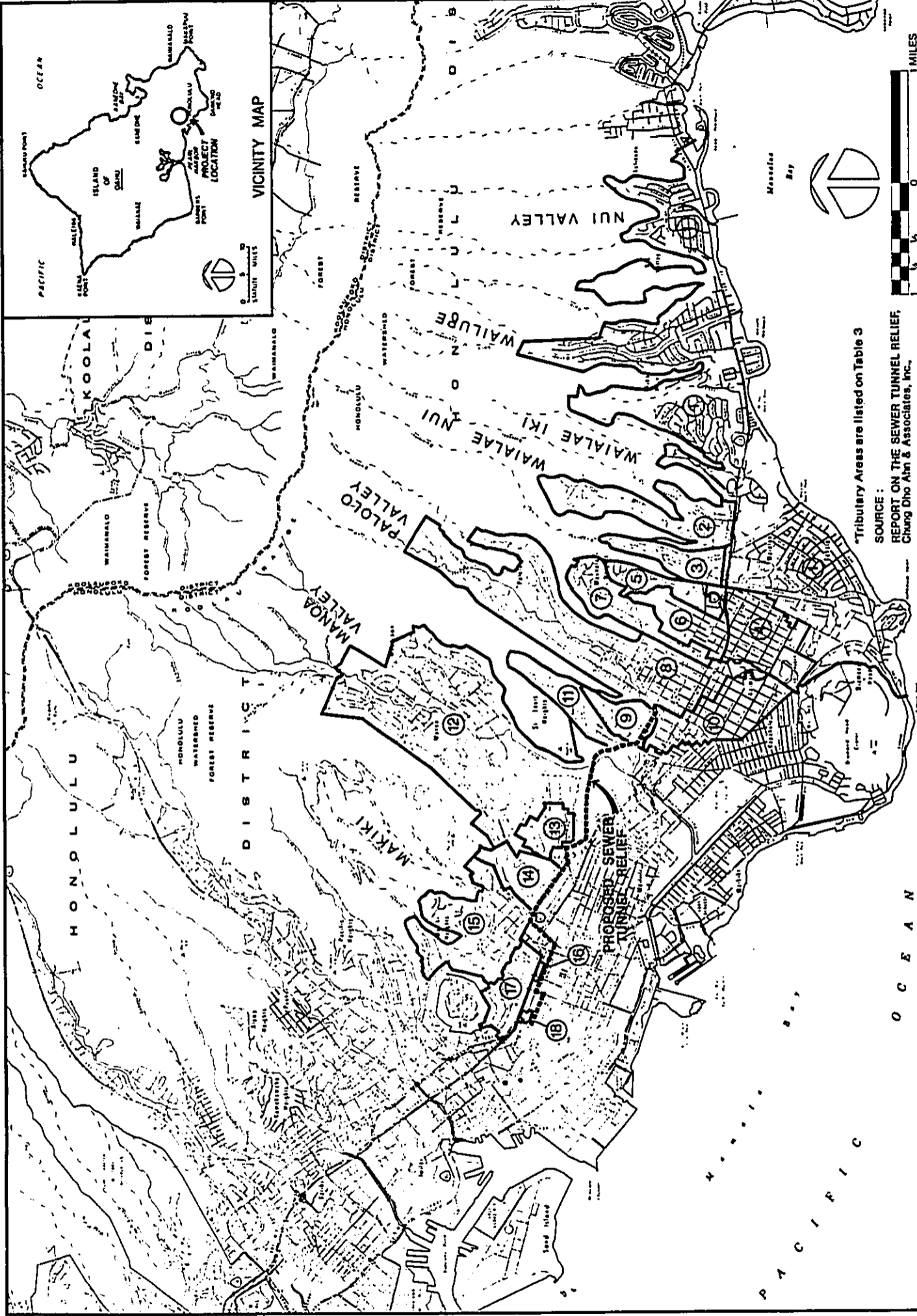
I. PROJECT BACKGROUND

A. BACKGROUND

A comprehensive study on the existing Manoa-Kaimuki interceptor was conducted in 1971 by the City and County of Honolulu (Chung Dho Ahn & Associates, 1971) for purposes of evaluating conditions of the interceptor and preparing the necessary recommendations for insuring the continued service of the interceptor. The study recommended upgrading the system by constructing a new Sewer Tunnel Relief.

The purpose of this environmental document is to assess the potential impacts of the new relief sewer, in accordance with Chapter 343, H.R.S.

The existing Manoa-Kaimuki interceptor sewer services the central and eastern portions of Honolulu, between Punchbowl Crater and Niu Valley (see Figure 1). The project area is within the Mamala Bay Sewerage District of Oahu. Although primarily sewered, the area is still serviced by cesspools in a few scattered locations at Punchbowl Crater, Makiki Heights, Kaimuki, Diamond Head Crater and Kahala. Long-range plans call for the eventual sewer service hook-up in these unsewered areas.



Tributary Areas are listed on Table 3

SOURCE:
 REPORT ON THE SEWER TUNNEL RELIEF,
 Chung Cho Ahn & Associates, Inc.,
 March 1971.

SEWER TUNNEL RELIEF

prepared for: DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU
 prepared by: WILSON OKAMOTO & ASSOCIATES, INC.

PROJECT LOCATION & SERVICE AREAS

fig.1

Construction of the existing Manoa-Kaimuki interceptor began in 1928. A 4-foot wide by 5-foot high tunnel was installed from the intersection of Ward Avenue and Kinau Street, along Kinau Street, Victoria Street, Lunalilo Street, Pensacola Street, Wilder Avenue, Metcalf Street, Hoonanea Street, Dole Street, through the Chaminade University/Saint Louis High School campuses, to Palolo Avenue at Keanu Street. The total length of this increment of the tunnel was 18,945 feet (3.59 miles), with depths from ground surface ranging between eight to 55 feet.

In 1948, the tunnel was extended by 8,043 feet. A 4-foot by 6.25-foot tunnel, 6,040 feet in length, was added from Palolo Avenue to the Waialae Drive-in Theater at Keanu Street. Invert elevations for this section of the tunnel ranges from 15 to 200 feet below ground surface. Built after World War II, a 42-inch diameter reinforced concrete pipe (RCP) further extended the interceptor 2,003 feet in an easterly direction to an end point just beyond Kilauea Avenue. Depths of the 42-inch pipe section range between 10 and 22 feet.

The alignment of the existing Manoa-Kaimuki Interceptor is shown in Figure 2A.

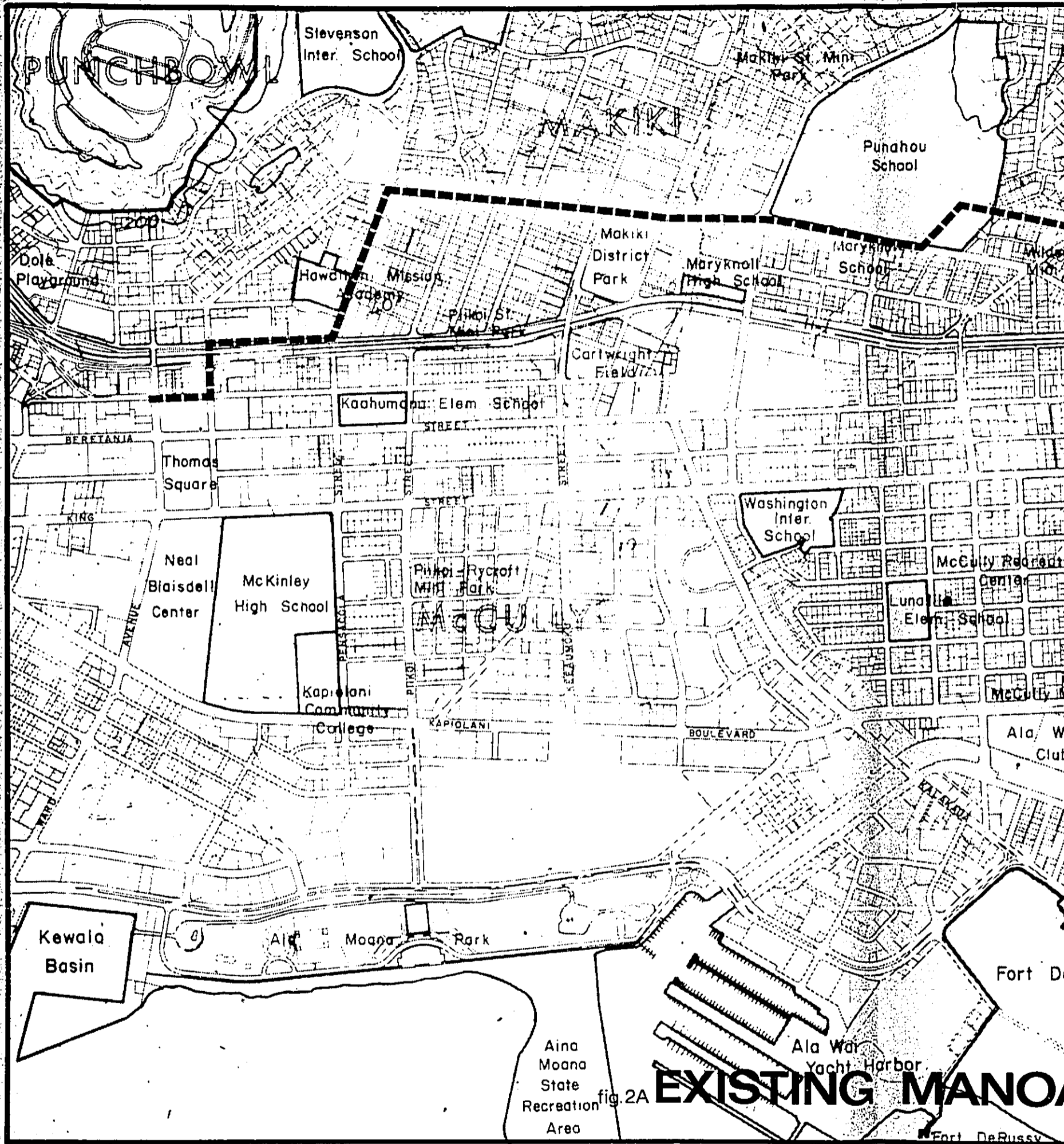
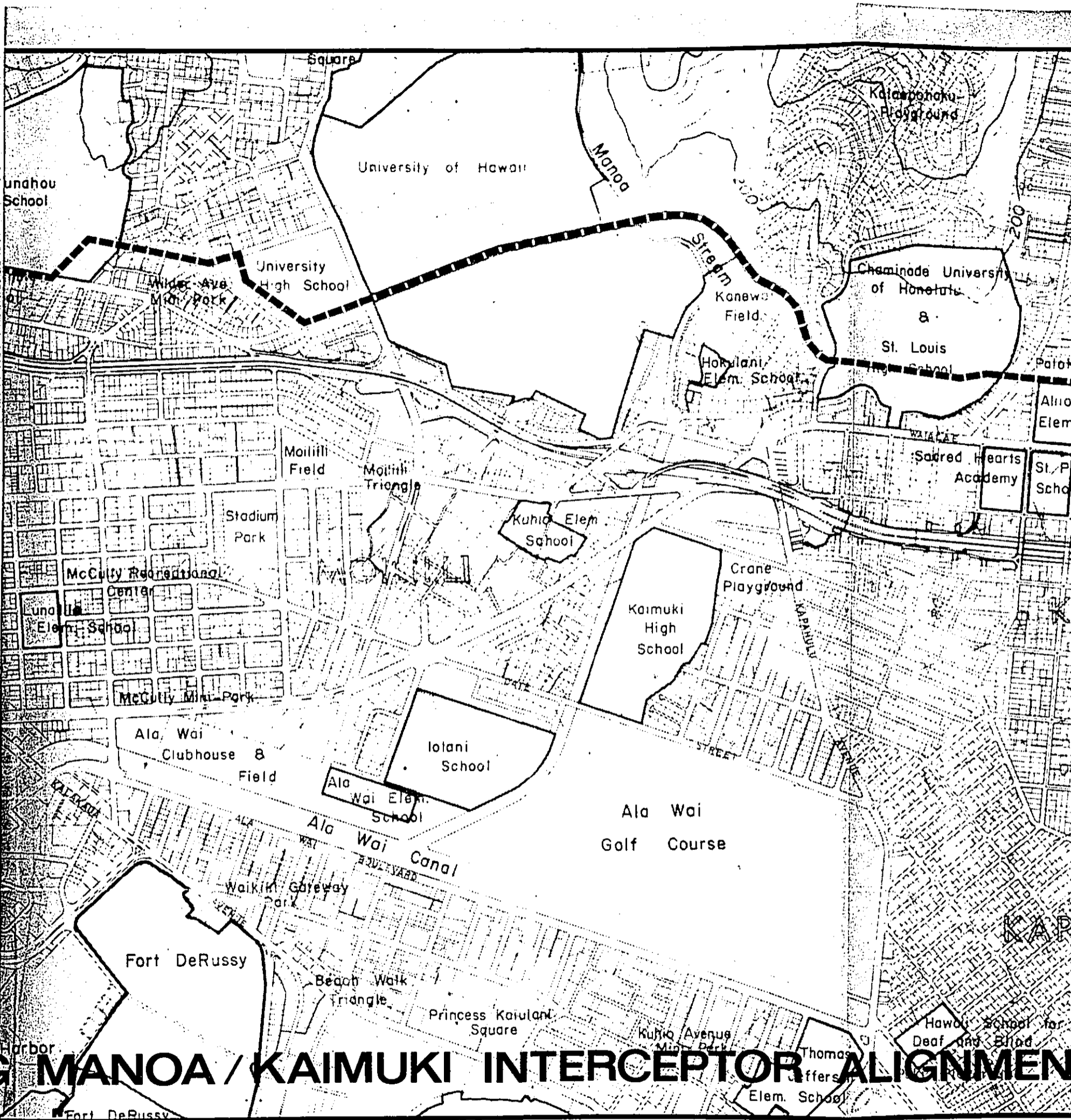


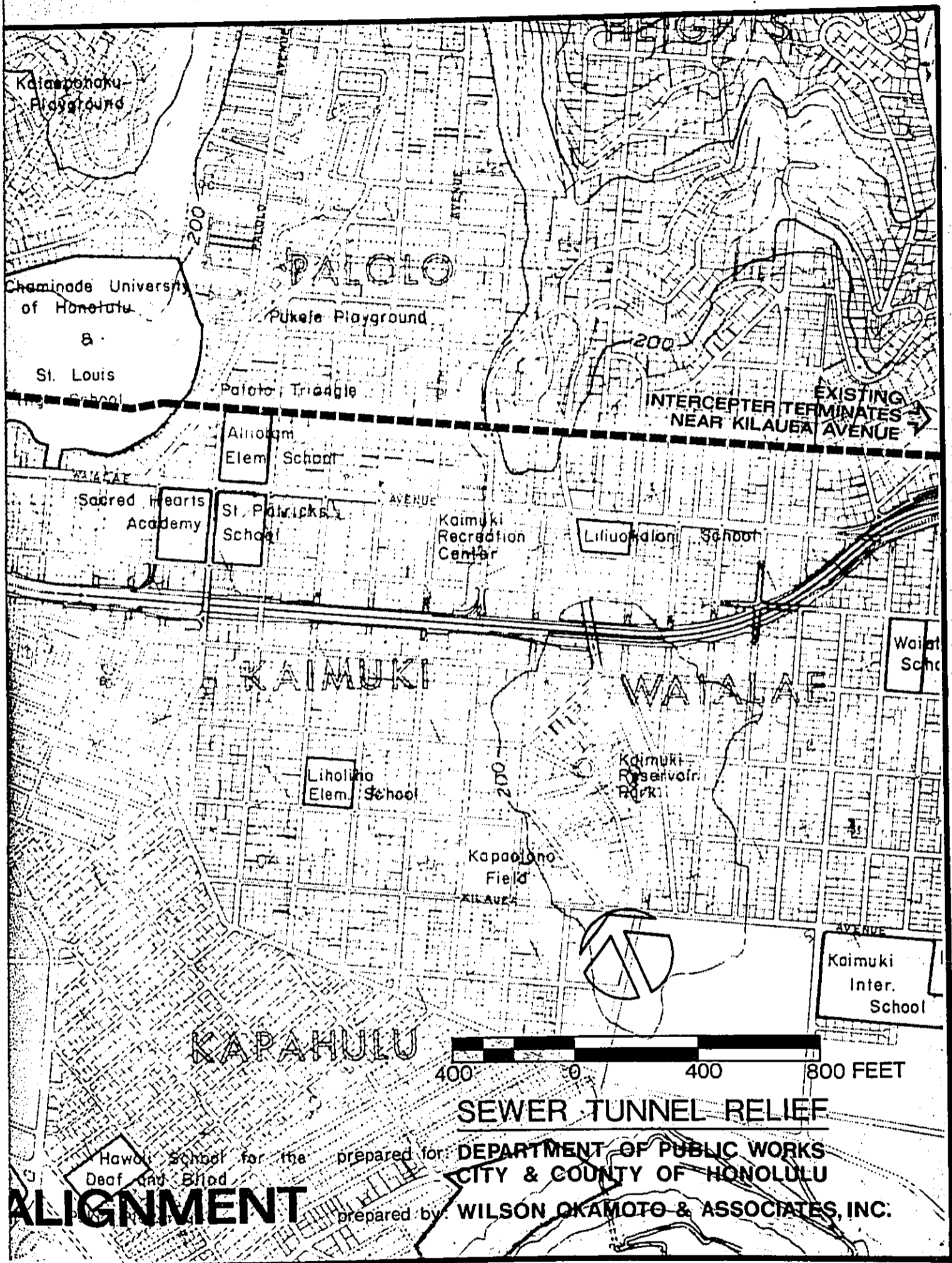
fig. 2A

EXISTING MANOA

Fort DeRussy



MANOA / KAIMUKI INTERCEPTOR ALIGNMENT



Kalahehonu Playground

Chaminade University of Honolulu
 &
 St. Louis High School

PALOLO

Pukele Playground

Palolo Treadle

EXISTING INTERCEPTOR TERMINATES NEAR KILAUEA AVENUE

Aliiokam Elem. School

Sacred Hearts Academy

St. Patrick's School

Kaimuki Recreation Center

Liliuokalani School

KAIMUKI

WAIATA

Waiata School

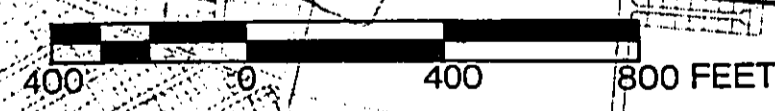
Liholilo Elem. School

Kaimuki Reservoir Park

Kapahulu Field

KAPAHULU

Kaimuki Inter. School



SEWER TUNNEL RELIEF

DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU

prepared by WILSON OKAMOTO & ASSOCIATES, INC.

Hawaii School for the Deaf and Blind
ALIGNMENT

B. CURRENT OPERATIONS

The existing Manoa-Kaimuki interceptor sewer is located within the Mamala Bay Sewerage District. This district, which has the highest population concentration in the State, is served by two separate municipal treatment and disposal systems. These systems are the Sand Island System (East Mamala or Honolulu System) and the Honouliuli System (West Mamala System). Both systems were designed for the disposal of advanced primary or secondary effluent into deep ocean waters (approximately two miles offshore in about 200-foot deep waters). (State Department of Health and City and County of Honolulu, December 1980)

The existing Manoa-Kaimuki interceptor sewer carries wastewater in a westerly direction, from the tributary areas, to the Sand Island Sewage Treatment Plant (STP). The Sand Island STP serves the areas from Niu Valley to Aliamanu and consists of an advanced primary plant and an ocean outfall used for the discharge of advanced primary effluent.

From the southeastern end of the tributary area, wastewater from the Paiko-Niu Valley area flows to the Niu Valley Sewage Pump Station (SPS) and is pumped into the Wailupe Trunk Sewer. This trunk line runs along the shoreline collecting wastewater from Aina Haina Valley, Waialae-Iki Ridge, and the

Waialae Golf Course Subdivision. The trunk line terminates at the Kahala SPS, located at Waialae Beach Park. This station also receives flows from the Waialae-Kahala, Black Point, Fort Ruger, and Diamond Head areas.

From the Kahala SPS, the wastewater is pumped through an 18-inch force main along Kealaolu Avenue and enters the existing Interceptor at the 42-inch RCP near Kilauea Avenue at the YMCA parking lot (TMK: 3-5-7:15). Flows from Aina Koa Valley and Waialae Ridge also enter the interceptor at this point.

The 42-inch RCP interceptor also collects flows from Waialae-Nui Valley at Kilauea Avenue, Tropicana Village flows at Hunakai Street, and East Kaimuki flows at the Waialae Drive-In Theater. The 42-inch RCP connects to the 4-feet x 6.25-feet tunnel portion of the interceptor at the Waialae Drive-in Theater, near Hoku Avenue.

Wastewater from Kahala Heights enters the interceptor near Hoku Avenue. Collection of wastewater from Wilhelmina Rise is provided by drop manholes at 13th Avenue and 17th Avenue. Flows from trunk sewers serving Palolo Valley enters the tunnel at a drop manhole off of Palolo Avenue. At Palolo Avenue, the tunnel section changes from a 4-feet x 6.25-feet to a 4-feet x 5-feet section.

Continuing west from Palolo Avenue, the 4-foot x 5-foot tunnel traverses the St. Louis High School/Chaminade University campuses, collects flows from the Chaminade areas at St. Louis Drive, and also collects flows from St. Louis Heights at Kanewai Street.

The 5-foot x 7-foot West Kaimuki Spur which collects flows from the West Kaimuki area, also discharges flows into the tunnel at the intersection of Dole Street and Saint Louis Drive. This spur tunnel begins on Second Avenue, collecting flows from an 18-inch trunk, proceeds west on Waiialae Avenue, and north on Saint Louis Drive to Dole Street.

Flows from Manoa Valley enter the interceptor at Dole Street near Krauss Hall of the University of Hawaii.

(On Dole Street, Ewa of University Avenue and just Diamond Head of Hoonanea Street, a connection diverts a portion of the Manoa-Kaimuki flows into the East End Relief Sewer).

The remaining tributary area is broken up into several smaller subdistricts with flows entering the tunnel through trunk sewers lines at drop manholes. Other feeder trunk lines of significance include the 18-inch Papakolea Residence Lots Trunk Sewer at Piikoi Street and a 15-inch sewer in Lunalilo Street which was installed with the H-1 Freeway construction.

Near the intersection of Kinau Street and Ward Avenue, the flow merges with the Kalihi interceptor, which contains flows from east Nuuanu Valley, Pacific Heights, and Pauoa Valley. The flow then passes through a 5-foot x 5.5-foot sewer tunnel and into a grit chamber on Ward Avenue, just above South Beretania Street. The flow then enters the 39-inch sewer which connects into the 60-inch sewer at Ward Avenue and South Beretania Street. The 39-inch connection is designed to carry the Kalihi interceptor flows after the Sewer Tunnel Relief is constructed. At Ward Avenue and Auahi Street, the 60-inch sewer joins the 78-inch East End Relief Sewer (gravity flow). The combined flows are then conveyed through the 5.75-foot wide by 6.25-foot high box section of the East End Relief Sewer in Auahi Street to the Ala Moana Sewage Pump Station, from which it is pumped to the Sand Island STP for treatment and disposal.

C. PROJECT NEED

Hydrogen sulfide corrosion of the Manoa-Kaimuki interceptor has jeopardized the structural integrity and reduced the hydraulic efficiency of the interceptor. (Reduction in hydraulic efficiency is attributed to loss of clay liners and deterioration of concrete surfaces). The deteriorated condition of the tunnel is a reflection of its age, and increases in flows, over time, have intensified deterioration

processes in the interceptor. For example, the introduction of flow from the Kahala Sewage Pump Station (SPS) in 1951, probably increased levels of hydrogen sulfide in the interceptor. (Flows from the Kahala SPS are assumed to have higher sulfide concentrations due to longer detention times).

Additionally, difficult maintenance conditions have hampered efforts to upkeep the sewer. Periodic inspection of the interceptor over the years indicate the area of greatest concern is the original tunnel section, constructed in 1928. Major problems include accumulation of muck and debris which reduce flow, cracks in the tunnel lining, and hydrogen sulfide corrosion.

The existing interceptor has been periodically inspected in years subsequent to construction. Past reports indicate the interceptor has sustained progressive degradation of its physical structure and its original carrying capacity (see Table 1). The extent to which this degradation has occurred justifies remedial actions such as the proposed construction of the new relief sewer.

TABLE 1

LIST OF PAST TUNNEL INSPECTIONS

Metcalf & Eddy, Record of Field Inspections of Various Trunk Sewers in Honolulu, T.H., 1944.

Belt, Collins and Associates, Ltd., South Honolulu Sewerage Study, prepared for the City and County of Honolulu, 1961.

Austin, Smith & Associates, Inc., North Honolulu Sewerage Study, prepared for the City and County of Honolulu, November 1961.

Pomeroy, Richard, Investigation of Certain Sulfide Problems in Sewers of the City and County of Honolulu, prepared for the City and County of Honolulu, April 13, 1962.

Chung Dho Ahn & Associates, Inc., Report on the Sewer Tunnel Relief, A Study of the Manoa-Kaimuki Interceptor Sewer, prepared for the City and County of Honolulu, March 1971.

Problems associated with the existing interceptor are summarized below.

1. Declining Physical Condition and Potential Health and Safety Hazards

Deterioration of the inner surfaces of the existing interceptor has resulted from sulfuric acid (H_2SO_4), a strong acid that corrodes concrete. On moist sewer walls, hydrogen sulfide (H_2S), is converted to

H_2SO_4 by bacterial activity. Hydrogen sulfide (H_2S) is generated in anaerobic (absence of free oxygen) conditions found in the sewers and in solution (ions) has little effect on concrete sewers. Hence, the control of H_2S will limit the effects of H_2SO_4 .

Hydrogen sulfide generation is dependent upon the following factors: (1) temperature; (2) humidity; (3) sulfate concentration in sewage; (4) sewage strength; (5) pH of sewage; (6) age of the sewage; (7) velocity of flow; (8) amount of slime; (9) brackish water infiltration; (10) other wastes; and (11) detention time.

The structural condition of the interceptor will continue to deteriorate as existing blistering, cracks, holes, and voids in the tunnel continue to become larger. Maintenance efforts have been unable to satisfactorily upkeep the line. Constraints to maintenance are discussed in the next section.

The declining condition of the existing system currently poses a potential threat to public health and safety. Structural deterioration may cause the collapse of the tunnel which may include the total collapse of the roadway above. This danger would threaten the integrity

of the surrounding utilities and could result in the overflow of raw sewage onto City streets, eventually polluting streams and the ocean. Raw sewage overflow would pose significant public health hazards. This potential hazard is illustrated by previous collapses of the Ward Avenue interceptor, near King Street in the 1970's.

Observations documented by the Chung Dho Ahn study revealed cracks, separation, and holes through the concrete lining of the tunnel along three separate segments of the interceptor. These occur along the older, 1928-constructed section. Cracks were observed in the crown extending over much of the length along Wilder Avenue, between Piikoi and Alexander Streets, and voids developed behind some of these cracks. These cracks and voids have since been grouted and repaired by the City and County.

Smaller holes and cracks were also identified by the 1971 Chung Dho Ahn study, but did not require remedial work at that time.

2. Maintenance Difficulties

Manual maintenance of the interceptor which is performed at night when sewage flows are lower generally consists of lowering crewmen into the sewer to collect accumulated sediments, transporting the collected sediments to the manhole entrance, and hoisting the sediments to the surface where it is loaded onto trucks for haul away and disposal.

This operation is hampered by:

- a. Design features of the existing tunnel (i.e., depth of the tunnel from the ground surface).
- b. Partial or total inaccessibility to some manholes (i.e., those located in easements, within narrow roads, where operations cause traffic hazards, under parked cars, and manholes that have been paved over).
- c. Large quantities of deposits accumulated in the tunnel.
- d. Wastewater sprays at drop manholes which increase health and safety hazards to workers.

- e. Normally high depth of flows which impede manual cleaning operations.
- f. Lack of personnel and equipment to conduct an organized program of maintenance.
- g. Low ceiling height which restricts cleaning personnel from standing upright.

3. Insufficient Capacity

The 1971 Chung Dho Ahn Sewer Tunnel Relief Study indicated insufficient capacity at two segments of the interceptor. These are along the 1928 tunnel between Ward Avenue and Dole Street (at the University of Hawaii), and along the 1948-constructed 42-inch RCP.

An updated hydraulic analysis for the Manoa-Kaimuki interceptor (Wilson Okamoto & Associates, Inc., 1985) indicates insufficient capacity between Ward Avenue and the Manoa Trunk connection, on Dole Street, near the University of Hawaii's Krauss Hall (see Appendix A). This finding is based on a Manning's "n" value of 0.018^a. If a Manning's "n" value of 0.021 is assumed,

^a The Manning's "n" value is a term used to evaluate the amount of flow resistance in the sewer. It is a measure of the roughness or smoothness of the tunnel surface. The higher the "n" value, the greater the flow resistance, resulting in a lower carrying capacity.

the section of interceptor between Ward Avenue and St. Louis Drive would be of insufficient capacity. The results of the hydraulic analysis are presented in Table 2.

TABLE 2
SUMMARY OF CAPACITY FOR EXISTING MANOA-KAIMUKI INTERCEPTOR

<u>Manning's "n"</u>	<u>Slope</u>	<u>Capacity of Tunnel</u>	<u>Beginning Point of Insufficient Capacity</u>	<u>Downstream Flow</u>	<u>Upstream Flow</u>
0.018	0.001	35.33 MGD	Manoa Trunk	42.27 MGD	32.35 MGD
0.021	0.001	30.29 MGD	St. Louis Drive	31.25 MGD	27.52 MGD

Backwater conditions in the West Kaimuki Spur of the existing interceptor, caused by a high depth of flow in the Manoa-Kaimuki Interceptor, result in low velocities in the West Kaimuki Spur. The proposed relief sewer invert elevation will be lower than that of the existing tunnel, resulting in a free flow condition in the West Kaimuki Spur.

Decreased functional efficiency of the existing tunnel and growth of tributary areas have stressed the capacity of the existing system. Capacity requirements are further discussed in Section II-A.

4. Odors

Hydrogen sulfide is malodorous. Odors emanating from the tunnel have been noticeable at times and have resulted in numerous complaints.

CHAPTER II
PROJECT DESCRIPTION

II. PROJECT DESCRIPTION

A. PROJECT OBJECTIVES

The proposed Sewer Tunnel Relief will assure the continued maintenance of public health and welfare by implementation of the following objectives:

- o Provide adequate carrying capacity to serve the needs of the existing and projected population within the tributary areas.
- o Minimize potential exfiltration of wastewater into the groundwater table.
- o Minimize the potential for backflow which could overflow sewage into existing drainage systems.
- o Minimize construction imposed adverse impacts to the physical and socio-economic environment through proper design of improvements.
- o Improve system hydraulics of the sewer, to minimize deposition of solids, reduce travel time through the system, reduce hydrogen sulfide generation and odor nuisance, and minimize maintenance of the system.

B. PROJECTED WASTEWATER FLOW RATES

The area, equivalent population, and design peak flow for each tributary area (as described in Section I-8 and shown in Figure 1) is listed in Table 3. The population figure consists of a projected population in the year 2005 for the area and an equivalent population for community and business facilities.

Calculations of the design peak flow (in million gallons per day) were conducted in accordance with the Design Standards of the Division of Wastewater Management, Volume I, February, 1984.

C. DESIGN CONSIDERATIONS

This section summarizes key design and performance characteristics of the proposed Sewer Tunnel Relief which includes hydraulic parameters, alternative tunnel lining materials, and other design features.

1. Hydraulic Parameters

The capacity of the Sewer Tunnel Relief was calculated for Manning's "n" values of 0.013 and 0.015 (see explanation of Manning's "n" value in Section I.C.3).

TABLE 3
 TRIBUTARY AREAS & SEWAGE FLOWS

District	Tributary Area (Acres)*	Tributary Equivalent Population*	Design Peak Flow (MGD)
1. Waialae to Niu Valley	2624	35265	15.12
2. Aina Koa	252	3791	1.54
3. Waialae Nui Valley	111	3392	1.06
4. East Kaimuki	306	7292	2.23
5. East Maunalani Heights	120	2580	0.88
6. West Maunalani Heights	163	3652	1.25
7. Wilhemina Rise	202	4393	1.52
8. Palolo Avenue	823	7581	3.92
9. Chaminade	98	2835	0.89
10. West Kaimuki	298	9131	2.82
11. St. Louis	145	3284	1.12
12. Manoa Valley	1258	29512	9.22
13. Metcalf Area	96	2385	0.79
14. Punahou Area	134	4298	1.31
15. Makiki Area	413	19729	5.46
16. Kaahumanu School	13.7	2504	0.59
17. Punchbowl Area	120	25041	5.18
18. Academy of Arts	9	655	0.17
TOTAL	7184.7	167,248	

Design peak flow at Ward Avenue and Beretania Street is 56.39 MGD.

* Data provided by the City and County of Honolulu, Department of Public Works, Division of Wastewater Management.

The "n" values represent a clean condition and a condition of build-up of slime on the walls and invert, respectively. Hydraulic characteristics at various points along the proposed relief sewer are presented in Table 4. At the project terminus, Ward Avenue and Beretania Street, full flow capacities of 67.34 and 58.36 mgd are calculated for "n" values of 0.013 and 0.015, respectively. This can be compared to a projected wastewater flow at this location of 56.39 mgd. This represents excess capacity of approximately 19% and 3%, respectively. Therefore, while the design period is targeted for the year 2005, additional hydraulic capacity to accommodate growth beyond this point in time will be available. The upper limit of the excess capacity (19%) can be expected to result in a hydraulic life of 30-50 years (vs. a 20 year design period). Population increases within the service area are not anticipated to exceed 19% through the period 2015 to 2035 in the tributary area. (It is noted that the structural life of the Sewer Tunnel Relief is anticipated to be on the order of 50 years).

Similar analyses and comparisons can be made at other points along the proposed relief sewer.

TABLE 4

SUMMARY OF HYDRAULIC DATA FOR THE
PROPOSED SEWER TUNNEL RELIEF^{a/}

Point	Conduit Size	Sewer Invert Slope	Flow Rate (MGD)	Normal Depth of Flow (Ft.)	Velocity at Normal Depth (Ft./Sec.)	Full Flow Capacity (MGD)
Ward Ave. & Beretania St.	60"	0.0016	56.39	3.50	5.94	67.34
Kin角度. & Pensacola St.	60"	0.0014	50.41	3.39	5.52	62.99
Kin角度. & Makiki St.	60"	0.0012	49.82	3.55	5.16	58.32
Wilder Ave. & Metcalf St.	4' x 6.25'	0.002	43.05	3.10	5.85	85.19*
Dole St. @ Manoa Int. Delineation of Increment 3 & 4	4' x 6.25'	0.0018	32.35	2.62	5.27	80.82*

^{a/} Assumes Mannings "n" values of 0.013 and 0.015

* Values are higher due to slope conditions.

Velocities in the proposed relief sewer will range between 3.3 to 6.0 feet per second. These velocities are greater than the required velocity to assure self-cleaning of the invert while minimizing travel time through the tunnel (see Appendix A - Design Considerations).

2. Tunnel Lining Materials

The concrete surface of the relief sewer will be lined to provide protection against hydrogen sulfide-related corrosion. The lining material proposed to be used in the initial increment of the project is a vinyl sheet liner made from vinyl chloride resins. Other types of lining materials which may be considered by the City and County include epoxy coatings and polyurethane coatings (see Appendix A). Both types of materials are highly resistant to chemicals and gases normally found in domestic wastewater.

3. Other Design Features

"Misting" of wastewater at drop manholes creates worker safety hazards, as well as potential for sewer odor generation (aeration of wastewater enables the malodorous

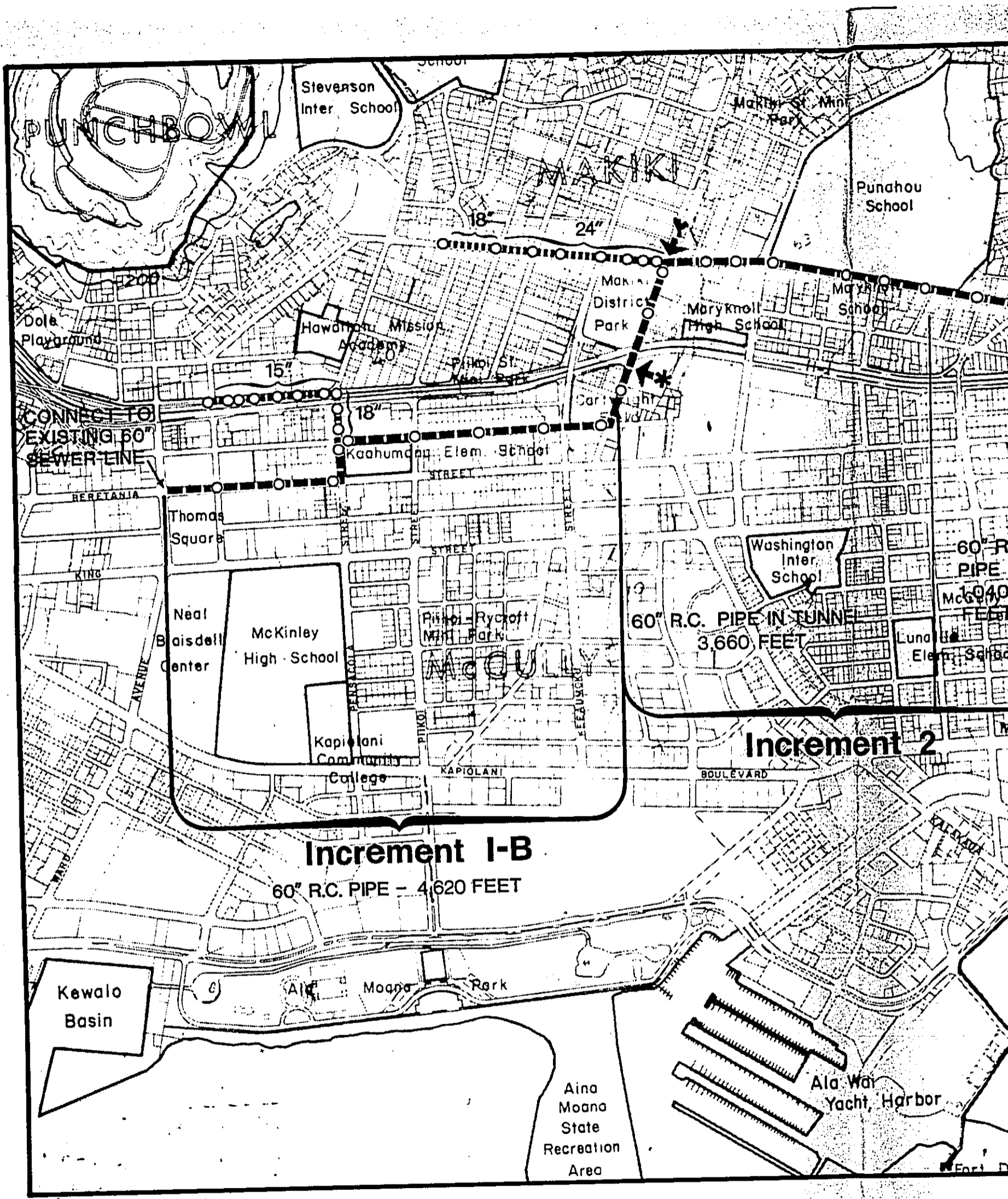
hydrogen sulfide gas to be released). To address this problem, the manholes for the Sewer Tunnel Relief are specially designed to minimize spraying at manhole drops.

D. PROPOSED IMPROVEMENTS

The proposed Sewer Tunnel Relief is divided into four increments. The limits of the replacement pipe and tunnel extends from the intersection of Ward Avenue and South Beretania Street to Palolo Avenue, at Keanu Street (see Figure 2). Probable manhole and portal locations (see Section III.D. Portals, Shafts and Manholes) are shown on Figure 2. Each of these increments is described below.

1. Increment 1-B

Increment 1-B of the Sewer Tunnel Relief consists of a 60-inch reinforced concrete pipe (RCP) sewer main starting on South Beretania Street at Ward Avenue and ending on Makiki Street, just mauka of Lunalilo Street. The approximate length of Increment 1-B is 4,620 feet. Increment 1-B also includes Sewerline "A", which connects to the 60-inch RCP at Pensacola Street and Kinau Street. Sewerline "A" continues mauka on Pensacola Street, along Lunalilo Street to Victoria Street. Sewerline "A" consists of 1,620 feet of 15-inch and 18-inch vitrified clay pipes. The extent of Increment 1-B is shown in Figure 2.



PUNCHBOWL

Steverson Inter School

MAKIKI

Punahou School

Dole Playground

Hawaiian Mission Academy

Makiki District Park

Maryknoll High School

CONNECT TO EXISTING 60" SEWER LINE

15"

18"

Kaahumanu Elem. School

BERETANIA

Thomas Square

KING

Neal Baisdell Center

McKinley High School

McCULLY

Pihai-Ryckoff Middle Park

60" R.C. PIPE IN TUNNEL 3,660 FEET

Washington Inter School

60" R PIPE 1,040 FEET

Kapiolani Community College

Increment 2

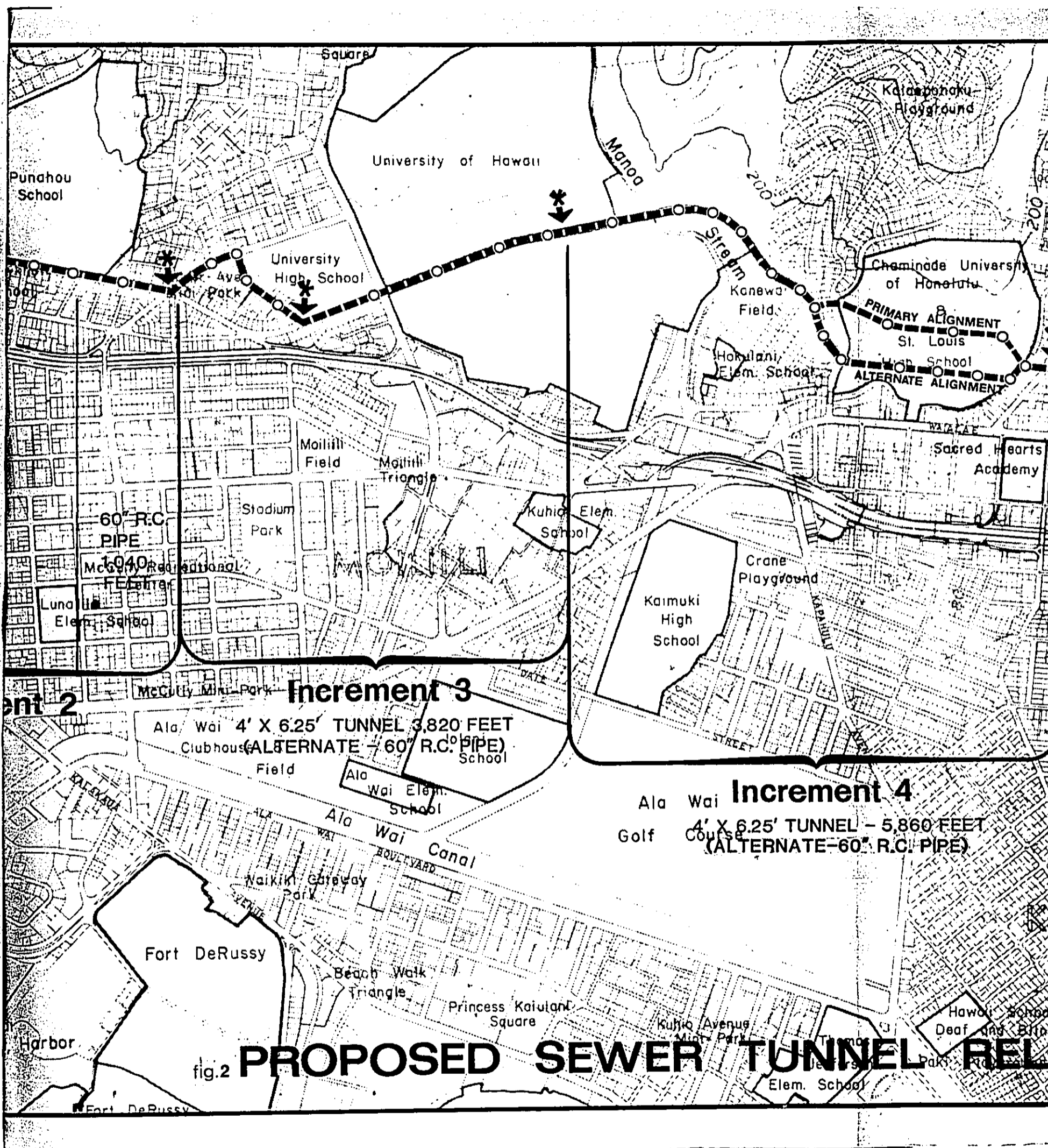
Increment I-B
60" R.C. PIPE - 4,620 FEET

Kewalo Basin

Ala Moana Park

Aina Moana State Recreation Area

Ala Wai Yacht Harbor



60" R.C. PIPE
1040 FEET

Increment 2

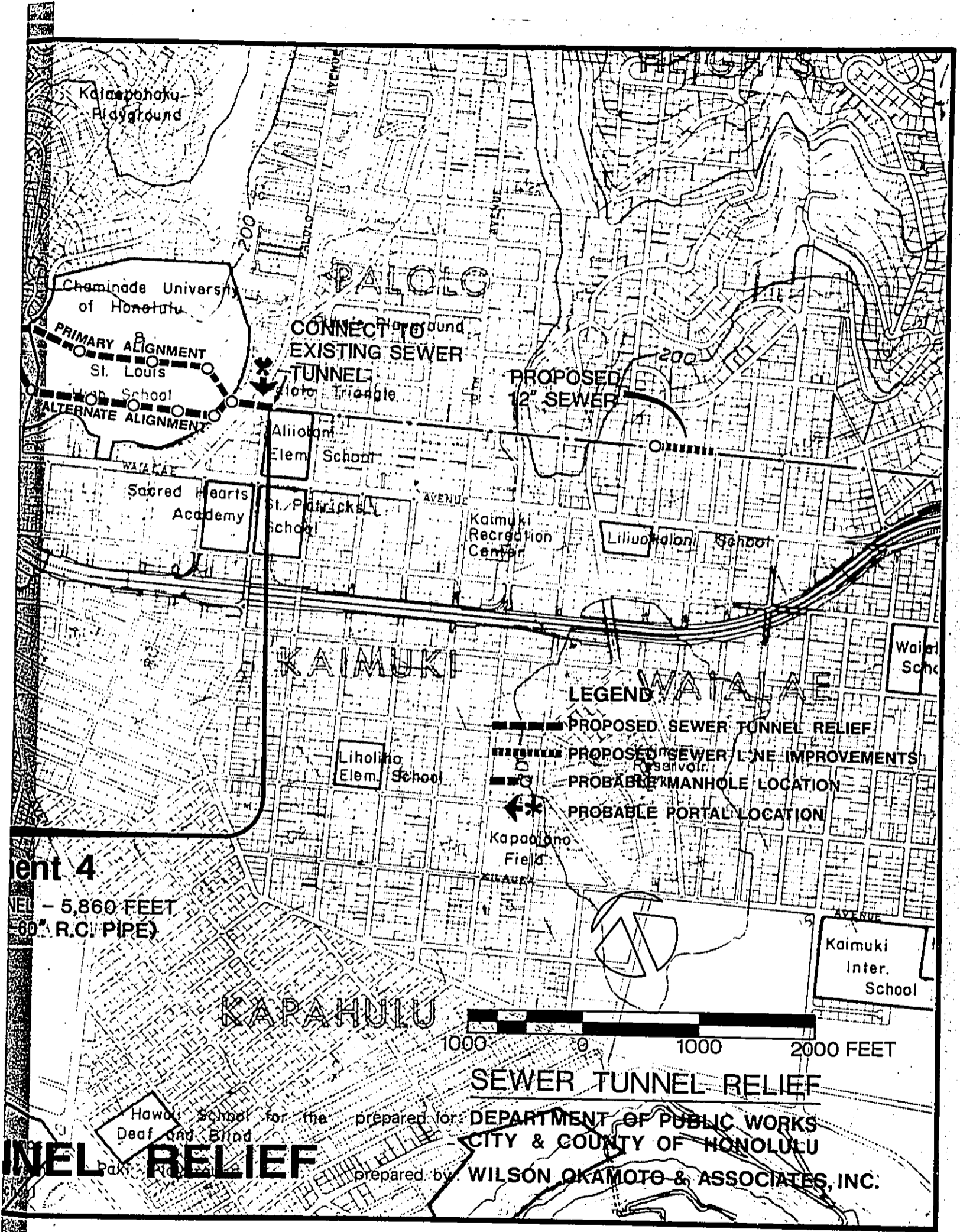
Increment 3

Ala Wai 4' X 6.25' TUNNEL 3,820 FEET
(ALTERNATE - 60" R.C. PIPE)

Increment 4

Ala Wai Golf Course 4' X 6.25' TUNNEL - 5,860 FEET
(ALTERNATE - 60" R.C. PIPE)

fig.2 **PROPOSED SEWER TUNNEL REL**



Chaminade University of Honolulu

PALOLO

CONNECT TO EXISTING SEWER TUNNEL

PROPOSED 12" SEWER

PRIMARY ALIGNMENT

St. Louis High School

ALTERNATE ALIGNMENT

Aliiokam Elem. School

Sacred Hearts Academy

St. Patrick's School

Kaimuki Recreation Center

Liliuokalani School

KAIMUKI

LEGEND

PROPOSED SEWER TUNNEL RELIEF

PROPOSED SEWER LINE IMPROVEMENTS

PROBABLE MANHOLE LOCATION

PROBABLE PORTAL LOCATION

Kapoolano Field

Liholiho Elem. School

ment 4

5,860 FEET (60" R.C. PIPE)

KAPAHULU

1000 0 1000 2000 FEET

SEWER TUNNEL RELIEF

Hawaii School for the Deaf and Blind

DEPARTMENT OF PUBLIC WORKS CITY & COUNTY OF HONOLULU

RELIEF

Prepared by: WILSON OKAMOTO & ASSOCIATES, INC.

Construction drawings for Increment I-B will be prepared on the basis of the cut and cover (open trench) method of construction. However, contract documents will be prepared to allow contractors the opportunity to submit alternate proposals for tunneling. Blasting will not be permitted within Increment 1-B. Extended work hour operations may be employed along Beretania and Pensacola Streets. A noise variance request has been filed with the State Department of Health to permit work to be performed during a 16-hour work day, 8:30 AM to 12:30 AM, Monday through Friday and weekends.

The approximate construction period for Increment 1-B is 540 calendar days if normal work hours (8:30 A.M. to 3:30 P.M.) are employed.

2. Increment 2

Increment 2 of the Sewer Tunnel Relief consists of a 60-inch RCP sewer main, constructed in two parts. The first part is a tunnel section, within which a 60-inch RCP will be installed. This section begins at Makiki Street just mauka of Lunalilo Street, crosses under Lunalilo Freeway, and continues along Wilder Avenue to Artesian Street (see Figure 2). This section averages 50 feet in depth and is approximately 3,660 feet long.

The second portion of Increment 2 is a shallow section of approximately 1,040 lineal feet. This section will involve installation of a 60-inch RCP by the cut and cover method along Wilder Avenue between Artesian Street and Metcalf Street.

Blasting will not be permitted in the cut and cover section of Increment 2. While blasting is not expected in the tunneled section, isolated rock formations may require the use of explosives.

Increment 2 includes the construction of Sewerline "B" on Wilder Avenue, from Makiki Street to Piikoi Street. This segment, approximately 1,800 feet long, will consist of 24-inch and 21-inch vitrified clay pipes and will be constructed by the cut and cover method.

The estimated construction period of Increment 2 is 720 calendar days.

3. Increment 3

Increment 3 of the project consists of a 4-feet x 6.25-feet tunnel, or alternatively, a 60-inch RCP placed within the tunnel. This tunnel section starts at Metcalf Street, near Clement Lane, continues along Dole Street to the vicinity of the University of Hawaii's Law School,

where the 36-inch Manoa Trunk Sewer connection is made (see Figure 2). This section of the sewer tunnel is approximately 3,820 feet in length.

Increment 3 may also include construction of an adit (horizontal entrance into the tunnel) at the University of Hawaii quarry. The feasibility of driving the adit through the quarry "wall" will need to be evaluated prior to construction.

Portions of the tunnel within this increment run parallel to the existing sewer tunnel. The lateral separation between the two tunnels within Increment 3 may be as little as 12 feet.

Blasting methods of tunnel excavation may be used in Increment 3.

The estimated construction period for Increment 3 is 720 calendar days.

4. Increment 4

Increment 4 represents a continuation of Increment 3. This 4-foot x 6.25 feet concrete, horseshoe shaped section will connect to the existing sewer tunnel on Keanu Street, near Palolo Avenue. Blasting may be employed in Increment 4.

Two alternative alignments have been considered for Increment 4, through the Saint Louis High School/Chaminade University campuses. The first alignment, recommended by the Chung Dho Ahn study, is designated the "Lower Route". The Lower Route traverses the Regency Park Condominium complex, and continues along the Gerber Fieldhouse, through the athletic field, to Keanu Street (see Figure 3).

The second alternative alignment is designated the "Mauka Route". The Mauka Route would begin near the intersection of Dole Street and Kanewai Street (see Figure 3). The tunnel would straddle residential lots to St. Louis Drive, near Kaminaka Street. The tunnel would continue across the Saint Louis High School/Chaminade University campuses, under an existing park and interior road (makai of the campus chapel) to the athletic field, reconnecting to the existing tunnel at Keanu Street, near Palolo Avenue. This alignment would require modifications to the lower Saint Louis campus sewer system. Modification costs of the Saint Louis system would be borne by the City and County.

In addition to the Mauka Route, an alignment along Waiialae Avenue was examined but considered unsound (see Chapter X, Alternatives).

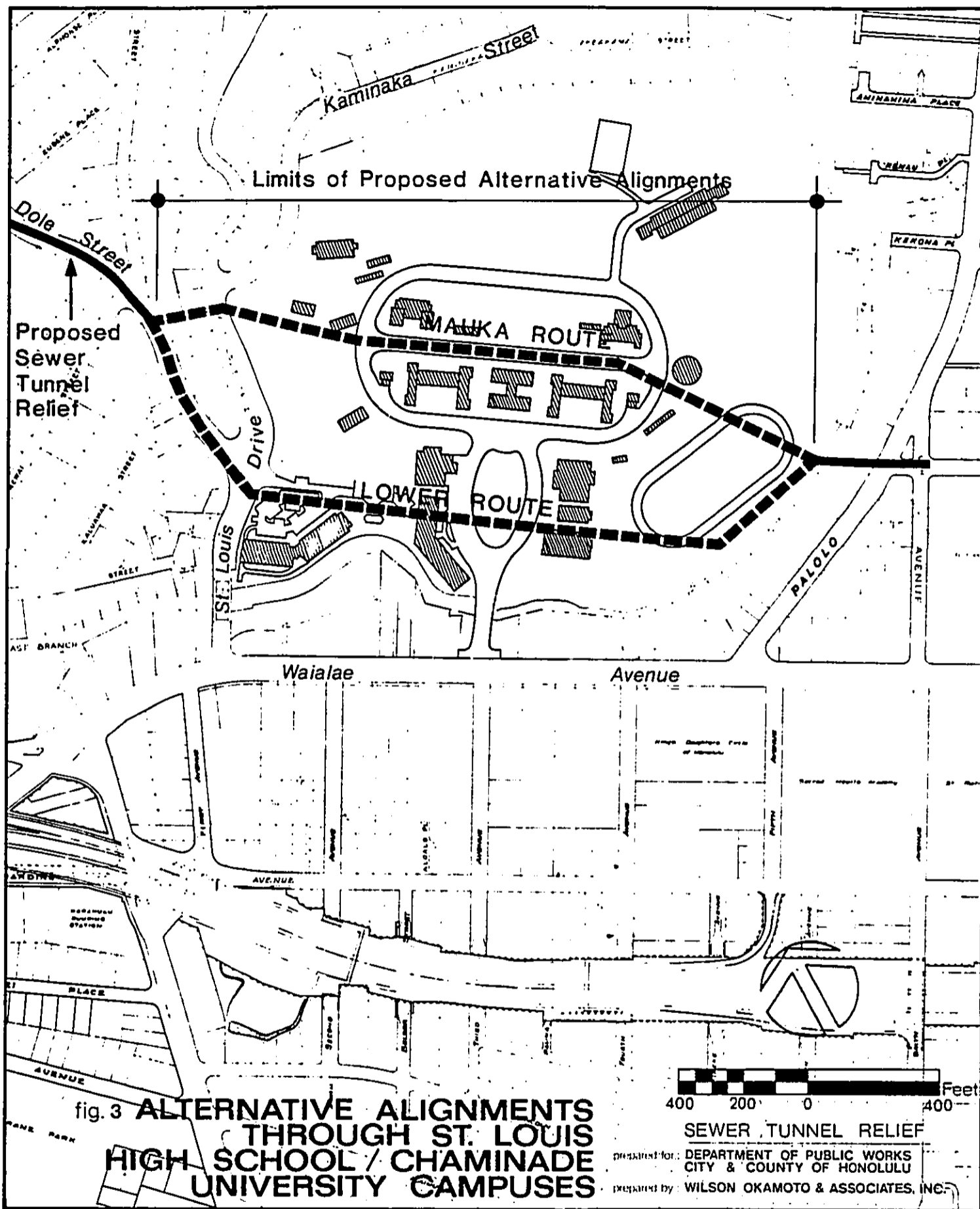


fig. 3 **ALTERNATIVE ALIGNMENTS THROUGH ST. LOUIS HIGH SCHOOL / CHAMINADE UNIVERSITY CAMPUSES**

400 200 0 400 Feet

SEWER TUNNEL RELIEF

prepared for: DEPARTMENT OF PUBLIC WORKS
CITY & COUNTY OF HONOLULU
prepared by: WILSON OKAMOTO & ASSOCIATES, INC.

Alternative alignments through the Saint Louis High School/Chaminade University campuses were considered because of possible adverse construction conditions which may be encountered with the Lower Route. Specifically, the Lower Route passes near foundation structures for the Regency Park Condominium, which was constructed after the Chung Dho Ahn study was completed. An existing easement provided by the developer of the Regency Park Condominium allows for construction along this route. A study conducted on the effects of blasting upon the condominium (Harding Lawson, 1979) concludes that the tunnel can be constructed through the condominium complex, but would require close monitoring of blasting activities. The report notes that blast vibrations may be transmitted to the structures via foundation piles, which rest on the rock being penetrated by the tunnel, and may result in settlement of vibration-sensitive soils.

The Lower Route also passes near the foundation structure (slab on grade) of the Gerber Fieldhouse. No adverse construction related impacts are anticipated.

Since either the Lower Route or Mauka Route are candidates for final design and construction, both will be addressed with regard to Chapter 343 requirements.

However, with regard to alignment preference, the Mauka Route is considered to be more desirable since this alignment would not have construction liabilities as significant as the Lower Route which will pass near foundations of the Regency Park Condominium.

It is also noted that the Mauka Route would be about 250 lineal feet shorter than the Lower Route. However, cost savings are not anticipated to be significant with the Mauka Route since manhole depths for this alignment would be over 100-feet (as compared to about 60-feet for the Lower Route).

The estimated construction period for Increment 4 is 720 calendar days. The total length of this increment is approximately 5,860 feet.

5. Keanu Street Sewer Improvements

In addition to the four major project increments described above, a relatively smaller improvement is proposed along Keanu Street. The Keanu Street sewer improvements would include a proposed 12-inch sewer between 13th Avenue and Elizabeth Street which would divert flows from the existing 13th Avenue drop manhole to a new manhole at Elizabeth Street (see Figure 2). A

section of the concrete lining at the 13th Avenue drop manhole is corroded due to the turbulent flow at the drop connection. Turbulence results in the release of a greater amount of hydrogen sulfide gas, and an increase in the volume of deposits. The new drop manhole at Elizabeth Street would be a vortex-type structure, which is designed to minimize turbulent flow conditions. The construction of a manhole at Elizabeth Street would also reduce the distance between manholes from the current 1,526 feet to approximately 970 feet.

E. RIGHT-OF-WAY REQUIREMENTS

The majority of the proposed relief sewer corridor is along City and County of Honolulu streets. Exceptions include those portions of the sewer which cross Lunalilo Freeway and fall within the right-of-way under authority of the State of Hawaii, Department of Transportation. Portions of the proposed relief sewer also pass within the borders of the University of Hawaii, Kanewai Park and various single family lots along Dole Street.

Through the Saint Louis High School/Chaminade University campuses, the Lower Route alternative traverses the Regency Park Condominium complex, and the St. Louis High School's Gerber Fieldhouse and athletic field.

The Mauka Route alternative alignment would straddle single family lots on St. Louis Drive and a private park, interior road and athletic field on the St. Louis High School/Chaminade University campuses.

Additionally, construction yards which will be established outside of the street right-of-ways, have various owners and permission or easements for their use will have to be arranged.

F. PROJECT COST AND TIMETABLE

The total estimated project cost is \$40.2 million^a. On an incremental basis, costs are estimated, as follows:

o	Increment 1-B -	\$ 6,600,000
o	Increment 2 -	\$13,300,000
o	Increment 3 -	\$ 7,300,000
o	Increment 4 -	\$13,000,000

Construction of Increment 1-B is projected to begin in mid-1986 with Increments 2 through 4 following sequentially^a.

^a Costs are escalated to time of construction for the respective Increments. Costs are for construction only (i.e., excludes design, administration and construction management). Extended work hour operations may be implemented within a portion of Increment 1-B. The project cost and timetable presented do not reflect the implementation of extended work hours.

Thus, if a June, 1986 construction start date is assumed the following project time frame would be expected:

- o Increment 1-B (540 days or 18 months) - June, 1986 to November, 1987.
- o Increment 2 (720 days or 24 months) - November, 1986 to October, 1988.
- o Increment 3 (720 days or 24 months) - July, 1987 to June, 1989.
- o Increment 4 (720 days or 24 months) - July, 1987 to June, 1989.

G. SOURCES OF FUNDING

Sources of funding for the construction of Increments I-B through 3 of the proposed Sewer Tunnel Relief, under current policies, are as follows:

<u>Source</u>	<u>Percent of Cost</u>
Federal (Environmental Protection Agency)	75
State of Hawaii	10
City and County of Honolulu	15

The City and County of Honolulu will fund 100 percent of the cost of Increment 4.

CHAPTER III
CONSTRUCTION OPERATIONS

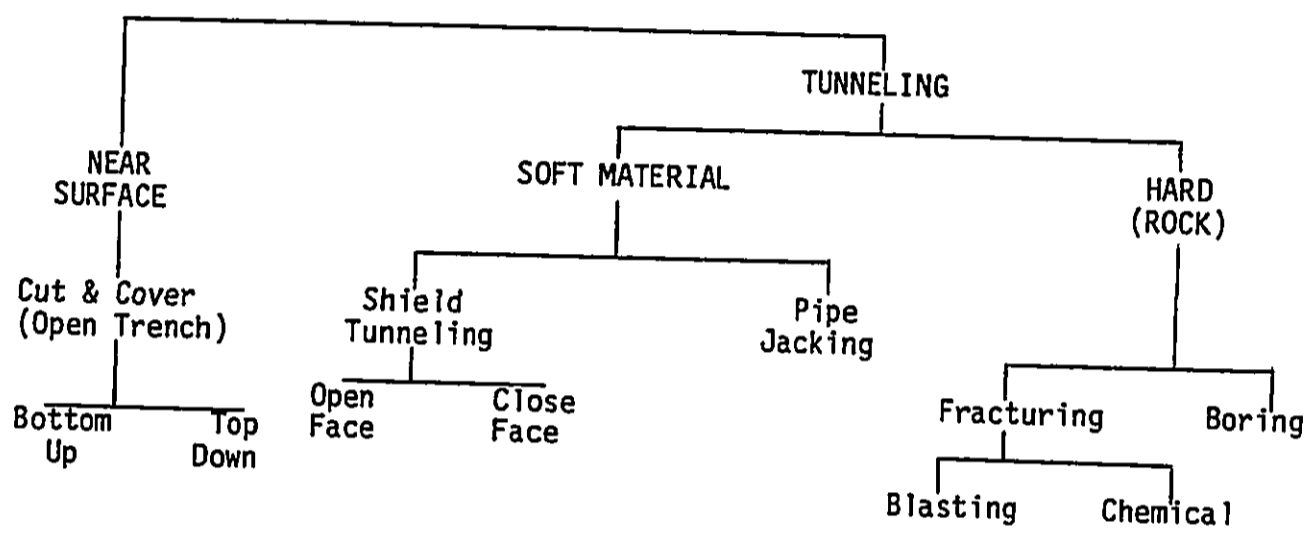
III. CONSTRUCTION OPERATIONS

Major impacts of the proposed Sewer Tunnel Relief are anticipated to be those associated with construction. To facilitate the assessment of construction related impacts, research on probable construction operations for the project was conducted. While methods discussed in this section may not necessarily be employed for the project, since the selected method of construction will ultimately be determined by the contractor, the methods do identify the likely options to be considered by the contractor. The documentation of construction methods, presented herein, provides insight to potential project impacts, as well as possible mitigative measures to address impacts (probable impacts and mitigative measures are discussed in Chapter VI).

For this report, two major construction methods are considered: (1) cut and cover; and (2) tunneling. The cut and cover method is the traditional open trench method used when the elevation of the utility to be installed is shallow relative to the ground surface.

Tunneling, on the other hand, is used for deeper excavation where the cut and cover construction method would be impractical. Tunneling is classified by the type of material (i.e., hard rock or soft ground) being excavated. Figure 4 diagrams the different alternative construction techniques considered. Each of these methods is discussed in this Chapter.

FIGURE 4
Alternative Construction Methods
for the Proposed Sewer Tunnel Relief

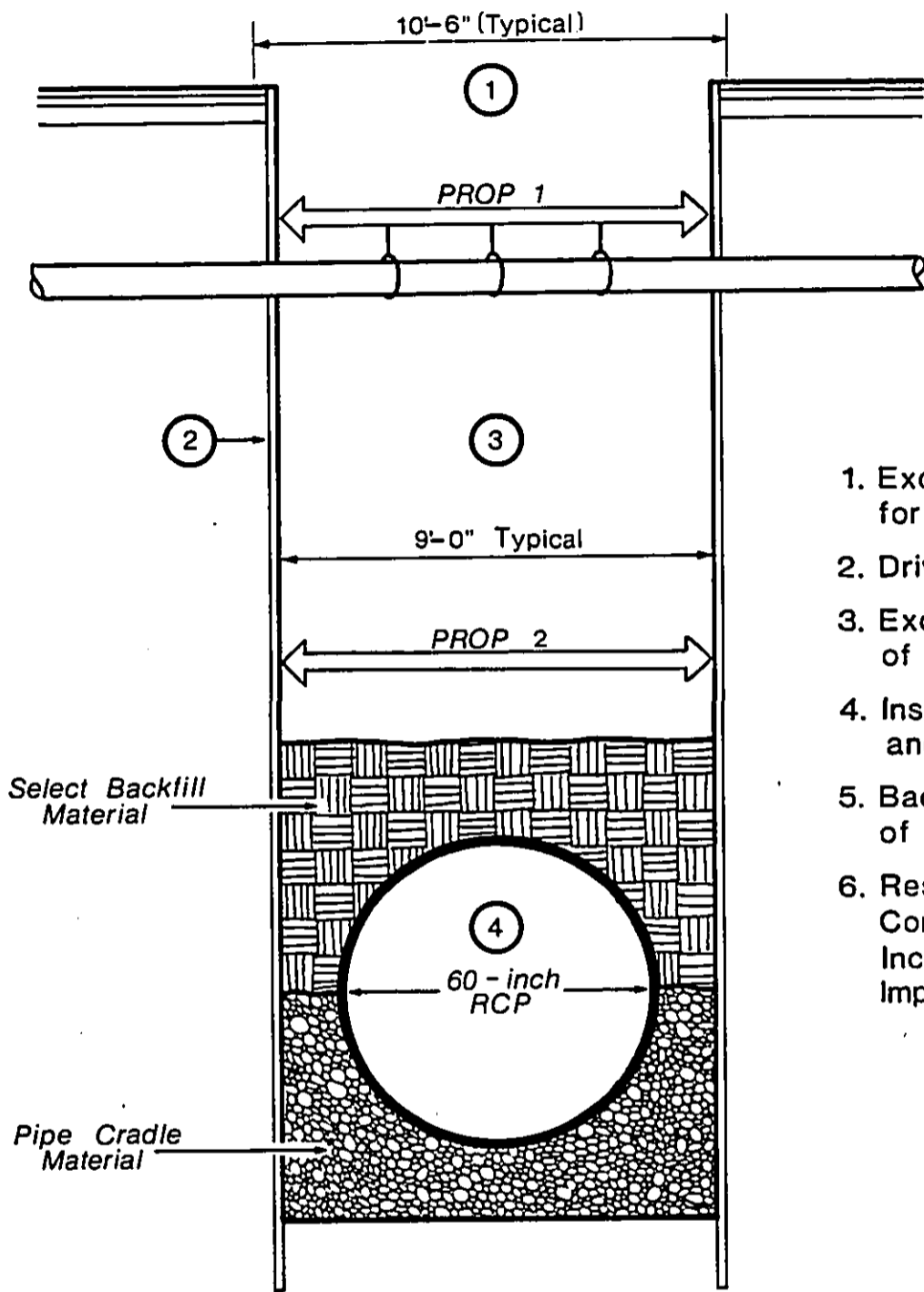


A. CUT AND COVER METHOD

The cut and cover method represents the traditional trenching method of excavation. Trench excavation for the 60-inch sewer main will probably be used for Increment 1-B and possibly portions of Increment 2. The steps presented below represent the procedures in a typical cut and cover operation and are presented in chronological order (see Figure 5).

1. Excavate trial trench for utilities. This operation is done by hand to verify the location and depth of the existing utilities and to relocate utilities if necessary.
2. Driving of sheet piles. The driving of sheet piles may be deleted in shallow excavations or where the trench walls are self-supporting. Within the Increment 1-B and Increment 2 sections, piling will probably be required for the lateral wall support. The final design of the trench support system will be determined by the contractor.

The contractor's design and installation of the wall support system is important in the prevention of movement of trench walls and subsequent settlement of surrounding ground. Though the absolute prevention of ground movement is impossible, carefully designed methods and procedures can minimize settlement and assure trench safety.



1. Excavate Trial Trench for Utilities.
2. Driving of Piles
3. Excavation and Propping of Utilities and Bracing.
4. Install Pipe Cradle and 60-inch RCP.
5. Backfill and Removal of Piles.
6. Restore and Repair Construction Limits. Includes Pavements and Improvements Repair.

fig.5 **TYPICAL CUT & COVER OPERATION**

SEWER TUNNEL RELIEF

DEPARTMENT OF PUBLIC WORKS
CITY & COUNTY OF HONOLULU
DESIGNED BY: WILSON OKAMOTO & ASSOCIATES, INC.

3. Excavation and propping. Once the piles are driven, trench excavation can begin (see Section III.C. Disposal of Spoil Material). The contractor has the option of excavating using the top-down method or the bottom-up method. The top-down method, commonly utilized in Hawaii, provides for excavation from the ground surface, downward to the trench invert. With the bottom-up method, the contractor advances the excavation by working along the trench invert, removing material from the trench face. This method usually requires excavating equipment in the trench and, therefore, is limited by the size and depth of the trench. The advantage of this method, however, is that less working area is required at the surface.

As the excavation proceeds, propping of existing utility lines shall be necessary. The method and design of the propping shall be the responsibility of the contractor with the requirements that the utilities be protected from damage and service interruptions minimized. A trench width of 10.5 feet is estimated.

The contractor will also be responsible for the continued stability and safety of the trench. This may require additional lateral bracing and shoring. The adequacy, safety and methods of the sheeting and bracing are the

responsibility of the contractor and should comply with all applicable health and safety requirements.

It is anticipated that in certain areas, coral will be encountered at the lower levels of excavation. This material is hard and may require the use of air hammers and other special equipment during excavation.

The driving of piles through the coral layer is difficult and additional lateral bracing should be installed to reinforce the trench. The coral layer itself should be stable and require little or no bracing or shoring.

4. Installation of pipe. Once excavation is completed to the required depth and dimensions, the actual installation of the sewer pipe (60-inch RCP) can proceed. The contractor will install the crushed rock cradle, the pipe, and the select backfill over the pipe, as required.
5. Backfill & Removal of Piles. This operation consists of the backfill of the trench with the specified materials. As the backfill proceeds, the contractor is required to remove all props, shorings, and braces. Before repaving and restoring the work area, all piles will be removed by the contractor.

6. Restore and repair construction limits. Once all backfill is completed and prior to acceptance of the work, the contractor will restore the roadway to a condition equal to or better than conditions existing prior to construction.

B. TUNNELING METHODS

Tunnel excavation involves a well coordinated cycle of mining, shoring, and material removal. Each operation of the cycle is highly interdependent and the tunneling process can proceed only at the efficiency of the slowest operation.

Tunneling is that portion of the work that advances the tunnel face. This can be done by hand digging, mechanical boring, blasting or other means depending on the material to be excavated and the size of the tunnel. This operation includes the installation of the tunnel reinforcing, including the rings, grouting and other work necessary to stabilize the tunnel walls.

Tunneling methods vary with type of ground, length of tunnel, size of tunnel, and time constraints. Generally, tunneling can be broken down into two categories based on the soil strength - soft rock tunneling or hard rock tunneling.

1. Soft Rock Tunneling. Where the material to be penetrated is variable and/or weathered, the shield tunnel or pipe jacking methods are commonly utilized.

a. Shield Tunneling. Shield tunneling machines vary in size and design, with most machines being individually designed for the task at hand. All shields have some type of protective skin, for the support of the tunnel at the tunnel face.

Shields generally are classified as hand-mining type, semi-mechanized, and mechanized. The hand-mining type is commonly used where different types of soils are expected to be encountered. The semi-mechanized type is used in relatively homogeneous sandy types of soil where the walls are relatively self-supporting. The mechanized type of shield machine is typically used with a significant tunneling length and large radius of curvature, where homogeneous soils are encountered.

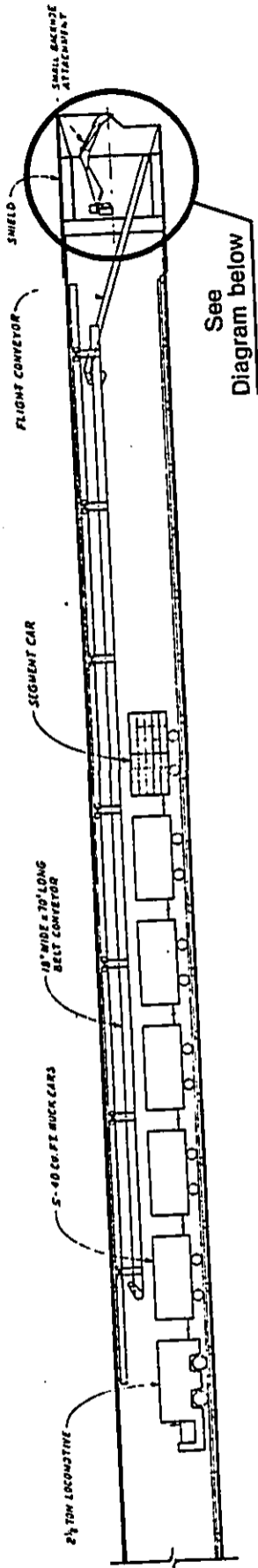
Additionally, shields can be open faced or closed faced. Open faced machines are used in most stable soils, where there is little danger of encountering water. Closed faced machines are used in clayey type soils where the work is subject to water intrusion.

While the choice of the shield machine for the Sewer Tunnel Relief will be left to the contractor, it is anticipated that the tunneling machine for the project would have an approximate outside diameter of 83 to 87 inches. The machine should possess a metal shield with a sloping front and vertical tail. Because of the limited tunneling space and the variable nature of the soil to be penetrated, it is anticipated that the tunnel face excavation will be a combination of hand-mining and semi-mechanized operations (i.e. the use of a small backhoe mounted at the face of the machine).

A diagrammatic sketch of a shield-driven tunnel is shown in Figure 6.

The tunneling cycle with a shield machine can be generalized as follows:

1. Remove material at the face of the tunnel and remove rubble.
2. Jack shield machine forward.
3. Erect primary segments.



Typical Tunnel Shield.

SOURCE : Chung Dho Ahn & Associates, Inc. REPORT ON THE SEWER TUNNEL RELIEF

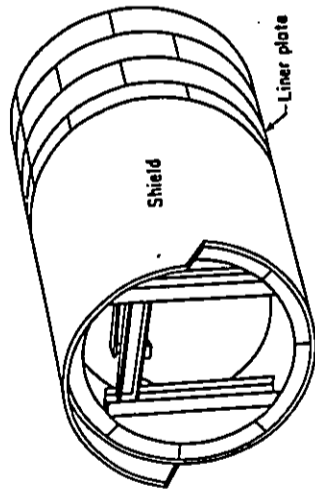


Diagram of Shield (Open-faced)
SOURCE : Parker, PLANNING AND ESTIMATING UNDERGROUND CONSTRUCTION

SEWER TUNNEL RELIEF
 PREPARED BY DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU
 PREPARED BY WILSON OKAMOTO & ASSOCIATES, INC.

fig. 6 **SHIELD-DRIVEN TUNNELLING**

4. Grout voids and survey face.

5. Install pipe.

The cycle time is machine dependent, but it is estimated that the average cycle time would be on the order of three to four hours, with each cycle advancing an estimated 3 to 4 feet. These numbers translate to 2 to 3 cycles per working day (8:30 a.m. to 3:30 p.m.) or 6 to 12 feet of tunnel progress per day.

A small portion of the shield tunnel excavation may require blasting, although the exact amount cannot be determined at this time. Blasting would greatly extend the tunneling cycle, perhaps as much as 3 times that required for soft ground. This would translate to approximately 4 to 6 feet of progress per day for those segments requiring blasting.

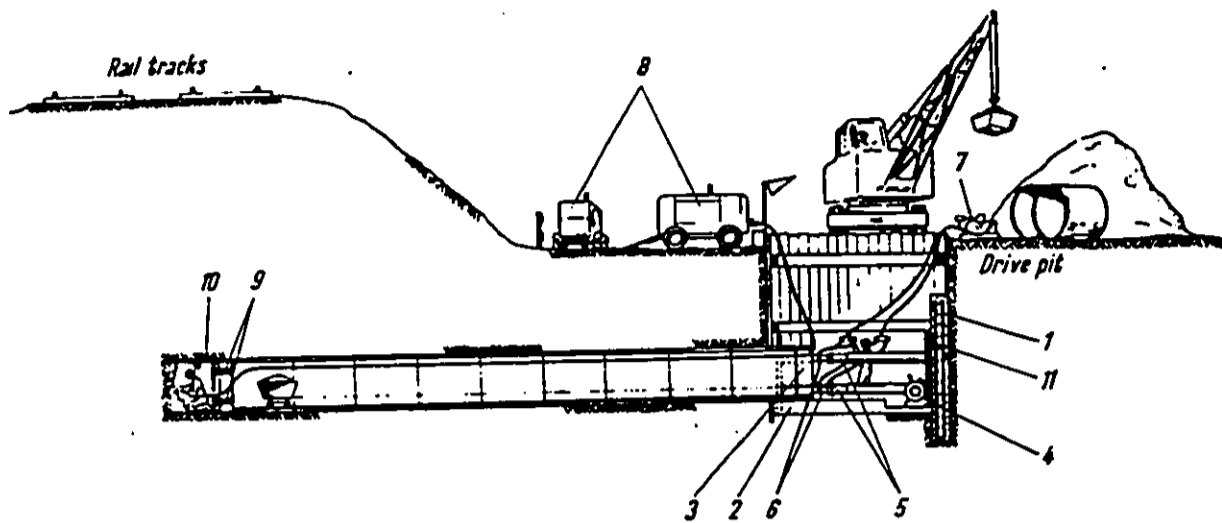
With respect to the above, consideration should be given to extended working hours (e.g., working a 3-shift, 24 hour period). Extended work hours will provide for more efficient operations since additional tunneling cycles incorporated in the work day will reduce the overall proportion of time attributed to daily mobilization and demobilization.

- b. **Pipe Jacking.** Pipe jacking is an alternative tunneling method which is limited by the soil type, pipe size and the precision required.

Under this procedure, the leading edge of the pipe would be equipped with a cutter or shoe for the pipe's protection. Lengths of pipe are added between the leading pipe edge and the jacks, and the entire length of pipe is jacked forward. Soil is excavated from the face of the operation and removed through the pipe. Pipe jacking results in a very clean excavation with a minimum of overexcavation (see Figure 7).

Due to the variable subsurface soil types and the limited working space provided by a 60-inch pipe, this method does not appear well-suited for the proposed relief sewer. The presence of hard and soft layers of material would create difficulty in maintaining tunnel alignment and grade. Moreover, the 60-inch pipe diameter dictates hand excavation at the face with the use of small power tools.

2. **Hard Rock Tunneling.** Hard rock tunneling can be achieved through the use of tunnel boring machines, drilling and blasting, or chemical splitting. These methods are described below.



SCHEMATIC VIEW OF PIPE JACKING LAY-OUT

1. Reinforced concrete jacking wall 2. Drive pad 3. Jacking ring
 4. Winch (for muck haulage) 5. Jacking Beams 6. 150 ton jacks
 7. Jacking pump 8. Generator 9. Shield Jacks 10. Steel cutting shield
 11. Jacking rig SOURCE: Szechy, THE ART OF TUNNELLING

fig.7 TYPICAL PIPE JACKING LAY-OUT

SEWER TUNNEL RELIEF

DESIGNED BY: DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU
 PREPARED BY: WILSON OKAMOTO & ASSOCIATES, INC.

- a. Boring. The use of tunnel boring machines is usually not economical for tunnel lengths less than 10,000 feet, due to their high initial capital costs. Boring machines typically have a lower tunnel size limit of 10 feet (3m).

Boring machines offer the following advantages: (1) the operation can be conducted as a continuous operation; (2) it forms a uniform excavation with little overexcavation; and (3) it has the ability to achieve a high degree of automation.

Most of today's boring machines are custom built for each job and are designed not only to do the boring but also to support the material removal and the placing of the tunnel linings and segments.

Boring machines work best where the soil material is homogeneous. Variable soil conditions cannot be readily dealt with, especially where hard and soft material is interlayered.

Rock fracture at the face of the tunnel is achieved by over-stressing the rock at the edges of the cutters. The pressure against the rock face becomes the limiting factor for the types of rocks that can be bored and the boring speeds.

It is noted that the greater the amount of pressure on the face, the higher the wear on the cutters. Down time can be minimized by providing maintenance during the hours when tunnel work is not being performed.

- b. **Blasting.** Tunnel blasting is a highly specialized field of construction that requires supervisors and powdermen who are experienced and well-trained. The construction emphasis is on the safe, quick, and efficient advancement of the tunnel.

The typical drilling and blasting cycle is composed of the following operations:

1. Drill holes at tunnel face.
2. Charge drilled holes with explosives and fire charges.
3. Ventilate face area to remove fumes and dust.
4. Check face for unexploded charges and remove loose rock.

5. Remove spoil (mucking).

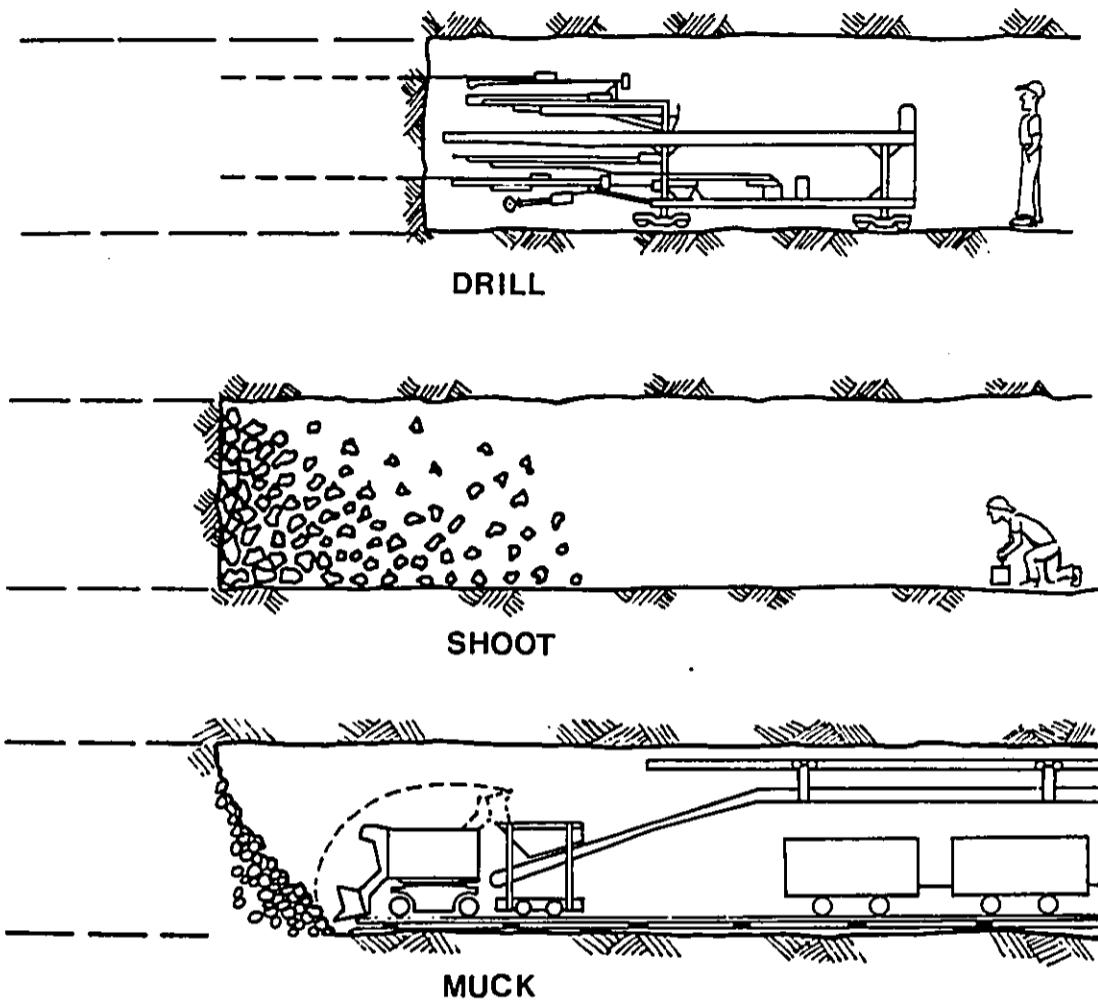
6. Install primary segments.

The general operational sequence for blasting is shown in Figure 8.

The rate of advancement in blasting work is dependent upon good consistent fragmentation of the rock material. The design of the hole spacing and explosive charge are the primary factors in assuring an efficient tunneling operation. A good design balances the explosive charge, the drilling depth, and the mucking time with environmental impacts associated with blast vibrations.

Explosives can be classified into three main groups: 1) Slow or phlegmatic explosives; 2) High (brisant or quick) explosives; and 3) Initiating explosives.

Slow explosives have a relatively low burn velocity. When confined, the explosive can be set off by exposure to open flame. The low velocity of this type of explosive initially creates cracks in



Conventional tunnel driving without installation of tunnel supports.

fig.8 **TYPICAL OPERATIONAL SEQUENCE FOR BLASTING**

SEWER TUNNEL RELIEF

PREPARED BY: DEPARTMENT OF PUBLIC WORKS
CITY & COUNTY OF HONOLULU
PREPARED BY: WILSON OKAMOTO & ASSOCIATES, INC.

the surrounding rocks. The rocks are then displaced by the slowly developing gas pressure. An example of this type of explosive is black powder.

High explosives can only be initiated by the use of a detonator. The high velocity of this explosive totally crushes the nearby rock and breaks, cracks and displaces rock farther away. Examples of this type of explosive are dynamite, nitrotoluene, nitroglycerin, nitrocellulose, etc. This group of explosive is the primary type used for tunnel excavation.

Initiating explosives are used to activate the above mentioned class of explosives.

1. Drilling Operation. Two types of drilling equipment are generally used - pneumatic rock drills and hydraulic drill systems. Pneumatic rock drills are powered by compressed air and hydraulic drill systems are powered by electrically driven hydraulic motors.

Most of the drills in larger tunnel operations are mounted on drilling booms or rigs and may be completely automated. However, because of

the limited space available in the construction of the proposed relief sewer, it is estimated that only two drills can be operated simultaneously. The drilling method for the project will be left to the contractor's discretion.

To maximize the effect of the blast, specifically designed blast patterns and charges are used. (i.e., The holes are drilled at varying angles and depths in the tunnel face). The blast design is important as this determines the depth and the limits of the blast face. A good design limits the amount of overexcavation and the need for contour blasting. (Overexcavation or over-break is defined as excavated material beyond what is necessary for the installation of the tunnel. Contour blasting is done to remove rock formations within the excavation limits not excavated by the original blast).

2. Charging Drilled Holes and Firing Charges. A number of events occur during this phase of the operation. The drilling rig and workers are withdrawn from the face of the tunnel. This

leaves only the powdermen at the tunnel face to load the explosives. After the powdermen are withdrawn to a safe distance, the charges are fired.

The primary explosives utilized in tunnel blasting are the water gels, although other explosives are often used. The explosives are often purchased premixed and are transferred directly from the shipping containers to the pneumatic loaders which injects the explosives directly into the bore holes. This is a time proven and safe method of explosive handling.

The explosive is then detonated with a primer charge consisting of a single dynamite charge with an electrical blasting cap.

3. Ventilating Face Area. This portion of the blasting cycle is the single greatest cause of lost time. The face area is cleared of smoke, dust and explosive fumes before workers return to the tunnel face. In a tunnel the size of proposed relief sewer, a single ventilation line which either acts to bring air in or to remove the fumes is anticipated to be employed.

No person shall be allowed at the tunnel face until the smoke and gases have been cleared and the level of visibility is acceptable. OSHA standards require a waiting period of not less than 15 minutes.

4. Checking Tunnel face For Unexploded Explosives and Removing Loose Rock. During this stage of the operation, the powdermen return to the rock face to check if any charges are left unexploded and to bring down any loose material on the tunnel sides and roof. The powderman has the option of reblasting any unexploded charges or removing the charge either by compressed air or by the use of water. In no case should the new powder holes be seated in the old powder holes.

Once the clear signal is given the next phase (spoil removal) can begin.

5. Removing Spoil. The mucking operation involves the removal of the excavated earth and rock (spoil material) from the face of the tunnel. The relatively small size of the proposed relief sewer is the primary consideration in

selecting the mucking equipment. Mucking operations are explained in greater detail in Section III.B.3.

6. Installing of Primary Segments. The installation of the support system must be completed prior to further tunnel advancement. Once this phase is completed, the next blasting cycle can begin.

c. Chemical Splitting. A recent development in tunneling technology involves the use of chemical agents to fracture rock materials. The "chemical agent" cycle is identical to that of the drilling and blasting method except that an expansive chemical mixture is used in place of the explosive charge.

This method can be utilized where the use of explosives would be undesirable due to close proximity to human activities and/or structures. Unlike blasting, this method does not create the vibrations or noise that can cause damage or complaints.

Major limitations are, however, associated with this method. First of all, fracturing may take 12 or more hours once the chemical is in place, thus lengthening the cycle time. Secondly, rock material is not extruded at the tunnel face and creates the need for additional work and equipment at the tunnel face.

3. Mucking. This process involves the removal of the excavated material from the face of the tunnel. This can be accomplished by a number of methods which include the use of rail mounted cars, conveyor loaders, diesel powered haulers, and slurry lines. The method of mucking is also dependent on the equipment and methods utilized in the other steps of the construction cycle. The types of equipment, the methods of removal and the cycle time of this operation for the proposed Sewer Tunnel Relief is limited by the small tunnel size.

The choice and method of spoil removal will be left to the contractor. This will allow the contractor to balance his resources to meet the limitations of the other operations of the cycle.

In the mucking operation, some type of face shovel will be utilized to begin the cycle. The removal of the material from the face area to a hoisting area can be accomplished by using any of the following methods: a conveyor system; a rail system; or a trailer-rig system (or a combination of the three).

4. Hoisting. Hoisting is that operation which removes the excavated material from the tunnel and brings it to the surface for disposal.

Hoisting is necessary only if the excavated material is to be removed through a vertical shaft (rather than a horizontal portal).

Hoisting operations are limited by the hoisting capacity, the size of the shaft, the vertical speed of the hoist device, and the depth of the shaft. Hoisting capacity and shaft size limit the size of material and equipment that may be used in tunnel excavations. The vertical speed of the hoist and the depth of the shaft limits the cycle time of hoist operations.

Since this operation is part of a larger integrated cycle, the choice of equipment should be left to the contractor subject to space limitations and the location of the opening.

5. Ventilation. The air supplied to all work areas, especially the work face, must be of good quality and must be supplied in uninterrupted quantities in order to maintain productivity, efficiency, and healthy working conditions.

Two fundamental methods of ventilating a tunnel can be considered by the contractor: a) blowing air to the face; and b) exhausting air from the face.

- a) The blowing method introduces fresh air to the tunnel face by the use of a ventilation duct. This insures a supply of fresh air at the tunnel face.

However, this means that the foul air is forced through the tunnel to the portal, resulting in increased contamination levels within the rest of the tunnel. During the blast's aftermath, the smoke, dust, and fumes filter back through the tunnel, inundating the entire heading and resulting in impeded tunneling operations.

- b) In the exhaust method, the reverse process occurs. Foul air is drawn out of the tunnel from the tunnel face, through a duct. During blasting, smoke, dust, and fumes can be quickly vented from the tunnel. With this method, however, the fresh air must traverse the tunnel to get to the tunnel face. The exchange of air by this method, therefore, is generally not as fast or as uniformly distributed at the working face as with the first method.

Generally, the contractor would consider using a combination of the two methods. The blowing method should be used during normal operations and the exhaust method used for the removal of smoke, dust, and fumes.

C. DISPOSAL OF SPOIL MATERIAL

Excavated material will be removed from the construction site and trucked off-site for storage. Within the cut and cover section, a portion of the material will be reused to backfill the open trench (see Section III.A. Cut and Cover Method). Within the tunneled section, excavated material will be permanently removed.

In this regard, two types of storage areas are identified: (1) temporary storage areas where material to be reused is stored; and (2) permanent disposal sites, where the unused material is deposited.

Temporary storage sites should be proximate to the construction site to minimize hauling time and costs. Sites should provide for the accessibility and maneuverability of trucks and other large equipment. If it is assumed that 1,000 feet of trench is open at any one time, approximately 7,000 cubic yards of material would need to be stockpiled. The estimated minimum required area to store this volume of material is half an acre. Temporary stockpile sites would be secured by the contractor.

Permanent disposal sites for the spoil material will also be secured by the contractor. A portion of the spoil material to be permanently removed may be used for other projects or sold by the contractor for other uses. Both temporary and permanent stockpile sites will conform with all applicable rules and regulations of the State Department of Health and the City and County of Honolulu.

D. PORTALS, SHAFTS, AND MANHOLES

The sinking of the shaft or the portal (tunnel entranceway) usually is the first operation in the tunneling process, with the tunneling operation beginning at the bottom of the completed shaft. The minimum shaft size is dependent upon the type of tunneling operations utilized. The shaft or portal must be able to provide space for the lowering of equipment, for equipment assembly, and work operations.

The location of each working shaft or access point should be left to the contractor. However, in selecting primary shaft locations, the following should be considered:

1. The working shaft must be situated in a reasonably level area and have space for a heavy crane, with room for the storage of construction materials and spoil material.

A spoil stockpile should be maintained by the contractor to maintain balance between the tunnel excavation and the spoil removal. To effectively manage haul away operations, the spoil stockpile should have the capacity to store the spoil material between truck trips and between spoil removal periods.

2. The shaft should be as shallow as possible to minimize the cycle time required to hoist the material up and out.

3. Access to the shaft must be available for material delivery and spoil removal.

Two shaft construction methods considered feasible are: (1) shaft sinking; and (2) shaft raising.

Shaft sinking is utilized when access to the bottom of the shaft is unavailable or where the shaft passes through incompetent or unstable ground where falling material would cause a hazard in shaft raising operations.

Though shaft sinking procedures vary, the following steps represent typical operations.

1. Perform excavation (by hand) to expose existing utilities and verify their position and depth.
2. Relocate those utilities found within the limits of the shaft operation.
3. Install piles (e.g., sheet or "H" piles) to provide the primary wall support during excavation in soft or unstable material. Where the operations are in rock material, piles may not be necessary.

4. Excavate the shaft in stages with bracings installed at intervals, as determined by the contractor. The method of excavation shall be determined by the contractor and may include blasting and more conventional digging techniques.
5. Construct the finished shaft structure. This step is applicable when the shaft will ultimately be used as a permanent structure. Should the shaft be temporary, it would be backfilled when its use is no longer required. In either instance, all pilings and bracings will have to be removed during this stage of operation.

When shafts are constructed in incompetent material, wall supports are required. The supports may include the following: steel-ring beam; wood sets; blocking between beams or sets; solid-steel or wood lagging; gunite or rock bolts.

Shaft raising, the second shaft construction method, is more economical, provided shaft construction can be delayed until construction of the tunnel has been completed to the shaft location. In this method, the shaft is excavated from the tunnel to ground surface. Shaft raising should only be undertaken in soil conditions which preclude the danger from falling rock and material.

The cycle for shaft raising is a basic drilling, blasting, and venting cycle. The mucking operation can be combined with the non-blasting operations because the rock material falls away from the rock face. In shaft raising, power, water, and air sources can usually be taken off the tunnel lines, thereby avoiding the duplication of equipment. This method, however, requires that all work be done above the workers heads, thereby complicating and slowing operations.

E. CONSTRUCTION YARDS AND PORTAL SITES

The contractor will require additional surface land areas at portal sites where materials egress and ingress (to the tunnel) is required. While actual portal sites cannot be predetermined, potential sites have been identified for purposes of illustrating probable relative locations and spacings of portals. Potential sites identified for this purpose are as follows (See Figure 2):

- o Makiki Street, makai of H-1 Freeway
- o Makiki Street, at Wilder Avenue
- o Wilder Avenue, at Metcalf Street

- o Dole Street, at Hoonanea Street
- o Dole Street, near Johnson Hall Dormitory (at Manoa Trunk Sewer)
- o Keanu Street, near Palolo Avenue

Additionally, the contractor will require areas for working or staging, or for storage of construction materials. It is estimated that a minimum area on the order of 10,000 to 20,000 square feet would be required. An area of this magnitude would serve short-term material storage requirements only. Contract documents may require the contractor to make his own arrangements for such areas.

However, the City and County may designate construction yard areas for the contractor in the interest of time and cost savings. Generally, construction yard location will affect project labor costs and contract time. As shown in Table 5, having a construction yard two miles away (4 miles round trip) from the project site (versus a site located one mile away) could result in an increase in manpower cost for mobilization from approximately \$1.0 million to \$1.5 million. Furthermore, additional travel time required would translate to over 160 lost work days.

TABLE 5

GENERALIZED RELATIONSHIP BETWEEN CONSTRUCTION
YARD LOCATION AND PROJECT COST^a

Round-Trip Distance Between Construction Yard and Construction Site	Daily Mobilization/ Demobilization Time	Daily Manpower Costs for Mobilization/ Demobilization ^b	Manpower Cost for Mobilization/De- mobilization for Project Duration ^c	Work Days Lost Due to Additional Travel Time Required ^d
2 miles	1.0 hr.	\$ 600.00	\$1.0 million	--
4	1.5 hrs.	\$ 900.00	\$1.5	166
10	2.0 hrs.	\$1,200.00	\$2.0	369

a/ Material transport cost increase assumed minimal; Equipment rental costs not considered.

b/ Assumes 30 workers @ \$20.00/hr. wage and fringe rate.

c/ Assumes 1660 work days.

d/ Based on a work day between 8:30-3:30 with a 1/2 hour lunch period. Work day hours are 5 1/2, 5, and 4 1/2 hours for 2, 4, and 10 miles, respectively.

Since project cost and time implications of construction yard location would be considered in the preparation of the contract documents, potential sites for construction yards, to be designated by the City and County, are addressed herein.

Potential construction yard sites include City and County parks. Among City and County parks located in proximity to the project corridor which may be considered are Sheridan Playground, Makiki District Park, Kanewai Field, Moiliili Park, Punahou Square, and Cartwright Field. Recreational impacts of using portions of these parks for construction yards are discussed in Section VI.B.

In addition to parks, consideration may also be given to utilizing other public open areas such as under the freeway viaducts or the Board of Water Supply's (BWS) Palolo Shaft.

Consideration of such areas will require early coordination between the Department of Public Works and the State Department of Transportation and the BWS, respectively.

F. TEMPORARY CONSTRUCTION EASEMENTS

Temporary construction easements (i.e., short-term easements required for construction) will be obtained by the City and County of Honolulu wherever construction work or access falls

outside of City and County road and highway right-of-ways. The contractor, for example, will be required to obtain at his own cost, easements for use of private parcels which he feels are necessary to facilitate his construction operations (e.g., private lots for use as staging areas).

A temporary construction easement for access will be required for the work within the Saint Louis High School/Chaminade University campuses. This easement, which will be obtained by the City and County, will serve as the contractor's entrance and exit route through the campus to the work site.

G. CONTROL OF OPERATIONS

Close inspection of the construction operations will be maintained by the Department of Public Works, as well as agencies whose utilities will be affected by the construction. The City construction manager will be responsible to see that the work is proceeding according to plans, in the manner specified in the contract documents. Construction management responsibility will include the maintenance of public health and safety.

The contractor will be responsible for obtaining all construction permits and the payment of all construction fees. It is the contractor's responsibility to prepare all the necessary drawings, plans and approvals for these permits.

1. Traffic and Access

All construction traffic plans must be approved by the City and County of Honolulu, Department of Transportation Services. Construction within any State right-of-way must be coordinated with the State Department of Transportation.

The traffic constraints will be a major determinant in the contractor's selection of construction method. The construction plans and specifications will mandate minimum traffic requirements which the contractor must provide for.

2. Working Hours

For the purpose of this environmental assessment, it is assumed that work along the project corridor, excluding Increment I-B from Ward Avenue and Beretania Street to Pensacola and Kinau Streets, will be performed on an 8:30 A.M. to 3:30 P.M. work day, Monday through Friday basis. At the time of construction, the contractor may consider extended work hour operations along these sections of

the Sewer Tunnel Relief. Viability of extended work hours will depend upon the immediate surrounding environment of the construction area (e.g., noise sensitivity of surrounding areas) and the kind of construction operations to be employed.

Extended work hour operations will probably be employed in the construction of a portion of Increment I-B from the intersection of Ward Avenue and Beretania Street to the intersection of Pensacola and Kinau Streets. Construction in this section of the project corridor should be of short duration to minimize adverse traffic impacts to heavily-travelled roadways. Land use along these roadways is predominantly business and commercial in nature as compared to other sections of the project corridor which are proximate to numerous single- and multi-family residences. Extended work hour operations would probably be performed during a 16-hour work day, 8:30 A.M. to 12:30 A.M., seven days a week. A variance must be obtained from the State Department of Health (DOH) which will allow exemption from DOH noise standards after 6 P.M. and on weekends.

3. Blasting

Control of blasting operations shall be the responsibility of the contractor. Blasting operations will be conducted under the supervision of experienced blasters who are familiar with tunneling operations.

The contractor will be required to obtain a blasting permit from the State Department of Labor and Industrial Relations' Occupational Safety and Health Office. The public will be notified of all proposed blasting work.

Inspectors representing the City and County will continuously monitor blasting operations and will have the authority to immediately halt a blasting operation should unsafe or undesirable conditions arise.

CHAPTER IV
PHYSICAL ENVIRONMENT

IV. PHYSICAL ENVIRONMENT

A. GEOLOGY

The Hawaiian archipelago extends in a northwest-southeast direction, from Kure Atoll to the island of Hawaii, a total distance of about 1,367 miles. It is believed the islands developed from volcanic activity along a major rift system in the ocean floor.

The proposed project is located on the island of Oahu which is the third largest island in the archipelago. Most of Oahu's land mass was formed during the shield building period of the Koolau and Waianae volcanoes. Both developed as separate submarine volcanoes, originally forming two islands.

The Waianae volcano became inactive, but the northeast Koolau volcano continued to grow. Flows from the Koolau volcanic dome bridged the gap between the two islands to form the island of Oahu. Honolulu is located on the southwest side of the Koolau Volcanic dome.

Extensive erosion carved deep valleys, following the mountain building stage. During the glacial ages, the rise and fall of sea level deposited marine and terrestrial sediments on the coastal plains of Oahu. Fossil reef corals are found miles

from the present shore, and submarine wave-cut benches are found hundreds of feet below present sea level.

A resurgence of volcanic activity called the Honolulu Volcanic Series occurred along the Koolau southeast rift zone and resulted in the interbedding of lava, ash and cinders with the sediments above. The valley filling lava flows are partially responsible for the flatness of the major Honolulu valleys.

In the coastal area, marine sedimentary formations composed of consolidated calcareous reef sediments, muds, and sands predominate. Further inland, and in the upland valley areas, alluvium and colluvium overlie the younger basalt and the Koolau basalt. The older alluvium is characterized by greater compaction and thorough weathering. The soil characteristics vary in specific areas due to the nature of the geological formation of Oahu.

B. SOILS

Soils within the Honolulu metropolitan area consist of varying types. On the lower Koolau slopes and floors of valleys, and on most of the coastal plain areas, the soils consist primarily of clays, silts, and loams. These soils are

composed of stratified layers of consolidated substances. The texture of these soils varies from very fine in coastal areas, to rocky towards higher elevations.

The shoreline is characterized by beaches and sandy areas. The sands are primarily derived from coral and seashells. In some coastal areas, and at selected inland sites, the lands have been filled to allow development. These areas have been primarily filled with material dredged from the ocean or hauled from nearby areas.

The following discussion summarizes soil conditions along the corridor of the proposed Sewer Tunnel Relief.

1. Increment 1-B

The subsurface soils in Increment 1-B generally fall into three major soil classifications (Geolabs-Hawaii, Inc., 1972):

- a. An upper layer of brown sandy silt with variable clay, gravel and cinder content. This layer is a result of sediment transport and is of varying thickness.

- b. An intermediate layer of volcanic cinder which is medium dense to very dense. This layer is a result of volcanic activity, and varies from 10 to 50 feet in thickness.
- c. A lower layer of coralline limestone which is the remains of an ancient coral fringe reef.

Located below these layers are the Koolau basalts of the Koolau Volcanic dome, which forms the northeast portion of the island of Oahu.

While groundwater was observed in some borings at elevations 0.5 ft. to 6.5 ft., groundwater is not expected to be encountered at the invert level of the sewer main. However, the possibility of encountering pockets of perched water during excavation may be present.

2. Increment 2

Excavation in Increment 2 will occur within a stratum composed of non-marine sediments. Sands, clays, and volcanic cinder material are the primary components in this area.

The sand and clays range from unconsolidated, requiring wall support, to consolidated "mudrock", which would not require wall supports, but may require light blasting. Mudrock is composed of some gravels and sands but is primarily made up of silty clays. The excavation and transport of this material may create a dust problem unless rigorous control measures are taken. Mitigative measures for dust control are discussed in Chapter VI.

The volcanic cinder material is sometimes noted as black sand. The structural properties of this material lies between rock material and sand and gravel. While the material is not sufficiently cemented to be considered a rock (tuff), its strength is due to the interlocking of irregular shaped grains. The cinder material, as measured by a standard penetration test, would be rated compact to very compact and excavations in this material could be expected to be self-supporting for extended periods of time.

This material can be readily excavated with a variety of tools ranging from hand digging to pneumatic tools. A boring machine would also operate well in this type of material (although use of a boring machine is not deemed feasible for the length of tunnel involved).

3. Increments 3 and 4

Borings or soils studies for Increments 3 and 4 of the proposed relief sewer have not been conducted to date. However, it is believed that subsurface characteristics of this portion of the project are of a volcanic rock (tuff) nature. This material is thick and massive and would require blasting in a normal tunneling operation. The University of Hawaii quarry is indicative of the thickness and the type of rock to be encountered. However, the joint structure as seen in the quarry may not be indicative of the material, as the rock was probably disturbed during quarrying operations.

C. HYDROLOGY

The Koolau basalt is the principal aquifer in the Honolulu District. Recharge is transmitted and stored in open spaces within clinker, lava tubes, vesicles, flow contacts, and cooling cracks.

The Honolulu Volcanic Series erupted in scattered locations subsequent to the Koolau Volcanic Series. Because of their localized nature, developable water is generally small. Many of the eruptions formed scenic landforms along the dry south-southeast coast of Oahu, such as Punchbowl, Diamond

Head, Koko Head, and Salt Lake, which are comprised of non-water bearing consolidated ash. In the wetter areas of the valleys, ground water is perched on and within cinder or clinker zones.

There are four types of water sources available in the Honolulu District. These are: surface water, potable ground water, brackish ground water, and sea water. Of these, potable ground water is the primary source for domestic water development. Only one surface water source is utilized for domestic water in the district. Currently brackish water is primarily used for golf course irrigation and air conditioning. The remaining water sources are not utilized because development to domestic standards is not economically feasible due to high capital investment, operational, and/or maintenance costs.

There are three types of groundwater bodies. The most important and extensive are the bodies of basal water that underlie most of Oahu. The basal water, also known as Ghyben Herzberg freshwater lenses, floats on denser water of higher salinity.

The second most important water body is associated with sheetlike structures of rock solidified within the conduits of the rift zone called dikes. Because of poor permeability of

the dikes, groundwater is trapped within dike compartments, often at high elevations.

Water bodies perched on buried soils, ash beds, or lava flows are only locally significant because of their small size.

Construction of the proposed Sewer Tunnel Relief will occur makai of existing domestic water sources, except for wells at the Kaimuki Pump Station. Future water source developments are addressed in Section V.D.

D. TOPOGRAPHY

The Honolulu metropolitan area is characterized by varying topographic conditions. In the cliff and valley areas of the City and in the vicinity of volcanic craters, such as Aliamanu, Punchbowl and Diamond Head craters, slopes of 30 percent or more can be found. At valley heads, and towards the base of these craters, lesser slopes of 21-30 percent are found. The coastal plain area is generally flat with slopes of zero to ten percent.

Much of the project corridor has slopes of zero to ten percent. Near Metcalf Street and at Chaminade University, the slopes range between 11 to 20 percent. Steeper areas along the project corridor occur at St. Louis Drive, with slopes of

30 percent or more, and at Wilhelmina Rise, with slopes of 21 percent or more.

E. CLIMATE

The region's climate is moderate throughout the year. The average temperature ranges from about 74°F-75°F in March to 79°F-80°F in September. The warmest and coolest months of the year differ by an average of 6.5°F.

The average rainfall in the State is 73 inches per year. Honolulu lies on the leeward coast of Oahu, and hence does not receive as much cool and moist tradewinds as does the windward coast. As a result, the area is drier than the State average. Honolulu receives 20-30 inches of rain per year on the coastal plains, 40-75 inches in the mauka cliffs and valleys, and 100 to 150 inches along the ridge of the Koolau Range.

Trade winds prevail throughout the year, but are least continuous from October through April. During these months, tropical storms occasionally bring heavy rains, which account for most of the rainfall on the leeward plains.

The average relative humidity is 72 percent in the mornings and 57 percent in the afternoons.

F. WATER QUALITY

1. Surface Water

The proposed relief sewer route crosses under the Makiki Stream, Manoa Stream, and Palolo Stream. The Makiki Stream crossing occurs along Wilder Avenue at Anapuni Street. Makiki Stream, along this reach, has been concrete lined. The stream is of "low environmental and biological quality which may be restricted to the public for health or safety reasons" (Timbol and Maciolek, 1978). The stream flows intermittently, yet it is inhabited by a few common species of aquafauna such as tahitian prawns (Macrobrachim lar), crayfish (Procambarus clarkii) and guppies (Poecilia reticulata).

The proposed relief sewer crosses under Manoa Stream at Dole Street, near the Hale Aloha Dormitory Towers of the University of Hawaii. Manoa Stream is perennial with three tributary streams; Pukele, Waiomao and Palolo Streams. Twenty-four percent of the stream length has been concrete lined or revetted. Timbol and Maciolek describe the stream as "limited consumptive", indicating that the stream is of "moderate to high" quality water or natural values, which use is controlled to prevent

excessive modification. The stream supports a variety of aquafauna such as: atyid shrimp (Atya bisulcata), crayfish (Procambarus clarkii), gobies (Awaous gentivittatus, A. stamineus), eleotrid (Eleotris sandwicensis), carp (Cyprinus carpio), Chinese catfish (Clarias fuscus), mosquito fish (Gambusia affinis), oriental weatherfish (Misgurnus anguillicaudatus), shortfin molly (Poecilia mexicana), guppies (Poecilia reticulata), Tilapia (Tilapia mossambica) and green swordtail (Xiphophorus helleri).

Palolo Stream, which is a tributary of the Manoa Stream, is also traversed by the proposed relief sewer, near Keanu Street. As part of the Manoa stream system, Palolo Stream is also categorized as a "limited consumptive" stream.

2. Coastal Waters

The marine waters along Ala Wai Boat Harbor, Kewalo Basin, and Keehi Lagoon have been classified by the State Department of Health as "Class A" (Chapter 54 - Water Quality Standards of Title 11, State Department of Health Administrative Rules). Under this classification, water quality is maintained to provide recreation and aesthetic pursuits.

G. AIR QUALITY

Air quality measurements are sampled by the State Department of Health year round. Sampling stations at Downtown Honolulu, Kalihi Kai and Waikiki report total suspended particles and sulfur dioxide for 1981, as presented in Table 6.

The Department of Health also estimates emissions by type of source which are based upon emission factors from the U.S. Environmental Protection Agency, and an inventory of pollutant sources in the State. Air quality in the Honolulu District is most influenced by motor vehicles. Industrial air pollution contributes comparatively minor effects.

Urbanization in Honolulu concentrates usage of large numbers of motor vehicles in confined spaces. Although the air is generally clean and low in pollutants, physical and meteorological factors may concentrate high levels of motor vehicle pollutants in certain parts of the city. These factors include: light and variable wind flow; modified local air circulation (due to tall buildings); higher surface temperatures (caused by buildings; paved surfaces and traffic); and large amounts of direct sunshine.

TABLE 6

AIR QUALITY AT SPECIFIED LOCATIONS IN HONOLULU: 1981^{1/}

Sampling Station	Total Suspended Particles			Sulfur Dioxide		
	Annual Minimum	Range Maximum	Arithmetic Average	Annual Minimum	Range Maximum	Arithmetic Average
Downtown	23	75	40	5	44	19
Kalihi Kai	32	93	53	5	8	5
Waikiki	18	78	36	5	5	5
Standards ^{2/}						
Primary			75			80
Secondary			60			60

1/ 24-hour sampling, in micrograms per cubic meter
 2/ National ambient air quality standards.

Source: State of Hawaii, Data Book 1982.

As documented in the Atlas of Hawaii, air quality was studied during the period between July through September 1971. During light traffic conditions, concentrations for suspended particles and carbon monoxide varied between 11 to 24 micrograms per cubic meter (ug/m^3) and 0.05 to 2.0 milligrams per cubic meter (mg/m^3), respectively. Heavy traffic conditions raised pollution concentrations, especially at congested intersections. Concentrations of suspended particles were found to be as high as 70-90 ug/m^3 and 40 mg/m^3 for carbon monoxide in specific problem areas of downtown Honolulu and near the University of Hawaii.

In general, however, trade winds are able to provide sufficient air circulation to disperse these pollutants.

H. FLOOD HAZARD

Areas subject to coastal flooding or tsunami inundation are identified on Flood Insurance Rate Maps (FIRM) prepared for the City and County of Honolulu, by the Federal Emergency Management Agency. Generally, the project corridor falls within Zone C, which indicates "areas of minimal flooding".

The only areas of possible flood hazards are at Manoa and Palolo Streams, designated Zone A7 and A5, respectively. The Zone A designation delineates the 100-year flood area.

I. ARCHAEOLOGICAL/HISTORICAL SITES

There are no known archaeological sites within the project area. However, there are five significant historic sites proximate to the proposed development.

Construction of the proposed Sewer Tunnel Relief will occur within existing rights-of-way adjacent to Thomas Square (TMK: 2-4-1:1), Honolulu Academy of Arts (TMK: 2-8-18:1), Linekona School (TMK: 2-4-2:20), Punahou School (TMK: 2-4-14:21) and Makiki Fire Station (TMK: 2-4-29: por. of 29) which are listed on the National Register of Historic Places. The Lishman Building (TMK: 2-4-22:por. 1) is pending removal from the Register.

Properties within the project area which appear to meet the criteria for inclusion in the National Register of Historic Places include St. Louis High School, the University of Hawaii, Sacred Hearts Roman Catholic Church, St. Clement's Episcopal Church, Jodo Mission of Hawaii, Scottish Rite Cathedral, Hawaii Sugar Planter's Association buildings in Makiki Park, and the residences at 1022, 1026, and 1148 Kinau Street.

The Honolulu Academy of Arts, Linekona School, Punahou School, portions of the University of Hawaii (TMK: 2-8-23 por. of 3), and the Makiki Fire Station are listed on the State Register of Historic Places.

J. AMBIENT NOISE

The project corridor traverses an urban area where noise levels generally range between 40 to 50 decibels during daylight hours (see Table 7). Primary noise sources in these areas are traffic-related.

K. FLORA AND FAUNA

The project area is highly urbanized, and no rare or endangered species are known to occur here. Introduced species of birds that are frequently seen include lace-necked and barred doves, red-necked cardinals, house sparrows, mynahs and white-eyes (mejiro).

The animals found in Honolulu are those common to urban areas. These include the domestic pets of urban residences and strays. Other animals such as mongooses, rats and mice are also likely to be found.

The aquatic fauna known to exist in streams which traverse the project corridor have been previously described in Section III-E. Most of these species were introduced. In the upper reach of Manoa Stream, the endemic Atyid shrimp (Atya bisulcata) is abundant and the endemic Goby (Awaous stamineus) is commonly found. The indigenous Goby (Awaous genivittatus)

TABLE 7

NOISE LEVELS IN SPECIFIED NEIGHBORHOODS ON OAHU: 1981-1982

Neighborhood	Noise Levels (in decibels) exceeded --					
	Manual sampling			Automatic sampling		
	10 percent of time	50 percent of time	90 percent of time	10 percent of time	50 percent of time	90 percent of time
Makiki	52.7	46.9	45.3	56.5	50.5	48.6
Manoa	45.4	42.6	40.7	51.5	46.0	43.4
Palolo	49.3	44.6	41.6	65.0	52.4	45.4
Kaimuki	51.8	44.6	41.7	57.2	47.6	43.3
Waiialae Iki	46.4	43.1	40.6	54.6	44.8	41.7
Kahala	48.0	44.5	42.4	--	--	--

Adapted from: Department of Planning and Economic Development, State of Hawaii 1983 Data Book.

NOTE: Data collected during the latter part of 1981 and throughout 1982, during daylight hours only. Data were obtained from both manual sampling, utilizing on-site noise-level readouts, and automatic sampling, utilizing a community noise analyzer. Differences in noise levels as measured by the two types of sampling result from the inclusion in the automatic samplings of such sources as vehicles traveling near the microphone, barking dogs, or other instantaneous sounds. With manual samplings, these sources are eliminated from the recorded data.

and the endemic Eleotrid (Eleotris sandwicensis) are commonly found near the mouth of the stream. The inhabitants of Makiki Stream are introduced species.

L. AGRICULTURAL LANDS OF IMPORTANCE

The State Department of Agriculture has identified agricultural lands of importance for the State and categorizes these into three groups. "Prime" agricultural lands are those which have the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically, when treated and managed according to modern farming methods. "Unique" agricultural lands have a special combination of soil quality, location, growing season, and moisture supply currently used to produce sustained high quality and/or high yields of a specific crop when treated and managed according to modern farming methods. For example, specialty crops such as taro farming or aquaculture development may be very productive in areas which may not be desirable for traditional farming crops, if the areas being farmed have the unique characteristics required by these special crops. "Other" important agricultural lands include agricultural lands which have not been rated "prime" nor "unique". These lands are also of statewide or local importance, however, they exhibit properties, such as seasonal

wetness, erodibility, limited rooting zone, slope, flooding or drought prone conditions which exclude them from the "prime" or "unique" categories.

The project area does not have lands classified as "prime" nor "unique" agricultural lands. "Other" agricultural lands are found in the Makiki Heights/Tantalus and St. Louis Heights areas. The proposed project will not traverse agricultural lands.

CHAPTER V
SOCIO-ECONOMIC ENVIRONMENT

V. SOCIO-ECONOMIC ENVIRONMENT

A. POPULATION

The high level of economic activity that occurs on Oahu offers many opportunities for employment, business development and other conditions which encourage people to locate here. In 1980, the State resident population was 964,691 and the defacto population was 1,052,700. Of the total State resident population, 57,056 persons were members of the armed forces and 64,023 were military dependents. The resident population of the City and County of Honolulu in 1980 was 762,565 persons and the de facto population was 822,000 persons. (State of Hawaii, Department of Planning and Economic Development, December 1983).

The City of Honolulu is the largest and most populous City in the State of Hawaii. In 1980, 365,048 persons were Honolulu residents, approximately 37.8 percent of the total State resident population. The median age of Honolulu residents in 1980 was 31.4 years, and there were 2.79 persons per household (U.S. Department of Commerce, Bureau of the Census, July 1982).

Population projections (to the year 2005) used to project flow rates from proposed Sewer Tunnel Relief's tributary areas are presented in Section II-A.

B. ECONOMY

The City and County of Honolulu is highly urbanized and serves as the major commercial, financial, and governmental center of the State. Most jobs are in services (23%) and trade (24%), both of which are closely related to the island's tourism industry. Public service is another major employment field, with approximately 22% of all jobs in government. Nine percent of this total is with the federal government, 11% with the State and 3% with the local government. Other sectors offer less than 10% of the job market.

The County's unemployment rate has decreased from a peak of 9.8% in 1976 to a low of 4.9% in 1980. Since then, the rate has increased slightly to a rate of 5.0% in May, 1984.

Among the State's four major industries in 1982, visitor expenditures accounted for \$3,700 million (62%), defense expenditures \$1,693.4 million (28%), pineapple production \$206 million (3%) and sugar/molasses production \$351.5 million (6%).

The commercial character of the City of Honolulu is exemplified by the Ala Moana Shopping Center, which is one of the world's largest open mall shopping complexes. There are also many other shopping centers and a multitude of smaller commercial establishments which provide a variety of goods and services.

With the City of Honolulu as the State Capital, the Honolulu District houses most of the political and administrative government activities in the State. Most public agencies and offices are based here, including federal government regional offices, the State Legislature, the Governor's office, all major State departments, and the main functions of the City and County of Honolulu.

Always in close relation to these activities, the area is also the locale of statewide headquarters or main offices for many trusts and foundations, industries, corporations and financial institutions.

Resort activity and tourism also occurs in Honolulu. At the waterfront, Waikiki Beach thrives as a busy destination spot. The area supports many hotels, condominiums, night clubs, theaters, restaurants, retail shops, and other visitor support facilities and services.

C. EXISTING LAND USES

A variety of land uses are found along the project corridor. Multi-family dwellings (condominiums, apartments), churches, schools, parks, and commercial facilities are prevalent along the project corridor extending from Ward Avenue to Palolo Avenue.

Table 8 summarizes the existing land uses and significant facilities along the project corridor.

D. PUBLIC SERVICES

Community facilities along the project corridor are shown in Figures 9A and 9B.

1. Education

Education services are provided by a network of public agencies and private organizations for all scholastic levels. This section addresses institutions situated along or in proximity to the project corridor.

Higher education is provided by the University of Hawaii and Chaminade University of Honolulu. There are four public schools and eight private schools in the area. The public schools are the Queen Kaahumanu Elementary School (K-6), Aliiolani Elementary School (K-6), University Laboratory Schools (K-5 and 6-12) and Hokuani Elementary School (K-6). Private schools are the Hawaiian Mission Elementary School (K-8), Hawaiian Mission Academy (9-12), Maryknoll Grade School (Pre-school to 8), Maryknoll High School (9-12), Our

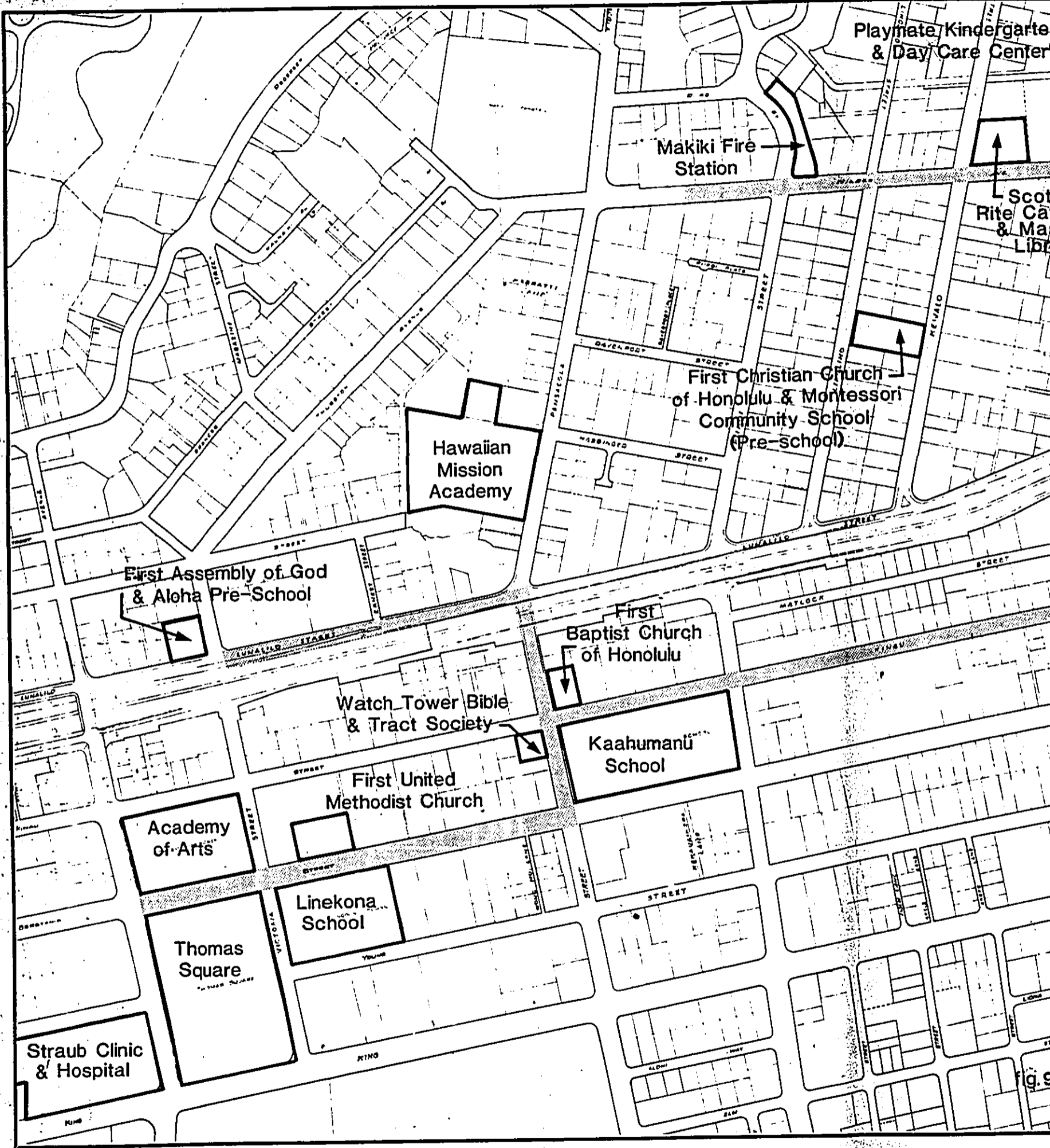
TABLE 8

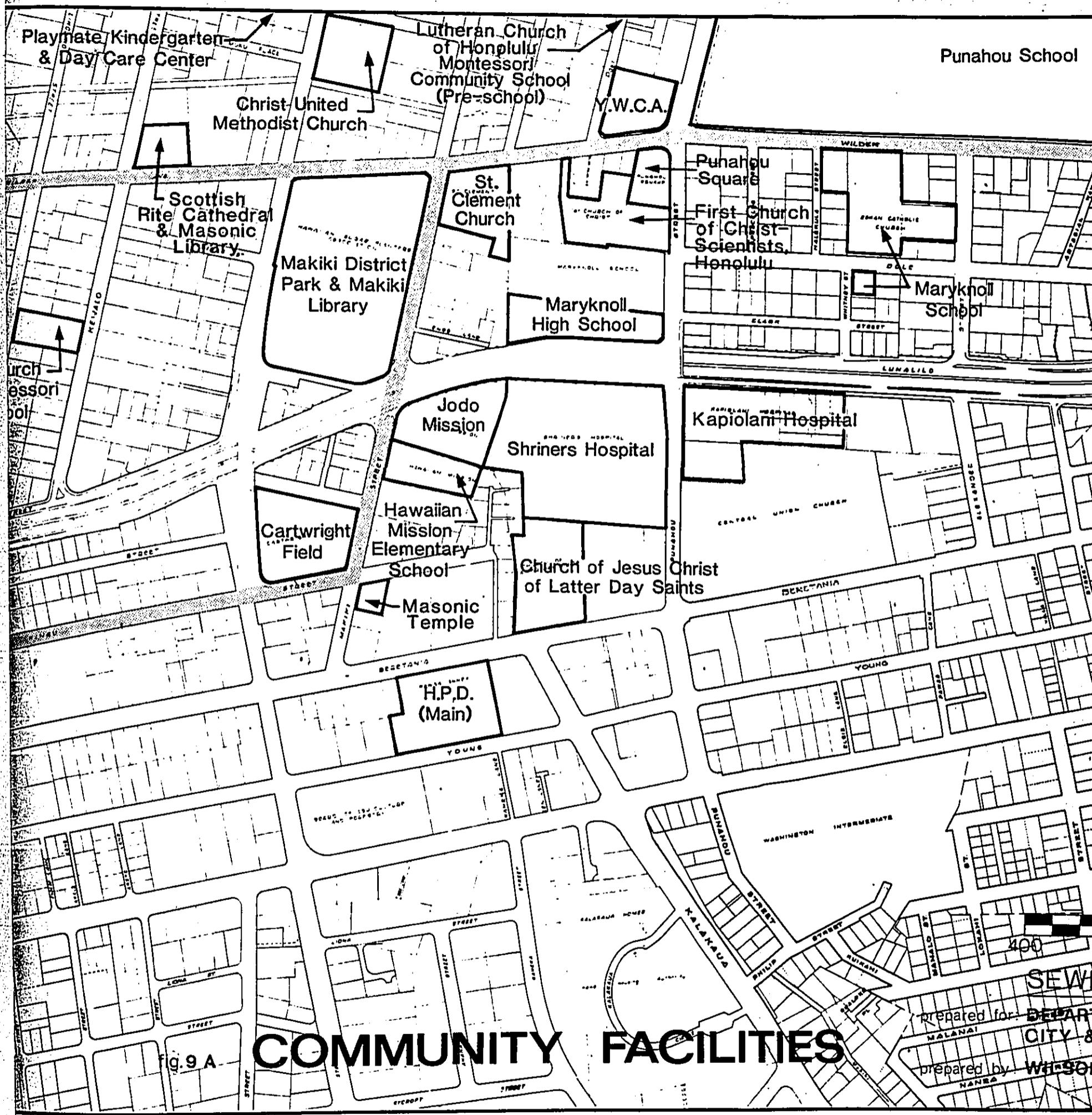
LAND USE ALONG THE PROJECT CORRIDOR

<u>Corridor</u>	<u>From</u>	<u>To</u>	<u>Land Use</u>	<u>Significant Facilities</u>
Beretania St.	Ward St.	Pensacola St.	Park Multi-Family dwellings School Commercial	Thomas Square Academy of Arts Linekona School First United Methodist Church
Pensacola St.	Beretania St.	Lunalilo St.	Post Office Commercial School Multi-family dwellings Single-family dwellings	Kaahumanu Elementary School Makiki Post Office
Lunalilo St.	Pensacola St.	Victoria St.	Multi-family dwellings	
Kinau St.	Pensacola St.	Piikoi St.	Single-family dwellings Multi-family dwellings School	Kaahumanu Elementary School 1148 Kinau Street residence
Kinau St.	Piikoi St.	Keeaumoku St.	Commercial Single-family dwellings Multi-family dwellings	
Kinau St.	Keeaumoku St.	Makiki St.	Park Commercial	Cartwright Field
Makiki St.	Kinau St.	H-1 Freeway	Multi-family dwellings Park School Church Single-family dwellings	Cartwright Field Hawaiian Mission School Jodo Mission of Hawaii
Makiki St.	H-1 Freeway	Wilder Ave.	Multi-family dwellings Park Church Community Garden	Makiki District Park Hawaii Sugar Planter's Association Buildings St. Clement's Episcopal Church

TABLE 8 - Continued

<u>Corridor</u>	<u>From</u>	<u>To</u>	<u>Land Use</u>	<u>Significant Facilities</u>
Wilder Ave.	Makiki St.	Lihoiho St.	Multi-family dwellings Fire Station Church	Makiki Fire Station Scottish Rite Cathedral
Wilder Ave.	Makiki St.	Metcalf St.	Multi-family dwellings School Church Single-family dwellings	Punahou School Maryknoll School Sacred Hearts Church
Metcalf St.	Wilder Ave.	Hoonanea St.	Multi-family dwellings Commercial Single-family dwellings	
Hoonanea St.	Metcalf St.	Dole St.	Single-family dwellings	
Dole St.	Hoonanea St.	University Ave.	Single-family dwellings Commercial School	University High School Our Redeemer Lutheran School
Dole St.	University Ave.	St. Louis Dr.	Park School Single-family dwellings Multi-family dwellings	University of Hawaii National Marine Fisheries Service Kanewai Field St. Louis High School Chaminade University
Keanu St.	6th Ave.	Sierra Dr.	School Single-family dwellings Multi-family dwellings	Aliiolani Elementary School
Keanu St.	Wilhelmina Rise	15th Ave.	School Single-family dwellings	Island Paradise Academy





Playmate Kindergarten & Day Care Center

Lutheran Church of Honolulu
Montessori Community School (Pre-school)

Punahou School

Christ United Methodist Church

Y.W.C.A.

Scottish Rite Cathedral & Masonic Library

Makiki District Park & Makiki Library

St. Clement Church

Punahou Square
First Church of Christ-Scientists, Honolulu

ROMAN CATHOLIC CHURCH

Maryknoll School

Maryknoll High School

Jodo Mission

Shriners Hospital

Kapiolani Hospital

Cartwright Field

Hawaiian Mission Elementary School

Church of Jesus Christ of Latter Day Saints

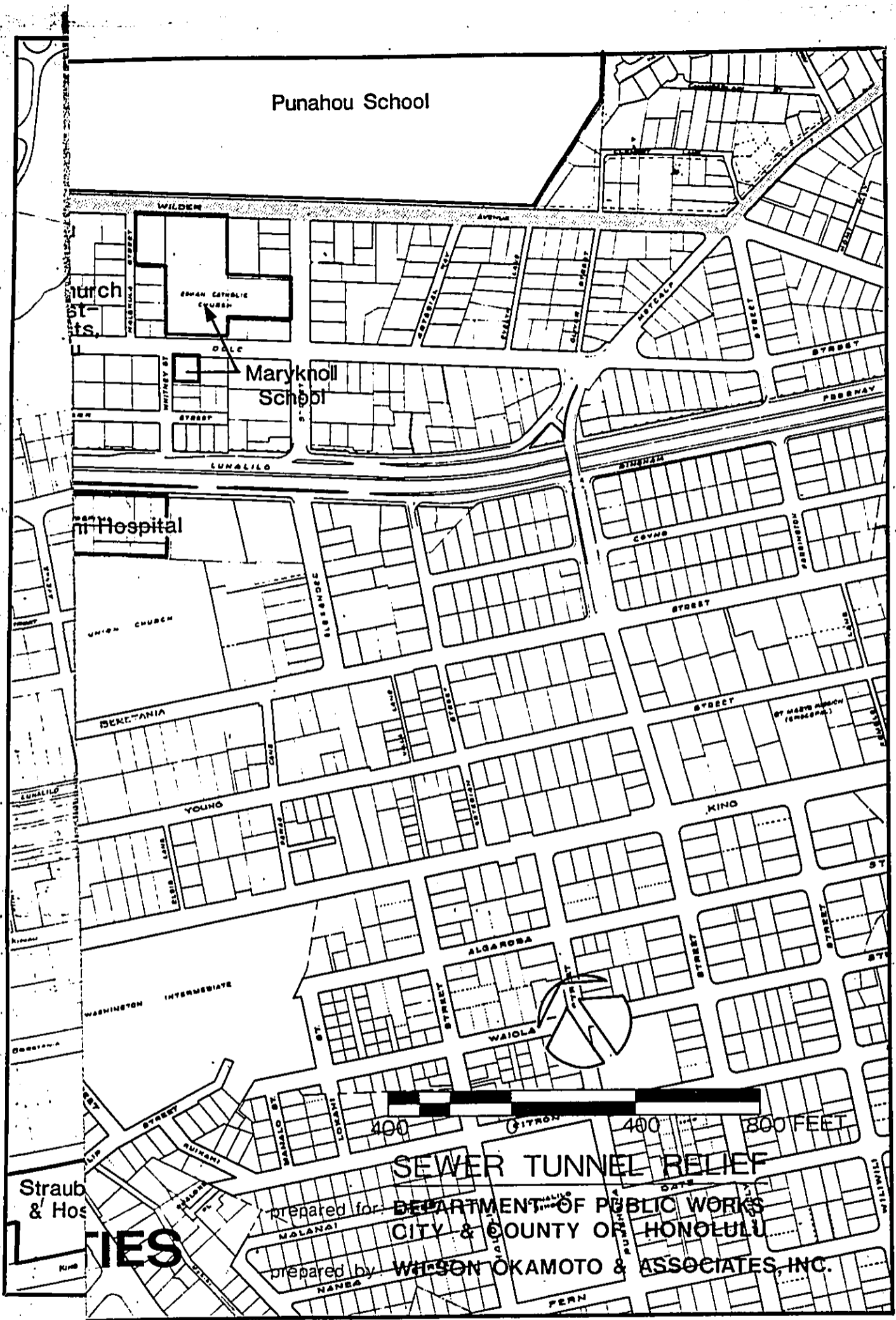
Masonic Temple

H.P.D. (Main)

Fig. 9 A

COMMUNITY FACILITIES

400
SEW...
prepared for: DEPAR...
CITY &...
prepared by: WILSON...
MALANAI
HANEA



Punahou School

Church
Sts.

EDMAN CATHOLIC CHURCH

Maryknoll School

Hospital

UNION CHURCH

BEKETHANIA

YOUNG

WASHINGTON INTERMEDIATE

ALGARROBA

WAIOLA

400 800 FEET

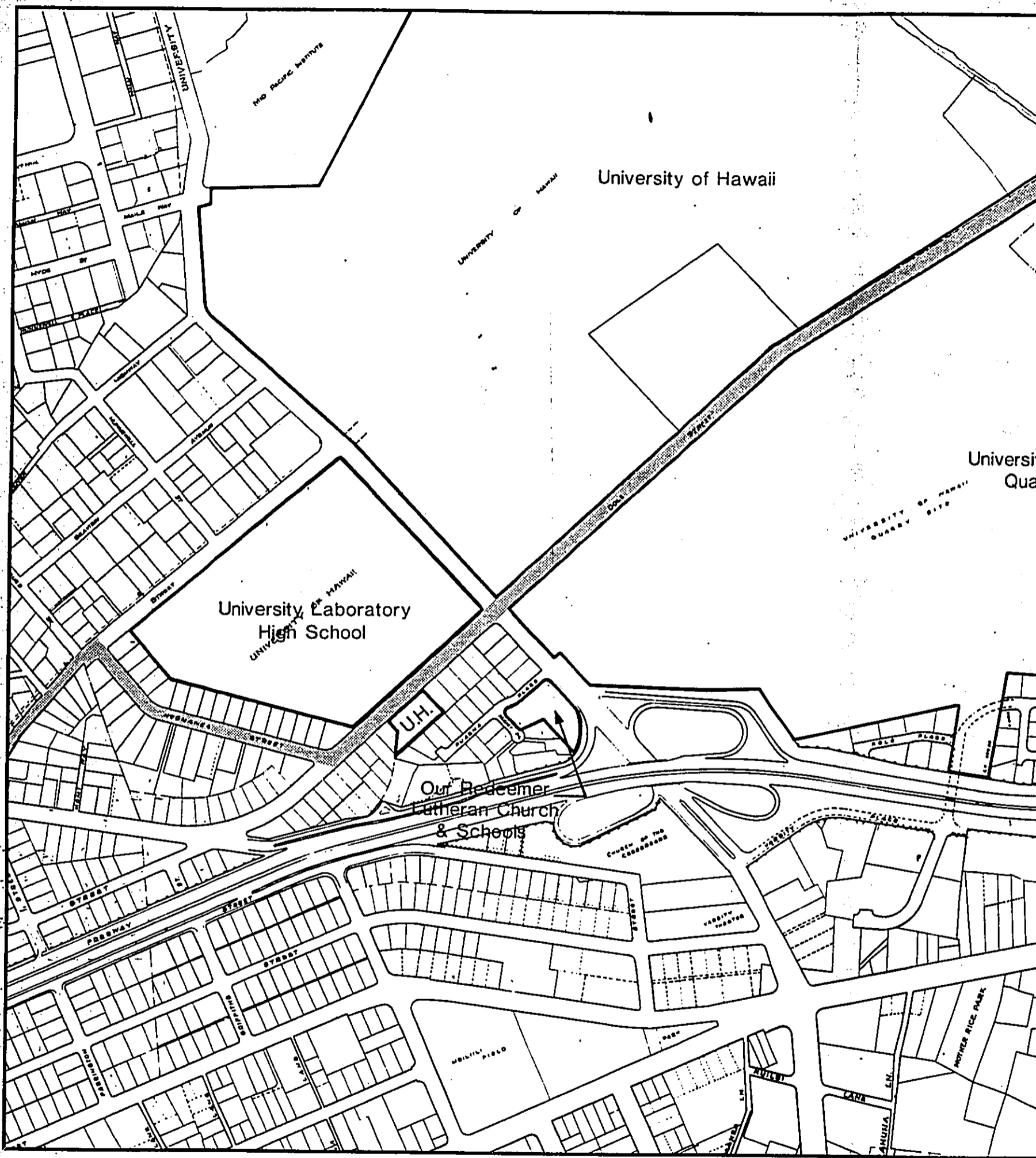
SEWER TUNNEL RELIEF

prepared for: DEPARTMENT OF PUBLIC WORKS
CITY & COUNTY OF HONOLULU

prepared by: WILSON OKAMOTO & ASSOCIATES, INC.

Straub
& Hos

LIES



MOKUAU'IA PARK

University of Hawaii

University Laboratory High School

U.H.

Our Redeemer Lutheran Church & Schools

COURT OF THE COLLEGE

University of Hawaii
Quadrangle

UNIVERSITY OF HAWAII
QUADRANGLE

UNIVERSITY AVENUE
MOKUAU'IA STREET
KAMEHAMEHA STREET
KALIA STREET
MOKUAU'IA STREET
KAMEHAMEHA STREET
KALIA STREET

UNIVERSITY AVENUE
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KALIA STREET



Chaminade Unive
& St. Louis High S
& L. Robert Allen Pre-Scho

PRIMARY SEWER ALIGNMENT
SECONDARY SEWER ALIGNMENT

Kanewai Field

Hokulani Elementary School

University of Hawaii Quarry Site

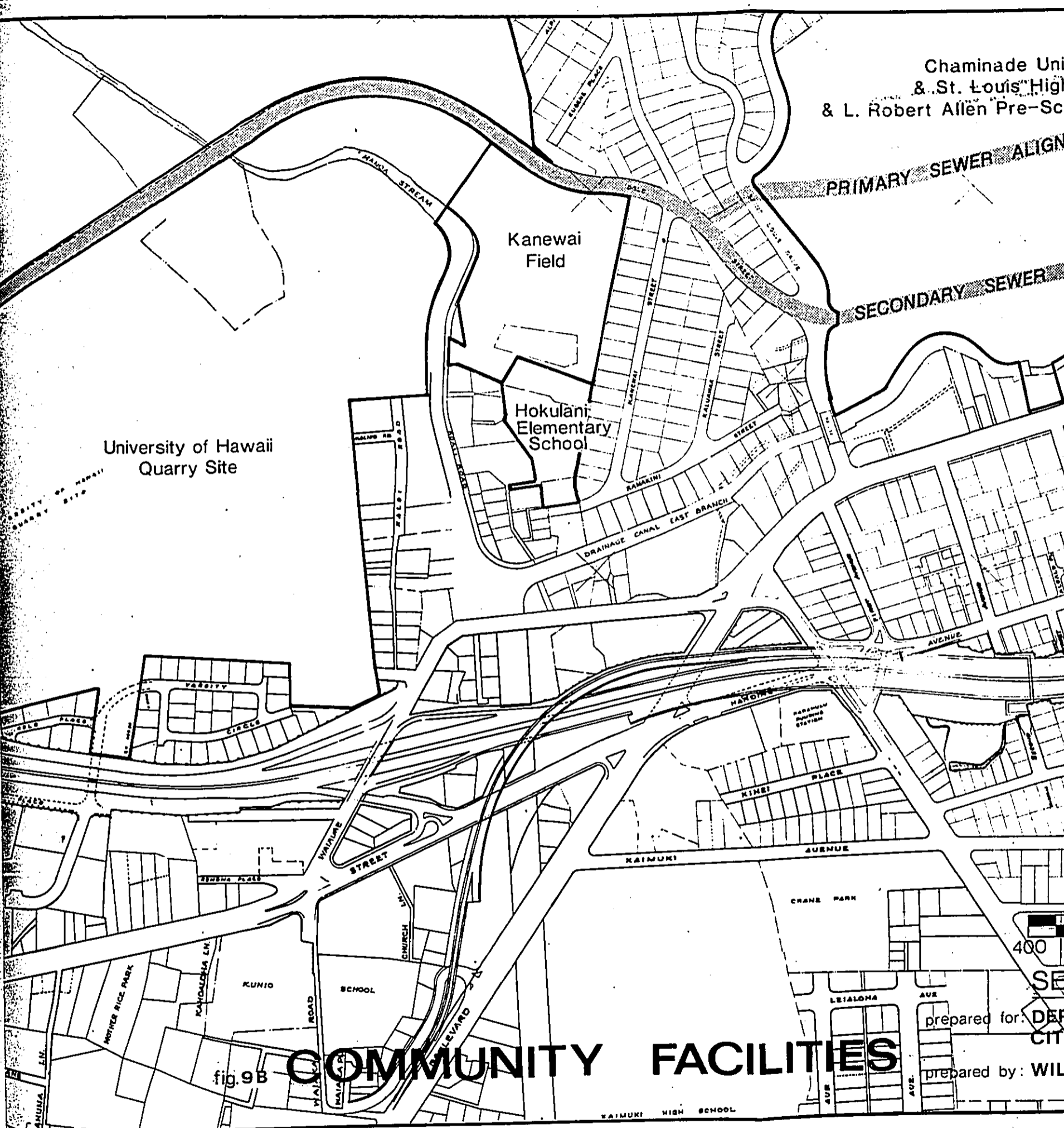


fig. 9B

COMMUNITY FACILITIES

prepared for: DEPAR
CITY
prepared by: WILSON

KAIMUKI HIGH SCHOOL

Chaminade University.
& St. Louis High School
& L. Robert Allen Pre-School Montessori

Paleo
Mini-Park

Aliiolani
Elementary
School

PRIMARY SEWER ALIGNMENT

SECONDARY SEWER ALIGNMENT

St. Patrick's
Church

Sacred
Hearts
Academy

HONOLULU
SEWERAGE
STATION

PLACE

AVENUE

CRANE PARK

400 0 400 800 FEET

SEWER TUNNEL RELIEF

prepared for: DEPARTMENT OF PUBLIC WORKS
CITY & COUNTY OF HONOLULU

prepared by: WILSON OKAMOTO & ASSOCIATES, INC.

LITIES

Redeemer Lutheran Schools (Elementary (K-8) and High (9-12) Schools), St. Louis High School (7-12), Punahou School (K-12), Sacred Hearts Academy (K-8 and 9-12) and St. Patrick's School (K-8).

Additionally, two religious organizations provide preschool services. These are the First United Methodist Church (preschool) and the St. Clement's School (preschool to kindergarten).

Other preschools are the Aloha Pre-School, Playmate Kindergarten and Day Care Center, and three Montessori Schools located at the First Christian Church of Honolulu, the L. Robert Allen Preschool, and the Lutheran Church of Honolulu.

2. Religion

The cosmopolitan nature of Hawaii's population has resulted in a wide variety of religious beliefs in the islands. Major churches include those of Christian and Buddhist religions, while others include Indian/Hindu, Jewish, Muslim, Shinto and other faiths.

Along the project corridor, there are fourteen religious facilities. These are: First United Methodist Church, Watch Tower Bible and Tract Society, First Baptist Church of Honolulu, Jodo Mission of Hawaii, St. Clement's Episcopal Church, First Church of Christ Scientist-Honolulu, Our Redeemer Lutheran Church, First Christian Church of Honolulu, Church of Jesus Christ of Latter Day Saints, Christ United Methodist Church, Lutheran Church of Honolulu, First Assembly of God, Sacred Hearts Roman Catholic Church and St. Patrick's Church.

3. Health

There are no major medical facilities along the project corridor. There are, however, three hospitals in the vicinity. These are Straub Clinic & Hospital, Inc., Shriners Hospital For Crippled Children, and Kapiolani/Children's Medical Center.

Straub and Kapiolani Hospitals offer emergency ambulance service. These hospitals participate in a communications network with other hospitals such as Queen's Medical Center which receive municipal ambulance service. Ambulances will normally report to the nearest major medical facility, unless specifically requested to go elsewhere.

4. Recreation

There are six recreational and park areas along the project corridor - Thomas Square, Palolo Mini Park, Makiki District Park, Punahou Square, Cartwright Field, and Kanewai Park.

Thomas Square, Punahou Square, and Palolo Mini Park offer opportunities for passive recreation. Makiki District Park has an open area for jogging or picnicking as well as various team sports, four tennis courts, meeting rooms, two volleyball courts and one basketball court. Both Cartwright Field and Kanewai Park have play courts, field areas for softball and playground equipment for children. Additional discussion of park characteristics are contained in Section VI.B.

5. Transportation and Traffic

Oahu is primarily served by the Honolulu International Airport for air service and the Honolulu Harbor for water surface shipping. Facilities for ground transportation include an interstate freeway system and network of State and City and County highways and streets. Major thoroughfares along the project corridor include Beretania Street, Pensacola Street, Piikoi Street,

Keeaumoku Street, Kinau Street, Wilder Avenue, the H-1 Freeway, Dole Street, University Avenue, and Palolo Avenue.

The City and County of Honolulu Department of Transportation Services operates municipal bus service along segments of the corridor route, along Lunalilo, Kinau, Keeaumoku, Punahou, South Beretania, Metcalf and Dole Streets. Buses also run along Ward, Wilder and University Avenues, and on St. Louis Drive. Bus routes, bus stops, and direction of traffic flow along the project corridor are presented in Figures 10A and B.

Inasmuch as impacts to traffic are considered to be significant during construction of the proposed relief sewer, an analysis of existing traffic conditions was conducted for this environmental document.

To establish existing conditions of project corridor roadways, a level of service (LS) assessment was conducted for each of the major roads. Calculation of the level of service of a given roadway permits evaluation of prevailing roadway and traffic conditions. Level of service denotes any of an infinite number of differing combinations of operating conditions that may occur on a given lane or roadway when it is accomodating



fig. 10A

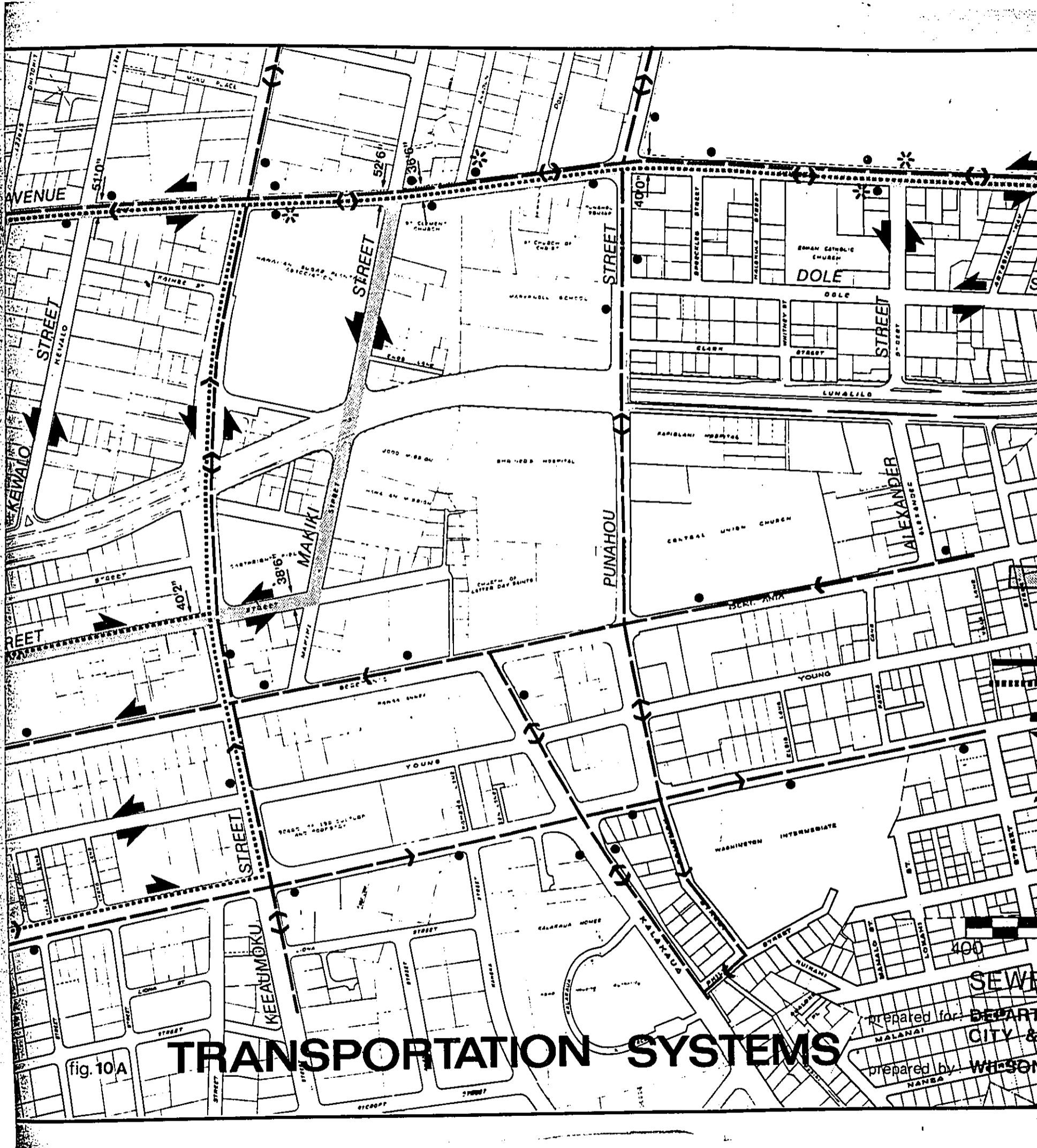
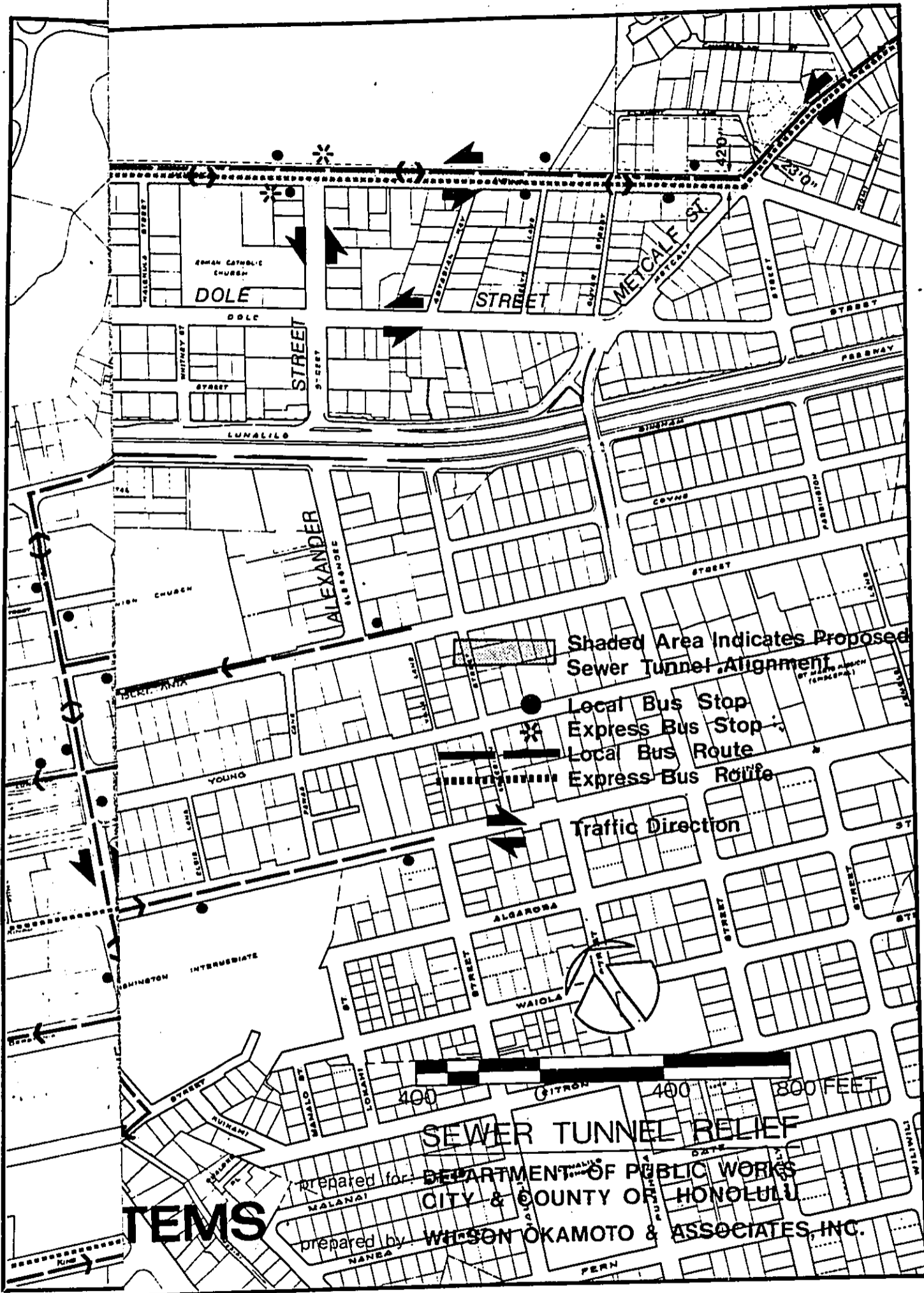
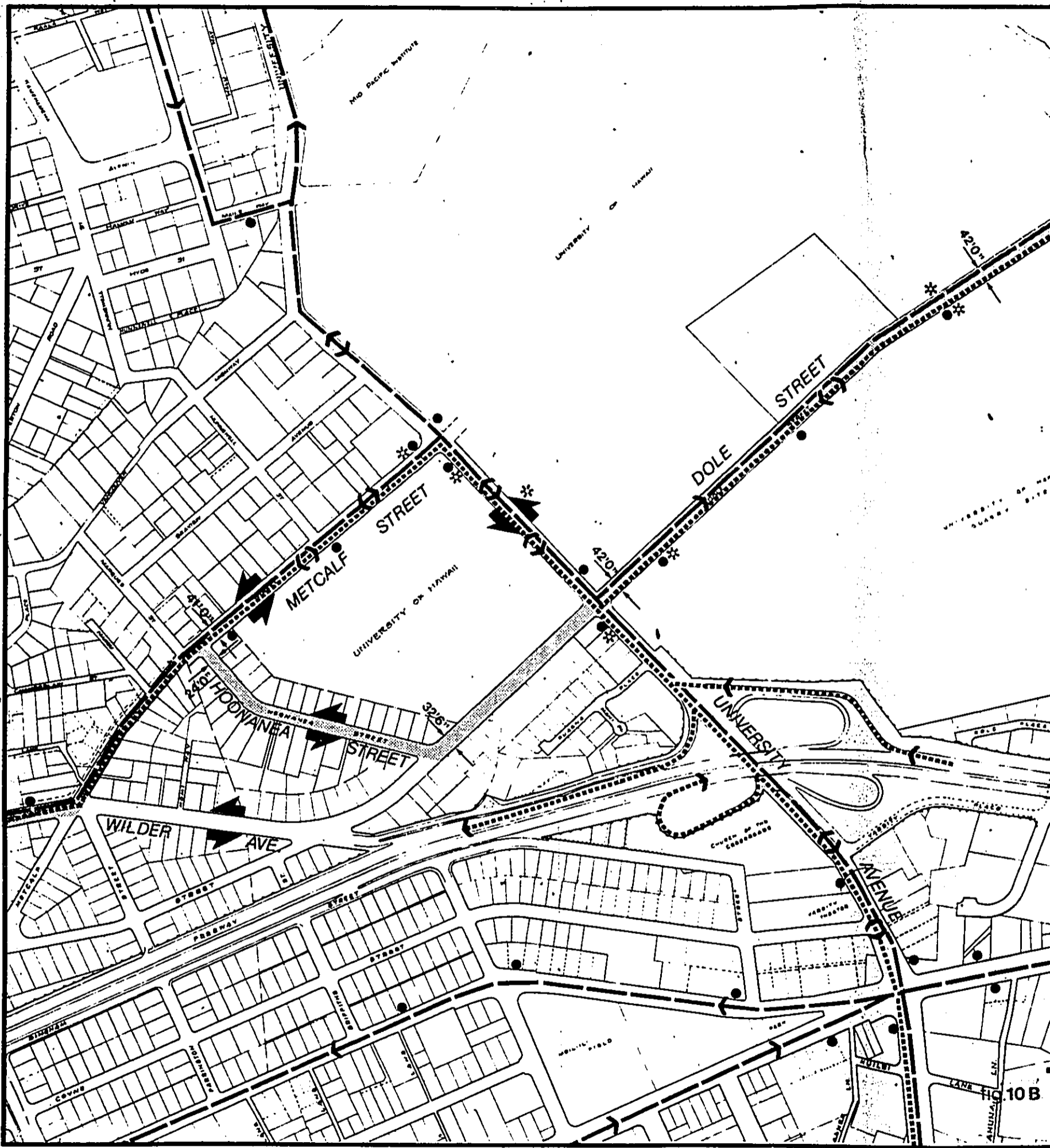


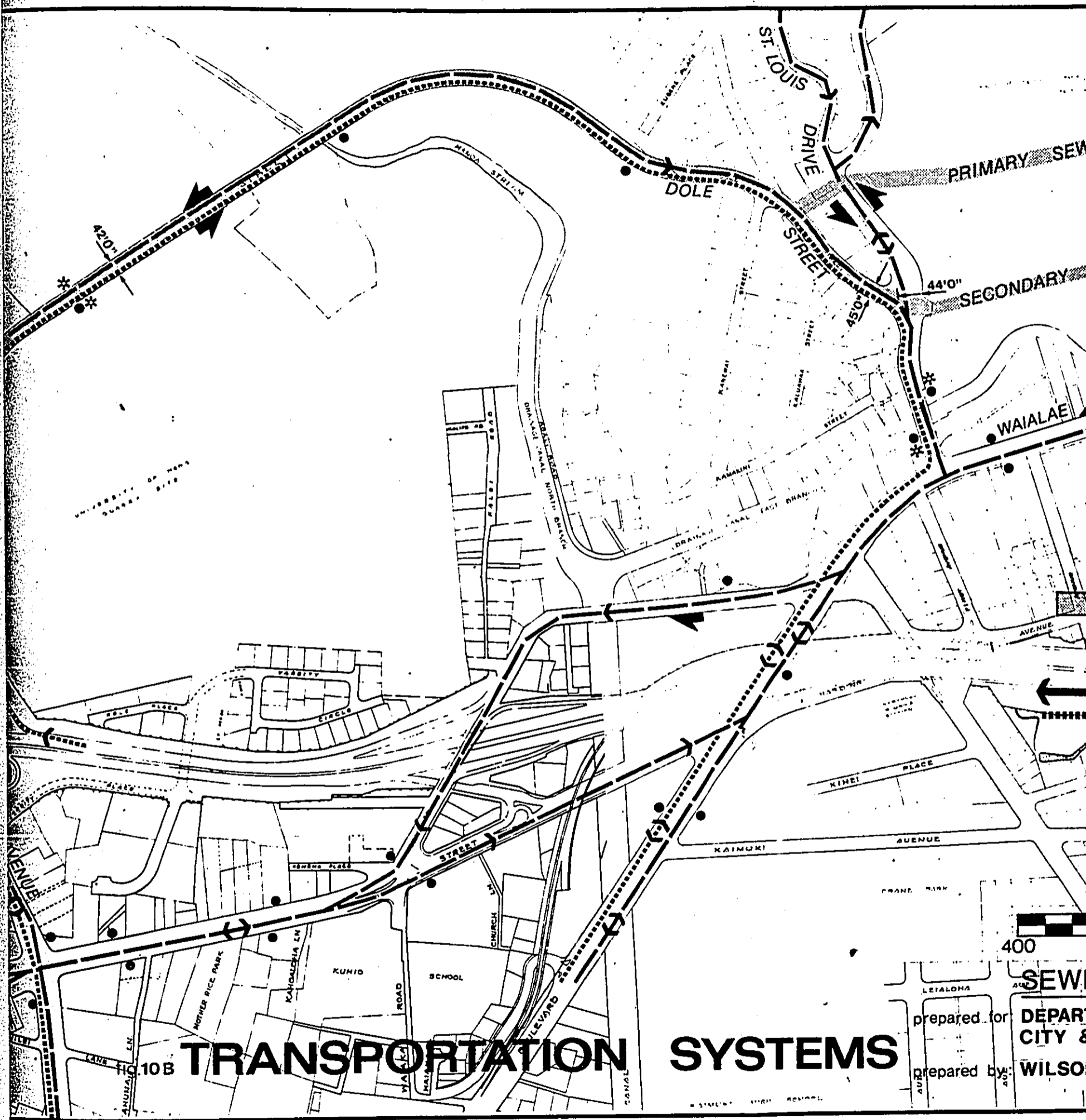
fig. 10A

TRANSPORTATION SYSTEMS

SEWAGE
 prepared for: DEPARTMENT OF
 CITY & COUNTY OF HONOLULU
 prepared by: WILSON JONES & COMPANY
 HONOLULU

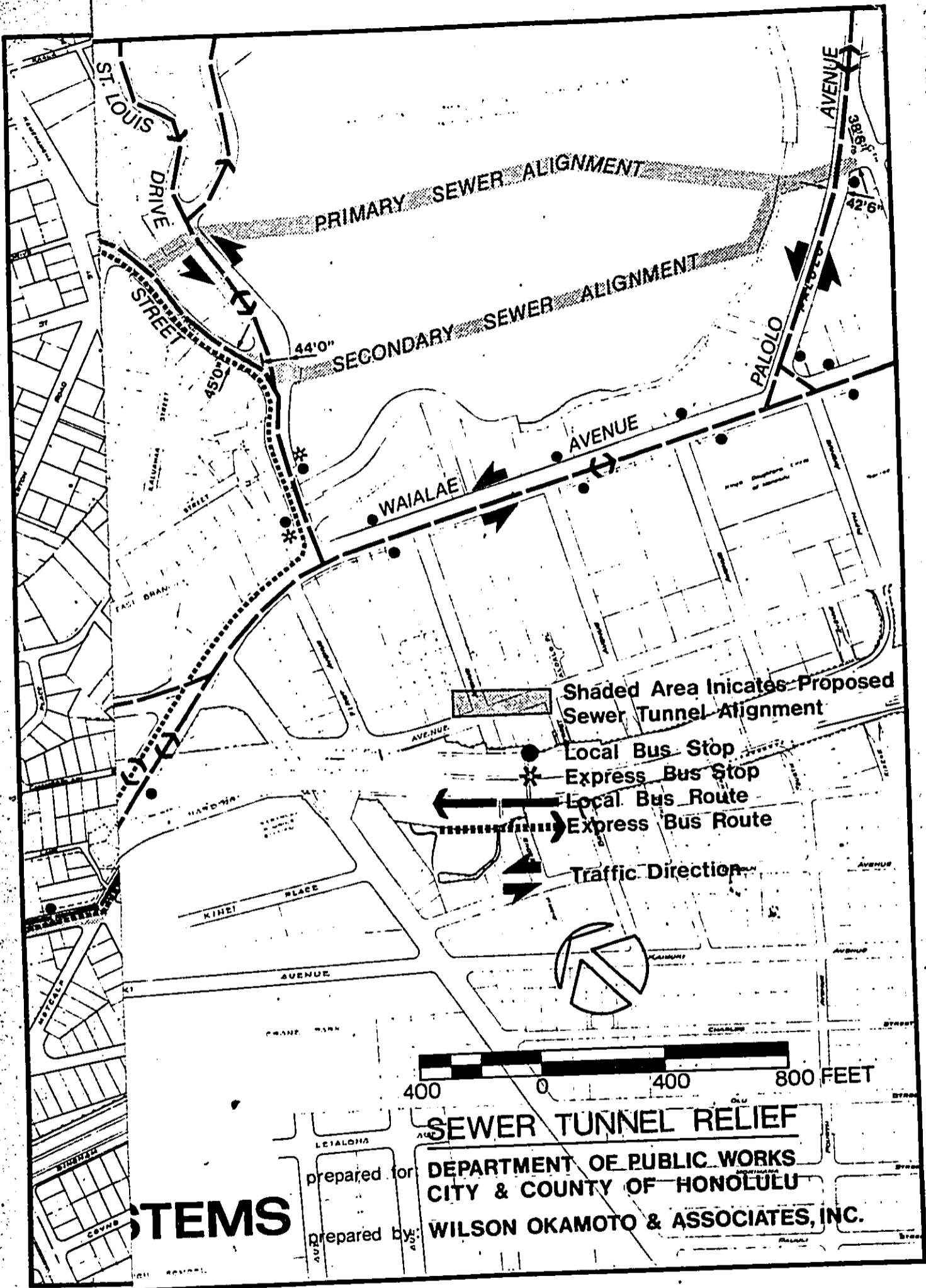






TRANSPORTATION SYSTEMS

prepared for DEPARTMENT OF PUBLIC WORKS
 prepared by: WILSON



Shaded Area Indicates Proposed Sewer Tunnel Alignment

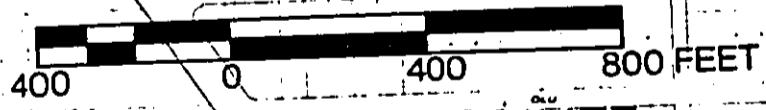
Local Bus Stop

Express Bus Stop

Local Bus Route

Express Bus Route

Traffic Direction



SEWER TUNNEL RELIEF

DEPARTMENT OF PUBLIC WORKS
CITY & COUNTY OF HONOLULU

prepared by: **WILSON OKAMOTO & ASSOCIATES, INC.**

SYSTEMS

various traffic volumes. Six levels of service, levels A through F, define the full range of driving conditions from best to worst, in that order. These levels of service qualitatively measure the effect of such factors as travel time, speed, cost, and freedom to maneuver, which, in combination with other factors, determine the quality of the service that any given facility provides to the user under the stated conditions. With each level of service, a service volume (SV) is defined. It is the maximum volume (vehicles per hour) that can pass over a given section of lane or roadway while operating conditions are maintained at the specified level of service. (Wright, Paul H., and Radnor J. Paquette, 1979). Definitions of the different levels of service are presented in Table 9.

Assumptions made in conducting the capacity analysis for existing roadway conditions along the project corridor were:

- Highest one hour volume (between 8:30 A.M. and 3:30 P.M.) was selected for each section of roadway.
- 5 percent trucks and buses for each section of roadway.

TABLE 9
LEVELS OF SERVICE CHARACTERISTICS

Level of Service	Traffic Flow Description	Remarks
A	Free Flow	Low densities with no restrictions due to traffic conditions
B	Stable flow	Slight restriction of driver freedom
C	Stable flow	More marked restriction on the driver's selection of speed and reduced ability to pass
D	Approaching unstable flow	Little freedom for driver maneuverability though operating speeds are still tolerable
E	Unstable flow	Low operating speeds and volumes near or at capacity
F	Forced flow	Traffic jam; frequent interruptions and breakdown of flow, volumes below capacity with low operating speeds

Source: Adapted from Wright, Paul H. and Paquette, Radnor J., Highway Engineering, Fourth Edition, 1979.

- 10 percent right turns for each section of roadway where applicable.
- 10 percent left turns for each section of roadway where applicable.

These assumptions result in probable worst case traffic conditions for all roadways analyzed. Therefore, existing conditions are probably better than the theoretical conditions, especially during the six hours (between 8:30 A.M. and 3:30 P.M.) that were not considered. At best, the capacity analysis may be used as an approximation of existing worst traffic conditions.

A summary of service volumes and levels of service, resulting from a capacity analysis of existing conditions, for major streets along the project corridor is presented in Table 10.

Additional information regarding traffic and access along the project corridor during construction is summarized in Section III-F. Construction impacts to traffic are summarized in Section VI-B.

TABLE 10
EXISTING TRAFFIC CHARACTERISTICS OF MAJOR STREETS

<u>Street</u>	<u>Existing* Volume (vph)</u>	<u>Service Volume (vph) (for given LS)</u>	<u>Existing LS (see Table 9)</u>
Beretania at Ward	1470	1364 (LS=B) 1550 (LS=C)	C
Beretania at Victoria	1793	1475 (LS=C) 1829 (LS=D)	D
Pensacola at Lunalilo	732**	505 (LS=E)	F
Pensacola at Beretania	1382**	1366 (LS=E)	F
Kinau at Pensacola	1137	1137 (LS=D)	D
Kinau at Piikoi	879**	875 (LS=C) 1024 (LS=D)	D
Kinau near Keeaumoku	833	800 (LS=C) 945 (LS=D)	D
Wilder at Keeaumoku (Kokohead bound)	434	539 (LS=A)	A
(Ewa bound)	472	950 (LS=A)	A
Wilder at Punahou (Kokohead bound)	569	784 (LS=A)	A
(Ewa bound)	627	741 (LS=A)	A
Wilder at Metcalf (Kokohead bound)	289***	280 (LS=C)	D
(Ewa bound)	540	364 (LS=E) 713 (LS=A)	A
Dole at University (Kokohead bound)	519	675 (LS=B)	B
(Ewa bound)	717	660 (LS=E)	F

*Highest one-hour volume between 8:30 AM and 3:30 PM

**Assumes 20% right turns

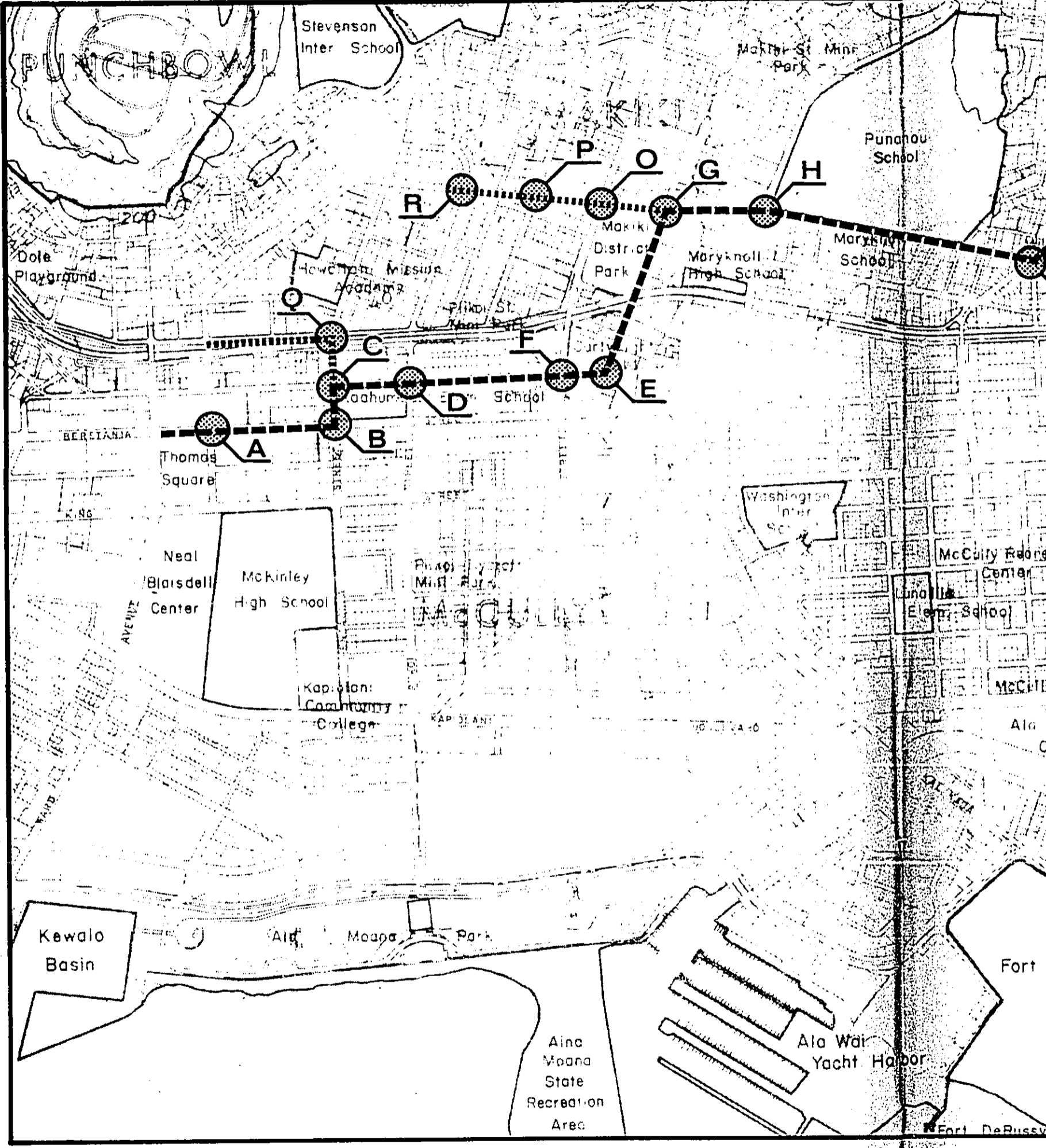
***Assumes 50% left turns

6. Police and Fire Protection

The project area is served by the Honolulu Police Department and the Honolulu Fire Department. These services are managed by the City and County of Honolulu.

7. Utility Systems

The proposed Sewer Tunnel Relief will underlie various utility systems which are within roadway rights-of-way. Disruption to the existing utility lines are anticipated to be minimal during construction. Should temporary disruption be required, however, the contractor will take necessary coordination measures to inform affected area residents and minimize the inconveniences associated with the disruption. The presence of these utility lines will increase construction time and cost, particularly in the cut and cover section of the project. These utility systems include drainage, sewer, water, gas, and electrical/telephone/cable TV systems. Figures 11-A to 11-D show schematically the extent and relationship of these utility systems through major intersections along the project corridor. Existing utilities within the H-1 Freeway corridor at the Makiki Street intersection are a 24-inch drainline, 12-inch waterline, 8-inch sewerline and a telephone cable. The proposed relief sewer will



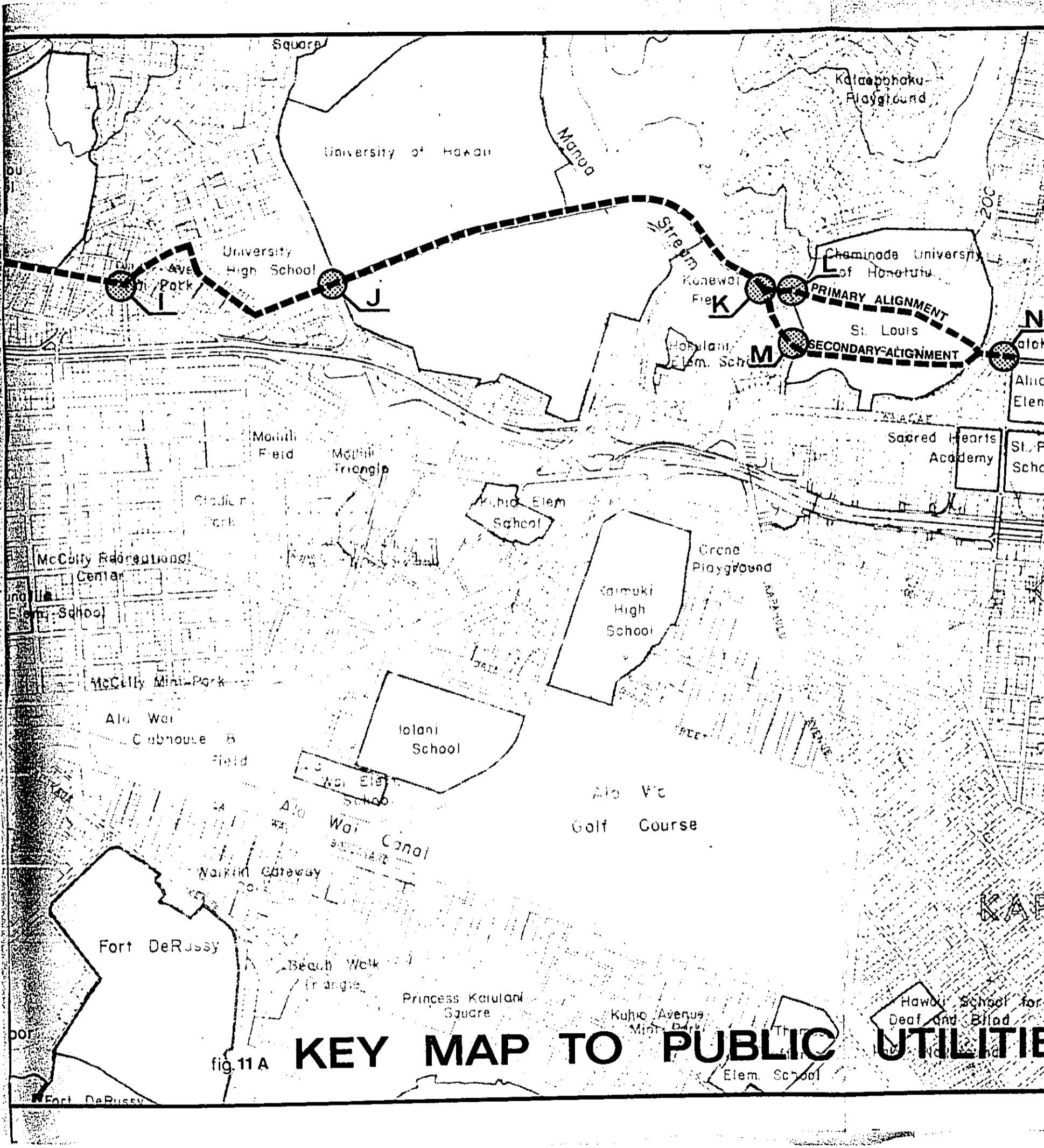
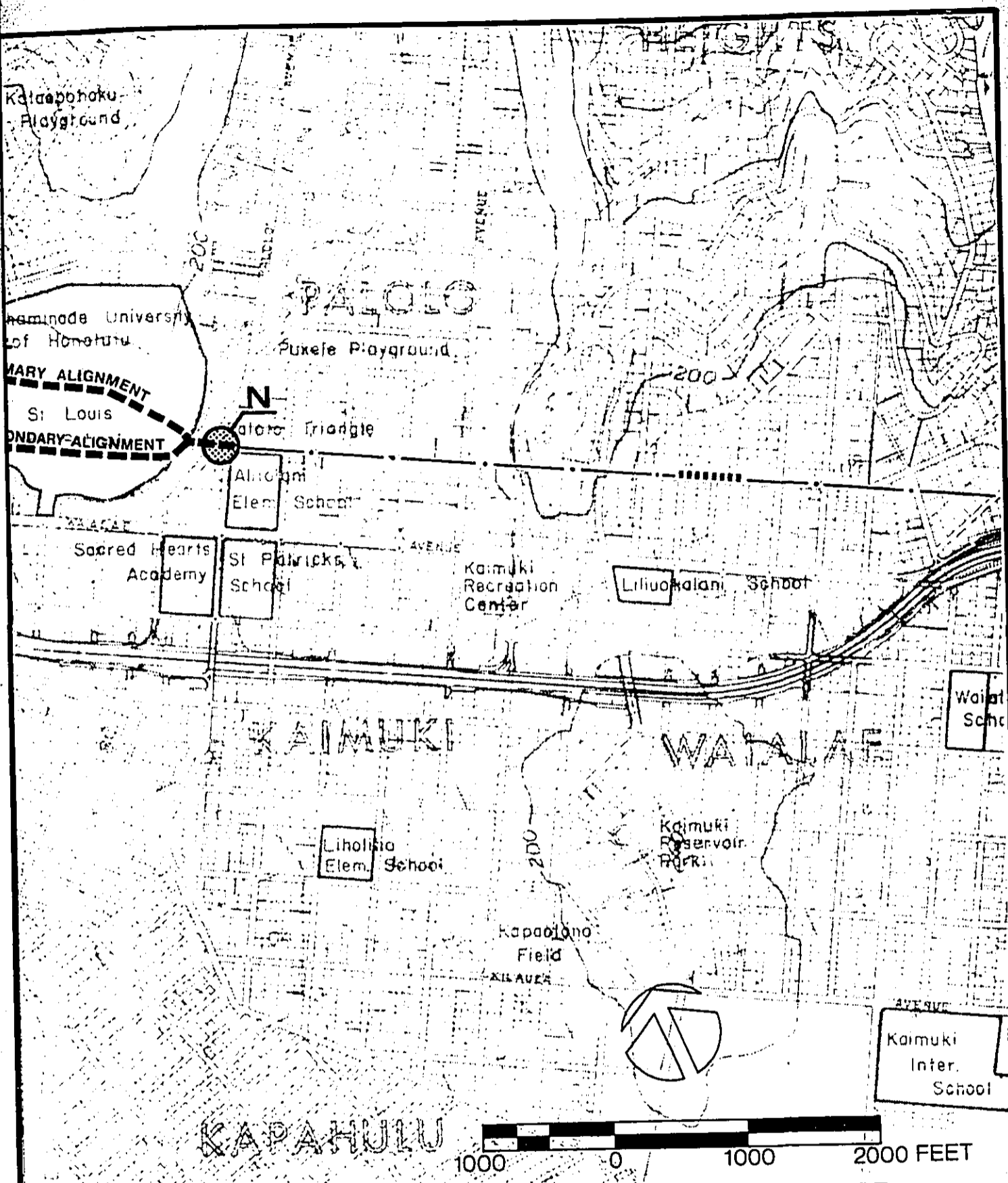


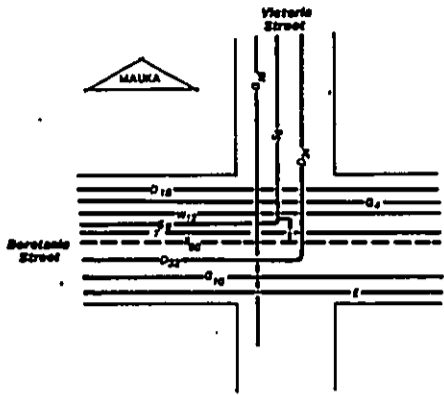
fig. 11 A

KEY MAP TO PUBLIC UTILITIES

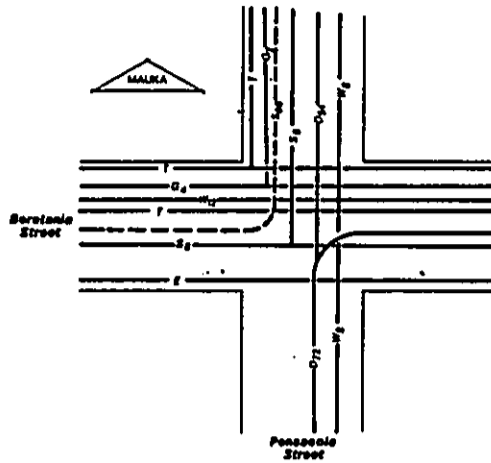


Hawaii School for the Deaf and Blind
UTILITIES

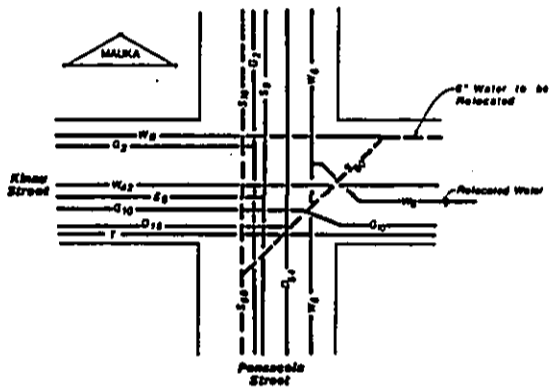
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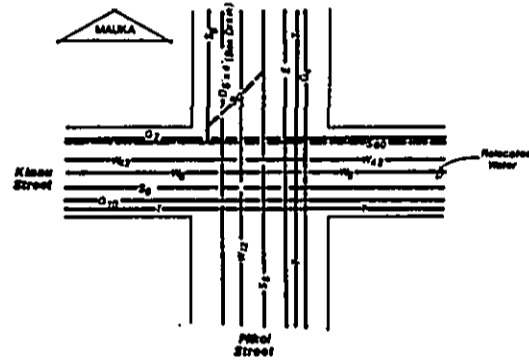
(A) BERETANIA ST. / VICTORIA ST.



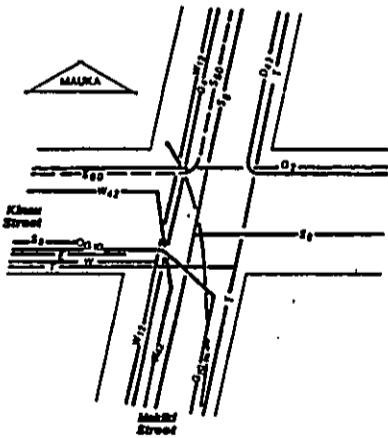
(B) BERETANIA ST. / PENSACOLA ST.



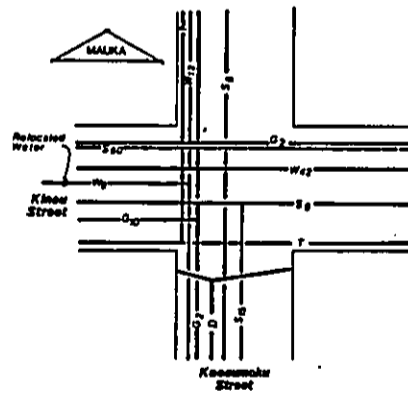
(C) KINAU ST. / PENSACOLA ST.



(D) KINAU ST. / PIIKOI ST.



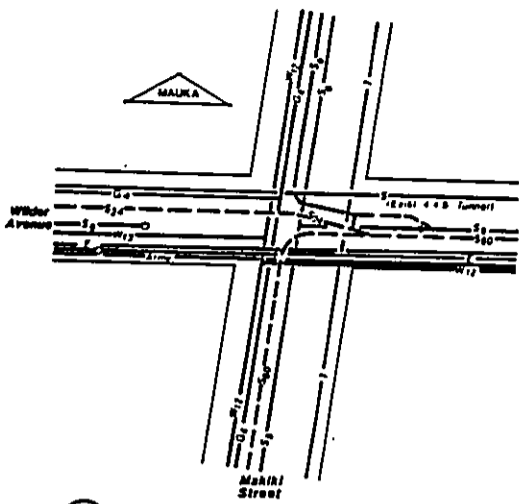
(E) KINAU ST. / MAKIKI ST.



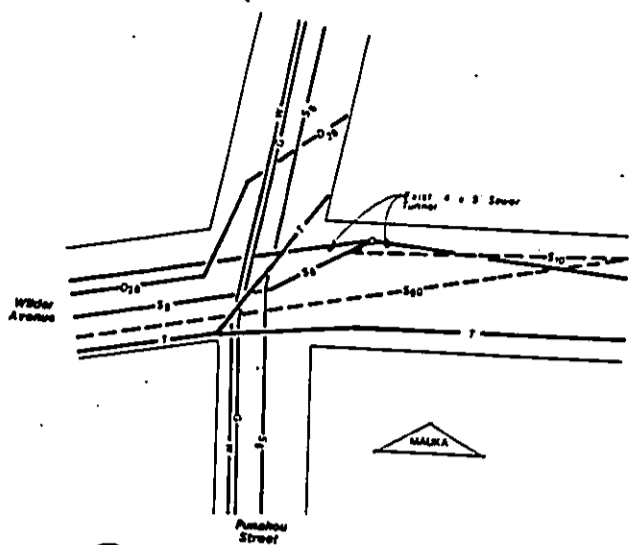
(F) KINAU ST. / KEEAUMOKU ST.

SEWER TUNNEL RELIEF

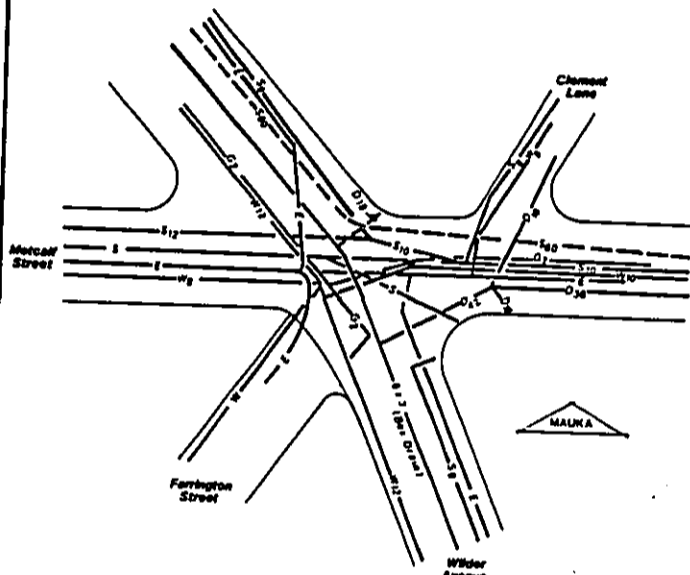
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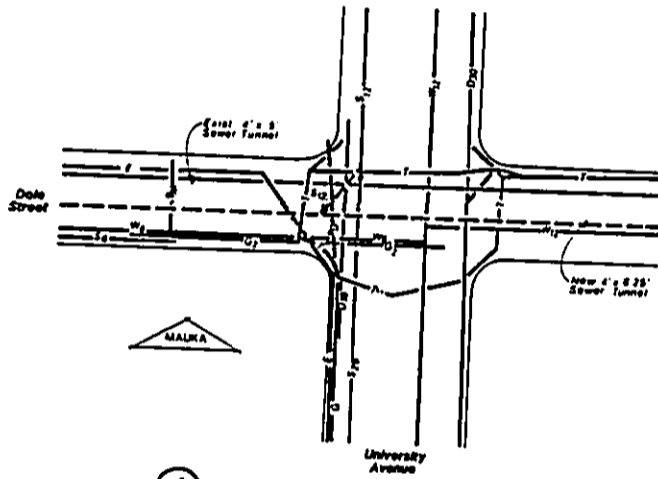
G WILDER AVE. / MAKIKI ST.



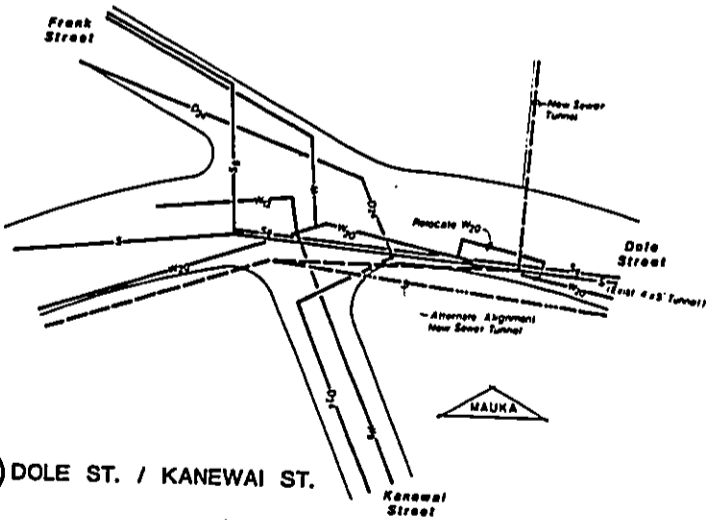
H WILDER AVE. / PUNAHOU ST.



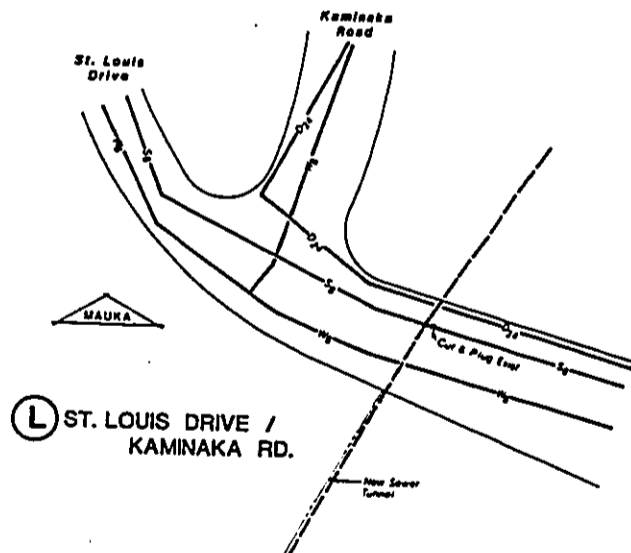
I WILDER AVE. / METCALF ST.



J DOLE ST. / UNIVERSITY AVE.



K DOLE ST. / KANEWAI ST.



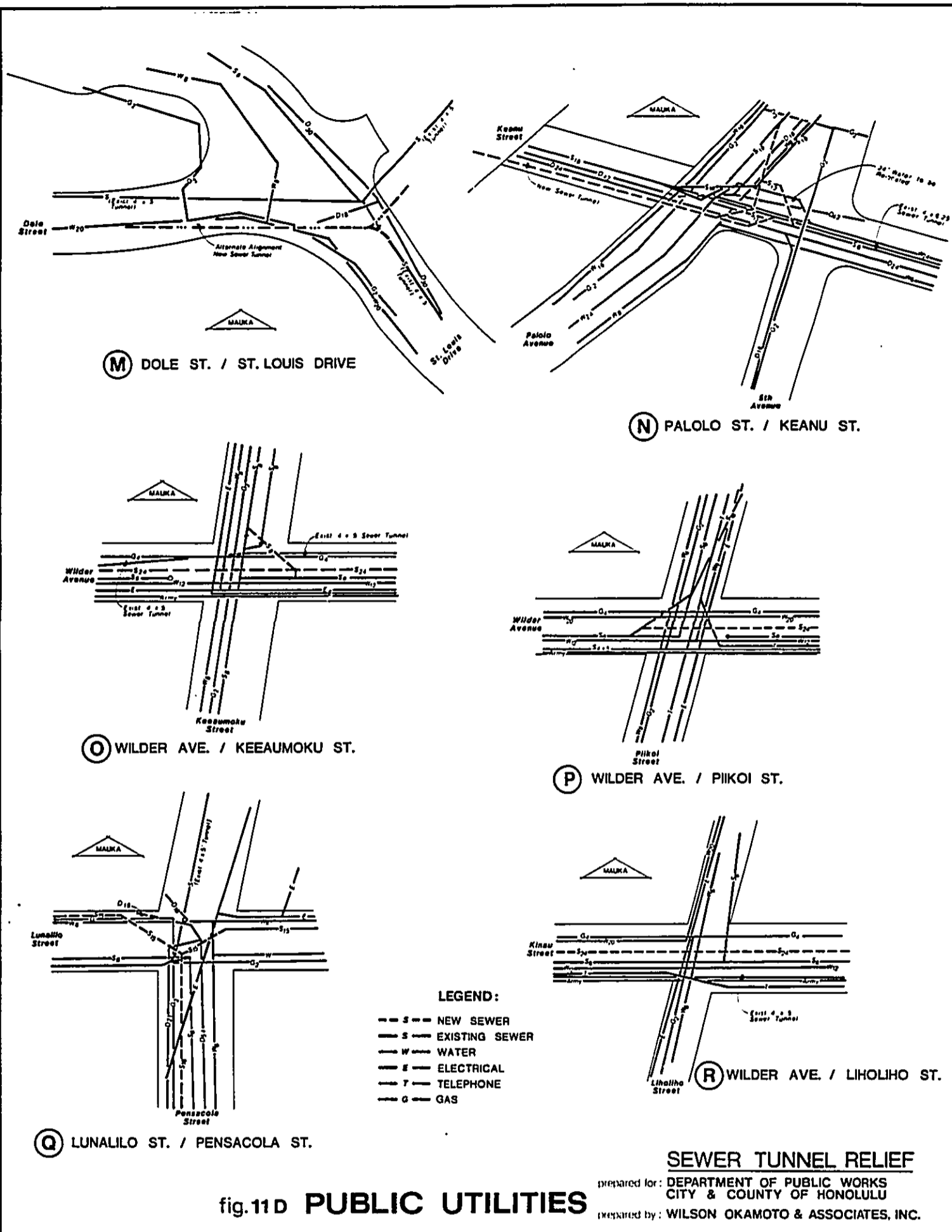
L ST. LOUIS DRIVE / KAMINAKA RD.

fig.11c **PUBLIC UTILITIES**

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M) DOLE ST. / ST. LOUIS DRIVE

N) PALOLO ST. / KEANU ST.

O) WILDER AVE. / KEEAUMOKU ST.

P) WILDER AVE. / PIIKOI ST.

Q) LUNALILO ST. / PENSACOLA ST.

R) WILDER AVE. / LIHOLIHO ST.

- LEGEND:**
- S --- NEW SEWER
 - - - S - - - EXISTING SEWER
 - - - W - - - WATER
 - - - E - - - ELECTRICAL
 - - - T - - - TELEPHONE
 - - - G - - - GAS

fig.11D PUBLIC UTILITIES

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cross under the 24-inch drainline. (For the purpose of this study, utility systems at the intersections are considered representative of utility system occurrence for the rest of the corridor).

a. Drainage System

The overall drainage systems are administered and maintained by City and County of Honolulu, Department of Public Works. Presently, storm runoff on public streets is collected by catch basins and transported to discharge points through pipe culverts and box drains. Natural and improved streams (i.e., Makiki Stream, Manoa Stream, Palolo Stream) serve to convey a large portion of the runoff to the ocean.

Pipe culverts with 18-inch, 21-inch, 24-inch, 28-inch, 30-inch, 32-inch, 36-inch, 42-inch, 54-inch, and 72-inch diameters are aligned with or traverse the project corridor. An 8-foot by 3-foot box drain runs along Wilder Avenue and a 6-foot by 4-foot box drain runs down Piikoi Street.

No modifications will be made to the existing system, except during construction when temporary bracing and propping may be necessary.

b. Sewerage System

The major interceptor sewer is described in Section I.B. Current Operations. This large interceptor system is fed by subsystems called collector systems. The collector systems are smaller lines (6-inch, 8-inch, 10-inch, 15-inch, 18-inch, 20-inch) servicing localized subareas.

c. Water System

Municipal water is provided by the City and County of Honolulu Board of Water Supply (BWS). There are no BWS operated water sources or storage facilities within immediate proximity of the project corridor except for the Manoa Well I. The BWS, however has identified potentially developable secondary sources at Thomas Square, Queen Kaahumanu School, Makiki District Park and Punahou School.

The development of the proposed interceptor will be coordinated with existing and proposed water system improvements. Waterlines and mains with 4-inch, 6-inch, 8-inch, 10-inch, 12-inch, 16-inch, 20-inch, 24-inch, and 42-inch diameters are aligned with or traverse the project corridor. Alignment of a

6-inch and a 24-inch line along Kinau Street and Keanu Street, respectively, will be relocated. Alignment of a relocated 8-inch waterline will be along Kinau Street.

d. Gas System

Gasco, Inc. distributes propane gas through 2-inch, 4-inch and 10-inch lines which are aligned with or traverse the project corridor. Development of the proposed facilities will be coordinated with existing and proposed gas facilities. For example, a relocated 2-inch gasline will be installed along Kinau Street in the vicinity of the proposed relief sewer.

e. Electrical/Telephone/Cable T.V. Systems

Electrical power along the project corridor is provided by the Hawaiian Electric Company, Ltd. (HECO). Underground electrical lines are aligned with or traverse the project corridor.

Telephone service along the project corridor is provided by the Hawaiian Telephone Company. Underground telephone systems exist along the project corridor.

Cable television service is provided for Honolulu by Oceanic Cablevision. Within Increment 1-B, television cables are either located overhead or in Hawaiian Telephone ducts.

Development of the proposed improvements will be coordinated with these utility systems. No modifications to the existing systems are anticipated.

CHAPTER VI

PROBABLE IMPACTS AND MITIGATIVE MEASURES

VI. PROBABLE IMPACTS AND MITIGATIVE MEASURES

A. REGIONAL

1. Short-term Impacts

Implementation of the proposed improvements will provide temporary economic benefits resulting from construction expenditure and employment opportunities. These effects will occur for the duration of construction.

2. Long-term Impacts

Following construction, economic benefits will arise from minimal maintenance and repair costs. As noted earlier, the Sewer Tunnel Relief will be lined for protection from corrosive sewer gases, and velocities of flow will be high enough to provide for self-cleaning.

The improved system will also minimize structural problems characteristic of the existing system. The improved system will provide adequate capacity to serve existing and future needs of the area residents. This will allow for continued growth, as provided by the County's Development Plans.

The new segments will replace existing tunnel sections which are structurally deteriorated. These improvements will minimize existing health and safety hazards which have intensified since construction of the Manoa-Kaimuki Interceptor 36 to 56 years ago.

B. CORRIDOR IMPACTS

This section describes anticipated impacts which will affect the vicinity immediately along the project corridor.

1. Short-term Impacts

The use of construction equipment will create short-term impacts to the local environment, which are unavoidable. Construction activities are typically scheduled from 8:30 A.M. to 3:30 P.M., Monday through Friday (excluding holidays). The corridor traverses a highly developed urban area and will affect existing land uses along the route. The duration of construction, contingent upon phasing of development and construction methods utilized, will dictate construction related impacts.

Generally, the greatest public impact will occur along the cut and cover sections of the project. Extended work hour operations may be employed within Increment I-B along Beretania and Pensacola Streets. Construction activities would be scheduled during a 16-hour, 8:30 A.M. to 12:30 A.M. work day if extended work hour operations are employed. Work would be performed on weekdays and weekends.

For those sections that are to be tunneled, the degree of impact will vary according to method of tunneling employed by the contractor. Excavation by blasting is expected to have the greatest impact in terms of vibration. As such, with regard to addressing environmental impacts of tunnel excavation, the blasting method will be assumed. Should the contractor employ other methods of excavation (e.g., tunnel boring, chemical splitting), impacts should be of lesser significance.

a. Noise

An increase in noise levels will be experienced during construction, particularly along the open trench section along Beretania Street, Pensacola Street, Kinau Street and a portion of Wilder

Avenue. In addition, work around manhole shafts, portals, and construction staging areas will create an increase in local ambient noise levels. These unavoidable construction impacts will occur along segments of the project corridor.

Noise impacts may have direct and indirect effects upon people along the corridor. Adverse impacts of excessive noise include speech, sleep and task interference, and general annoyance. The effects of noise on people are summarized in Table 11.

Particularly sensitive to construction-related noise are educational institutions and residential units along the corridor. Educational institutions that may be impacted include Kaahumanu Elementary School, Hawaiian Mission Academy and School, Punahou School, Maryknoll Schools, Our Redeemer Lutheran Schools, the University of Hawaii, Saint Louis High School/Chaminade University and Aliiolani Elementary School. Other institutions which may be impacted include churches, preschools, and hospitals near the project corridor as identified in Section V-D. The majority of affected residential units are located along Kinau Street, portions of Wilder Avenue, and Dole Street.

TABLE 11

EFFECTS OF NOISE ON PEOPLE
(Residential Land Use Only)

Day-Night Average Sound Level In Decibels	Hearing Loss	Speech Interference ¹		Distance In Meters for 95% Sentence Intelligi- bility	Annoyance ²	Average Community Reaction ⁴	General Community Attitude Towards Area
		Indoor	Outdoor				
75 and above	May Begin to Occur	98%	0.5	% of Population Highly Annoyed ³	Very Severe		Noise is likely to be the most important of all adverse aspects of the community environment.
70	Will Not Likely Occur	99%	0.9	25%	Severe		Noise is one of the most important adverse aspects of the community environment.
65	Will Not Occur	100%	1.5	15%	Signifi- cant		Noise is one of the important adverse aspects of the community environment.
60	Will Not Occur	100%	2.0	9%	Moderate to		Noise may be consi- dered an adverse aspect of the community environment.
55 and below	Will Not Occur	100%	3.5	4%	Slight		Noise considered no more important than various other environmental factors.

Notes 1, 2, 3, and 4 continued on next page.

NOTES TO TABLE 11

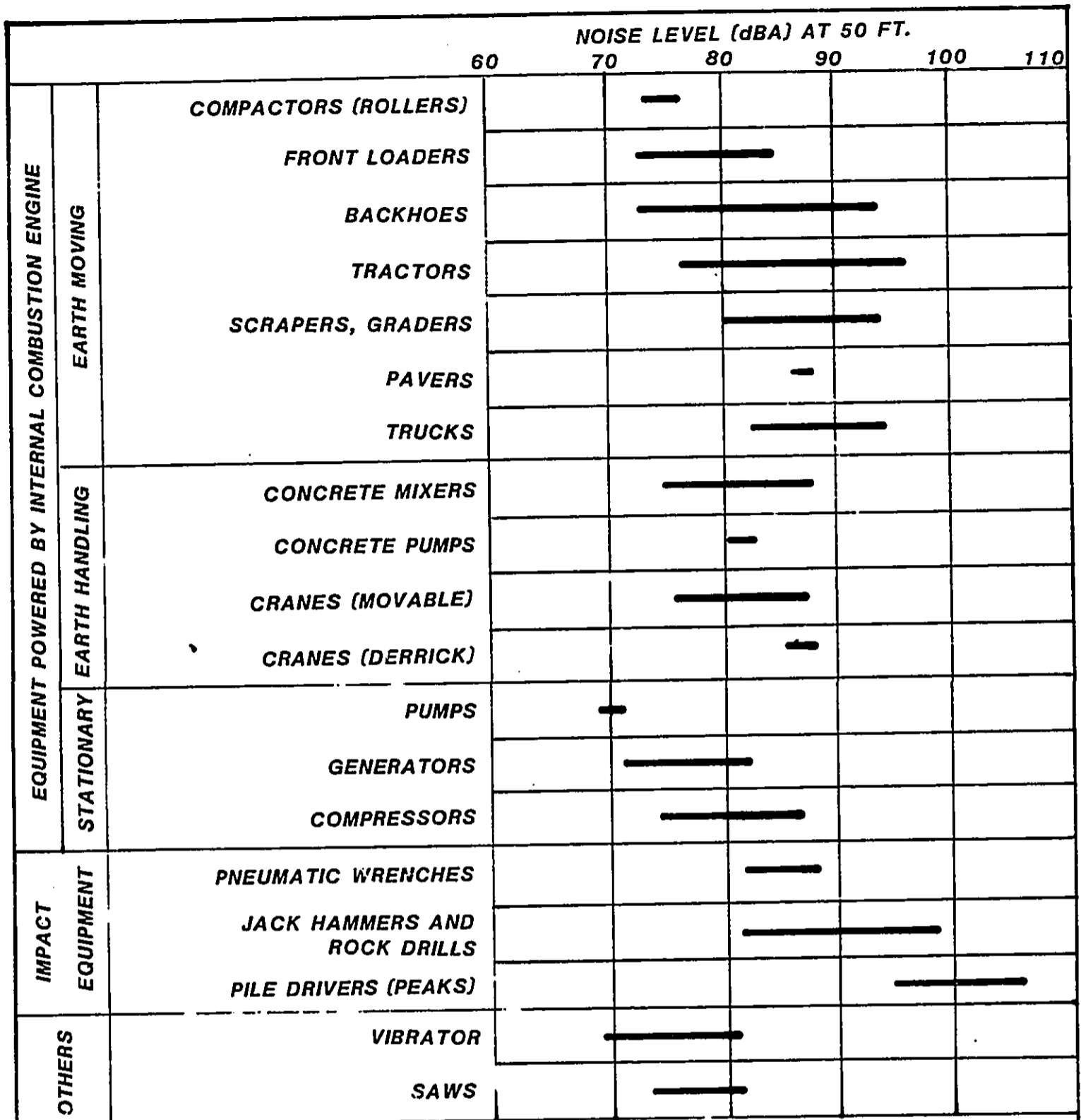
1. "Speech Interference" data are drawn from the following tables in EPA's "Levels Document": Table 3, Fig. D-1, Fig. D-2, Fig. D-3. All other data from National Academy of Science 1977 report "Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise."
2. Depends on attitudes and other factors.
3. The percentages of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time.
4. Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

NOTE: Research implicates noise as a factor producing stress-related health effects such as heart disease, high-blood pressure and stroke, ulcers and other digestive disorders. The relationships between noise and these effects, however, have not as yet been quantified.

Source: Federal Interagency Committee on Urban Noise, "Guidelines for Considering Noise in Land Use Planning and Control," June 1980.

Sources of noise will be equipment required for construction activities, including heavy vehicles required to excavate and remove spoil material and import construction materials, pile driving, and use of other power equipment. Blasting for shaft excavation may also create an increase in ambient noise levels. Pile driving can be expected to be a significant generator of adverse noise. Pile driving will probably be used in the trench sections and around manholes. Figure 12 shows the noise levels that can be expected from the construction equipment.

It shall be the contractor's responsibility to minimize construction noise impacts through compliance with Title 11, State Department of Health Administrative Rules, Chapter 42 - Vehicular Noise Control for Oahu and Chapter 43 - Community Noise Control for Oahu. In this regard, the contractor will be responsible for maintaining mufflers and other noise attenuating equipment. If necessary, stationary surface equipment will be surrounded by sound attenuating enclosures or by some other means to meet Department of Health requirements. Table 12 shows the noise abatement potential for the construction equipment.



NOTE: BASED ON LIMITED AVAILABLE DATA SAMPLES

SOURCE: NOISE FROM CONSTRUCTION EQUIPMENT AND OPERATIONS BUILDING EQUIPMENT AND HOME APPLIANCES, EPA, 1971

CONSTRUCTION EQUIPMENT
NOISE RANGES fig. 12

SEWER TUNNEL RELIEF
 PREPARED BY: DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU
 PREPARED BY: WILSON OKAMOTO & ASSOCIATES, INC.

TABLE 12
NOISE ABATEMENT POTENTIAL

<u>Equipment Type</u>	<u>Noise Level in dB(A)</u> <u>at 50 feet</u>		
	<u>Present</u>	<u>With Feasible</u> <u>Noise Control/1/</u>	<u>Important</u> <u>Noise Sources/2/</u>
Front Loader	79	75	ECFIH
Backhoe	85	75	ECFIH
Bulldozer	80	75	ECFIH
Truck	91	75	ECFIT
Paver	89	80	EDFI
Concrete Mixer	85	75	ECFWT
Concrete Pump	82	75	ECH
Crane	83	75	ECFIT
Compressors	81	75	ECHI
Pile Drivers	101	95	WPE

1/ Estimated levels obtainable without major redesign or extreme cost

2/ Key to Noise sources.

C - Engine casing	I - Engine intake
E - Engine exhaust	P - Pneumatic exhaust
F - Cooling fan	T - Power transmission system, gearing
H - Hydraulics	W - Tool/work interface

SOURCE: Bolt, Beranek, and Newman, Noise From Construction Equipment and Operations, Building Equipment, and Home Appliances, 1971.

Additionally, truck routes may be identified by the Department of Health so as to assure that noise from construction-related vehicles using the public traffic ways will impact the least number of people and businesses.

If extended work hours (e.g., evening and night work) are implemented along Beretania and Pensacola Streets, construction can be limited to low noise generating activities. Approval of a variance from the DOH which will allow exemption from DOH noise standards after 6 P.M. and on weekends will be required.

Other measures may also be employed to minimize noise-related complaints, as follows:

- o Conduct public forums to explain project benefits and mitigating measures practiced by the contractor.

- o Notify residences in the vicinity of construction and drop shaft sites prior to blasting operations. Notify residences proximate to sections of the project corridor where extended work hour operations will be

implemented. Explain through leaflets, signs and public announcements, the construction duration and its possible effects.

- o Control construction activities within sensitive public and residential areas by restricting construction hours or through scheduling of construction activities. Wherever feasible and appropriate, construction near schools will be scheduled during the summer vacation period.

b. Waste Spillage and Dispersion

The spillage of debris from the trucks transporting the excavated material from the construction site to the approved disposal areas may cause adverse aesthetic impacts along truck routes. (It shall be the responsibility of the contractor to locate approved waste disposal areas). In addition, during wet weather, the debris could enter the sewer system, the storm drainage system and adjacent properties.

In this regard, the contractor shall be responsible for minimizing excessive solid waste spillage

resulting from loading disposal trucks. Trucks should not be overloaded and should be dampened to minimize the dust problems. A tarp over the top of the waste material would reduce the amount of dust generated. Mud and grime on the truck wheels should also be washed off to prevent the material from being spread to the public streets.

In general, during construction, the contractor shall be responsible for maintaining the construction area to ensure that it is free from debris and maintained to provide a neat and orderly appearance.

c. Air Quality

Ambient air quality is expected to temporarily decrease as a result of construction activities, especially along the open trench sections and at the tunnel shaft and manhole work areas. A potential source of air pollution will be fugitive dust generated during loading of excavated material onto trucks for haul-away. Airborne dust will be controlled with appropriate dust control measures, such as water spraying and sprinkling. Roads at construction sites will be paved or frequently wetted to minimize dust.

Vehicular emissions can also be expected to increase due to construction vehicles and increased traffic congestion along the open trench section and the tunnel shaft and manhole work areas. Emissions from construction equipment will be minimized with proper maintenance of these vehicles. Measures to mitigate increased traffic congestion are described in the "Traffic" impact section.

Air quality may also be affected in very localized areas surrounding shafts where tunnel ventilation lines are located. Ventilation exhaust lines will expel dust and fumes from the tunnel as fresh air is provided to the tunnel face. However, exhaust from the ventilation lines will be sufficiently dispersed to have minimal impact to the surrounding areas. Filters may be used to further minimize air emissions from the tunnel. It shall be the contractor's responsibility to minimize air quality impacts through compliance with Title 11, Department of Health Administrative Rules, Chapter 60-Air Pollution Control.

d. Traffic

Work within existing roadways (along open trench segments) and tunnel shaft work areas will cause increased traffic congestion, safety hazards, and inconvenient access to existing residences, businesses and public facilities. These effects are unavoidable, but will occur only during construction.

Construction will not obstruct significant lengths of roadway along the project corridor, but will advance incrementally along roadway sections as work progresses. No roads are anticipated to be closed completely as construction will be incremented by lanes.

In those segments of the project where the cut and cover method of construction is used, the loss of two or more lanes of traffic during working hours would adversely affect traffic conditions. Contract specifications will require accessibility to fire hydrants at all times and driveways during non-working hours. The Department of Health and the Fire Department will be notified by the contractor whenever surface construction work is planned.

Traffic conditions at the tunnel portal and manhole work areas will also be affected during construction since they will be located within roadways. However, these impacts will not be as severe as those impacts related to open trench sections. While the extent of traffic lanes impacted at manholes and portals (shown in Figure 2) would depend upon the contractor's method of operation, 15-feet of road space is assumed to be typical of roadway width required.

Based on existing traffic conditions discussed in Section V-D, capacity analyses were conducted to determine the project's potential impacts to traffic during construction.

Assumptions made for the capacity analysis were as follows:

- Cut and cover method to be used in Increment I-B.
- Highest one hour volume (between 8:30 A.M. and 3:30 P.M.) used as basis of analysis.
- No parking along roadways affected by construction.
- Relocate bus stops affected by construction operations.

- Minimum lane width of 10 feet.
- One percent trucks for each section of roadway.
- Usable land width along Kinau and Pensacola Streets of 10 feet, 20 feet along Beretania Street, Wilder Avenue open trench section and Dole Street.
- Usable lane width along tunneling sections of Wilder Avenue of 24 feet.
- No turning movements allowed.

These assumptions result in probable "worst case" traffic conditions for all roadways analyzed during normal working hours. In general, therefore, traffic conditions will probably be better than the theoretical traffic conditions predicted. As the highest one hour traffic volume was used as a basis of analysis, traffic conditions can be expected to be considerably better during the six hours (between 8:30 A.M. and 3:30 P.M.) that were not considered. Construction will not occur throughout the project corridor simultaneously. Rather, the impacts of construction will be limited to areas proximate to the trenching activities. Degree of traffic impacts, therefore, will vary as construction proceeds along the corridor. With this in mind, the

results of the capacity analysis should be viewed only as an approximation of worst construction traffic conditions at a particular point in time. These results are shown in Table 13.

During non-working hours, the open trench may or may not be covered. If the trench is covered, existing traffic conditions during non-working hours are not expected to be impacted since the number of travel lanes will not be reduced. If the trench is left uncovered (i.e., secured with barriers) traffic will be impacted due to loss of roadway width. In this regard, a capacity analysis was conducted to determine traffic impacts based on the assumption that the trench is left open during non-working hours (see Table 13A). Assumptions made for the capacity analysis were as previously stated, with the exceptions that the highest one hour volume between 6:30 and 8:30 AM was used as a basis of analysis and roadway widths were assumed to be reduced by 15 feet.

Implementation of extended work hour operations are being considered for construction along Beretania and Pensacola Streets. Performance of work during an extended work day would occur from 8:30 A.M. to 12:30 P.M. (16 hours). Work would be performed on an everyday basis.

TABLE 13
TRAFFIC CHARACTERISTICS OF MAJOR STREETS
DURING CONSTRUCTION

Street	Existing Volume (vph)**	Construction Service Volume (vph) (for given LS)	Existing LS**	Construction LS
Beretania at Ward	1470	920 (LS=E)	C	F
Beretania at Victoria	1793	897 (LS=E)	D	F
Pensacola At Lunalilo	813***	*	F	*
Pensacola at Beretania	1727***	*	F	*
Kinau at Pensacola	1137	488 (LS=E)	D	F
Kinau at Piikoi	977***	611 (LS=E)	D	F
Kinau near Keeaumoku	833	351 (LS=E)	C	F
Wilder at Keeaumoku (Kokohead bound)	482***	460 (LS=C) 598 (LS=E)	A	D
(Ewa bound)	524***	460 (LS=C) 598 (LS=E)	A	D
Wilder at Punahou (Kokohead bound)	569	494 (LS=E)	A	F
(Ewa bound)	627	494 (LS=E)	A	F
Wilder at Metcalf (Kokohead bound)	579***	390 (LS=E)	D	F
(Ewa bound)	540	390 (LS=E)	A	F
Dole at University (Kokohead bound)	519	425 (LS=C) 553 (LS=E)	B	D
(Ewa bound)	717	*	F	*

* Construction level of service cannot be calculated because existing level of service is below E.

** From Table 10.

*** Volume is not identical to Table 10 value due to restrictions on turning movements.

TABLE 13A

TRAFFIC CHARACTERISTICS OF MAJOR STREETS (ALONG
OPEN TRENCH SEGMENTS) DURING NON-WORKING,
MORNING PEAK TRAFFIC HOURS

<u>Street</u>	<u>Existing Peak Hour Volume (vph)</u>	<u>Open Trench Peak Hour Service Volume (vph) (for given LS)</u>	<u>Open Trench Peak Hour LS</u>
Beretania at Ward	2415	1845 (LS=E)	F
Beretania at Victoria	2311	1770 (LS=E)	F
Pensacola at Beretania	2048	1175 (LS=E)	F
Kinau at Pensacola	1206	1163 (LS=E)	F
Kinau at Piikoi	864	1393 (LS=A)	A
Kinau near Keeaumoku	636	825 (LS=A)	A

A capacity analysis was conducted to determine the impact of extended work hours along Beretania and Pensacola Streets (see Table 14). Assumptions made for the capacity analysis were as previously stated, with the exception that the highest one hour volume between 8:30 A.M. and 12:30 A.M. was used as the basis of analysis.

Implementation of extended work hour operations will probably adversely impact traffic along Beretania and Pensacola Streets, for the relatively short

TABLE 14

TRAFFIC CHARACTERISTICS OF BERETANIA AND
PENSACOLA STREETS DURING EXTENDED
WORK HOUR OPERATIONS

Street	Construction Service Volume (vph) (for given LS) ***	Construction LS***	Extended Work Hour Service Volume (vph)	Extended Work Hour LS
Beretania at Ward	920 (LS=E)	F	**	**
Beretania at Victoria	897 (LS=E)	F	**	**
Pensacola At Lunailo	*	*	*	*
Pensacola at Beretania	*	*	*	*
Kinau at Pensacola	488 (LS=E)	F	**	**
* Construction level of service cannot be calculated because existing level of service is below E.				
** Extended work hour level of service cannot be calculated because construction level of service is below E.				
*** From Table 13.				

period during which these operations may be utilized. As shown in Table 14, the level of service during extended work hours along this section of the project corridor indicates possible forced flow or "traffic jam" conditions. On the assumption that turning movements are restricted, flow on cross streets should not be adversely

impacted. However, as conditions approach "traffic jam" conditions, drivers will probably bypass affected travelways, resulting in greater use of cross streets and streets parallel to the project corridor (i.e., King Street, Kapiolani Boulevard Young Street, Piikoi Street, Keeaumoku Street).

Under these conditions, traffic conditions and level of service of cross streets and parallel streets can be anticipated to be lower for the duration of construction.

Use of extended work hours is viewed as a positive step towards reducing the total period of construction. While disruption on a daily basis is increased, the number of days which would be required to complete construction would be significantly reduced.

Prior to construction, traffic control plans will be submitted to the City and County, Department of Transportation Services, and to the State Department of Transportation for approval regarding work within their respective rights-of-way. No work will be allowed until the traffic control plans are

approved. The following are possible mitigative measures that may be implemented by the City and County of Honolulu along various sections of the project corridor.

1. South Beretania Street from Ward Avenue to Pensacola Street:

- Temporarily move bus stops away from intersections and construction areas.
- Prohibit parking near construction areas.

2. Pensacola Street from Lunalilo Street to South Beretania Street:

- Prohibit parking from Lunalilo Street to Kinau Street.
- Implement concurrent construction of all improvements on this street.
- Temporarily move bus stop away from construction area or reroute buses.

3. Intersection of Pensacola Street and Lunalilo Street:

- Route traffic away from this intersection.

4. Lunalilo Street from Victoria Street to Pensacola Street:
 - Prohibit parking near construction areas.

5. Kinau Street from Pensacola Street to Makiki Street:
 - Prohibit parking.

 - Route traffic away from this street.

6. Wilder Avenue from Piikoi Street to Metcalf Street:
 - Prohibit parking near construction areas.

 - Move bus stops away from construction area.

7. Dole Street from Hoonanea Street to University Avenue:
 - Prohibit parking.

 - Move bus stops away from construction area.

 - Restrict use of the Dole Street accessway to the U.H. Quarry. Utilize the Waialae Avenue and "Varsity" accessways.

Other actions which may be considered include the adjustment of traffic signal indication timing, temporary widening of roadways which may eliminate sidewalk areas and temporarily inconvenience pedestrians, and modification to directional flow of traffic (i.e., providing for temporary one way traffic flow on existing two way streets, or reverse directional flow on existing one way streets).

Similar measures may also be considered at portals, manholes, and construction staging areas. Once these areas are identified each will need to be evaluated on a case-by-case basis to determine the need for, and type of action required.

It is noted that disruption due to lane closures may also be aggravated by construction trucks entering and exiting the construction zone. The major impact of trucks will be at the cut and cover section of the project, where during excavation operations, it is estimated that 2-3 trucks may be required per hour. The ingress and egress of trucks to and from the construction zone should be overseen by flagmen and police officers to optimize traffic safety conditions.

While the specific mitigative measures suggested above will ameliorate traffic impacts due to construction, an overall traffic control plan, nonetheless, will be developed, submitted for approval, employed, monitored and updated by the contractor. Contract specifications will require the contractor to use proper construction signs, barricades, flagmen and other measures necessary to insure minimum inconvenience and maximum safety to roadway users.

In coordination with all of the above measures, roadway users will be informed of the construction program, detours (if necessary), and other potential inconveniences. Public awareness of construction activities can be expected to significantly contribute to minimizing traffic-related impacts of construction.

e. Utilities

Construction of the proposed Sewer Tunnel Relief may minimally impact existing utilities along the project corridor. If the cut and cover method of construction is used in Increment I-B, water and gas

service is anticipated to be temporarily disrupted along Kinau Street where a service transfer from existing to relocated lines is proposed. If service must be temporarily disrupted during the course of construction, it will be the responsibility of the contractor to obtain the necessary permits and clearances.

Development of the proposed relief sewer will be coordinated with appropriate agencies and organizations to minimize potential disruption of utility services to area residents during construction. To ensure proper coordination with utility companies, construction plans will be submitted to the Gas Company, Hawaiian Electric Company, Board of Water Supply, Oceanic Cablevision and the Hawaiian Telephone Company for review and approval.

Specific utilities that could be affected by the proposed relief sewer include the following:

1. Fifty-four (54) inch culvert drain along Pensacola Street (for cut and cover method). Leakage may occur at the joints of the drainpipe. The proposed relief sewer runs parallel to and crosses under this drain

line. Where the trench for the relief sewer exposes the drain line, ground treatment for additional stability or drain line support may be required.

2. Existing Manoa-Kaimuki Interceptor along Wilder Avenue and Dole Street. The existing interceptor sewer has substantially deteriorated and tunnel blasting and construction could further jeopardize its structural and functional integrity. Blasting operations shall be closely monitored and periodic inspections of the existing interceptor conducted to assure minimum impacts to the existing tunnel.
3. Forty-two (42) inch waterline on Kinau Street (for cut and cover method). This is a major transmission main which parallels the new relief sewer. Adequate shoring and bracing of the trench shall be provided to ensure the continued integrity of the waterline.

f. Hydrologic

The invert of the proposed Sewer Tunnel Relief is above the groundwater table along the project

route. Generally, the new relief sewer will overlie caprock-confined water.

While installation of the new relief sewer is not anticipated to adversely impact the underlying groundwater, certain construction activities may temporarily impinge upon groundwater conditions, as discussed below.

1. Tunneling under Makiki, Manoa, and Palolo Streams. The Makiki Stream crossing occurs along Wilder Avenue at Anapuni Street. The tunnel for the proposed relief sewer will traverse Manoa Stream, just makai of Dole Street. Palolo Stream is traversed by the proposed relief sewer near Keanu Street. The Manoa and Makiki streams overlie a basalt layer, and tunneling through this layer may result in stream water infiltration into the tunnel. Additionally, the Makiki Stream has been lined with rock and cement. Construction of the Sewer Tunnel Relief under this stream will be carefully monitored to assure that structural integrity of the concrete channel is maintained. The possibility of stream water infiltration also exists at the Palolo stream

crossing. Such infiltration will not only create difficult construction conditions, but may also result in loss of water from the stream thereby reducing streamflow. Should streamflow be significantly reduced, adverse impacts to downstream riparian flora and fauna may result.

Should loss of water be observed during construction of the tunnel section crossing under the Makiki, Manoa and Palolo Streams, the City and County and the contractor will consider the following possible measures for mitigating adverse impacts:

- o Ground treatment of basalt layer overlying the tunnel (i.e., grouting of cracks and voids in rock layer separating the tunnel and the stream bed).
- o Temporarily line the stream bed with a non-porous geotextile fabric lining to prevent seepage into the tunnel. (Lining shall be in place for duration of construction under the stream).

A Department of the Army permit is not required for the proposed project since the new relief sewer will be constructed under Makiki, Manoa and Palolo Streams.

2. Construction near Manoa Well I. The Board of Water Supply's (BWS) Manoa Well I (test well) is located in the University of Hawaii Quarry, near the Gateway House dormitory. It is uncertain, but unlikely that tunnel construction will affect the yield or quality of this well. Recent drainage improvements along Dole Street did not have an apparent impact on well performance. Well monitoring during construction will be coordinated with the BWS, however, to assure minimum impacts to this potential domestic source.
3. Construction near potential secondary water sources. The BWS has identified two sites along the project corridor as possible sites for secondary water source development. These potential secondary source sites, which are intended for irrigation use (non-potable), are at Thomas Square and at the Queen Kaahumanu

School. Construction of the Sewer Tunnel Relief is not anticipated to impact these water sources since the tunnel invert is above the groundwater table.

4. Construction near the wells at the Kaimuki Pump Station. There have been no apparent impacts on well performance or water quality from the existing Manoa-Kaimuki interceptor sewer which directly overlies the groundwater source for the Kaimuki Pump Station (located at the intersection of Harding Avenue and Kapahulu Avenue). The proposed relief sewer invert will also overlie this groundwater source. Installation of the new relief sewer is not anticipated to adversely impact the underlying groundwater as there are no exfiltration impacts from the existing tunnel. However, well monitoring activities performed during construction will be coordinated with the BWS to assure minimum impacts to the Kaimuki wells.

g. Public Safety

Necessary measures to assure public safety will be provided throughout all phases of construction.

During construction on public roadways, signs, barricades, and if necessary, police officers will be employed to adequately separate the public from construction activities. Pedestrian access will be maintained throughout construction and will be segregated from vehicular traffic. Pedestrians may be required to bypass certain construction areas, however, this may be considered a minor inconvenience of short duration.

Between work hours (nights, weekends, holidays) open excavated areas will be secured by adequate safety signs, signals and/or other safety devices as required by State and County regulations.

If extended work hour operations are implemented, proper measures will be provided in accordance with safety requirements for work during night hours and on weekends, to assure public health and welfare.

h. Blasting

Blasting, during the construction of the tunnel sections, may impact surrounding areas. Damage caused by blasting is usually the result of blast

vibrations. The magnitude of vibrations depends on the amount of the explosive charge, distance from the detonation, geology and geography of the area, and the detonation sequence of the individual charges.

Vibrations increase with the amount of charge per blast and the subsurface conditions. While subsurface conditions are beyond the control of the contractor, the blast can be controlled by the amount of the charges and the timing of individual blasts between detonation holes.

The greater the blast charge, the greater the amount that is excavated and the greater the vibrations.

Unfortunately, the smaller the tunnel, the larger the given unit of explosive required per unit of excavation, as shown in Table 15 and Figure 13.

Initial blasting requirements will be established through careful study, by the contractor, of subsurface characteristics to assure that blasting impacts do not impact nearby structures and utilities.

TABLE 15

QUANTITATIVE RELATIONSHIP OF EXPLOSIVE CONSUMPTION VS. TUNNEL SIZE

Cross-sectional area of tunnel (m ²)	10	20	40	60	80	100
Specific consumption in explosives (kg/m ³)	2.5	1.8	1.1	1.0	0.8	0.7

Source: Sze'chy, Karoly, The Art of Tunnelling, 1973.

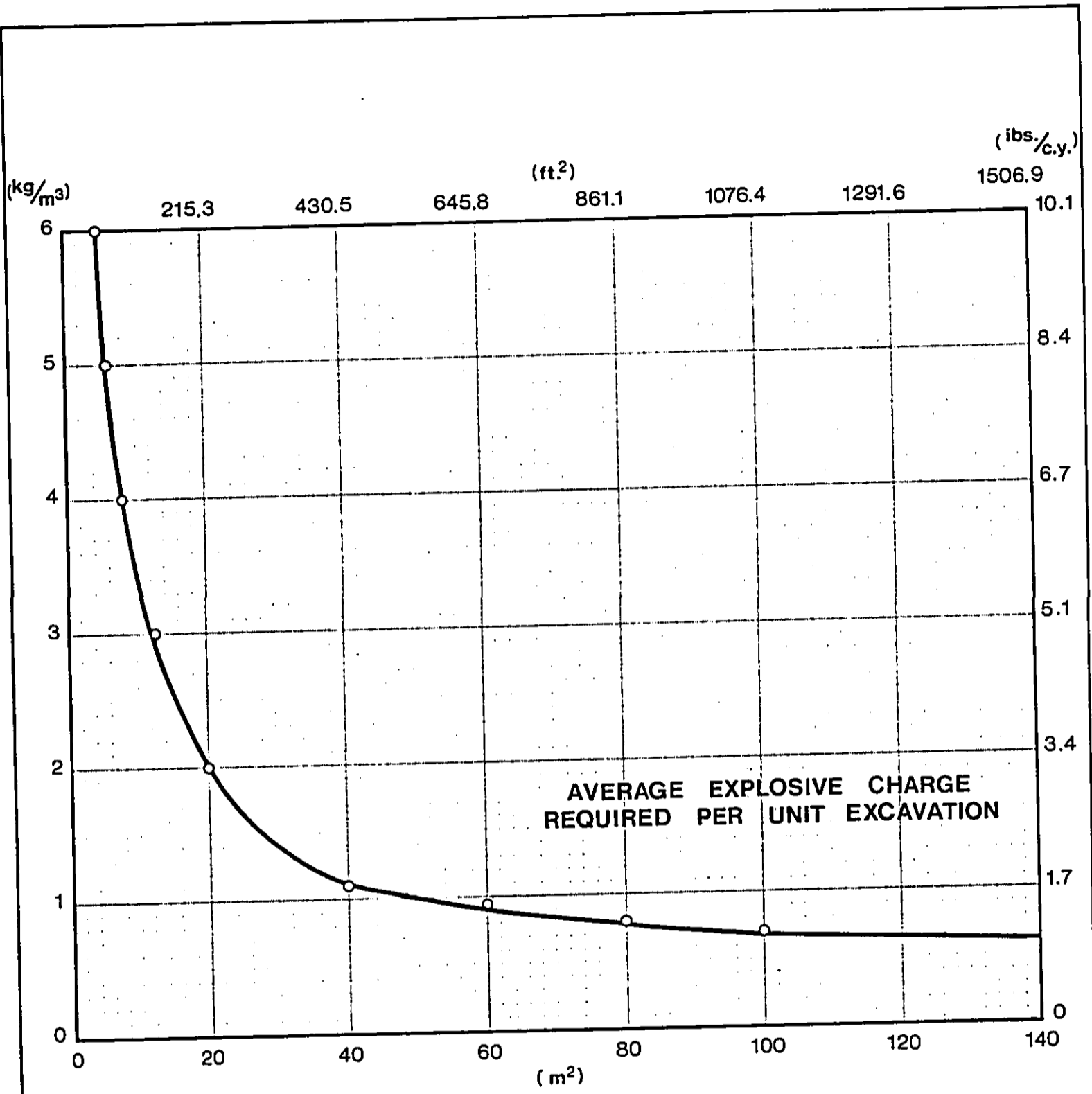


fig. 13 **TUNNEL SIZE VS. CHARGE REQUIREMENT**

SEWER TUNNEL RELIEF
 DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU
 PREPARED BY WILSON OKAMOTO & ASSOCIATES, INC.

Impacts of blasting vibrations can be considered on three levels. On the first level, the magnitude of vibrations are strong enough to be perceived by humans, but not cause structural damage. On the second level, blast vibrations are significant enough to cause structural damage to nearby structures. On the third level, blast vibrations could cause vibration-sensitive soils beneath foundations to temporarily lose bearing capacity.

- a. Blast vibrations perceivable by humans. Sensitivity to blast vibrations varies from person to person, but the level at which vibrations become perceptible to humans is far below that which can cause structural damage.

Human perception of blast vibrations can lead to increased stress, lower productivity, and increased uneasiness.

From the contractor's standpoint, these perceptions could be evidenced by an increase in complaints or claims. For example, people tend to notice existing cracks in buildings after the commencement of construction and tend to blame the construction activity for the cracks.

b. Blast vibrations causing structural damage.

There is a direct relationship between the peak particle velocity and the extent of blast vibration damage to structures. The peak particle velocity is the maximum velocity of the ground in the direction of the maximum displacements caused by the vibration. It is not the speed of the shock wave being propagated through the ground.

When an explosive is detonated at the tunnel face, its destructive power is dependent upon the amount of vibration that can be generated in the surrounding rock. The rock immediately around the borehole is crushed while rock farther away is cracked and fractured. Beyond this zone, vibrations which are transmitted through the ground may not have the ability to fracture the rock but may have the energy to cause damage to other structures.

Table 16 presents criteria for blast damage. The recommended safe peak particle velocity (as set by the U.S. Bureau of Mines) for residential structures is 2.0 inches per second.

Table 16

DAMAGE LEVELS FROM GROUND VIBRATIONS AS A FUNCTION OF
PEAK PARTICLE VELOCITY OF GROUND MOTION NEAR STRUCTURES

<u>Peak Particle Velocity inches per second</u>	<u>Nature of Damage</u>
12	Fall of rocks in unlined tunnels.
7.6	50% probability of major plaster damage.
5.4	50% probability of minor plaster damage.
2.8-3.3	Threshold of damage from close-in blasting.
2.0	Safe blasting criterion for residential structures recommended by U.S. Bureau of Mines.
0.02	Perceptible motion level to people.

Source: Blaster's Handbook, E.I. Dupont de Nemours & Co., 1980

Blasting operations and impacts will be carefully monitored during construction to determine the extent and magnitude of vibrations and blasting modifications made based on the measurements. Inasmuch as subsurface conditions vary along the tunnel alignment, continuous monitoring of blast vibrations will be recorded in the tunnel and at nearby structures.

Should the Lower Route through the Saint Louis High School/Chaminade University campuses be implemented, monitoring of vibrations will begin when the tunnel face approaches approximately 100-feet from the edge of the Regency Park Condominium building (Harding-Lawson Associates, 1979). Moreover, reduction in blasting intensity will be required when peak particle velocities exceed 2.0 inches per second.

In general, findings from the monitoring program will be used by the City and County and the contractor in evaluating the blasting program to assure that public health and safety

is maintained. Any signs of damage such as cracking, settlement, or other indications will be carefully studied and modifications in the blasting program made accordingly.

- c. Blast vibrations affecting vibration-sensitive soils. "Vibration-sensitive" soils generally include loose, saturated sands subject to liquification, or soft clays or silts which could consolidate after vibrational loadings." (Harding-Lawson Associates, 1979).

Careful monitoring during construction of the areas surrounding the blast area should be maintained. Any signs of cracking, settlement, or other indications of ground movement will be immediately brought to the attention of the engineer.

If vibration becomes too severe, blasting will be discontinued and alternate construction methods employed.

A blasting permit will be obtained by the contractor from the State Occupational Safety and Health Office. The public will be notified of all blasting work conducted in conjunction with the project.

i. Economy

The economic impact upon adjacent businesses along the proposed project corridor is anticipated to be adverse, but of limited duration. Construction activity may discourage patrons who wish to visit business establishments affected by the construction due to additional noise, dust and emissions levels, and increased traffic congestion. However, this unavoidable impact will be limited since construction fronting a particular establishment will be limited in duration. It is estimated that construction at any point will last from 4 to 8 weeks in duration. During construction, the contractor shall provide continued access to all commercial establishments.

j. Worker Safety

Strict adherence to all safety regulations and employee training programs shall be required of the contractor to minimize or prevent injuries during construction operations.

k. Archaeological/Historical Sites

All work in the vicinity of known historic sites

will be coordinated with the State Historic Preservation Office (SHPO). Additionally, as the proposed project involves the use of Federal funds, compliance with Section 106 of the National Historic Preservation Act will be required. Section 106 requires that:

"The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking."

Impacts to archaeological remains along the project corridor is not anticipated. However, in the event archaeological remnants are uncovered during construction, work will be halted and the State Historic Preservation Office will be notified to direct and determine the proper course of action.

1. Public and Cultural Facilities

Construction of the proposed relief sewer, especially along open trench sections, will impact public and cultural facilities along the project corridor. These anticipated impacts include increased noise levels, possible waste spillage and dispersion, increased dust levels, increased traffic congestion, safety hazards, and inconvenient access, which have been addressed in previous sections. Additionally, the use of heavy construction equipment will create vibrations, and trenching work may induce settlement.

If the cut and cover method of construction is used in Increment I-B, specific facilities which may be impacted as described for the open trench method include the Honolulu Academy of Arts and the Queen

Kaahumanu Elementary School. Specific mitigation measures suggested, in addition to those discussed in previous sections, to assure minimum impacts to these facilities are listed below:

Honolulu Academy of Arts:

- o Limit construction vibration levels at the buildings to "everyday" traffic level vibration.
- o Insure a properly retained trench assuring no deflections at the trench walls which would induce settlement.
- o Coordinate with the Honolulu Academy of Arts prior to construction to enable identification and maintenance of "baseline" conditions.

Queen Kaahumanu Elementary School:

- o Establish the detailed construction schedule to consider school activities. Where possible, schedule construction during summer months.

Wherever feasible and appropriate, construction work located within the proximity of schools will be scheduled during the summer vacation period to minimize adverse impacts on school activities.

m. Parks

As discussed in Section III-D, the City and County may consider designating portions of public parks for use by the contractor as construction staging areas. Since it is uncertain if any of the City and County parks would be used as staging sites, impacts to those parks located proximate to the project corridor will be addressed for the purposes of this environmental document.

There are four City and County parks adjacent to the proposed project corridor which may be considered for use as possible construction staging areas: (1) Cartwright Field; (2) Makiki District Park; (3) Punahou Square; (4) Kanewai Field. Additionally, two City and County parks are located in proximity to the project corridor and are, therefore, considered potential construction staging sites: (1) Sheridan Playground; (2) Moiliili Field.

In the event that any of these facilities or portions of these facilities are set aside for construction staging area purposes, recreational opportunities would be temporarily affected. The probable impacts to these facilities are summarized below.

Cartwright Field (TMK: 2-4-10:15)

Cartwright Field is a 2.373 acre (103,354 square feet) City and County park located at the corner of Kinau and Makiki Streets, along the project corridor. The park is also bordered by Keeaumoku and Lunalilo Streets. Cartwright Field facilities include a softball field, basketball court, and tot-lot. A chain-link fence surrounds the entire facility and separates the basketball court and tot-lot from the softball field.

If Cartwright Field is used as a construction staging area, ingress and egress for construction vehicles could be provided along either Kinau Street or Lunalilo Street. Use of this facility would preclude the use of either the tot-lot and basketball court, or the softball field, thereby creating temporary inconveniences to park users.

Other anticipated adverse impacts would include increased noise and dust levels, and the probable loss of parallel parking areas proximate to Cartwright Field. These temporary impacts would affect surrounding residences, businesses and institutions.

Makiki District Park (TMK: 2-4-22: por. of 1)

Makiki District Park is located adjacent to the H-1 Freeway and is bounded by Makiki Street and Wilder Avenue along the project corridor. The Makiki District Park is situated on a 8.444 acre (367,824 square feet) parcel of land which is also occupied by the Makiki Library on the western side of the property. Access to Makiki Library is provided along Keeaumoku Street.

Makiki District Park has an open space area, meeting rooms, four tennis courts, two volleyball courts, one basketball court, and a community garden area.

Should a portion of this park be selected as a staging area, use of an area along the eastern extent of the facility (near the corner of Makiki Street and Wilder Avenue) would probably be considered. This portion of the park is now an open, grassed area. Access to a staging area in this location may be provided either along Makiki Street or Wilder Avenue.

Use of this area would result in less open space for jogging, walking, picnicking and various team sports. Required adjustments by park users would

not appear to be significant with the exception of the possible temporary elimination of adequate park area for team sports.

Surrounding facilities which would be impacted by the use of Makiki District Park as a staging area are the library, a church and residences. Temporary adverse impacts would include increased noise and dust levels, and the possibility of traffic congestion.

Punahou Square (TMK: 2-4-08:1)

Punahou Square is a passive City and County recreational area located at the corner of Wilder Avenue and Punahou Street. This 0.579 acre (25,216 square feet) landscaped park area is along the project corridor, fronting Wilder Avenue.

Should Punahou Square be used as a staging area, its use as a passive recreational area would be temporarily lost. Ingress and egress for construction vehicles could be provided along Wilder Avenue and Punahou Street, respectively.

Impacts of the use of Punahou Square as a staging area would include the temporary relocation of a bus stop currently located along Wilder Avenue, higher noise and dust levels, possible traffic congestion and inconveniences to pedestrians. Land uses in the immediate vicinity of Punahou Square includes a school, church, and community and residential facilities.

Kanewai Field (TMK: 2-8-29:11)

Kanewai Field is a 9.325 acre (approximately 406,197 square feet) park located along Dole Street, near the Manoa Stream. Recreational facilities at Kanewai Field consist of two tennis courts, a swimming pool; playground equipment, four softball fields, two basketball courts, and one volleyball court. A chainlink fence separates a parking lot from the park and separates each of the field and court facilities.

If a portion of Kanewai Field is utilized as a construction staging area, access for construction vehicles could be provided by an existing unpaved road that extends from Dole Street, past the basketball courts and along residences bordering the

eastern-most softball field. A probable location for a staging area at Kanewai Field would be the eastern-most softball field. The accessway would probably require widening to accommodate construction vehicles, thereby reducing the basketball court area.

Use of a portion of Kanewai Field for a staging area may temporarily eliminate the use of a basketball court and softball field. Probable impacts would also include an increase in noise and dust generation, and possibly, traffic congestion along Dole Street. These temporary impacts may affect residences adjacent to Kanewai Field and the University of Hawaii apartments. The construction staging area should be located at least 300 feet away from the Hokuani Elementary School to assure minimal impacts to this public facility.

Sheridan Playground (TMK: 2-3-12:21)

Sheridan Playground is a 1.731 acre (75,386 square feet) park located on the corner of Piikoi Street and Elm Street, approximately four blocks makai of the project corridor. The park is also bordered by Alder and Rycroft Streets.

Sheridan Playground recreational facilities include a community center and parking lot, a basketball court, playground and landscaped open space.

If a portion of Sheridan Playground is used as a construction staging area, ingress and egress for construction vehicles could be provided along Piikoi Street. Designation of a portion of Sheridan Playground for use as a staging area may result in the temporary loss of use of either the basketball court and/or open space. Other anticipated temporary adverse impacts would include increased noise and dust levels, and possible traffic congestion along Piikoi Street. Community center users would be temporarily inconvenienced by staging area operations. The temporary impacts would affect residences in the immediate surrounding area.

Moilili Field (TMK: 2-8-05:3)

Moilili Field is a 3.439 acre (149,821 square feet) park located approximately three blocks makai of the project corridor. The park is bordered by South Beretania, Isenberg and South King Streets. Moilili Field facilities include three softball fields, a pavillion and spectator stands.

Use of a portion of Moiliili Field as a staging area may preclude the use of at least one of the softball fields, probably the easternmost field. Access for construction vehicles may be provided from Isenberg Street, King Street, or Beretania Street.

Temporary adverse impacts would include increased noise and dust levels which would affect the surrounding business/commercial area. Additionally, use of this site as a temporary construction yard would probably adversely impact traffic along both South Beretania and South King Streets.

If park facilities are utilized as construction staging areas, the contractor will be responsible to restore the condition of these facilities to pre-construction conditions or better.

Additionally, the contractor will comply with all applicable rules and regulations in conducting staging area operations, and will provide necessary measures to assure the maintenance of public health and safety.

2. Long-term Impacts

Visible evidence of construction along the corridor will be negligible once the project is completed. All surface conditions should be restored to pre-construction conditions or better.

Over the long-term, the new relief sewer will assure greater public health and safety conditions for corridor residents, as potential for roadway collapse (resulting from voids) and sewage overflow will be virtually eliminated. Once the existing tunnel is removed from service, it will be inspected and rehabilitated to an extent necessary to ensure its continued integrity and availability for standby use. Provisions will be made for by-passing flows from the new relief sewer to the existing tunnel. Such by-passing provisions will allow flows to be diverted to the existing sewer in the event inspection or major maintenance is required to be performed on the Sewer Tunnel Relief. Potential by-pass points are Wilder Avenue at Makiki and Alexander Streets.

To assure the long-term efficiency of the new relief sewer, periodic cleaning, maintenance, and inspection activities will be required. Cleaning and maintenance will occur during the late night period when sewage flows

are lowest. Such activities may involve the temporary, limited closure of traffic lanes around manholes, but these are not considered to pose significant impacts. (Maintenance requirements for the Sewer Tunnel Relief are anticipated to be minimal, perhaps limited to annual inspection).

CHAPTER VII
RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

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VII. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

A. HAWAII STATE PLAN

The Hawaii State Plan establishes broad objectives and policies which guide all public planning decisions. The State's objectives and policies for liquid and solid wastes are as follows.

Objectives:

- o Maintain basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.
- o Provide adequate sewer infrastructure for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.

Policies:

- o Encourage the adequate development of sewer systems that complement planned growth.

- o Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes.

The proposed improvements are consistent with these policies and objectives. The improvements are required to adequately service existing needs and planned growth of the area.

B. STATE FUNCTIONAL PLANS

The State Functional Plans are intended to facilitate the implementation of the Hawaii State Plan. The State Health Plan identifies the major priority objectives, policies and implementing actions undertaken by the State Department of Health, and is most applicable to the proposed project.

With respect to sewer systems, it is the State's objective "to minimize the threat to public health from unsanitary conditions by ensuring that facilities are built and maintained so that products and services are provided in a healthful manner."

To achieve this objective, it is the State's policy to "use a combination of education, technical assistance, and regulations to achieve compliance with applicable standards."

The advancement of this policy is achieved by the following implementing action: Provide technical consultation and advice to other public and private agencies or individuals regarding correcting existing and potentially hazardous conditions and practices, review new facilities, and inspect, monitor and enforce requirements for all facilities.

The proposed Sewer Tunnel Relief is consistent with the objective of the State Health Plan for sewer systems, particularly since the proposed improvements are required to mitigate existing health and safety problems posed by the existing sewerline.

C. STATE LAND USE DESIGNATION

The proposed improvements will occur within the State Land Use Urban District, which allows for development of the proposed facilities.

D. CITY AND COUNTY OF HONOLULU - GENERAL PLAN

The County General Plan specifies long-range goals and objectives for planning Oahu's future. It sets a guide for both the quantity and quality of future growth.

Planned growth objectives, as discussed in the following section, would be constrained by the inadequate and deteriorating condition of the existing Manoa-Kaimuki interceptor sewer. The proposed improvements are designed to mitigate these effects and facilitate implementation of the General Plan growth objectives.

The proposed Sewer Tunnel Relief will be consistent with and will implement the following General Plan objectives and policies:

Transportation and Utilities -

Objective: To meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal.

Policy: Provide safe, efficient, and environmentally sensitive waste-collection and waste-disposal services.

Physical Development and Urban Design -

Objective: To coordinate changes in the physical environment of Oahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located.

Policy: Plan for the construction of new public facilities and utilities in the various parts of the Island according to the following order of priority: first, in the primary urban center; second, in Ewa; and third, in the urban-fringe and rural areas.

E. STATE DEPARTMENT OF HEALTH AND CITY AND COUNTY OF HONOLULU -
WATER QUALITY MANAGEMENT PLAN FOR THE CITY AND COUNTY OF
HONOLULU (208 PLAN)

The Water Quality Management Plan for the City and County of Honolulu (208 Plan) is prepared in consonance with the requirements of Sections 208 (Areawide Waste Treatment Management) and 303 (Water Quality Standards and Basin Planning) of the Federal Water Pollution Control Act.

Major areas of emphasis of the 208 Plan are as follows:

- o To develop rational, enforceable and environmentally sound water quality standards for all waters of the State of Hawaii.
- o To develop and select control/development/financing strategies that increase net benefits and are effective, equitable and efficient.

- o To develop a regulatory program for all point and nonpoint sources of pollution that supports the control strategies and ensure that environmental standards are met.
- o To establish the management structures necessary to implement the control strategies effectively, efficiently, and equitably.
- o To develop public consensus and support to ensure implementation of the plan.

F. CITY AND COUNTY OF HONOLULU - DEVELOPMENT PLANS

The tributary areas for the proposed Sewer Tunnel Relief are contained within two development plan areas.

The East Honolulu Development Plan area extends from Aina Koa Ridge to Makapuu Point, and is identified by the General Plan as part of the "urban fringe". The General Plan prescribes limited growth here, to maintain its 1980 proportion of the islandwide population.

The Primary Urban Center Development Plan area extends from the Waialae-Kahala area to Pearl City. The General Plan provides for increased urbanization in this area.

The proposed facilities are designated in the Development Plan Public Facilities Map and are intended to fulfill the growth objectives of the Development Plans by providing adequate facilities to meet existing and projected needs. The Development Plan Land Use Map designations are illustrated in Figure 14. The projected wastewater flow rates (see Section II-B) have been based upon the growth policies of the Development Plans.

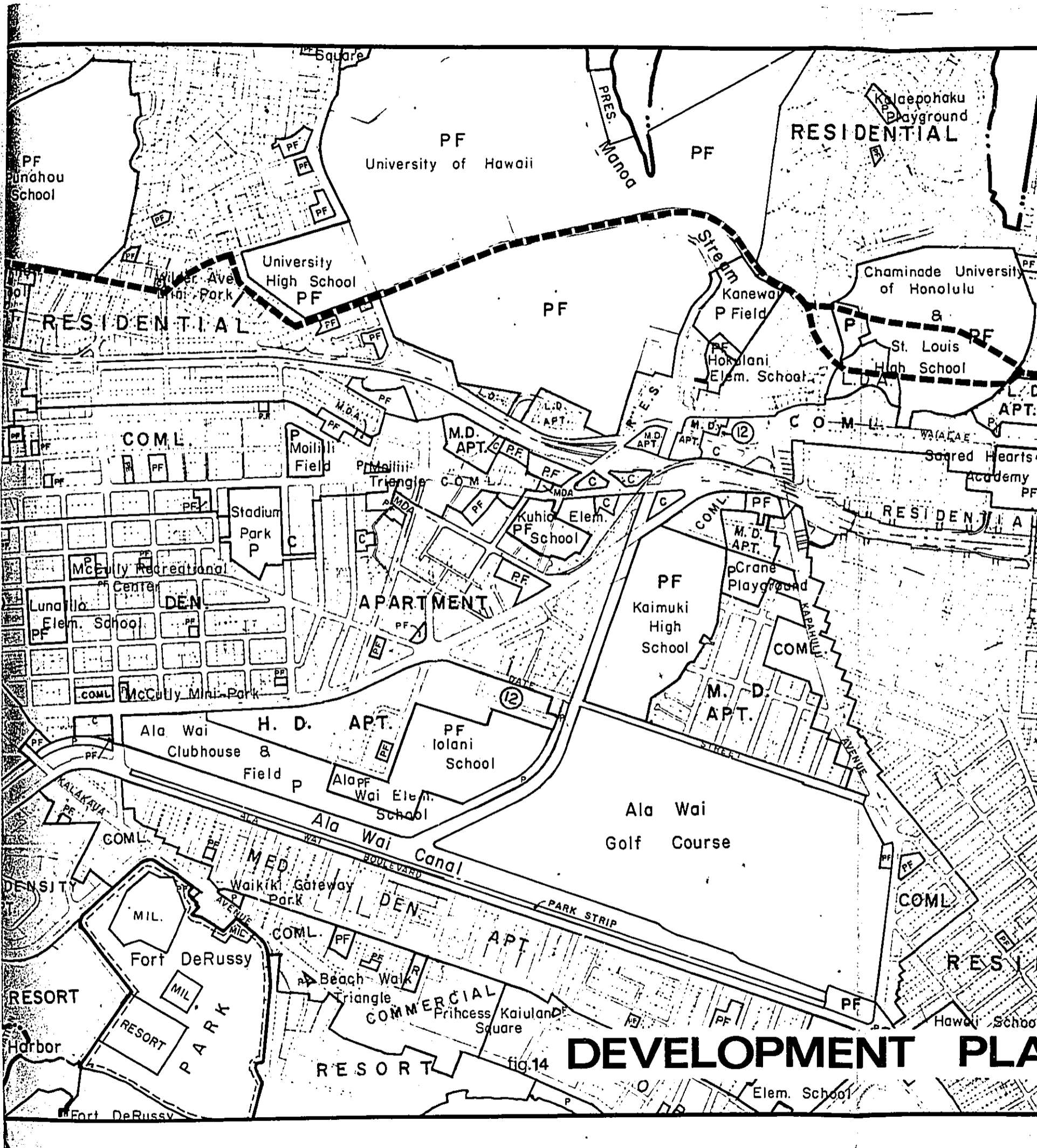
G. CITY AND COUNTY OF HONOLULU - ZONING DISTRICTS

The project corridor traverses several zone districts (see Figure 15): Apartment A-1 (PD-H), A-2, A-3, Business B-2, Preservation P-1, Residential R-4, R-6, Historic, Cultural and Scenic District No. 3, "The Punchbowl District," and Historic, Cultural and Scenic District No. 5, "Thomas Square/Academy of Arts District."

The City's Comprehensive Zoning Code allows for development of public facilities, such as the proposed sewer facilities, within all zone districts.

H. COASTAL ZONE MANAGEMENT

The Hawaii Coastal Zone Management Program has established objectives and policies to protect, preserve, and where



Kalaepohaku Playground
RESIDENTIAL

Chaminade University of Honolulu
&
St. Louis High School

RESIDENTIAL

PRES.

Pukele Playground

Paloto Triangle

L.D. APT. Aliiolani Elem. School

M.D. APT.

Sacred Hearts Academy St. Patrick's School

AVENUE C. OLM

Kaimuki Recreation Center Liliuokalani School

RESIDENTIAL

Waiata School

LEGEND:

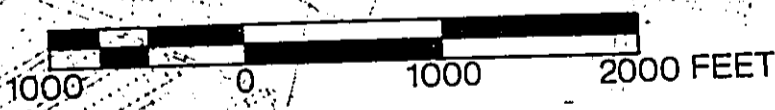
- P Parks & Recreation
- RES. Residential
- H.D. APT. High Density Apt.
- M.D. APT. Med. Density Apt.
- L.D. APT. Low Density Apt.
- R Resort
- COML Commercial
- MIL Military
- PRES. Preservation
- PF Public Facility
- School

PF Iiholimo Elem. School

Kaimuki Reservoir Park

P Kapapala Field

COML



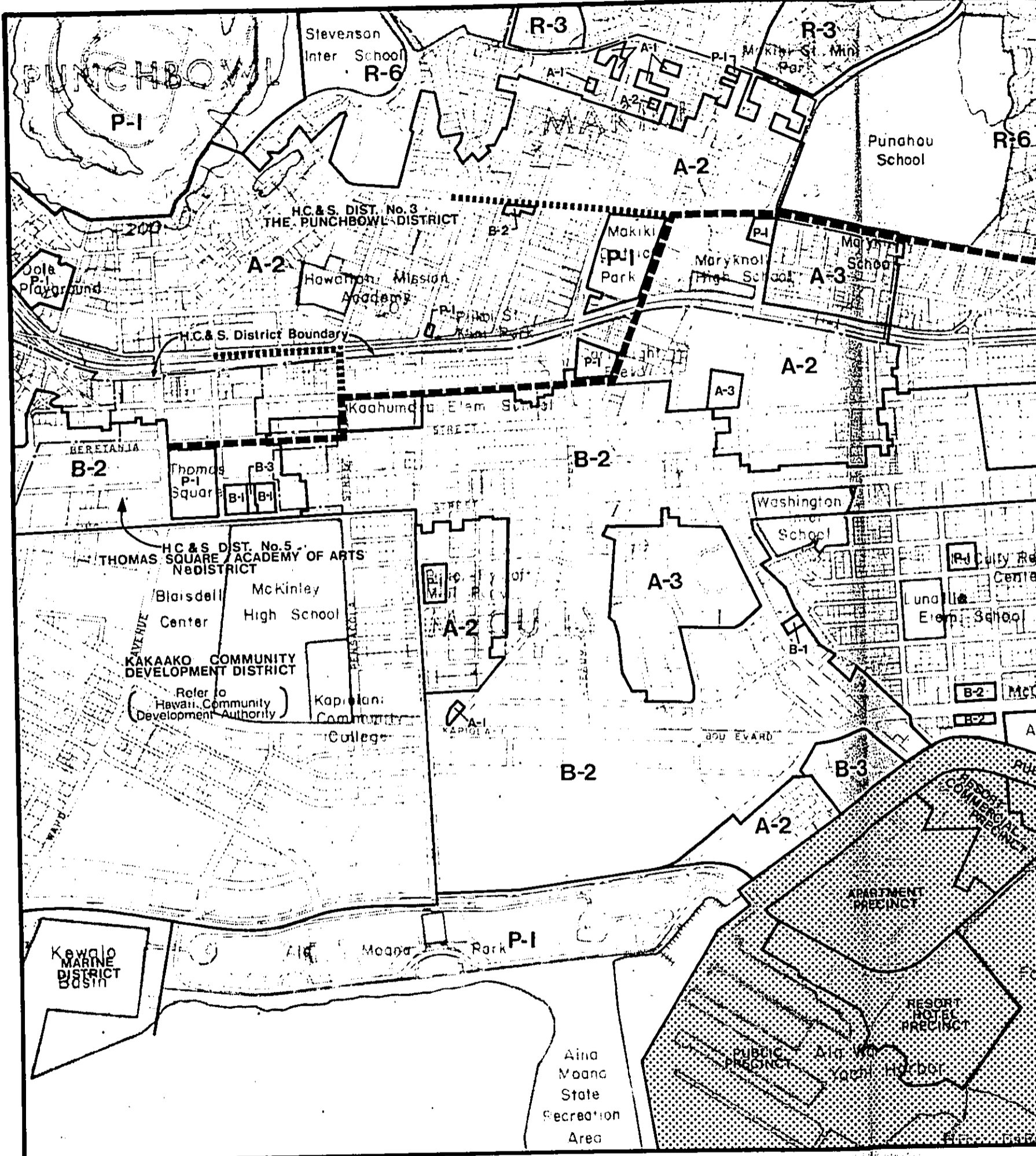
RESIDENTIAL

SEWER TUNNEL RELIEF

prepared for: DEPARTMENT OF PUBLIC WORKS
CITY & COUNTY OF HONOLULU

prepared by: WILSON OKAMOTO & ASSOCIATES, INC.

PLAN



PUNCHBOWL
P-1

Stevenson
Inter School
R-6

R-3

R-3

Punahou
School
R-6

HC&S DIST. No. 3
THE PUNCHBOWL DISTRICT

Jole
Playground

A-2

Hawaian Mission
Academy

Makiki
Park

Maryknoll
High School

Maryknoll
School
A-3

H.C. & S. District Boundary

Kaahuna
Elem. School

HERETANJA
B-2

Thomas
Square
P-1
B-3
B-1

B-2

A-2

A-3

HC & S DIST. No. 5
THOMAS SQUARE / ACADEMY OF ARTS
NEODISTRICT

Blaisdell
Center

Mckinley
High School

**KAKAAKO COMMUNITY
DEVELOPMENT DISTRICT**

(Refer to
Hawaii Community
Development Authority)

Kapiolani
Community
College

A-2

A-3

Washington
School

Public Re-
creation
Center

Luna
Elem. School

B-2

B-2

B-2

B-3

A-2

Kewalo
MARINE
DISTRICT
BASIN

Aiea Moana Park
P-1

Aiea Moana
State
Recreation
Area

**PUBLIC
PRECINCT**

**APARTMENT
PRECINCT**

**RESORT
HOTEL
PRECINCT**

Aiea Harbor

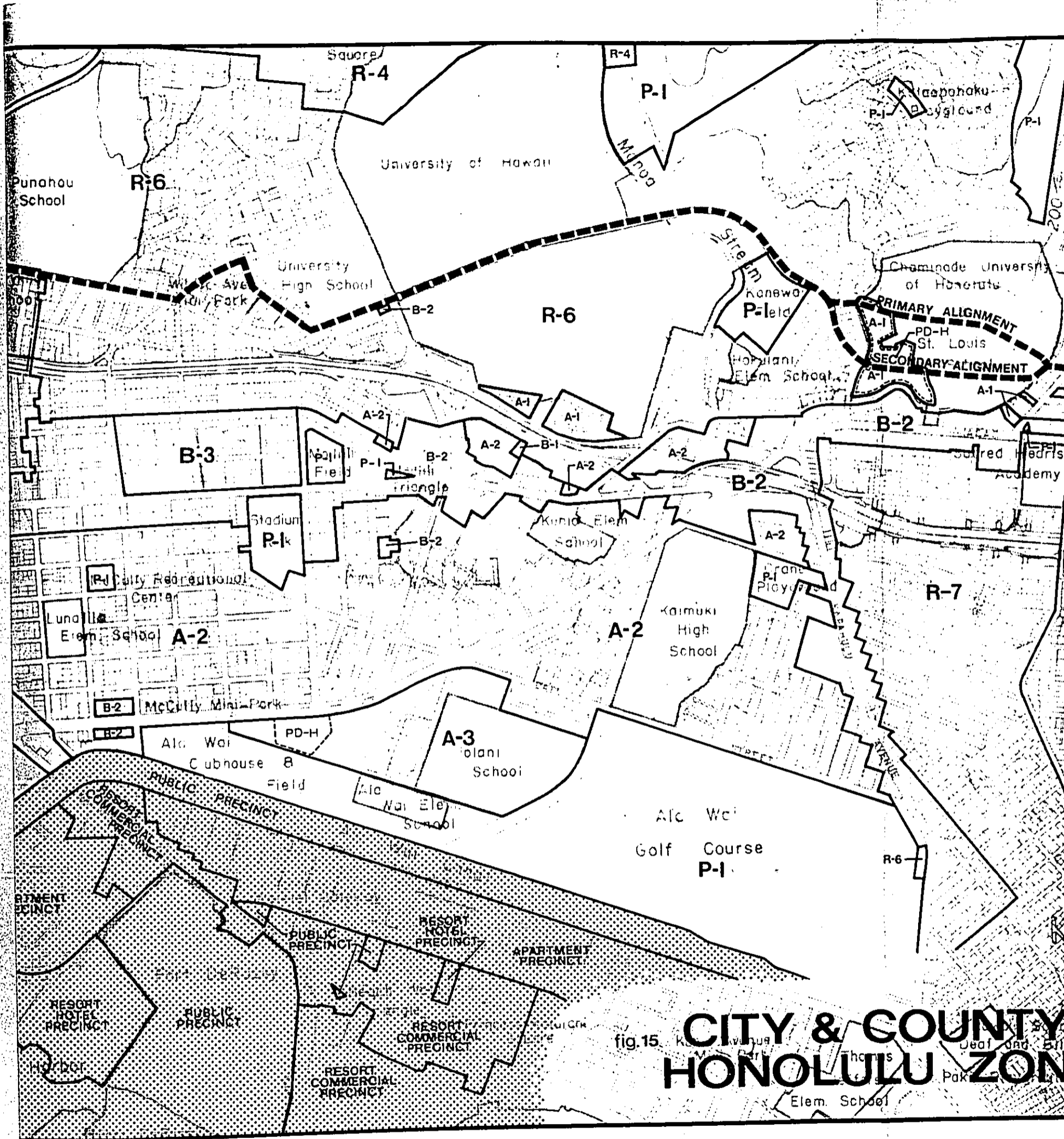
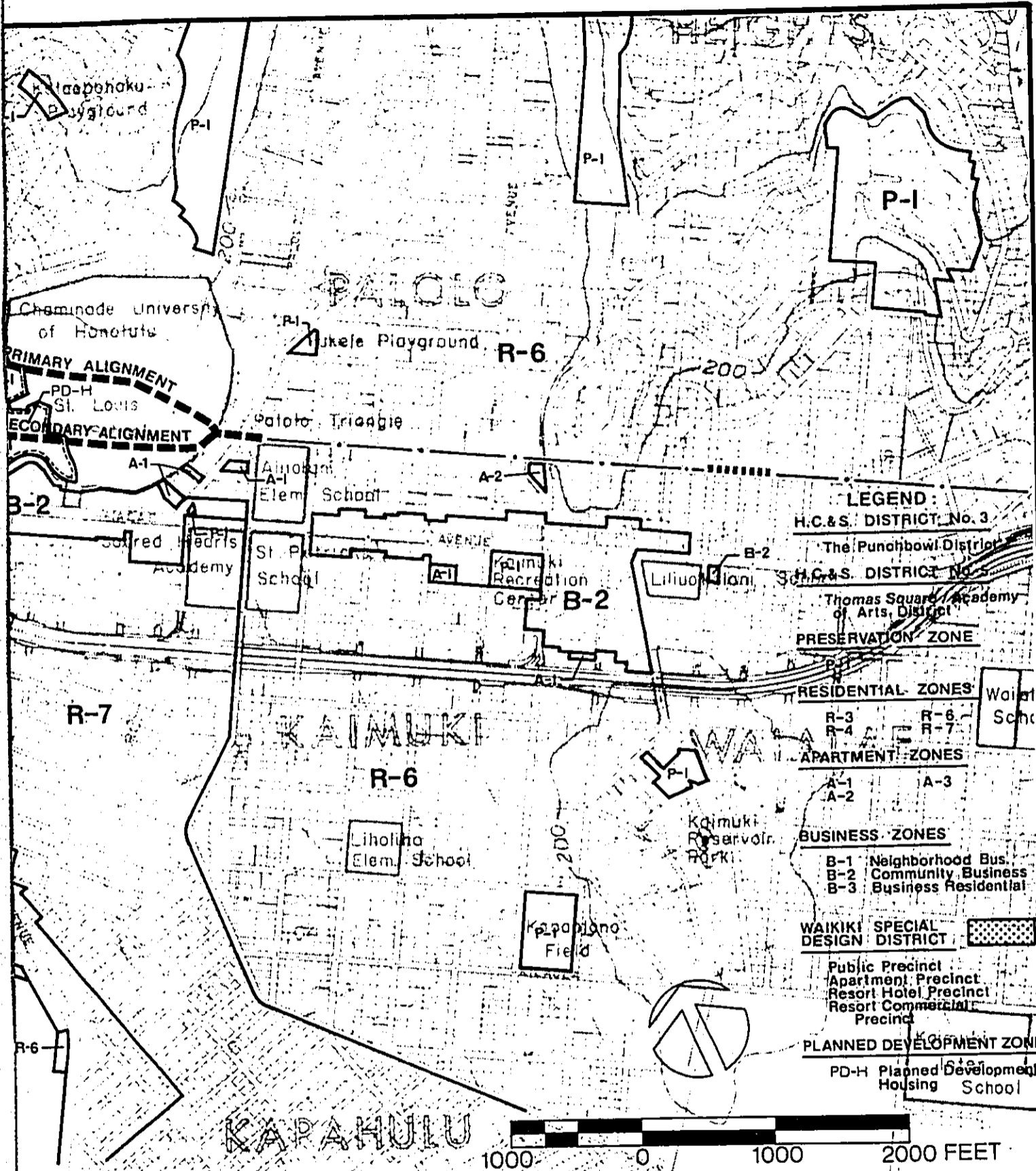


fig. 15. CITY & COUNTY HONOLULU ZONING



- LEGEND:**
- H.C.&S. DISTRICT No. 3
 - The Punchbowl District
 - H.C.&S. DISTRICT No. 2
 - Thomas Square Academy of Arts District
 - PRESERVATION ZONE
 - RESIDENTIAL ZONES:
 - R-3
 - R-4
 - R-6
 - R-7
 - APARTMENT ZONES:
 - A-1
 - A-2
 - A-3
 - BUSINESS ZONES:
 - B-1 Neighborhood Bus.
 - B-2 Community Business
 - B-3 Business Residential
 - WAIKIKI SPECIAL DESIGN DISTRICT
 - Public Precinct
 - Apartment Precinct
 - Resort Hotel Precinct
 - Resort Commercial Precinct
 - PLANNED DEVELOPMENT ZONE
 - PD-H Planned Development Housing School

SEWER TUNNEL RELIEF

COUNTY OF HONOLULU
 prepared for: DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU
 prepared by: WILSON OKAMOTO & ASSOCIATES, INC.

desirable, restore or enhance the natural and man-made resources within the coastal zone. The program reviews certain federal programs, licenses and permits for consistency with the State's CZM program. The need for consistency review for the proposed project will be coordinated with the State Department of Planning and Economic Development.

I. SPECIAL MANAGEMENT AREA

Regulations governing development along the shorefront of the coastal zone are administered by the City and County of Honolulu, Department of Land Utilization.

The proposed Sewer Tunnel Relief will not be located in the Special Management Area.

J. SPECIAL DESIGN DISTRICTS

Increment 1-B of the proposed relief sewer will traverse South Beretania Street, between Ward Avenue and Pensacola Street, within the Thomas Square/Academy of Arts District.

The proposed improvements will be installed underground. The improvements are consistent with the overall objective of the district "to protect the site from intrusion by incompatible developments and to preserve and enhance its historic value, cultural atmosphere and uses, and scenic quality."

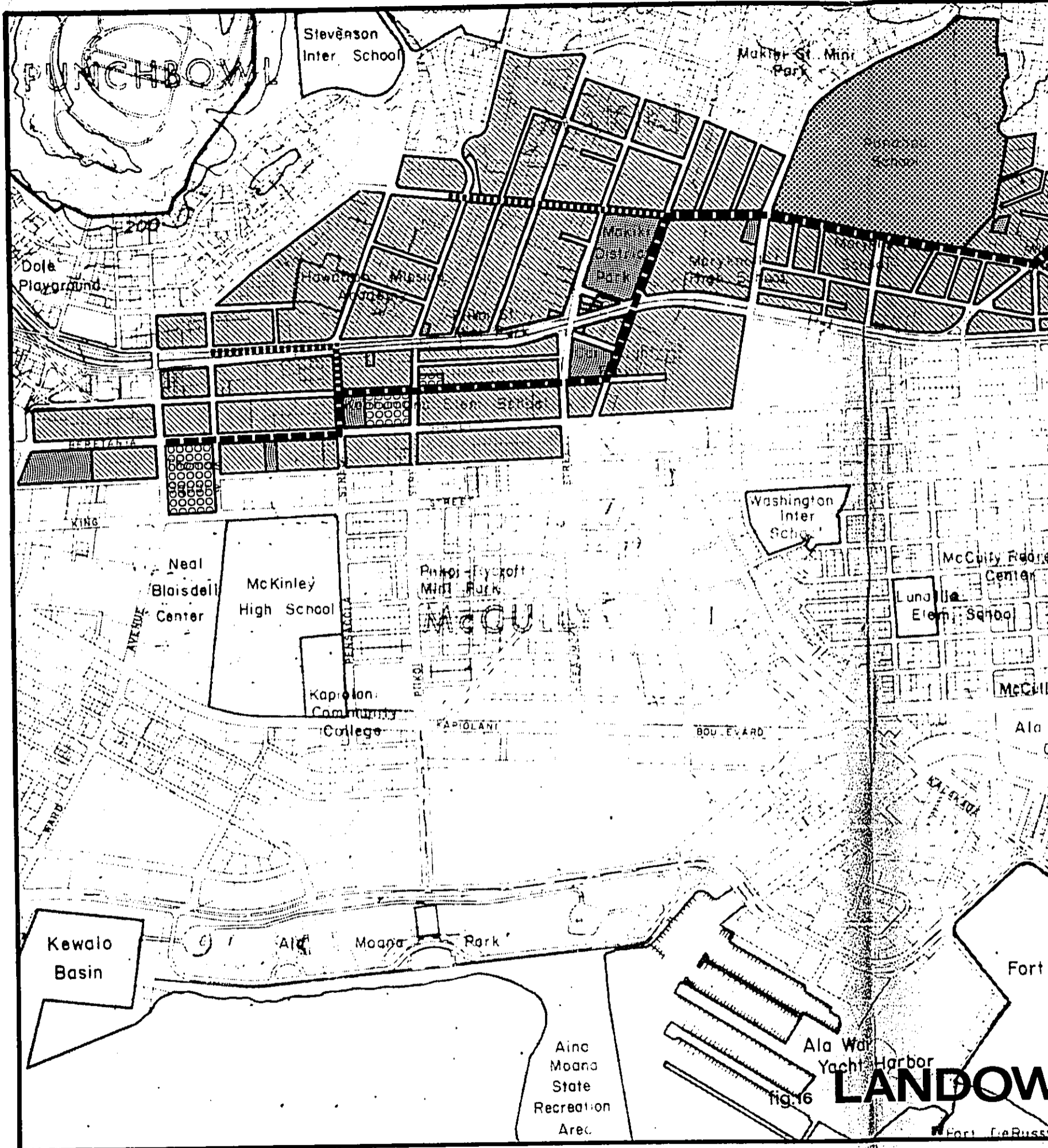
Construction of the proposed relief sewer along Lunalilo Street, Makiki Street mauka of the H-1 Freeway, and Wilder Avenue from Piikoi Street to the vicinity of Alexander Street will occur within the Punchbowl District.

The proposed improvements are consistent with the primary objective for the establishment of the Punchbowl District which is "to protect, preserve and enhance the natural setting and unique character of Punchbowl and its environs."

A Certificate of Appropriateness from the Director of the City and County's Department of Land Utilization will be required for construction of the proposed improvements within these districts.

K. LANDOWNERSHIP

The majority of lands along the project corridor (see Figure 16) are privately owned (large estates, small businesses, homeowners, religious organizations). All public school lands (except Hokuani Elementary School) along the project corridor, the University of Hawaii, Linekona School, and a few smaller parcels are owned by the State of Hawaii. All



FUNCHBOWL

Stevenson Inter. School

Makiki St. Mini Park

Dole Playground

Neal Blaisdell Center

McKinley High School

Punahou Mini Park

Kaplan Community College

Washington Inter. School

McCully Recreation Center

Luna Elementary School

McCully

Ala

Kewalo Basin

Aiea Moana Park

Aiea Moana State Recreation Area

Ala Wai Yacht Harbor

LANDOWN

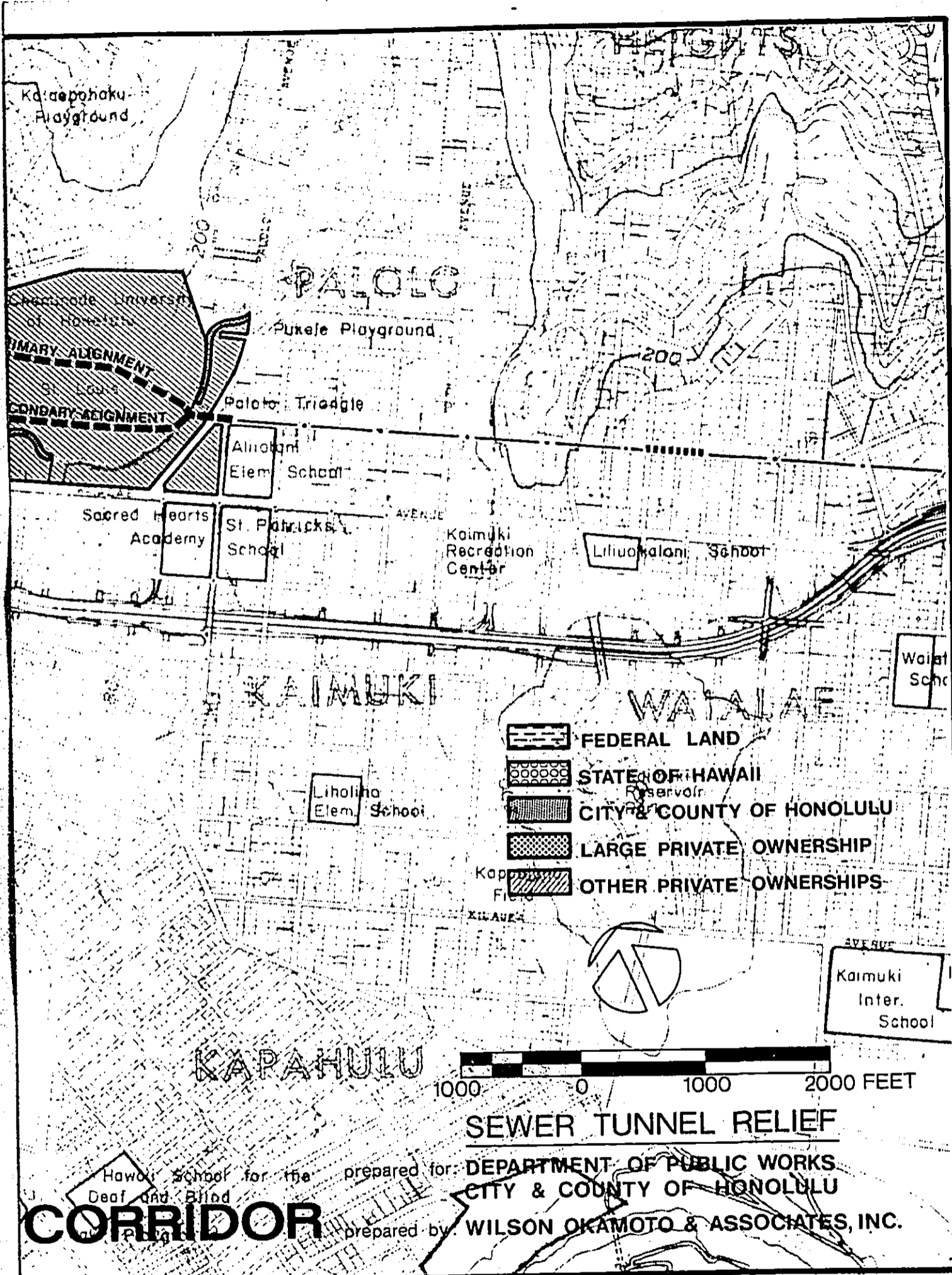
Fort LeRuss

fig. 16



LAND OWNERSHIP ALONG PROJECT CORRIDOR

T



Hawaii School for the Deaf and Blind
CORRIDOR

prepared for: DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU
 prepared by: WILSON OKAMOTO & ASSOCIATES, INC.

SEWER TUNNEL RELIEF

roadways (except H-1 Freeway), parks, Hokuani Elementary School parcel and Thomas Square are owned by the City and County of Honolulu. The National Marine Fisheries Service located on Dole Street is situated on Federally-owned land.

CHAPTER VIII
RELATIONSHIP BETWEEN SHORT-TERM
USES OF MAN'S ENVIRONMENT
AND THE MAINTENANCE AND ENHANCEMENT
OF LONG-TERM PRODUCTIVITY

VIII. RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE
MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

As described in Chapter VI, construction activities associated with the new Sewer Tunnel Relief will create disruptions and nuisances during the construction period. Each increment of construction will affect different local neighborhoods between Ward Avenue and Palolo Avenue.

However, once construction activities are completed, surface conditions will be restored to pre-construction conditions or better, with no visible effects of the project.

A major trade-off for the short-term construction impacts is the assurance of continued maintenance of public health and welfare with the new relief sewer. As stated earlier, a "no-action" alternative will present the City and County with a continued threat of failure of the existing Manoa-Kaimuki Interceptor Sewer, with major adverse consequences to public health and safety.

Significantly, the proposed project will also facilitate achievement of a City Development Plan objective by providing the necessary additional capacity to allow growth in the Primary Urban Center.

CHAPTER IX
IRREVERSIBLE AND IRRETRIEVEABLE
COMMITMENT OF RESOURCES

IX. IRREVERSIBLE AND IRRETRIEVEABLE COMMITMENT OF RESOURCES

Irretrievable resources committed to the project will include materials, labor, energy, and funding to implement construction of the proposed Sewer Tunnel Relief. New long-term commitment of lands resulting from the project will be minimal as the proposed relief sewer will be aligned within existing City and County rights-of-way and easements. New easements created through the Saint Louis High School/Chaminade University campuses will, however, preclude future above ground facilities development along the easement.

Although intangible, loss of productivity due to construction disruptions may be considered an irreversible and irretrievable resource commitment. For example, loss of productivity associated with construction activities may be related to:

- o Loss of time due to increased traffic congestion.

- o Interruptions of business and academic activities due to construction noise and traffic.

CHAPTER X
ALTERNATIVES

X. ALTERNATIVES

A. NO ACTION

The problems of the existing interceptor should not go unresolved. It must be structurally sound and capable of handling the wastewater from its tributary areas. Without improvements, the rate of deterioration can be expected to increase since liner tiles no longer offer protection to the concrete tunnel. This will increasingly pose health and safety hazards.

In addition to structural deficiencies, the existing tunnel is considered hydraulically deficient to accommodate projected wastewater flows.

B. RECONSTRUCTION OF EXISTING TUNNEL

An analysis of rehabilitating the existing Manoa-Kaimuki Interceptor Sewer was conducted by Chung Dho Ahn and Associates, Inc. in 1971. Their findings indicate the new tunnel and pipe sections, as proposed, would cost approximately \$2.17 million (1971 dollars) less than repairs to the existing tunnel. Additionally, reconstruction may not eliminate all the problems associated with the existing system.

The fixed alignment and grade of the existing Manoa-Kaimuki interceptor sewer may preclude the transformation of the sewer system into a structurally and hydraulically adequate facility that is relatively free of corrosion and maintenance problems. Improvements to the existing tunnel would be hampered by the need to divert existing flows to permit work on the tunnel and the need to enlarge the tunnel to provide adequate capacity.

C. ALTERNATIVE ALIGNMENT THROUGH SAINT LOUIS HIGH SCHOOL/CHAMINADE UNIVERSITY CAMPUSES

Because of possible adverse construction conditions which may be encountered through the Regency Park Condominium complex, alternative alignments for the Sewer Tunnel Relief through this area were examined. As described in Chapter II, the Lower Route (as recommended by Chung Dho Ahn) and the Mauka Route represent viable alignments.

In addition to the Lower Route and the Mauka Route, an alternative alignment along Waialae Avenue was also examined. This alternative involved alignment of the tunnel from Dole Street, down Saint Louis Drive, along Waialae Avenue to Palolo Avenue and Keanu Street.

In evaluating this alternative, consideration was given to salvaging a portion of the 5-foot x 7-foot West Kaimuki sewer tunnel, which begins on Second Avenue, continues west on Waialae Avenue, turns north on Saint Louis Drive, finally connecting to the existing Manoa-Kaimuki interceptor sewer at Dole Street. However, it was determined that the use of the existing West Kaimuki sewer tunnel would not be desirable from a hydraulic standpoint (ie., an inverted siphon used to cross under the Palolo Stream has limited hydraulic capacity which may lead to adverse backwater conditions upstream creating overflows and a public health hazard). For these reasons, this alternative was not considered feasible and desirable.

D. ALTERNATE ALIGNMENTS FOR THE PROPOSED SEWER TUNNEL RELIEF

Selection of the alignment for the Sewer Tunnel Relief involved consideration of design and maintenance constraints, ground conditions, existing obstructions, and the anticipated short-term impacts of construction along the selected route. Desired features of the proposed relief sewer include an alignment close to the existing interceptor sewer to reduce the need for an extensive diversion and collection system to convey flows to the new relief sewer, an open trench method of construction, an invert elevation above the groundwater table, and sufficient slope. In addition, the proposed Sewer Tunnel

Relief should be located in public roadways or accessible easements with manholes located to facilitate easy maneuverability of vehicles and equipment for maintenance. The areas proximate to the new relief sewer should not be adversely impacted by odors, noise and the obstruction of traffic caused by construction and maintenance operations for the proposed Sewer Tunnel Relief.

The conditions described above are ideal conditions and do not consider ground conditions and existing obstructions. Many of the roadways, especially within Increment 1-B, are heavily travelled. These roadways include Ward Avenue, Beretania Street, Kinau Street, Wilder Avenue, Pensacola Street, Piikoi Street and Dole Street.

Major obstructions influencing the design and selection of an alignment for the proposed relief sewer include the: 1) H-1 Freeway; (2) Ground Elevations; 3) Major Storm Drains; and 4) Other Utilities.

H-1 Freeway

The H-1 Freeway spans the City and County of Honolulu from Waialae to Makakilo. Construction of the proposed project will require crossing under this Interstate highway by tunneling or utilizing a grade separation structure or viaduct. Trenching is not permitted within the highway right-of-way.

Ground Elevations

The location of a sewer invert at elevations above the groundwater table minimizes infiltration. The existing Manoa-Kaimuki interceptor, which employed tunnel construction methods, is located above the groundwater table.

Construction of the new relief sewer above the groundwater table would require an alignment in the mauka areas of Honolulu where ground elevations are higher (generally above King Street). Additionally, as open-cut construction is preferred over tunneling, the sewer should be a reasonable distance from the ground surface. This constraint would necessitate a location makai of the H-1 Freeway.

The area between Metcalf Street and Dole Street along Wilder Avenue, where the ground elevation ranges from 10 to 30 feet, is a controlling area. The new relief sewer alignment should extend east to Metcalf Street, clearing all utility lines as necessary.

The University of Hawaii Quarry area has been excavated to an elevation of approximately 15 feet below the invert of the Manoa-Kaimuki interceptor. As the proposed relief sewer invert elevation will not be appreciably lower than the existing tunnel, it cannot be located within the quarry area.

Recent construction of extensive athletic facilities in the quarry area also precludes construction in this area.

Major Storm Drains

Construction of the proposed relief sewer will necessitate crossing a box drain which is aligned along Pensacola Street. The drain consists of a 54-inch reinforced concrete pipe between South Beretania and South King Streets. Makai of South King Street, the drain ranges in size from a 9-foot by 5-foot box to a double 10-foot by 5-foot box structure. Crossing the drain at South Beretania Street would require locating the proposed relief sewer 5 feet deeper, which would greatly increase costs. It is preferable to cross this drain at Kinau Street.

Another major box drain is located along Isenberg Street and Wilder Avenue. This box structure measures 10-foot by 6.5-foot along Isenberg Street and 8-foot by 3-foot along Wilder Avenue. Crossing this drain should be avoided as the ground elevation is low in this area.

Other Utilities

The location of the proposed relief sewer within roadway rights-of-way will be influenced by the alignment of existing

utility systems within these roadways. Construction of the Sewer Tunnel Relief employing cut and cover methods will require a trench width of roughly 10.5 feet. Tunneling construction methods will require adequate allowances for the construction of manholes. Horizontal clearances as well as vertical clearances of the proposed project with existing utility systems must be considered.

Major utility systems in the vicinity of the proposed improvements include the 48-inch East End Relief Sewer, a 42-inch waterline along Kinau Street and the existing Manoa-Kaimuki interceptor. Also in the vicinity are numerous drainage, sewer, water, gas, and electrical/telephone/cable TV systems.

Consideration of the conditions described above influenced the selection of an alignment for the proposed relief sewer. The following summarizes constraints and rationale for selection of major portions of the Sewer Tunnel Relief alignment:

PROJECT CORRIDOR SECTION: Hoonanea Street to Palolo Avenue

SELECTED ALIGNMENT: Along Dole Street and through the Saint Louis High School/Chaminade University Campuses

ALTERNATIVES: None (Low ground elevations makai of Dole Street)

PROJECT CORRIDOR SECTION: Metcalf Street to Hoonanea Street

SELECTED ALIGNMENT: Metcalf Street and Hoonanea Street

ALTERNATIVES: None (Low ground elevations along Wilder Avenue in this vicinity; preferred alignment will not traverse private properties)

PROJECT CORRIDOR SECTION: Makiki Street to Metcalf Street

SELECTED ALIGNMENT: Wilder Avenue

ALTERNATIVE: Dole Street

- (1) Does not extend west past Punahou School.
- (2) Relatively narrow roadway width.
- (3) Alignment would traverse private properties or turn mauka up Punahou Street to Wilder Avenue.
- (4) Requires low sewer invert elevation to meet clearance requirements along Metcalf Street.

PROJECT CORRIDOR SECTION: H-1 Freeway Crossing

SELECTED ALIGNMENT: Makiki Street

ALTERNATIVE: Alexander Street

- (1) Requires an alignment along Beretania Street.
- (2) Requires the addition of an intercepting sewer along Wilder Avenue.

PROJECT CORRIDOR SECTION: Pensacola Street to Keeaumoku Street

SELECTED ALIGNMENT: Kinau Street

ALTERNATIVES:

King Street

- (1) Heavily travelled roadway.
- (2) Ground elevation is probably too low.

Young Street

- (1) Construction along this roadway would preclude the use of this street as a transportation facility due to a narrow roadway width.

Beretania Street

- (1) Heavily travelled roadway.

PROJECT CORRIDOR SECTION: Ward Avenue to Pensacola Street and
Connection of the Sewer Tunnel Relief to the Existing 60-inch
Sewerline Along Ward Avenue

SELECTED ALIGNMENT: Connection at Intersection of Beretania
Street and Ward Avenue with Alignment Along Beretania Street

- (1) Existing pipe stub on the 60-inch sewerline at Ward
Avenue would facilitate connection.
- (2) Alignment along Beretania Street at Ward Avenue would
divert flows from Kinau Street, where odor problems
persist.

ALTERNATIVES:

Connection at Intersection of King Street and Ward Avenue with
Alignment Along King Street

- (1) Invert of the existing main is high (drainline alignment
would make connection difficult).
- (2) Connection at this point would increase the probability
of backwater effects.
- (3) Distance between the ground surface and existing
utilities too small.

Connection at Intersection of Kapiolani Boulevard and Ward
Avenue with Alignment Along Kapiolani Boulevard

- (1) Existing main is below the water surface.
- (2) Connection at this point would increase the probability
of backwater effects.

XI. LIST OF NECESSARY APPROVALS

XI. LIST OF NECESSARY APPROVALS

City and County of Honolulu Development Plan Public Facilities Map Amendments have been initiated.

A Certificate of Appropriateness from the Director of the City and County's Department of Land Utilization will be required for construction of the proposed improvements within the Historic Cultural and Scenic District No. 3, "The Punchbowl District", and Historic, Cultural and Scenic District No. 5, "Thomas Square/Academy of Arts District".

State of Hawaii, Department of Health approval of a variance for extended work hours along Increment I-B from the intersection of Ward Avenue and Beretania Street to the intersection of Pensacola Street and Kinau Street will be required.

XII. SUMMARY OF UNRESOLVED ISSUES

XII. SUMMARY OF UNRESOLVED ISSUES

A. BLASTING

The method of tunneling through rock sections cannot be predetermined since the method will be determined by the contractor. Blasting is one of three methods which may be selected. Blasting impacts are assumed to result in "worst case" impacts for purposes of this environmental document. Other methods of rock excavation are assumed to have less severe impacts upon the surrounding environment.

B. REHABILITATION OF THE EXISTING INTERCEPTOR FOR USE AS A BACKUP SYSTEM

The extent of repair required to rehabilitate the existing interceptor for use as a backup system for the proposed Sewer Tunnel Relief will be determined through separate engineering studies. An assessment of the extent of repair requires the performance of a complete inspection of the existing sewer tunnel. This inspection can be performed once the existing sewer tunnel is removed from service. Accordingly, once requirements for rehabilitating the existing tunnel are defined, separate environmental documents will be prepared pursuant to Chapter 343, HRS.

C. PORTAL AND STAGING LOCATIONS

Potential portal locations for construction of the proposed relief sewer have been identified within this document. However, selection of actual locations will be the contractor's responsibility and will depend upon his method of operations.

Impacts anticipated at portals will vary in magnitude and extent depending on the portal locations selected. For example, locating a portal within a heavily-travelled, commercial area, as compared to a minor street within an urban area, may be expected to cause impacts of varying intensity and extent. While there is uncertainty in portal locations, the general impacts which may be anticipated at portal locations, the extent and magnitude of impacts which may be anticipated, and possible mitigation measures can be identified. These considerations are summarized in this section.

The maximum duration of construction operations at a portal location is the expected duration of the particular increment within which the portal is located. Length of operation is dependent on construction operations implemented, selected portal locations, and the contractor's preference. A preliminary construction timetable is presented in Chapter II.

In general, short-term impacts anticipated at portal locations include increased noise levels, waste spillage and dispersion, reduced air quality, traffic congestion, increased safety hazards, economic effects, and possible effects of blasting. Impacts will be carefully monitored during construction by City officials.

Noise:

Construction activity at portal locations will create an increase in local ambient noise levels. However, these noise levels are not anticipated to be significantly higher than those along open trench areas. Appropriate mitigation measures include:

- o Contractor's compliance with Chapters 42 and 43, Title 11, State Department of Health Administrative Rules.
- o Identification of truck routes by the Department of Health.
- o Notification of residences and businesses in the vicinity of portal sites, explaining the construction duration and its possible effects.

- o Control of construction activities within sensitive public and residential areas by restricting construction hours or rescheduling activities.

Waste Spillage and Dispersion:

The spillage of debris from the trucks transporting excavated material from the portal site may cause adverse aesthetic impacts along truck routes.

Construction activities will be closely monitored by the City to assure that appropriate mitigation measures are implemented. Potential measures include:

- o Dampening of trucks and prevention of overloading to minimize dust.
- o Use of a tarp to cover waste material and reduce dust generation.
- o Removal of mud and grime from truck wheels.

Air Quality:

Sources of air pollution generated at portal sites would include dust generated during loading of excavated material

for haul-away, vehicular emissions and exhaust from tunnel ventilation lines. Generation of dust and type of dust will vary according to type of underlying material excavated. Underlying material varies by location. Exhaust from ventilation lines will be sufficiently diluted and is anticipated to have minimal impact to surrounding areas.

Appropriate mitigation measures for dust control include:

- o Contractor's compliance with Chapter 60 of Title 11, Department of Health Administrative Rules.
- o Water spraying or sprinkling to minimize dust.
- o Maintaining construction equipment to minimize emissions.
- o Utilizing filters to minimize any exhaust from ventilation lines.

Traffic:

Work at portal locations will cause increased traffic congestion, safety hazards, and inconvenient access to local residences, businesses, and public facilities. Impacts at portal locations, however, will not be as severe as those impacts related to open trench sections. While the extent

of traffic lanes impacted at portals would depend upon the contractor's method of operation, 15-feet of road space is assumed to be typical of roadway width required, resulting in closure of one or more lanes of traffic. Loading of trucks may be expected to be performed within a closed lane.

Prior to construction, traffic control plans will be submitted to the City and County Department of Transportation Services, and to the State Department of Transportation for approval regarding work within their respective rights-of-way. No work will be allowed until the traffic control plans are approved. Contract specifications will require accessibility to fire hydrants and driveways at all times.

Potential traffic mitigation measures include:

- o Eliminating parking near portal locations.
- o Relocating bus stops affected by construction operations.
- o Restricting turning movements in portal vicinity.
- o Routing traffic away from construction area.
- o Controlling ingress and egress of trucks (overseen by flagmen and police officers) to optimize traffic safety conditions, and minimize inconvenience.

- o Informing roadway users, residents and businesses of the construction program, detours (if necessary), and other potential inconveniences.

Additional measures for consideration include:

- o Adjusting traffic signal indication timing.
- o Temporary widening of roadways which may eliminate sidewalk areas and temporarily inconvenience pedestrians.
- o Modifying directional flow of traffic.

Safety Hazards:

Necessary measures such as signs, barricades, and if necessary, police officers will be employed to assure public safety at portal locations. Pedestrians may be required to bypass certain construction areas. Open areas will be secured by adequate safety signs, signals and/or other safety devices as required by State and County regulations.

Economy:

Businesses adjacent to portal locations may be affected by construction operations, as construction activity may

discourage patrons who wish to visit business establishments. To effectively minimize this potential detrimental impact, the contractor shall provide continued access to all commercial establishments proximate to a selected portal location.

Blasting:

Blasting is one of three tunneling methods which may be employed, and is addressed as an unresolved issue in Section A of this Chapter.

If blasting is required, noise levels at adjacent properties may be expected to be higher than if other tunneling methods are utilized. Additionally, blasting may cause vibrations to nearby areas. Initial blasting requirements will be established through careful study, by the contractor, of subsurface characteristics to assure that blasting impacts do not impact nearby structures and utilities.

Appropriate mitigation measures include:

- o Contractor's compliance with Chapters 42 and 43, Title 11, State Department of Health Administrative Rules.
- o Notify residences and businesses in the vicinity of blasting operations, explaining the construction duration and its possible effects.

- o Control construction activities within sensitive public and residential areas by restricting construction hours or rescheduling activities.
- o Monitor blasting operations and impacts during construction to determine the extent and magnitude of vibrations, and blasting modifications made based on the measurement.
- o Utilize findings from the blast monitoring program to evaluate the blasting program to assure the maintenance of public health and safety.
- o Discontinue or modify blasting operations if vibration becomes too severe.

D. GENERAL CONSTRUCTION IMPACTS TO CORRIDOR INSTITUTIONS, BUSINESSES AND RESIDENTS

Probable construction impacts and mitigative measures are discussed in Chapter Six. However, additional concerns have been raised by the Honolulu Academy of Arts, University of Hawaii, Neighborhood Board No. 10 and State Representative James Shon regarding the levels of impacts to be anticipated. This section, therefore, acknowledges and recognizes the fact that impacts associated with construction, by nature, cannot be totally mitigated and, therefore, will to some extent, be

unavoidable. With this understanding, it is a major goal of the City and County of Honolulu to implement a construction management program which is responsive to corridor institutions', businesses' and residents' concerns and which assures that construction impacts are, to the maximum extent practicable, minimized. Construction plans and specifications will be formulated to minimize construction impacts within reasonable levels which are economical, practical and consistent with the State's statutes regarding noise and air pollution control. Impacts to motorists and the general public, as well as occupants along the project corridor, will be considered in the project plans.

Impacts and mitigative measures, to a large degree, are dependent upon the contractor's selected method of operation. (The contractor is afforded some degree of discretion in selecting his method(s) of operation to promote the competitive bidding process.) Given the present uncertainty as to what specific construction methods and contractor's requirements are, the EIS document is unable to provide discussions on site specific impacts.

XIII. AGENCIES, ORGANIZATIONS, AND INDIVIDUALS CONSULTED
IN THE PREPARATION OF THE EIS

XIII. AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED IN THE
PREPARATION OF THE EIS

FEDERAL AGENCIES

Mr. Stratford C. Whiting
Soil Conservation Service
U.S. Department of Agriculture
P. O. Box 5004
Honolulu, Hawaii 96850

Mr. Kisuk Cheung, Chief
Engineering Division
Pacific Ocean Division
Corps of Engineers
Fort Shafter, Hawaii 96858

Mr. Ernest Kosaka
Office of Environmental Services
Fish and Wildlife Service
U.S. Department of Interior
P. O. Box 50167
Honolulu, Hawaii 96850

Dr. John Shupe
Director of Pacific Site Office
U.S. Department of Energy
P. O. Box 50168
Honolulu, Hawaii 96850

Mr. Stanley F. Kapustka
District Chief
U.S. Geological Survey
Division of Water Resources
U.S. Department of Interior
Prince Kuhio Federal Building
Room 6110, P. O. Box 50166
Honolulu, Hawaii 96850

Mr. H. Kusumoto, Administrator
Federal Highway Administration
U.S. Department of Transportation
P. O. Box 50206
Honolulu, Hawaii 96850

Mr. Frank Johnson
Department of Housing and Urban
Development
P. O. Box 5007
Honolulu, Hawaii 96850

FEDERAL AGENCIES - (Continued)

Department of the Army
Facilities Engineering
Schofield Barracks, Hawaii 96857

Commander
Naval Base Pearl Harbor
Department of the Navy
Box 110
Pearl Harbor, Hawaii 96860-5020

Commander (DPL 14th Coast Guard
District)
U.S. Coast Guard
300 Ala Moana Boulevard
Honolulu, Hawaii 96850

STATE AGENCIES

Mr. Hideo Murakami, Comptroller
Department of Accounting and
General Services
State of Hawaii
P. O. Box 119
Honolulu, Hawaii 96810

Mr. Francis M. Hatanaka
Superintendent
Department of Education
State of Hawaii
P. O. Box 2360
Honolulu, Hawaii 96804

Mr. Melvin Koizumi
Deputy Director
For Environmental Health
State Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Mr. Susumu Ono, Chairman
Department of Land and Natural
Resources (6 copies to
State of Hawaii divisions)
P. O. Box 621
Honolulu, Hawaii 96809

STATE AGENCIES - (Continued)

Mr. T.C. Yim, Administrator
Office of Hawaiian Affairs
Kawaiahao Plaza Suite 100
567 S. King Street
Honolulu, Hawaii 96813

Mr. Kent Keith, Director
Department of Planning and
Economic Development
State of Hawaii
P. O. Box 2359
Honolulu, Hawaii 96804

Mr. Wayne Yamasaki, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Mr. Jack K. Suwa
Chairman, Board of Agriculture
Department of Agriculture
State of Hawaii
1428 South King Street
Honolulu, Hawaii 96814

Department of Defense
State of Hawaii
3949 Diamond Head Road
Honolulu, Hawaii 96816

Department of Social Services
and Housing
State of Hawaii
Liliuokalani Building
1390 Miller Street
Honolulu, Hawaii 96813

Marine Programs
University of Hawaii
1000 Pope Road
Honolulu, Hawaii 96822

Mr. Harold Masumoto
Vice President
for Administration
University of Hawaii
2444 Dole Street
Honolulu, Hawaii 96822

STATE AGENCIES - (Continued)

Dr. Doak C. Cox, Director
Environmental Center
University of Hawaii
Crawford 317
2250 Campus Road
Honolulu, Hawaii 96822

Dr. L. Stephen Lau, Director
Water Resources Research Center
University of Hawaii
Holmes Hall 283
2540 Dole Street
Honolulu, Hawaii 96822

Ms. Letitia Uyehara, Director
Office of Environmental Quality
Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Mr. Russell Fukumoto
Executive Director
Hawaii Housing Authority
1002 No. School Street
Honolulu, Hawaii 96813

Ms. Georgiana K. Padeken, Chairman
Department of Hawaiian Home Lands
State of Hawaii
P. O. Box 1879
Honolulu, Hawaii 96805

CITY & COUNTY AGENCIES

Mr. Frank K. Kahooahano
Fire Chief
Fire Department
City & County of Honolulu
1455 S. Beretania Street, #305
Honolulu, Hawaii 96814

Mr. Donald Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 S. King Street, 8th Floor
Honolulu, Hawaii 96813

CITY & COUNTY AGENCIES - (Continued)

Mr. Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813

Mr. Alvin K.H. Pang, Director
Department of Housing & Community
Development
City and County of Honolulu
650 South King Street, 5th Floor
Honolulu, Hawaii 96813

Mr. John P. Whalen, Director
Department of Land Utilization
City and County of Honolulu
650 S. King Street, 7th Floor
Honolulu, Hawaii 96813

Mr. Tom Nekota, Director
Department of Parks and Recreation
City and County of Honolulu
650 S. King Street, 9th Floor
Honolulu, Hawaii 96813

Mr. Douglas G. Gibb, Chief
Police Department
City & County of Honolulu
1455 S. Beretania Street
Honolulu, Hawaii 96814

Mr. John Hirten, Director
Department of Transportation
Services
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dr. Alma Ching Corn, M.D.
City and County Physician
Health Department
1455 South Beretania Street
Honolulu, Hawaii 96814

Mr. Herbert Muraoka
Director and Building Superintendent
Building Department
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

GOVERNMENT OFFICIALS

Senator Steve Cobb
12th Senatorial District
State Capitol, Room 215
Honolulu, Hawaii 96813

Senator Ann Kobayashi
14th Senatorial District
State Capitol, Room 223
Honolulu, Hawaii 96813

Senator Neil Abercrombie
16th Senatorial District
State Capitol, Room 203
Honolulu, Hawaii 96813

Senator Milton Holt
18th Senatorial District
State Capitol, Room 232
Honolulu, Hawaii 96813

Representative Calvin Say
25th Representative District
State Capitol, Room 430
Honolulu, Hawaii 96813

Representative Brian T. Taniguchi
27th Representative District
State Capitol, Room 431
Honolulu, Hawaii 95813

Representative Jim Shon
28th Representative District
State Capitol
Honolulu, Hawaii 96813

Representative Russell Blair
31st Representative District
State Capitol, Room 323
Honolulu, Hawaii 96813

Representative Mazie Hirono
32nd Representative District
State Capitol, Room 331
Honolulu, Hawaii 96813

Representative Galen K. Onouye
35th Representative District
State Capitol
Honolulu, Hawaii 96813

GOVERNMENT OFFICIALS - (Continued)

Councilmember Leigh-Wai Doo
Council District IV
Honolulu Hale
Honolulu, Hawaii 96813

Councilmember Marilyn Bornhorst
Council District V
Honolulu Hale
Honolulu, Hawaii 96813

Councilmember Tony Narvaes
Council District VI
Honolulu Hale
Honolulu, Hawaii 96813

ORGANIZATIONS

Jodo Mission of Hawaii
1429 Makiki Street
Honolulu, Hawaii 96814

First Christian Church of Honolulu
1516 Kewalo Street
Honolulu, Hawaii 96822

Church of Jesus Christ of
Latter-Day Saints
1500 South Beretania Street
Honolulu, Hawaii 96826

Christ United Methodist Church
1639 Keeaumoku Street
Honolulu, Hawaii 96822

Mr. John Ward, Principal
Hawaiian Mission Academy
1438 Pensacola Street
Honolulu, Hawaii 96822

Mr. Frank Sasaoka, Principal
Queen Kaahumanu Elementary School
1141 Kinau Street
Honolulu, Hawaii 96814

Ms. Juliette Ling, Principal
Hokulani Elementary School
2940 Kamakini Street
Honolulu, Hawaii 96816

ORGANIZATIONS - (Continued)

Mr. Hiroshi Nishida, Principal
Aliiolani Elementary School
1240 7th Avenue
Honolulu, Hawaii 96816

Dr. Loretta Krause, Principal
University Laboratory School
Room 121
1776 University Avenue
Honolulu, Hawaii 96822

Mr. Donald Duckworth, Director
Bishop Museum
P. O. Box 19000-A
1525 Bernice Street
Honolulu, Hawaii 96817

Father Charles Lum Kee, Chancellor
St. Louis/Chaminade Educational
Center
3140 Waiialae Avenue
Honolulu, Hawaii 96816

First Baptist Church of Honolulu
1313 Pensacola Street
Honolulu, Hawaii 96814

First Church of Christ-Scientist,
Honolulu
1508 Punahou Street
Honolulu, Hawaii 96822

Our Redeemer Lutheran Church
1404 University Avenue
Honolulu, Hawaii 96822

Mr. James Gahler, Principal
Maryknoll Grade School
1722 Dole Street
Honolulu, Hawaii 96822

Mr. Jared Kaufman, Principal
Maryknoll High School
1402 Punahou Street
Honolulu, Hawaii 96822

First United Methodist Church
1020 S. Beretania Street
Honolulu, Hawaii 96814

ORGANIZATIONS - (Continued)

Mr. Robert Atkins, Principal
Hawaiian Mission Elementary School
1415 Makiki Street
Honolulu, Hawaii 96814

Honolulu Academy of Arts
900 S. Beretania Street
Honolulu, Hawaii 96814

Life of the Land
250 South Hotel Street
Room 251
Honolulu, Hawaii 96813

Mrs. Theodore Crocker, President
Outdoor Circle
200 N. Vineyard Boulevard
Honolulu, Hawaii 96817

The Parish of Saint Clements, Inc.
c/o St. Clements Episcopal Church
1515 Wilder Avenue
Honolulu, Hawaii 96822

Dr. Roderick F. McPhee, President
Punahou School
Punahou & Wilder Avenues
Honolulu, Hawaii 96822

Brother Edward L.K. Gomez, Principal
St. Louis High School
3140 Waialae Avenue
Honolulu, Hawaii 96816

Sierra Club
P. O. Box 22897
Honolulu, Hawaii 96822

Waialae Drive-In Theater
4044 Waialae Avenue
Honolulu, Hawaii 96816

Watch Tower Bible & Tract Society
1228 Pensacola Street
Honolulu, Hawaii 96814

YWCA
1566 Wilder Avenue
Honolulu, Hawaii 96822

ORGANIZATIONS - (Continued)

Hawaii's Thousand Friends
1154 Fort Street Mall Room 402
Honolulu, Hawaii 96813

Ms. Phyllis Zerbe
Government Affairs Department
Pacific Resources, Inc.
P. O. Box 3379
Honolulu, Hawaii 96842

Hawaii Association of the Blind
225 Liliuokalani Avenue Apartment 5D
Honolulu, Hawaii 96815

Mrs. Betty White, Vice Principal
High School Office
Sacred Hearts Academy
3253 Waialae Avenue
Honolulu, Hawaii 96816

Mr. Ed Vance, Principal
St. Patrick's School
1124 7th Avenue
Honolulu, Hawaii 96816

St. Patrick's Church
1124 7th Avenue
Honolulu, Hawaii 96816

Sister Marie Celeste Lactaen
Principal
Grade School Office
Sacred Hearts Academy
3253 Waialae Avenue
Honolulu, Hawaii 96816

Mrs. Louise Bogart, Director
L. Robert Allen Preschool
1365 Kaminaka Drive
Honolulu, Hawaii 96816

Lutheran Church of Honolulu
1730 Punahou Street
Honolulu, Hawaii 96822

First Assembly of God & Aloha
Pre-School
930 Lunalilo Street
Honolulu, Hawaii 96822

ORGANIZATIONS - (Continued)

American Lung Association of Hawaii
245 North Kukui Street
Honolulu, Hawaii 96817

Mr. David J. Welch, Chairman
Peer Review Committee
Society for Hawaiian Archaeology
P. O. Box 22911
Honolulu, Hawaii 96822

Mrs. M.H. Ko, Director
Playmate Kindergarten & Day Care
Center
1704 Keeaumoku Street
Honolulu, Hawaii 96822

Masonic Temple
1227 Makiki Street
Honolulu, Hawaii 96814

Masonic Public Library
1611 Kewalo Street
Honolulu, Hawaii 96822

Scottish Rite Cathedral
1611 Kewalo Street
Honolulu, Hawaii 96822

Mr. Ken Morinaka, Sales Manager
Kotake Shokai, Ltd.
P. O. Box 4512
Honolulu, Hawaii 96813-0612

NEIGHBORHOOD BOARDS

Kaimuki Neighborhood Board No. 4
c/o Neighborhood Commission Office
City Hall, 4th Floor
Honolulu, Hawaii 96813

Diamond Head/Kapahulu/St. Louis
Heights Neighborhood Board No. 5
c/o Neighborhood Commission Office
City Hall, 4th Floor
Honolulu, Hawaii 96813

Palolo Neighborhood Board No. 6
c/o Neighborhood Commission Office
City Hall, 4th Floor
Honolulu, Hawaii 96813

NEIGHBORHOOD BOARDS - (Continued)

Manoa Neighborhood Board No. 7
c/o Neighborhood Commission Office
City Hall, 4th Floor
Honolulu, Hawaii 96813

Makiki/Lower Punchbowl/Tantalus
Neighborhood Board No. 10
c/o Neighborhood Commission Office
City Hall, 4th Floor
Honolulu, Hawaii 96813

Ala Moana-Kakaako Neighborhood
Board No. 11
c/o Neighborhood Commission Office
City Hall, 4th Floor
Honolulu, Hawaii 96813

UTILITY COMPANIES

Hawaiian Electric Company
P. O. Box 2750
Honolulu, Hawaii 96840

Hawaiian Telephone Company
P. O. Box 2200
Honolulu, Hawaii 96841

The Gas Company
P. O. Box 3379
Honolulu, Hawaii 96842

Oceanic Cablevision
2669 Kilihau Street
Honolulu, Hawaii 96819

INDIVIDUAL

Mr. Milton Staackmann
415 Atkinson Drive, Apt. 1507
Honolulu, Hawaii 96814

CHAPTER XIV
ENVIRONMENTAL IMPACT STATEMENT PREPARATION
NOTICE COMMENTS AND RESPONSES

XIV. ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE COMMENTS AND RESPONSES

The following agencies and organizations provided comments on the EIS Preparation Notice. A total of 30 comment letters were received.

A double asterisk (**) indicates those which submitted written comments requiring substantive responses. The comment and response letters are reproduced in this section.

A single asterisk (*) indicates those which submitted written comments not requiring substantive responses.

A. CITY AND COUNTY OF HONOLULU AGENCIES

- ** 1. Board of Water Supply
- ** 2. City and County Physician, Health Department
- ** 3. Department of General Planning
- * 4. Department of Housing and Community Development
- ** 5. Department of Land Utilization
- ** 6. Department of Parks and Recreation
- ** 7. Department of Transportation Services
- ** 8. Fire Department
- * 9. Police Department

B. STATE AGENCIES

- ** 1. Department of Accounting and General Services
- ** 2. Department of Education
- 3. Department of Hawaiian Home Lands
- ** 4. Department of Health
- 5. Department of Land and Natural Resources
- * 6. Department of Planning and Economic Development
- * 7. Department of Transportation
- * 8. Hawaii Housing Authority
- ** 9. Office of Environmental Quality Control
- 10. Office of Hawaiian Affairs
- 11. University of Hawaii, Environmental Center
- 12. University of Hawaii, Vice President for Administration
- ** 13. University of Hawaii, Water Resources Research Center

C. FEDERAL AGENCIES

- ** 1. U.S. Army Corps of Engineers
- * 2. U.S. Department of Agriculture, Soil Conservation Service
- 3. U.S. Department of Energy, Director of Pacific Site Office
- * 4. U.S. Department of Housing and Urban Development
- 5. U.S. Department of Interior, U.S. Geological Survey,
Division of Water Resources
- ** 6. U.S. Department of Interior, Fish and Wildlife Service
- ** 7. U.S. Department of Transportation, Federal Highway
Administration

D. GOVERNMENT OFFICIALS

1. Councilmember Marilyn Bornhorst, Council District V
2. Councilmember Leigh-Wai Doo, Council District IV
3. Councilmember Tony Narvaes, Council District VI
4. Representative Russell Blair, 31st Representative District
5. Representative Mazie Hirono, 32nd Representative District
6. Representative Galen K. Inouye, 35th Representative District
7. Representative Calvin Say, 25th Representative District
- ** 8. Representative James T. Shon, 28th Representative District
9. Representative Brian T. Taniguchi, 27th Representative District
10. Senator Neil Abercrombie, 16th Senatorial District
11. Senator Steve Cobb, 12th Senatorial District
12. Senator Milton Holt, 18th Senatorial District
13. Senator Ann Kobayashi, 14th Senatorial District

E. NEIGHBORHOOD BOARDS

1. Ala Moana-Kakaako Neighborhood Board No. 11
2. Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board No. 5
3. Kaimuki Neighborhood Board No. 4
- ** 4. Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10
5. Manoa Neighborhood Board No. 7
6. Palolo Neighborhood Board No. 6

F. UTILITY COMPANIES

1. The Gas Company
- ** 2. Hawaiian Electric Company
- ** 3. Hawaiian Telephone Company
4. Oceanic Cablevision

G. ORGANIZATIONS

1. Aliiolani Elementary School
2. Bishop Museum
3. Christ United Methodist Church
- ** 4. Church of Jesus Christ of Latter-Day Saints
5. First Baptist Church of Honolulu
6. First Christian Church of Honolulu
7. First Church of Christ-Scientist, Honolulu
8. First United Methodist Church
9. Hawaii Association of the Blind
10. Hawaiian Mission Academy
11. Hawaiian Mission Elementary School
12. Hawaii's Thousand Friends
13. Hukulani Elementary School
- ** 14. Honolulu Academy of Arts
15. Jodo Mission of Hawaii
16. L. Robert Allen Preschool
17. Life of the Land

18. Maryknoll Grade School
19. Maryknoll High School
20. Masonic Public Library
21. Masonic Temple
22. Our Redeemer Lutheran Church
- ** 23. Outdoor Circle
24. Pacific Resources, Inc.
25. The Parish of Saint Clement's, Inc.
26. Punahou School
27. Queen Kaahumanu Elementary School
28. Sacred Hearts Academy, Grade School Office
29. Sacred Hearts Academy, High School Office
30. Scottish Rite Cathedral
31. St. Louis/Chaminade Education Center
32. St. Patrick's Church
33. St. Patrick's School
- ** 34. Society for Hawaiian Archaeology
35. Sierra Club
36. University Laboratory School
37. Waialae Drive-In Theater
38. Watch Tower Bible & Tract Society
39. YWCA

COMMENTS TO EIS
PREPARATION NOTICE
WHICH REQUIRED RESPONSES

85-0335

RECEIVED
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE 523-4161

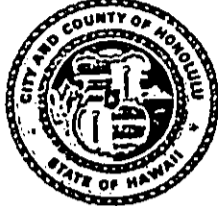
'85 JAN 21 PM 3 14

RECEIVED
DEPT OF PUBLIC WORKS
JAN 21 9 51 AM 1985
TO _____

Ernell
Wm
JALH
2/1/85
ALVIN K.H. PANG
DIRECTOR

DEPT OF
WASTEWATER
MANAGEMENT

FRANK F. FASI
MAYOR



January 17, 1985

MEMORANDUM

TO: Russell L. Smith, Jr., Director
Department of Public Works

FROM: Alvin K. H. Pang

SUBJECT: Environmental Impact Statement - Preparation Notice
Sewer Tunnel Relief, Honolulu, Oahu

Thank you for the opportunity to comment on the subject Preparation Notice for the Sewer Tunnel Relief project in the Honolulu Urban Area.

The Honolulu Primary Urban Area has been identified in the Department's Housing Location Study as the suggested location for the development of publicly-assisted housing units.

The proposed developments, we note, will be designed and constructed to provide adequate sewer carrying capacity and will minimize health hazard, maintenance cost and related adverse effects. The proposal also will result in significant beneficial long-term impacts by assuring the health, safety and overall well-being of the community.

ALVIN K. H. PANG

RECEIVED

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

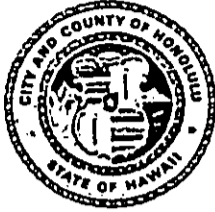
DEC 26 PM 3 19

1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 - AREA CODE (808) 943-3111

84-07201

EILEEN R. ANDERSON
MAYOR

DIR. OF
WASTEWATER
MANAGEMENT



DOUGLAS G. GIBB
CHIEF

WARREN FERREIRA
DEPUTY CHIEF

OUR REFERENCE EFS-JS

WWM
Juan
1/4
SM

December 20, 1984

TO: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: DOUGLAS G. GIBB, HONOLULU POLICE DEPARTMENT

SUBJECT: EIS PREPARATION NOTICE FOR SEWER TUNNEL RELIEF

We have reviewed the environmental impact statement preparation notice concerning replacement of portions of the Manoa-Kaimuki interceptor sewer, and we find nothing in it that requires comment at this time.

Douglas G. Gibb
DOUGLAS G. GIBB
Chief of Police

10
DEC 26 10 53 AM '84
DEPT OF PUBLIC WORKS
RECEIVED
DEPT OF PUBLIC WORKS



DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

KAMAMAILU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 • TELEX: 7430250 HEDPED

85 00469
GEORGE R. ARIYOSHI
GOVERNOR
KENT M. KEITH
DIRECTOR
MURRAY E. TOWILL
DEPUTY DIRECTOR
LINDA KAPUNIAI ROSEHILL
DEPUTY DIRECTOR

Ref. No. P-959

January 22, 1985

DIVISIONS
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION
ENERGY DIVISION
335 Merchant St., Room 110, Honolulu, Hawaii 96813
FOREIGN-TRADE ZONE DIVISION
Par 2, Honolulu, Hawaii 96813
LAND USE DIVISION
PLANNING DIVISION
RESEARCH AND ECONOMIC ANALYSIS DIVISION
OFFICES
DIRECTOR'S OFFICE
ADMINISTRATIVE SERVICES OFFICE
INFORMATION OFFICE

WASTEWATER MANAGEMENT

ENUU
WWM
Jan
2/8/85
MP

The Honorable Russell Smith
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Smith:

Subject: EIS Preparation Notice for Sewer Tunnel Relief, Honolulu

We have reviewed the subject preparation notice and have no comments on it at this time.

Thank you for the opportunity to review the document.

Very truly yours,

Murray E. Towill
Kent M. Keith

01
JAN 28 8 48 AM '85
DEPT OF PUBLIC WORKS
RECEIVED

GEORGE R. ARIYOSHI
GOVERNOR

85-0301
WAYNE J. YAMASAKI
DIRECTOR

RECEIVED
DEPT OF PUBLIC WORKS
JAN 17 2 39 PM '85



85 JAN 18 AM 9 21

DEPT. OF
WASTEWATER
MANAGEMENT

DEPUTY DIRECTORS
JONATHAN K. SHIMADA, Ph.D.
WALTER T.M. HO
CHERYL D. SOON
ADAM D. VINCENT

TO _____
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
800 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

IN REPLY REFER TO:
STP 8.10405

January 14, 1985

END CM
WWM [Signature]

Mr. Russell L. Smith, Jr., Director
and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Smith:

Sewer Relief Tunnel
Honolulu, Hawaii
EIS Preparation Notice

We do not anticipate any significant environmental
impacts upon the State transportation system from this
proposal.

Very truly yours,

[Signature]
Wayne J. Yamasaki
Director of Transportation

RECEIVED

DEC 24 AM 9 07

GEORGE R. ARIYOSHI
GOVERNOR

DIV. OF
WASTEWATER
MANAGEMENT



STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

84-07178

RUSSELL N. FUKUMOTO
Executive Dir.

WWM *From*
Alcott IN REPLY REFER

TO: 84:DEV/73

PPSO

December 19, 1984

Mr. Michael J. Chun
Director and Chief Engineer
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

RECEIVED
DEPT. OF PUBLIC WORKS
DEC 21 3 36 PM '84
TO

Gentlemen:

SUBJECT: Environmental Impact Statement Preparation
Notice for Sewer Tunnel Relief, Honolulu,
Oahu, Hawaii

The Authority has reviewed subject EIS and has no comments
to offer relative to the proposed action at this time.

Thank you for allowing us to comment on this matter.

Sincerely,

Russell N. Fukumoto
RUSSELL N. FUKUMOTO
Executive Director



United States
Department of
Agriculture

Soil
Conservation
Service

P.O. Box 50006
Honolulu, HI
96850

A5-0178

EW *1/11/85*
WWM *CO*
MP

RECEIVED
DEPT OF PUBLIC WORKS
JAN 10 2 47 PM '85
TO _____

Dr. Michael J. Chun
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

January 9, 1985

Dear Dr. Chun:

Subject: EIS Prepartation Notice for Sewer Tunnel Relief
Honolulu, Oahu, Hawaii

REC'D
DEPT OF
WASTE WATER
MANAGEMENT

85 JAN 11 AM 10 16

RECEIVED

We have reviewed the subject notice and have no comments.

Thank you for the opportunity to review this document.

Sincerely,

Stratford L. Whiting
Stratford L. Whiting
District Conservationist





REC-1

U.S. Department of Housing and Urban Development
Honolulu Area Office, Region IX
300 Ala Moana Blvd., Room 3318
Honolulu, Hawaii 96850

85 00468

85 JAN 24 AM 11 51

DEPT OF
WASTEWATER
MANAGEMENT

January 24, 1985

Mr. Russell Smith
Director and Chief Engineer
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

85-31
ENV cel.
WWM gum
2/8/85
MP

Dear Mr. Smith:

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN)
for Sewer Tunnel Relief, Honolulu, Hawaii

We have reviewed the EISPN for the subject project that will provide a 4x5 foot tunnel 3.59 miles long with depths between 8 and 55 feet between Palolo Avenue and Ward Avenue located mostly north of the H-1 freeway. Other new concrete pipes are also proposed to overcome deficiencies in the existing sewer lines.

We concur with the proposed action and do not have any substantive comments that should be considered in preparing the Draft EIS.

Sincerely,

Robert K. Fukuda
Manager, 9.2S

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BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU, HAWAII

630 SOUTH BERETANIA

HONOLULU HAWAII 96813



DEPT. OF PUBLIC WORKS

EILEEN R. ANDERSON, Mayor
WALTER A. DOOS, JR., Chairman
ERNEST A. WATARI, Vice Chairman
MILTON J. ADGER
MICHAEL J. CHUN
RICHARD HIGASHIYAMA
PAULA R. RATH
WAYNE J. TAMASAKI
KAZU HAYASHIDA
Manager and Chief Engineer

December 26, 1984

TO: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: YOUR MEMORANDUM OF DECEMBER 11, 1984, ON THE
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR
SEWER TUNNEL RELIEF - HONOLULU, OAHU, HAWAII

Thank you for sending us the Preparation Notice for the proposed project. We note that some blastings will be required during construction. We recommend that the blasting procedures and charges be monitored to also assure that our water system will not be impacted.

Please submit the construction plans for our review and approval. If you have any questions, please contact Lawrence Whang at 527-6138.

Lawrence Whang
KAZU HAYASHIDA
Manager and Chief Engineer

DEC 31 9 18 AM '84
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DEPT OF PUBLIC WORKS

January 22, 1985

MEMORANDUM

TO: MR. KAZU HAYASHIDA
MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM: RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF DECEMBER 26, 1984
REGARDING THE ENVIRONMENTAL IMPACT
STATEMENT PREPARATION NOTICE FOR
PROPOSED SLUFF TUNNEL RELIEF

Thank you for your comment concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

Blasting operations and impacts will be carefully monitored to assure minimum impacts to water and adjacent utility systems. To assure proper project coordination with the EIS, construction plans will be submitted for your review and approval.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Ed Asakawa at 523-4667.

Russell L. Smith, Jr.
RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

RECEIVED
 DEPARTMENT OF HEALTH
CITY AND COUNTY OF HONOLULU
 1435 S. BERETANIA STREET
 HONOLULU, HAWAII 96814



WASTEWATER
 MANAGEMENT

ANNA MARIA BRAULT, M.D.
 DIRECTOR
 DOROTHY R. GHO
 COUNTY DIRECTOR

December 17, 1984

TO: Michael J. Chun, Director and Chief Engineer
 Department of Public Works

FROM: Anna Maria Brault, M.D., Director

SUBJECT: Environmental Impact Statement Preparation
 Notice For Sewer Tunnel Relief - Honolulu,
 Oahu, Hawaii

Thank you for the opportunity to comment on subject report.

The Health Department wishes to be informed in advance whenever surface construction is planned. The Ambulance Units will need to know which roads will be accessible for fast response to calls for emergency prehospital medical care and emergency ambulance services.

Anna Maria Brault
 ANNA MARIA BRAULT, M.D.

1000 00-00

January 22, 1985

MEMORANDUM

TO: ALMA CHING COPIE, M.D., DIRECTOR
 DEPARTMENT OF HEALTH

FROM: RUSSELL L. SMITH, JR.
 DIRECTOR AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF DECEMBER 17, 1984
 REGARDING THE ENVIRONMENTAL IMPACT
 STATEMENT PREPARATION NOTICE FOR
PROPOSED SEWER TUNNEL RELIEF

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The construction plans and specifications for the proposed Sewer Tunnel Relief will require the contractor to notify your Department whenever surface construction work is planned. Construction will not obstruct significant lengths of roadway along the project corridor, but will advance incrementally along roadway sections as work progresses. No roadway are anticipated to be closed completely.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Arakawa at 533-4067.

Russell L. Smith, Jr.
 RUSSELL L. SMITH, JR.
 Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.



DEPARTMENT OF GENERAL PLANNING
RECORDS SECTION
CITY AND COUNTY DEPARTMENT OF PUBLIC WORKS
550 SOUTH KING STREET
HONOLULU, HAWAII 96813
JAN 16 8 17 AM '85



FRANK E. FASI
City Engineer

WATER
MANAGEMENT

DONALD A. CLEGG
City Planning Officer
EUGENE B. CORNELL
City Engineer/Planning Officer
BH/DGP 12/84-4446

January 14, 1985

MEMORANDUM

TO: Mr. Russell L. Smith, Jr., Director and Chief Engineer
Department of Public Works

SUBJECT: Environmental Impact Statement Preparation Notice for
Sewer Tunnel Relief - Honolulu, Oahu, Hawaii

This is in response to your December 11, 1984 request for input during the EIS preparation phase for the proposed project. The Environmental Impact Statement should address the following concerns:

- A. Consistency with the City and County Development Plan Land Use Maps
- B. Consistency with the City and County Development Plan Public Facilities Map
- C. Safety
- D. The Adequacy of the System Design and its Description
- E. The Appropriateness of the Cost Estimate and the Funding Sources

A. Consistency with the City and County Development Plan Land Use Maps. The 1971 capacity of the interceptor between Ward Avenue and Palolo Avenue was determined to be 35.33 MGD. Will the capacity of the replacement interceptor be consistent with the demand which could be created by the planned land uses shown on the Development Plan Land Use Maps for the Primary Urban Center (PUC) and East Honolulu? To what degree will the sewage facilities be oversized in terms of serviceable population? What is the target year for nominal service and maximum load service?

Mr. Russell L. Smith, Jr., Director and Chief Engineer
Page 2
January 14, 1985

B. Consistency with the City and County Development Plan Public Facilities Map. The following two items will require a Development Plan public facilities amendment (see page 4): 1) The portion of Increment 1B noted as the installation of a 12-inch diameter vitrified clay (VC) pipe in Lunaliio Street between Victoria Street and Pensacola Street, and an 18-inch diameter VC pipe along Pensacola Street to Kinau Street where it will tie into the new 60-inch RCP; 2) the portion of Increment 2 noted as the 18-inch line to be installed along Wilder Avenue between Liholiho Street and Piikoi Street and the 24-inch line between Makiki Street and Liholiho Street connecting to the proposed relief sewer at the Wilder Avenue-Makiki Street intersection. These two items are marked in yellow in the attachment.

Another item is the routing of the interceptor in Increment 1B through Cartwright Field instead of along Kinau Street and Makiki Street. Although this may be substantially in conformance with the Development Plan Public Facilities Map, it may be advisable to initiate a Development Plan Public Facilities Map amendment so that the actual alignment will be in technical conformance with the Development Plan Public Facilities Map. The differing alignment as shown on the DP Public Facilities Map is noted in orange on the attachment.

The Chief Planning Officer would be willing to initiate these two amendments. For more information regarding the Development Plan Public Facilities Map amendment procedures, contact Mr. Lon Polk at extension 6051.

The impact on park use should also be discussed in the EIS.

Some discussion should be given to the coordination between the proposed subject project and the proposed projects which may be initiated by the Department of Transportation Services. A review of the Development Plan Public Facilities Map indicates that there are five projects which require consideration. These are:

1. Improvements within the right-of-way along Beretania Street in the 7 years and beyond planning category.
2. The acquisition of additional right-of-way on Pensacola Street in the 2-6 years category south of Kinau Street and in the 7 years and beyond category north of Kinau Street.

Mr. Russell L. Smith, Jr., Director and Chief Engineer
Page 3
January 14, 1985

3. The acquisition of additional right-of-way on Wilder Avenue in the 7 years and beyond planning category.
4. The acquisition of additional right-of-way along Metcalf Street in the 7 years and beyond planning category.
5. The acquisition of additional right-of-way along Dole Street in the 7 years and beyond planning category.

It is appropriate to coordinate the improvements and acquisitions of rights-of-way with the construction of the sewer tunnel relief.

C. Safety. The use of explosive devices for excavation is of concern, especially since the sewer tunnel relief will traverse heavily-populated areas. A discussion of where the explosive devices will be used and the safety measures that would be used would be appropriate.

There is also concern regarding the length of time that the project will take and the resulting health and safety problems which may occur during this time. The projected completion time is approximately 6 years. What is the probability that the project will require a longer period of time to complete? What mitigating measures will be used to lessen the adverse impacts upon public health, safety, and traffic congestion?

There is also concern on how the system will operate under emergency situations especially a loss of electrical power to run the pumping stations. A discussion of this possibility would be appropriate.

D. Adequacy of System Design and Project Description. Our discussions with your staff have indicated that the "abandoned" sections of the original sewer will be kept as an emergency backup to the main system. This is not expressed in the project description, and a discussion of this would be appropriate. A discussion of anticipated sources of funding for repair and maintenance of anticipated "abandoned" system, which is to be used in emergency situations, should also be provided.

Regarding the design of the emergency backup system, would the capacity of the repaired "abandoned" system be sufficient to accommodate the flow in case of an emergency situation?

Mr. Russell L. Smith, Jr., Director and Chief Engineer
Page 4
January 14, 1985

E. Appropriateness of Cost Estimates and Funding Sources. The cost estimates on page 6 indicate that the estimated construction costs for all increments would be 40.6 million dollars in 1984. Using the same assumptions of 10% per annum escalation, the 1986 cost would be 49.2 million dollars. The current CIP estimates the cost to be 21.451 million dollars, considerably less than the 49.2 million dollars estimated for 1986 made using the same assumptions. Some clarification of the cost of the project would be appropriate.

Clarification of the funding process is also appropriate. Construction grants for wastewater treatment works from the United States Office of Water, Environmental Protection Agency (Catalog of Federal Domestic Assistance No. 66.418) indicates that a Federal grant may be for 75% of eligible project costs for grant assistance awarded before October 1, 1984 and 55% for new grants awarded after September 30, 1984. Our discussion with your staff indicates that the project may be eligible for 75% funding. A discussion of this arrangement would be appropriate. Also, a discussion of State and City funding requirements for both cases would be appropriate.

A worst case scenario of State and City funding sources which may be required to be allocated to this project if the final total cost is in the vicinity of 49.2 million dollars should be discussed. The State share would be about 8.8 million dollars and the City share would be about 13.3 million dollars.

Thank you for this opportunity to comment on the EIS Preparation Notice for the Sewer Tunnel Relief. If you have any questions, please contact Mr. Bennett W. Mark at extension 6067.

Donald A. Clegg
DONALD A. CLEGG
Chief Planning Officer

Attach.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. PARI
MAYOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-120

March 15, 1985

Mr. Donald A. Clegg -2- March 15, 1985

MEMORANDUM

TO: MR. DONALD A. CLEGG
CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF JANUARY 14, 1985
REGARDING THE ENVIRONMENTAL IMPACT
STATEMENT PREPARATION NOTICE FOR
PROPOSED SEWER TUNNEL RELIEF

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

Response to your comments is provided below:

1. Consistency with the City and County Development Plan Land Use Maps

Calculations of flow for the Proposed Sewer Tunnel Relief are consistent with the City's Development Plan Land Use Maps for the Primary Urban Center (PUC) and East Honolulu. The calculations of flow were based on the Development Plan Population Capacity and General Plan Guidelines for the year 2005. Hydraulic analyses will be conducted during the EIS preparation phase to establish the anticipated hydraulic capacity of the proposed relief tunnel.

2. Consistency with the City and County Development Plan Public Facilities Map

Amendments to the City's Development Plan Public Facilities Map have been initiated.

The EIS document will include the potential construction related impacts to public facilities and appropriate mitigation measures.

The proposed Sewer Tunnel Relief project will be coordinated with proposed projects which may be initiated by the Department of Transportation Services.

3. Safety

The EIS document will describe blasting methods, operations, and probable limits, as well as its potential impacts. Blasting operations and impacts will be carefully monitored during construction to determine the extent and magnitude of vibrations. Findings from the monitoring program will be used by the City and County and the contractor in evaluating the blasting program to assure that public health and safety is maintained.

With regard to construction time, the Department will enforce construction time requirements stipulated in the contract documents. As with any construction project, however, delays beyond the control of the contractor may arise which may affect the total length of construction.

Potential construction related impacts along the project corridor will be addressed and appropriate mitigation measures suggested in the EIS document.

Finally, the proposed Sewer Tunnel Relief will be a total gravity flow system. This system of operation, therefore, will not be affected by loss of electrical power.

4. Adequacy of System Design and Project Description

The proposed use of the existing Manoa-Kaimuki Interceptor Sewer as a backup to the new relief sewer (after project completion) will be addressed in the EIS document. The

Mr. Donald A. Clegg

-3-

March 15, 1985

extent and cost of rehabilitating the existing sewer to serve as a backup will be determined later as part of a separate effort after flows are diverted.


For temporary, emergency purposes, the existing sewer would accommodate future flows. However, flow conditions, from a hydraulic standpoint, would be less than desirable, since portions of the sewer would probably flow full during peak flow conditions.

5. Appropriateness of Cost Estimates and Funding Sources

The CIP estimates will be modified and updated to agree with the current cost estimates prepared for the EIS.

Under current policies, sources of funding for the Proposed Sewer Tunnel Relief Increments 1-B, 2 and 3 will be 75% Federal, 10% State, and 15% City and County of Honolulu. Increment 4 is ineligible for Federal and State funding. Funding arrangements will be summarized in the EIS.

We hope the above responses adequately address your comments. A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.


for RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: /Wilson Okamoto & Associates, Inc.

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
75 King's Highway
630 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 525-4333



WASTEWATER
MANAGEMENT

FRANK F. FASI
DIRECTOR

JOHN P. WHALEN
DIRECTOR
BENJAMIN B. LEE, AIA
SENIOR DIRECTOR
LUT2/84-6441(LM)

January 14, 1985

Ms. Letitia H. Uyehara, Director
Office of Environmental Quality
Control
State of Hawaii
550 Halekuanila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Environmental Impact Statement Preparation Notice (EISPN)
For Sewer Tunnel Relief in Honolulu, Oahu, Hawaii

We appreciate the opportunity to review the above EISPN and have the following comments and questions for your consideration.

1. Reference: C. Purpose and Need, Page 2.
Comment: Why may the "rate of structural degradation and decreased capacity of the interceptor . . . be attributed to the Kahala Sewage Pump Station?"
2. Reference: 1. Soils, Page 6 and 7.
Comment: The soil types and their characteristics along the sewer tunnel alignment should be described in more detail.
3. Reference: 2. Topography, Page 7.
Comment: The topography along the sewer tunnel alignment should be described in more detail.
4. Reference: Water Quality, Page 8.
Comment: The environmental impacts of the stream crossings during construction and subsequent long term impacts should be discussed in the Draft EIS. Particular attention should be given to Manoa Stream and Palolo Stream since both streams are of moderate to high quality.

Ms. Letitia H. Uyehara, Director
Page 2

5. Reference: Flood Hazard, Page 9.

Comment: The EISPN indicates that the flood hazard designation along the project corridor is Flood Zone C. Does this include the portions of the project adjacent to or within streams? If not, the FIRH designation for these areas should also be described in the Draft EIS.

6. Reference: Archaeological Historical Sites, Page 9.

Comment: The Draft EIS should discuss the possibility of discovering archaeological artifacts and Hawaiian burials during construction of the proposed project. Measures to mitigate impacts on archaeological resources should also be discussed.

If there are any questions or comments, please contact Lorene Haki of our staff at 527-5349.

Very truly yours,

JOHN P. WHALEN
Director of Land Utilization

JPM:s1

cc: DPW, Division of Wastewater Management
ATTENTION: Mr. Edward Arakawa
Wilson Okamoto & Associates, Inc.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK J. CASE
MAYOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

Mr. John P. Whalen -2- March 21, 1985

WPP 85-116

March 21, 1985

MEMORANDUM

TO: MR. JOHN P. WHALEN
DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

SUBJECT: YOUR LETTER OF JANUARY 14, 1985 TO OEQC
REGARDING THE ENVIRONMENTAL IMPACT
STATEMENT PREPARATION NOTICE FOR
PROPOSED SEWER TUNNEL RELIEF

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

Responses to your comments are provided below:

1. Purpose and Need

The EIS document will include a discussion of the rate of structural degradation and decreased capacity of the existing interceptor sewer which may be attributed to the Kahala Sewage Pump Station (SPS). The Kahala SPS serves the area as remote as Niu Valley; the long detention time in sewers, pump stations and force mains and saline water infiltration result in formation of hydrogen sulfate which contributed to the deterioration of the interceptor sewer.

2. Soils

The EIS document will include a more detailed description of soil conditions along the project corridor.

3. Topography

The EIS document will include a description of the topography along the project corridor.

4. Water Quality

Construction and long-term impacts at stream crossings will be addressed in the EIS. Possible mitigative measures to minimize impacts will also be discussed in the document.

5. Flood Hazard

The EIS document will include a discussion of the flood hazard areas designated Zone A7 and A5 for Manoa and Palolo Streams, respectively.

6. Archaeological/Historic Sites

The EIS document will discuss the potential for uncovering archaeological artifacts and Hawaiian burials during construction of the proposed project, and appropriate mitigation measures.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

for RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK P. FASI
DIRECTOR

FRANK P. FASI
DIRECTOR

TOM T. NEKOTA
DIRECTOR

FRANK P. FASI
DIRECTOR

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



RUSSELL L. SMITH, JR.
DIRECTOR

WPP 85-117

January 14, 1985

March 15, 1985

TO: RUSSELL SMITH, JR., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: TOM T. NEKOTA

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
SEWER TUNNEL RELIEF, HONOLULU, OAHU

The proposed sewer tunnel relief improvements may cause adverse effects on parks located in proximity to the project area.

Substantive comments will be provided after we have the opportunity to review the draft environmental impact statement.

Tom Nekota

TOM T. NEKOTA, Director

TTH:vc

MEMORANDUM

TO: MR. TOM T. NEKOTA
DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF JANUARY 14, 1985
REGARDING THE ENVIRONMENTAL IMPACT
STATEMENT PREPARATION NOTICE FOR
PROPOSED SEWER TUNNEL RELIEF

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The EIS document will address probable short-term construction related impacts along the project corridor and mitigative measures.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Russell L. Smith, Jr.

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

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DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JAN 17 1985

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Frank E. Anderson
MANAGER
D.G. Anderson
MANAGING DIRECTOR

John E. Hirtzen
DIRECTOR
DEPUTY DIRECTOR

January 15, 1985

TE12/84-4691

MEMORANDUM

TO: RUSSELL L. SMITH, JR., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: JOE MAGALDI, ACTING DIRECTOR

SUBJECT: EIS PREPARATION NOTICE FOR SEWER TUNNEL RELIEF

The EIS should include a traffic study. The study should address the following traffic related concerns:

1. The impact of the project on vehicular and pedestrian traffic during the construction phase. Detour plans must be coordinated with our department.
2. The impact of the project on City Bus Service in the affected areas. Closure of streets during construction must be coordinated with MTL to allow adequate time for rerouting of Bus Routes.

If there are any questions, please contact Kenneth Hirata of our staff at 527-5009.

JOE MAGALDI

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. FASI
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-118

March 15, 1985

Mr. John E. Hirten

-2-

March 15, 1985

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

for RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: / Wilson Okamoto & Associates, Inc.

MEMORANDUM

TO: MR. JOHN E. HIRTEN
DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

FROM: RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF JANUARY 15, 1985
REGARDING THE ENVIRONMENTAL IMPACT
STATEMENT PREPARATION NOTICE FOR
PROPOSED SEWER TUNNEL RELIEF

Thank you for your department's comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The EIS document will contain a capacity analysis which will address the project's potential impacts to traffic during construction. Possible mitigative measures that may be implemented along various sections of the project corridor will be suggested. No roadways are anticipated to be closed completely. Pedestrian traffic considerations will also be addressed in the EIS document.

In addition, to assure proper coordination with the DTS, construction plans will be submitted to your Department for review and approval.

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
1425 S. BORETANIA STREET, ROOM 302
HONOLULU, HAWAII 96814



FRANK KAHOOHANOHANO
FIRE CHIEF

January 9, 1985

TO : RUSSELL L. SMITH, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : FRANK K. KAHOOHANOHANO, FIRE CHIEF

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
FOR SEWER TUNNEL RELIEF - HONOLULU, OAHU, HAWAII

We have no objections to the proposed subject provided: (1) access to fire hydrants is maintained for fire department use and (2) access to building structures along the project route is not blocked.

Frank K. Kahooohanano
FRANK K. KAHOOHANOHANO
Fire Chief

FKK:sb
cc: Administrative Services

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JAN 15 2 15 PM '85

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
850 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK P. EASI
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 05-119

March 15, 1985

Mr. Frank K. Kahooahonohano -2- March 15, 1985

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.
Engineering and Construction Branch

MEMORANDUM

TO: MR. FRANK K. KAHOOAHONOHANO
FIRE CHIEF
FIRE DEPARTMENT

FROM: RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF JANUARY 9, 1985
REGARDING THE ENVIRONMENTAL IMPACT
STATEMENT PREPARATION NOTICE FOR
PROPOSED SEWER TUNNEL RELIEF

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The forthcoming EIS document will address your concerns. It will point out the following items.

1. The construction plans and specifications for the Proposed Sewer Tunnel Relief will require the contractor to notify your department whenever surface construction work is planned.
2. Construction will not obstruct significant lengths of roadway along the project corridor, but will advance incrementally along roadway sections as work progresses. No roadways are anticipated to be closed completely.
3. Contract specifications will require accessibility to fire hydrants at all times and driveways during non-working hours.



GEORGE R. ARTHUR
GOVERNOR

11 1985

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

STATE OF HAWAII
DIVISION OF PUBLIC WORKS
P. O. BOX 111, HONOLULU, HAWAII 96810

WILSON M. MURPHY
DIRECTOR

MARIE A. TOLSON
DEPUTY DIRECTOR

LETTER NO. (P) 1013.5

JAN 14 1985

Dr. Michael Chun
Director & Chief Engineer
Department of Public Works
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Dr. Chun:

Subject: Environmental Impact Statement
Preparation Notice for Sewer Tunnel Relief
Honolulu, Oahu, Hawaii

We have reviewed the subject Preparation Notice and note that the construction procedures are to be addressed in the EIS.

We are particularly concerned with the construction procedures and scheduling as it may affect Hokuani and Kaahumanu Elementary Schools and the University of Hawaii.

We request that the adverse short term impacts on pedestrian and vehicular traffic during construction be discussed further in the EIS.

Thank you for the opportunity to comment on the EIS Preparation Notice.

Very truly yours,

Teuane Tomimaga
TEUANE TOMINAGA

Acting State Public Works Engineer

GA:jk
cc: Honolulu District Office, DOE
Facilities Planning Office, UH

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DEPT OF PUBLIC WORKS
JAN 15 2 16 PM '85

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK FAS
MAIL

RUSSELL L. SMITH, JR.
DIRECTOR OF PUBLIC WORKS

WPP 85-105

Mr. Teuane Tominaga -2- March 15, 1985

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

March 15, 1985

Mr. Teuane Tominaga
Acting State Public Works Engineer
Division of Public Works
Department of Accounting & General Services
State of Hawaii
P. O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Tominaga:

Subject: Your Letter of January 14, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The EIS document will address probable short-term construction related impacts along the project corridor and mitigative measures. A capacity analysis will address the project's potential impacts to traffic during construction. In addition, impacts to pedestrian traffic will also be addressed. Wherever feasible and appropriate, construction work located within the proximity of schools will be scheduled during the summer vacation period to minimize adverse impacts on school activities.

Very truly yours,

for RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.
Engineering and Construction Branch

GEORGE & ARTHURS
CONSULTANTS

Francis M. Hatanaka
XXXXXXXXXXXXXX
SUPERINTENDENT



WASTE WATER
MANAGEMENT STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2344
HONOLULU, HAWAII 96813

OFFICE OF THE SUPERINTENDENT

January 4, 1985

RECEIVED
DEPT OF PUBLIC WORKS
JAN 3 2 11 PM '85
TO _____

Mr. Russell L. Smith, Jr.
Director and Chief Engineer
Department of Public Works
City & County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Smith:

SUBJECT: EIS, Preparation Notice
Sewer Tunnel Relief

The proposed sewer tunnel relief project routing along Pensacola and Kinau Streets is expected to severely impact our Kaahumanu Elementary School. Since the phasing of Increment 1-B is estimated to begin in late 1985 and will require 630 calendar days, may we request that consideration be given to scheduling the Kaahumanu section during the summer of 1986.

Kaahumanu Elementary is operating at full capacity with over 860 students and has no flexibility in relocating classes to minimize the noise and air pollution accompanying the sewer construction. Any relief you can provide through scheduling will be appreciated.

Should there be any questions, please contact Mr. Howard Lau at 737-4743.

Sincerely,

Francis M. Hatanaka
Superintendent

FMH:J1

cc: V. Honda, OBS
C. Suyat, Hon. Dist.

AN EQUAL OPPORTUNITY EMPLOYER

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. PASH
DIRECTOR

Mr. Francis M. Hatanaka

-2-

March 15, 1985

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

MPP 85-107

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

March 15, 1985

Mr. Francis M. Hatanaka
Superintendent
Department of Education
State of Hawaii
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Mr. Hatanaka:

Subject: Your Letter of January 4, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

As requested, we plan to schedule the sewer construction work within the immediate vicinity of Kaahumanu Elementary School during the summer vacation months. Work along the immediate boundaries of the school on Pensacola and Kinau Streets involves installation of about 1000 feet of 60-inch sewer pipe and about 600 feet of 8-inch water line. By necessity, the water line relocation work must precede the sewer pipe work and we expect the combined construction duration to last approximately 5 months. Accordingly, we may not be able to complete all construction work within the vicinity of the school during any 3-month summer vacation period. Please be assured that we intend to minimize interruptions to school activities as much as possible.

Very truly yours,

For RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.
Engineering and Construction Branch

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



RUSSELL L. SMITH, JR.
Deputy Director for Environmental Health

WPP 85-104

Leslie S. Hataubara
ZONING & PLANNING
DIRECTOR OF HEALTH

FRANK F. FASI
DIRECTOR

IN REPLY, PLEASE REFER TO
EPHD-55



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

APR 15 AM 11 39

WATER
MANAGEMENT

GEORGE B. ANTONIO
DIRECTOR OF WATER

January 10, 1985

March 15, 1985

Mr. Russell L. Smith, Jr.
Director and Chief Engineer
Department of Public Works
City & County of Honolulu
650 S. King St.
Honolulu, Hawaii 96813

Mr. Melvin K. Koizumi
Deputy Director for Environmental Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Smith:

Subject: Request for Comments on Proposed Environmental Impact Statement
(EIS) for Sewer Tunnel Relief, Honolulu, Oahu, Hawaii

Thank you for allowing us to review and comment on the subject proposed EIS.

The EIS should discuss in detail the short-term impacts of construction along the proposed route. These impacts should be compared against alternative routes along Beretania Street, King Street and Keoluani Boulevard. It appears at this point that the proposed route has the minimal impact; however, it should be documented.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

Sincerely,

MELVIN K. KOIZUMI
Deputy Director for
Environmental Health

RECEIVED
DEPT OF PUBLIC WORKS
APR 15 2 16 PM '85

Dear Mr. Koizumi:

Subject: Your letter of January 10, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The EIS document will address probable short-term construction related impacts along the project corridor and mitigative measures. Alternate alignments considered for the Proposed Sewer Tunnel Relief will be addressed.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
510 HALEKUAUWA STREET
ROOM 211
HONOLULU, HAWAII 96813

LETITIA N. UYEHARA
DIRECTOR
TELEPHONE NO.
548-9811

GEORGE B. ANTONIAN
ENGINEER

JAN -7 AM 8 30

OFFICE OF
WATER
MANAGEMENT

January 2, 1985

WPP 85-16

January 22, 1985

Mr. Russell Smith
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawaii 96813

Honorable Letitia N. Uyebara, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekuauiwa Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. Uyebara:

Dear Mr. Smith:

Subject: Preparation Notice for Proposed Sewer Tunnel Relief

Subject: Your letter of January 2, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

The environmental impact statement should describe in greater detail the effect of blasting on existing businesses and structures. It should also address where blasting would likely occur.

Thank you for your comment concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

We have no other comments to offer at the present time. Thank you for providing us the opportunity to review this preparation notice.

The EIS document will describe blasting methods, operations, and probable limits, as well as its potential impacts to structures and soils. The magnitude of blast vibrations perceivable by humans will also be discussed.

Hard rock tunneling methods to be discussed in the EIS document will address blasting, as well as mechanical boring and chemical splitting techniques.

Sincerely,

Letitia N. Uyebara

Letitia N. Uyebara
Director

10
JAN 4 1 56 PM '85
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DEPT OF PUBLIC WORKS

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Ed Arakawa at 523-4067.

Very truly yours,
Russell Smith
RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

Chief engineer: Kaimuki-Nuuanu sewer line urgent

By Mark Matsumaga
Honolulu Government Bureau

The city may face a "calamity" unless it builds a \$50 million sewer line from Kaimuki to Nuuanu, city Chief Engineer Russell L. Smith Jr. said yesterday.

The project would be in addition to a series of islandwide sewer improvements costing at least \$12 million that the federal government wants the city to make.

Smith said sewage from most of East Honolulu now flows through a tunnel more than 50 years old that runs from near the Waialae Drive-In Theater to Lusitana Street.

"If we have a collapse of that tunnel under Kaimuki, all the sewage that generates from, let's say, Koko Head (Avenue) or 12th Avenue all the way out to Kuliouou, will be going out someplace other than where it's supposed to," he said. In other words it will back up.

The lack of an alternative line also means there's no way to divert sewage from that tunnel to perform much-needed maintenance and repairs on it, he said.

Smith also said construction of a new line might help reduce the stench near the Honolulu Academy of Arts, although it wouldn't eliminate it. The cascading of sewage at the intersection, he said, releases odiferous gases there, he said.

Smith stressed that he was estimating the project's cost very roughly, based on projections from years ago, when it

was first proposed. "I'm not pointing any fingers," Smith said, but he suggested that not enough attention and money has been devoted to maintaining and improving Honolulu's sewer system in the past.

The council also faces a Jan. 31 deadline to sign a series of agreements to improve various Oahu sewer treatment facilities and substantially beef up maintenance of them, or risk hefty fines and loss of federal sewer grants.

Council members raised several questions and postponed acting on that matter until its next meeting.

Smith said he is heartened by City Council Chairwoman Patsy Mink's proposal for a massive civil works program to replace Oahu's deteriorating roads and sewers.

Smith took office with the Fast administration less than a fortnight ago but has 31 years of sanitary engineering experience here and elsewhere in the Pacific.

Questioned by Councilman George Akahane, Smith and other city Public Works officials said Honolulu does not share problems of air pollution caused by sewage treatment plants in Philadelphia and many other

Manland cities, as reported in yesterday's Advertiser. Industrial waste is to blame for much of the problems in those cities, they said. In Hawaii, hydrogen sulfide created by brackish water seeping into sewer lines is a larger problem.



University of Hawaii at Manoa

Water Resources Research Center
Hulmus Hall 253 • 2540 Dole Street
Honolulu, Hawaii 96822

17 January 1985

Mr. Russell L. Smith, Jr.
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Smith:

SUBJECT: Environmental Impact Statement Preparation Notice of Sewer Tunnel Relief, Honolulu, Hawaii, December 1984

We have reviewed the subject EISPN and offer the following comment. The most serious environmental impact of this proposal is the long construction period (6 years 4 1/2 months). It appears incongruous to allow "short term impacts" (p. 12-14) to continue for that long a time when the project is badly in need of completion according to the Chief Engineer in a Honolulu Advertiser, January 15, 1985, p. A-3 (copy enclosed). If the urgency is true as reported, the project should be completed as soon as possible, which would also reduce the duration of the "short-term" environmental impacts.

Since there are schools and universities along the projected route, the rapid cessation of noise and disturbances will undoubtedly be appreciated.

Thank you for the opportunity to comment. This material was reviewed by WRRRC personnel.

Sincerely,
Edwin T. Murabayashi
Edwin T. Murabayashi
EIS Coordinator

ETH:jm
Encl.

RECEIVED
DEPT OF PUBLIC WORKS
JAN 21 2 02 PM '85

AN EQUAL OPPORTUNITY EMPLOYER

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. FASI
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR and Chief Engineer

WPP 85-113

March 15, 1985

Mr. Edwin T. Murabayashi -2- March 15, 1985

The EIS document will include the potential construction related impacts to public facilities and appropriate mitigation measures.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,
Edwin T. Murabayashi

RUSSELL L. SMITH, JR.
for Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

Mr. Edwin T. Murabayashi
EIS Coordinator
Water Resources Research Center
University of Hawaii
Holmes Hall 283
2540 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Murabayashi:

Subject: Your Letter of January 17, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

Considering fiscal limitations and constraints and the nature and magnitude of the project, incremental construction and the projected schedule are considered realistic and appropriate. Although the entire project is projected to be completed in about 6 1/2 years, the duration of short term construction impacts for any given locality will be in terms of months rather than years. These impacts will not be significantly reduced for that given locality by compressing the overall project timetable. Unfortunately, while the urgency of the project exists, construction effort of this proportion requires us to manage the City's resources with other requirements.



DEPARTMENT OF THE ARMY
 ARMY ENGINEER DISTRICT, HONOLULU
 FT. SHAFTER, HAWAII 96839

MAIL ROOM
 APPROVAL

January 18, 1985

Mr. Russell Smith, Director
 Department of Public Works
 City and County of Honolulu
 650 S. King St.
 Honolulu, Hawaii 96813

Dear Mr. Smith:

Thank you for the opportunity to review and comment on the EIS Preparation Notice for Sewer Relief Tunnel, Honolulu, Oahu, Hawaii. The following comments are offered:

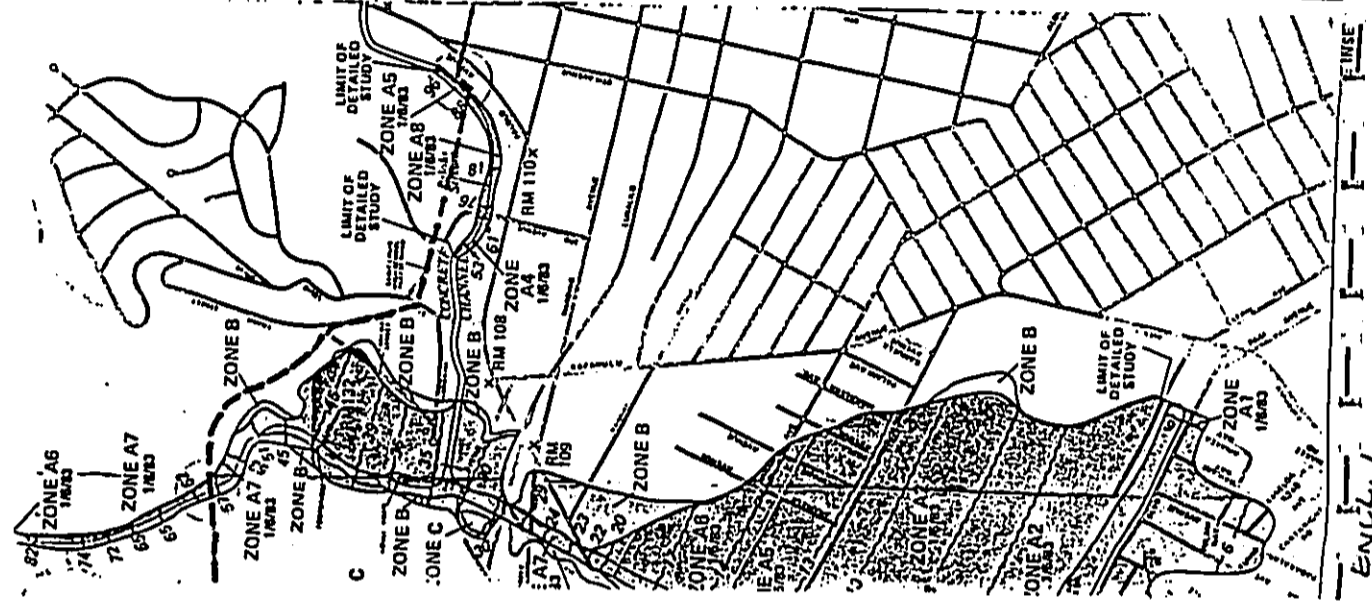
- a. A Department of the Army permit is not required for the proposed project provided the sewer tunnel is constructed under Hakiki, Manoa and Palolo Streams as stated in the EIS Preparation Notice.
- b. The only areas of possible flood hazards include the crossing of Manoa and Palolo Streams. This section has been identified on the flood insurance rate map for Honolulu as shown in Enclosure 1. The areas are designated Zone A7 and A5 for Manoa and Palolo Streams respectively. A Zone A designation delineates the 100-year flood area. The 100-year event is that which has a one percent chance of occurrence in any given year.

Sincerely,

Mark Chung
 Chief, Engineering Division

Enclosure

58-16 82 Z 57 151
 58-16 82 Z 57 151



To determine if flood insurance is available in this community contact your insurance agent, or call the National Flood Insurance Program, at (800) 618-6870.



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
 FLOOD INSURANCE RATE MAP

CITY AND COUNTY OF
 HONOLULU, HAWAII

PANEL 120 OF 135
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
 150001 0120 B

MAP REVISED:
 JANUARY 6, 1983



Federal Emergency Management Agency

ENCLOSURE

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK P. FASI
MUNICIPAL ENGINEER

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-103

March 15, 1985

Mr. Kisuk Cheung
Chief, Engineering Division
U.S. Army Engineer District, Honolulu
Department of the Army
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

Subject: Your Letter of January 18, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact
Statement (EIS) Preparation Notice for the Proposed Sewer
Tunnel Relief.

The EIS document will include a discussion of the flood hazard
areas designated Zone A7 and A5 for Manoa and Palolo Streams,
respectively.

A copy of your letter will be appended to the EIS document. If
there are any questions, please contact Mr. Ed Arakawa at
523-4067.

Very truly yours,
Handwritten signature of Russell L. Smith, Jr.

FOR RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

cc: Wilson Okamoto & Associates, Inc.



RECEIVED

JAN 24 10 10 AM '85

United States Department of the Interior

FISH AND WILDLIFE SERVICE

100 ALA MOANA BOULEVARD

P.O. BOX 50187

HONOLULU, HAWAII 96850

MAIL ROOM

ES

ROOM 6307

JAN 24 1985



DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-115

March 15, 1985

Mr. Russell L. Smith
Director and Chief Engineer
City Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

Re: Preparation Notice, Sewer Tunnel Relief
Honolulu, Oahu, Hawaii

Dear Mr. Chun:

We have reviewed the referenced document and offer the following comments.

The Environmental Impact Statement should discuss the potential impacts of the project on stream flow in Makiki, Manoa, and Palolo Streams. Flow reduction may reduce the amount of habitat available for indigenous stream animals.

We appreciate this opportunity to comment.

Sincerely yours,

Ernest Kosaka

Ernest Kosaka
Project Leader
Office of Environmental Services

cc: DAR

Mr. Ernest Kosaka, Project Leader
Office of Environmental Services
Fish and Wildlife Service
U.S. Department of the Interior
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Kosaka:

Subject: Your Letter of January 22, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The EIS document will discuss the potential impacts of the project on stream flow in Makiki, Manoa, and Palolo Streams, as well as possible measures for mitigating adverse impacts.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,

Russell L. Smith, Jr.
for RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.



Save Energy and You Serve America!

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U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 REGION ONE
 Hawaii Division
 Box 50206
 Honolulu, Hawaii 96850

ADMINISTRATIVE
 DIVISION
 HONOLULU, HAWAII

December 26, 1984
 HDA-HI
 (574)

ADMINISTRATIVE
 MANAGEMENT

Dr. Michael J. Chun, Director
 and Chief Engineer
 City & County of Honolulu
 Department of Public Works
 650 So. King Street
 Honolulu, Hawaii 96813

Dear Dr. Chun:

Subject: Environmental Impact Statement, Preparation Notice for
 Sewer Tunnel Relief, Honolulu, Oahu, Hawaii

The H-1 freeway should be included among the major thoroughfares
 listed on Page 12 of the Preparation Notice.

We have no other comments to offer. Thank you for the opportunity
 to review the document.

Sincerely yours,


 H. Kusumoto
 Division Administrator

January 22, 1985

Mr. H. Kusumoto
 Division Administrator
 Federal Highway Administration
 U.S. Department of Transportation
 P. O. Box 50206
 Honolulu, Hawaii 96850

Dear Mr. Kusumoto:

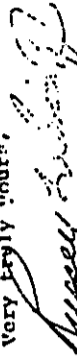
Subject: Your letter of December 26, 1984
 Regarding the Environmental Impact
 Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comment concerning the Environmental Impact
 Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel
 Relief.

The H-1 Freeway will be included among the major thoroughfares
 listed in the forthcoming FIS document.

A copy of your letter will be appended to the FIS document. If
 there are any questions, please contact Ed Akaoka at 523-4067.

Very truly yours,


 RUSSELL L. SMITH, JR.
 Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

10
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UFP 05-27

Representative James T. Sison
HOUSE OF REPRESENTATIVES
THE THIRTEENTH LEGISLATURE

STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

January 21, 1985

Henry Haalilio Peters
MARSHALL K. KEE
RICHARD A. KAWAKAWA
TOM OKAMURA

73. AMU 50

DISTRICT REPRESENTATIVE WATER
MANAGEMENT

- 14 - ANDREW LEVIN
- 24 - HARVEY S. TARR
- 34 - WAYNE METCALF
- 44 - DWIGHT Y. TAKAMUNE
- 54 - VIRGINIA ISHLL
- 64 - ROBERT K. LINDSEY
- 74 - MARK J. ANDREWS
- 84 - HERBERT J. HONDA
- 94 - JOSEPH M. SUKI
- 104 - BILL PEIL
- 114 - DANIEL J. KIHANO
- 124 - RON MEMOR
- 134 - ROBERT BUNDA
- 144 - JOSEPH P. LILONG
- 154 - BOB NAKATA
- 164 - TERANCE W. H. TOM
- 174 - MARSHALL K. KEE
- 184 - WYNNE T. ANDERSON
- 194 - HENRY HAALILIO PETERS
- 204 - CARL CAVASSO
- 214 - DONNA R. IKEDAI
- 224 - HAL KINGS
- 234 - BARBARA MARUMOTO
- 244 - ERIC HELMUNGE, JR.
- 254 - CALVIN K. T. SAI
- 264 - KEN KIYABU
- 274 - BRIAN T. TANGUCH
- 284 - JAMES T. SISON
- 294 - DAVID M. HIGINO
- 304 - KUNA U. MOYD KAKALII
- 314 - RUSSELL BLAIR
- 324 - HAZEL HIRONO
- 334 - BOO TAM
- 344 - NILE LU
- 354 - GALEN K. OMOUTE
- 364 - DWIGHT L. YOSHIMURA
- 374 - DENNIS M. NAKASATO
- 384 - RYUNOBU OKAMURA
- 394 - RONY M. CACTOLA
- 404 - DENNIS M. NAKASATO
- 414 - TOM OKAMURA
- 424 - CLARKE Y. HANAHOTO
- 434 - ANTONIO M. GONZALEZ
- 444 - ELOUIS YAMASHITA TUNGAPALAN
- 454 - MITSUO "MITSU" SHIRO
- 464 - PAUL T. OSHIRO
- 474 - SHAL CROWDER
- 484 - HENRY HAALILIO PETERS
- 494 - PETER K. AMU
- 504 - ARTHUR C. IANIMARAI
- 514 - RICHARD A. KAWAKAWA

Honorary Secretary
Honorary Treasurer



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JAN 23 40 PM '85

Thank you for the opportunity to comment on this project. Please include my office on your mailing list for the EIS.

Sincerely yours,
James T. Sison
JAMES T. SISON
Representative, 28th District

Dear Mr. Chun,

Subject: Environmental Impact Statement
Comments for Sewer Tunnel Relief
Honolulu, Oahu, Hawaii

The proposed sewer project will directly impact the 28th Representative District, especially increments 2-4 which are planned to follow Wilder Ave., Metcalf St., Koonanea St., Dole St., and St. Louis Drive. Most of these are important thoroughfares which if disrupted could have an adverse effect on morning and afternoon traffic. They also pass through residential neighborhoods and the University of Hawaii, and pose additional problems for these areas.

My primary concern is that before the implementation of the project, standards will be established to minimize adverse impacts. Such standards should include strategies to abate noise and air pollution, the careful scheduling of construction hours to minimize traffic congestion, and other safety measures.

In order to insure the adequacy of such strategies, I would suggest that standards be determined before the details of the project are determined, so that the reduction of impacts is well integrated into the implementation phases, not merely an afterthought. If contracts are to be let to the private sector, it is essential that standards be incorporated into the process before bids are received.

As to the possibilities of reducing air and noise pollution, I would suggest consulting the EIS prepared for the TAPA TOWER project in Waikiki several years ago, which contained an excellent review of the ways in which various equipment could be modified to ensure minimum impacts. It is this kind of detail I would want to see in the EIS because the project will pass through highly congested residential areas. Residents have a right to expect that their lives will be disrupted as little as possible.



HPP 85-109

March 15, 1985

The Honorable James T. Shon
House of Representatives
State of Hawaii
State Capitol, Room 318
Honolulu, Hawaii 96813

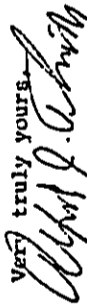
Dear Representative Shon:

Subject: Your letter of January 21, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The EIS document will address probable short-term construction related impacts along the project corridor and mitigative measures which will include strategies to abate noise and air pollution, scheduling construction hours to minimize traffic congestion, and other safety measures. The forthcoming EIS document will also include a discussion of construction operations and the responsibilities of the contractor to minimize construction impacts.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 573-4067.

Very truly yours,

for RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

MAKIKI/LOWER PUNCHBOWL/TANTALUS BOARD NO. 10
c/o Neighborhood Commission Office
City Hall 4th Floor
530 S. King St.
Honolulu, HI 96813

CITY AND COUNTY OF HONOLULU
WATER MANAGEMENT



January 23, 1985

Mr. Russell Smith
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 S. King St. 11th Floor
Honolulu, HI 96813

Dear Mr. Smith:

Subject: EIS Preparation Notice for Sewer Tunnel Relief, Honolulu
The Makiki Neighborhood Board agrees with your determination that an EIS is required for the subject project. The Board is concerned with the potential traffic congestion, damage to nearby buildings and utilities, and noise pollution. The draft EIS should state the plans to mitigate the potential impact of the construction.

Sincerely,
Charles H. Carole
Charles H. Carole
Vice President

cc: Neighborhood Commission

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



March 15, 1985

Mr. Charles H. Carole
Vice President
Makiki/Lower Punchbowl/Tantalus Board No. 10
c/o Neighborhood Commission Office
City Hall 4th Floor
530 South King Street
Honolulu, Hawaii 96813

Dear Mr. Carole:

Subject: Your Letter of January 23, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The EIS document will examine potential construction related impacts and associated mitigative measures, including those associated with noise, traffic, and blasting.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,
Russell L. Smith, Jr.
For
RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

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MAR 27 PM '85

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-110

FRANK P. PARK
MAIL ROOM

HAWAIIAN ELECTRIC COMPANY, INC. • PO BOX 2750 • HONOLULU, HAWAII 96804

JUL 11 AM 10 16

ENV 2-1
NV/G

DEPT OF
WATER
MANAGEMENT

January 8, 1985

Brenner Munger, Ph.D., P.E.
Manager
Environmental Department
(808) 548 6880



Mr. Russell L. Smith, Jr.
Director and Chief Engineer
Department of Public Works
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Smith:

Subject: Environmental Impact Statement Preparation Notice for
Sewer Tunnel Relief, Honolulu, Oahu, Hawaii

We have reviewed the above subject and offer the following comments:
1. The above subject will be in close proximity of existing HECO facilities which will remain energized; therefore, the following HECO Notes are to be included as part of the final construction plans:

- a. The existence and location of HECO's overhead facilities are as shown on the plans. The Contractor is to exercise extreme caution when the excavation and construction crosses or is in close proximity of our lines and is to maintain 13'-0" clearance for his equipment while working close to and/or under the overhead facilities.
- b. The Contractor is to comply with the directions of the State of Hawaii Occupational Safety and Health Law (DOSII).
- c. When trench excavation is adjacent to or under existing structures or facilities, the Contractor is responsible for properly sheeting and bracing the excavation and stabilizing the existing ground to render it safe and secure from possible slides, cave-ins and settlement, and for properly supporting existing structures and facilities with beams, struts or underpinings to fully protect it from damage.

Mr. Russell L. Smith, Jr.
January 8, 1985
Page Two

- d. For pole bracing instructions, should field conditions and/or construction procedures require that poles be braced to facilitate construction, the Contractor is to contact R. Correa at 548-7745 a minimum of 72 hours in advance.
- e. Should it become necessary, any work required to relocate HECO facilities shall be done by HECO. The Contractor shall be responsible for all coordination.
- f. The Contractor shall be liable for any damages to HECO's facilities.
- g. The Contractor shall report any damages to HECO's facilities to the HECO Trouble Dispatch at 548-7961.

Thank you for the opportunity to comment on this Environmental Impact Statement Preparation Notice.

Sincerely,

Brenner Munger

Brenner Munger, Ph.D., P.E.
Manager, Environmental Department

SIC:cal

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DEPT OF PUBLIC WORKS
JAN 10 2 47 PM '85



DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. GARDNER
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR AND LEAD ENGINEER

WPP 85-108

March 15, 1985

Dr. Brenner Munger, P.E.
Manager, Environmental Department
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840

Dear Dr. Munger:

Subject: Your Letter of January 8, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The forthcoming EIS document will include a discussion of construction operations and the responsibilities of the contractor. Construction plans will include HECO Notes cited in your letter. To assure proper coordination with the HECO, construction plans will be submitted for your review and approval.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,
A handwritten signature in dark ink, appearing to read "Russell L. Smith, Jr.".

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.
Engineering & Construction Branch

RECEIVED

JAN 21 10 01 HAWAIIAN TELEPHONE RECEIVED
DEPT. OF PUBLIC WORKS

WATER
MANAGEMENT

JAN 23 2 28 PM '85
TO

Mr. Michael J. Chun
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Sir:

Environmental Impact Statement (EIS)
Preparation Notice for Sewer Tunnel Relief
Honolulu, Oahu, Hawaii

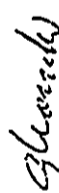
Thank you for your letter dated December 11, 1984, relating to the Environmental Impact Statement preparation.

Hawaiian Telephone Company is concerned with the blasting required to construct a portion of the proposed sewer relief tunnel which crosses the rock masses and coral ledges, as stated in the preparation notice, because blasting increases potential damage to our existing underground telephone structures. We suggest that the general areas where blasting may be required be stated in the EIS. Also, in Table 2, "Damage level from ground vibration", please include the probable damages to underground structures such as man-holes and ductlines.

Other problems concerning necessary relocation of our facilities, work coordination with your contractor, and access to our facilities during the construction phase of the project cannot be evaluated without more detailed plans. These problems can be addressed after our review of the construction plans.

If you have any questions, please call Mr. Apolinio Sindiong at 834-6241.

Sincerely,


George Kaneko
Oahu Engineering and
Construction Manager

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK Y. FASH
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-111

Mr. George Kaneko -2- March 15, 1985

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

March 15, 1985

Mr. George Kaneko
Oahu Engineering and
Construction Manager
Hawaiian Telephone Company
P. O. Box 2200
Honolulu, Hawaii 96841

Dear Mr. Kaneko:

Subject: Your Letter of January 21, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The EIS document will describe blasting methods, operations, and probable limits, as well as its potential impacts. Initial blasting requirements will be established through careful study, by the contractor, of subsurface characteristics to assure that blasting impacts do not impact nearby structures and utilities. Moreover, blasting operations and impacts will be monitored throughout construction to determine the extent and magnitude of vibrations, with findings from the monitoring program used by the City and County and the contractor in evaluating the blasting program. To assure proper coordination with the Hawaiian Telephone Company, construction plans will be submitted for your review and approval.

Very truly yours,

for RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.
Engineering and Construction Branch

THE CHURCH OF
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OF LATTER-DAY
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AREA OFFICE OF THE PRESIDING BISHOPRIC
1500 South Beretania Street
Honolulu, Hawaii 96813
TELE: 723 8446

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JAN 10 AM 11 23

DIV. OF
WASTEWATER
MANAGEMENT

TO _____
8 January 1985

Michael J. Chun
Director and Chief Engineer
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT
PREPARATION NOTICE FOR SEWER TUNNEL RELIEF
HONOLULU, OAHU, HAWAII

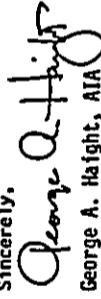
Dear Mr. Chun:

I have reviewed the Environmental Impact Statement for the Sewer Tunnel Relief project for Honolulu, Oahu, Hawaii. It appears that the construction project is sufficiently far removed from our church properties so that they will not be adversely affected by the construction.

I do have some concern about the blasting required for the construction of the tunnel. What can you do to assure us that the blasting required for the project will not impact the structural integrity of the existing church structures?

I respectfully await your reply.

Sincerely,


George A. Haight, AIA
Area Building Manager

GAH:ek

cc: Myron M. Hatch

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
640 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK P. PASH
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-106

Mr. George A. Haight -2- March 15, 1985

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

March 15, 1985

Very truly yours,
Russell L. Smith, Jr.

For RUSSELL L. SMITH, JR.
Director and Chief Engineer

Mr. George A. Haight, AIA
Area Building Manager
Area Office of the Presiding Bishopric
The Church of Jesus Christ of
Latter-Day Saints
1500 South Beretania Street
Honolulu, Hawaii 96826

cc: Wilson Okamoto & Associates, Inc.

Dear Mr. Haight:

Subject: Your Letter of January 9, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comment concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The EIS document will describe blasting methods, operations, and probable limits, as well as its potential impacts to structures and soils. Initial blasting requirements will be established through careful study, by the contractor, of subsurface characteristics to assure that blasting impacts do not impact nearby structures and utilities. Moreover, blasting operations and impacts will be monitored throughout construction to determine the extent and magnitude of vibrations. Findings from the monitoring program will be used by the City and County and the contractor in evaluating the blasting program to assure that public health, safety and integrity of nearby structures are maintained.

Mr. Michael J. Chun
January 23, 1985
Page two

Att. 2 - AH 8 50

OFFICE OF THE DIRECTOR
WATER
MANAGEMENT

Honolulu Academy of Arts

800 SOUTH BERTANFA STREET, HONOLULU, HAWAII 96814, TELEPHONE 838-2823

January 23, 1985

P. 12, Section III, A. Short-Term Impacts

1) Additional traffic congestion.

From the experience of several years ago we know the extent to which traffic can be snarled in the 900 block of South Beretania Street when the street is open for some months for sewer construction. In addition to having at least one lane under excavation, heavy construction equipment and workmen were, in the former instance, utilizing and thus blocking at least one other traffic lane. In spite of traffic officers directing traffic during construction hours, there was a bottleneck situation at all times and, in particular, drivers wishing to leave off and pick up passengers at the Academy had great difficulty in doing so. This included busloads of school children arriving several times each day for conducted tours of the collections, special exhibitions and studio work. A detour for through-traffic would alleviate this congestion. Possibly making King Street a two-way thoroughfare during the excavation of Beretania Street would solve this problem.

2) Increased airborne dust and particulate matter.

Airborne dust, combined with automotive exhaust deposited as a film on the surfaces of objects, is among the leading causes for the deterioration and destruction of works of art today. The Department of Public Works must, therefore, take every possible precaution to prevent airborne dust from the project filtering onto the museum's exterior and interior walls and floors and onto the surfaces of the works of art. Many gallery windows open toward the surrounding streets and others face onto five open courtyards so they cannot be sealed from any adverse effects of the immediate environment.

3) Increased noise levels.

4) Increased vehicle exhaust emissions.

Temporary traffic detours would help minimize both noise levels and exhaust emissions, the latter being especially harmful to works of art.

P. 13, Blasting

1) Impacts to the structural integrity of existing structures.

A second leading cause for the deterioration and destruction of works of art is vibration, which over a period of time literally

RE: Environmental Impact Statement Preparation Notice for Sewer Tunnel Relief - Honolulu, Oahu, Hawaii

Dear Mr. Chun:

Thank you for your letter of December 11, 1984 on the above captioned subject and for the enclosed copy of the EIS Preparation Notice. We very much appreciate your inviting us to apprise you of our deep concerns regarding the precautions that must be taken to safeguard both the Honolulu Academy of Arts and its invaluable art collection.

This museum's collection, built over more than half a century, constitutes the State of Hawaii's sole treasury of world art. The collection is enjoyed daily by the public and utilized as a major teaching resource by the University of Hawaii and most of the colleges and schools on Oahu. Moreover, the edifice itself, considered one of the most beautiful art museums in the United States by the museum profession, is listed on both the National Register of Historic Places and the State Register of Historic Places. (The EIS fails to note this latter fact.) As such, the museum and its collection must receive far greater protection from adverse effects of the project than would be customary for ordinary buildings. (We note that in the proposed sources of funding you anticipate receiving 75% of the necessary funds from the Federal Government and 10% from the State of Hawaii.)

Our specific points of concern are as follows:

P. 5, paragraph 3: "Surface work areas will be required at specific points along the tunnel route to serve as portals and construction staging areas."

If these surface work areas involve a concentration of heavy equipment moving in and out of staging areas, generating vibration and a high noise level and dirt, and if "portals" mean openings into existing sewage lines, allowing sewer gas to escape into the surrounding area, then no such work or staging area should be located within 1,000 feet of the Academy of Arts.

Mr. Michael J. Chun
January 23, 1985
Page three

"shakes works of art to death," as one leading American conservator has put it.

We note that the Department of Public Works will take care only to minimize impacts to existing structures, not to prevent damage to existing structures. In the case of the Honolulu Academy of Arts, which, as already cited, is registered as both a State and a National Historic site, absolutely no damage must occur to either the museum edifice nor to its collections as a result of blasting or from any other cause during the course of the Sewer Tunnel Relief project.

Table 2, p. 14, "Damage Levels from Ground Vibration" shows only a safe blasting criterion for residential structures recommended by U.S. Bureau of Mines. This Table does not at all take into account the very fragile, delicate and brittle nature of works of art as ancient Chinese bronze vessels, ceramics, frescoes, doweled Shinto wood sculptures, paintings on old silk and paper, ancient Syrian glass, etc. Considering the extreme importance of both this museum itself and the irreplaceable art collections it houses, no blasting must occur close enough to the Honolulu Academy of Arts to cause any damage whatsoever.

Again, thank you for giving us an opportunity to voice our concerns relative to the Sewer Tunnel Relief project as it could affect the Honolulu Academy of Arts.

Sincerely,

George R. Ellis
George R. Ellis
Director

GRE:cn



JUL 31 PM 1 01

ASSISTANT
MANAGER

THE OUTDOOR CIRCLE

200 No. Kingard, Suite 502, Honolulu, Hawaii 96817
808-521-0074

January 29, 1985

Mr. Michael J. Chun, Director
Dept. of Public Works
650 South King Street
Honolulu, Hawaii 96813

SUBJECT: Environmental Impact Statement
Sewer Tunnel Relief

Dear Mr. Chun:

The Outdoor Circle comments regarding the above stated Environmental Impact Statement are as follows:

Page 2, paragraph 2, no effect on street tree plantings is addressed anywhere.

Page 4, paragraph 2, well established hedges and trees in this area are not addressed. Page 9, paragraph 4 also is a critical area for trees.

Page 11, paragraph 4, parks in this area abound with mature trees. Parks and trees are of great concern to The Outdoor Circle and no where in this report is their integrity addressed.

The Outdoor Circle would like to have a copy of the Environmental Impact Statement on this project when it is completed, with sufficient time to answer it.

Thank you for this opportunity to express our views.
Sincerely,

Betty Crocker

Mrs. Theodore Crocker
President

BC/cc

Ashby Frlstoe

Mrs. Ashby Frlstoe
Landscape and Planting

RECEIVED
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BRANCHES
HONOLULU
KAPAHULU
MAUI
MOLOKAI
OUTER ISLANDS
PUNAHOU
WAILUKU
WAIKIKI
WAIKONA
WAIKOLE

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
630 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK FARI
MAIL ROOM

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-114

Mrs. Theodore Crocker -2- March 15, 1985

A copy of your letter will be appended to the EIS document and your organization will be a consulted party during the EIS phase of the project. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

March 15, 1985

Mrs. Theodore Crocker, President
Mrs. Ashby Fristoe, Landscape and Planting
The Outdoor Circle
200 No. Vineyard Boulevard, Suite 502
Honolulu, Hawaii 96817

Dear Mrs. Crocker and Mrs. Fristoe:

Subject: Your Letter of January 29, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

The forthcoming EIS document will address potential construction related impacts along the project corridor and suggest appropriate mitigation measures. Tree plantings, in particular, are not anticipated to be affected by construction of the new relief sewer since the cut and cover portion of the sewer will be conducted within existing paved areas of roadways. Tunnel portions of the sewer will be at depths well below tree roots, and should not affect plantings. Once construction activities are completed, surface conditions will be restored to preconstruction conditions or better, with no visible effects of the project.

The EIS document will address probable impacts to and mitigative measures for parks and other public facilities.

Very truly yours,
Russell L. Smith, Jr.

RUSSELL L. SMITH, JR.
for Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

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JAN 2 - AM 8 57 SOCIETY FOR HAWAIIAN ARCHAEOLOGY
P.O. Box 22911 Honolulu, Hawaii 96822

WASTE WATER
MANAGEMENT

Mr. Edward Arakawa
Division of Wastewater Management
Department of Public Works
650 South King St.
Honolulu, Hawaii 96813

January 21, 1985

FRANK P. PAUL
DIRECTOR

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-112

March 15, 1985

RE: EIS Preparation Notice for Sewer Tunnel Relief,
Honolulu, Oahu

Dear Mr. Arakawa:

The Peer Review Committee of the Society for Hawaiian Archaeology has read the environmental assessment for the proposed sewer tunnel relief project in Honolulu. We would like to make a few comments in regard to the potential for finding archaeological sites during this project, comments which have also been forwarded to the University of Hawaii Environmental Center in a letter by David Welch.

It appears from the project description that parts of this project will involve excavation of trenches and tunnels into deposits that may not have been previously disturbed by modern construction activities. While it is true that there are no known archaeological sites within the project area, this simply reflects the fact that modern construction had covered over any evidence of earlier features prior to archaeological research. If this project involves excavation of previously undisturbed deposits, it may uncover archaeological features and artifacts buried beneath the modern city.

We recommend that your department hire an archaeologist to monitor those phases of construction that involve excavation of such deposits. Archival research of historical records prior to the project might reveal areas where late prehistoric or historic features are likely to be encountered. This project could provide an opportunity to learn information about the prehistoric and early historic past of Makiki, Manoa, and Kaimuki that would otherwise be unobtainable.

Sincerely yours,

David J. Welch

David J. Welch, Chairman
Peer Review Committee
Society for Hawaiian Archaeology

cc: State Historic Preservation Office
OEQC

Mr. David J. Welch, Chairman
Peer Review Committee
Society for Hawaiian Archaeology
P. O. Box 22911
Honolulu, Hawaii 96822

Dear Mr. Welch:

Subject: Your Letter of January 21, 1985
Regarding the Environmental Impact
Statement Preparation Notice for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Environmental Impact Statement (EIS) Preparation Notice for the Proposed Sewer Tunnel Relief.

In the event that archaeological remnants are uncovered, construction will be halted and the State Historic Sites Office will be notified to direct and determine the proper course of action. The EIS document will discuss potential archaeological impacts and proper mitigative measures.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,
Russell L. Smith, Jr.

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.

CHAPTER XV
DRAFT ENVIRONMENTAL IMPACT
STATEMENT COMMENTS AND RESPONSES

XV. DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS AND RESPONSES

The following agencies and organizations provided comments on the Draft EIS. A total of 33 comment letters were received.

A double asterisk (**) indicates those which submitted written comments requiring substantive responses. The comment and response letters are reproduced in this section.

A single asterisk (*) indicates those which submitted written comments not requiring substantive responses.

A. CITY AND COUNTY OF HONOLULU AGENCIES

- * 1. Board of Water Supply
- * 2. Building Department
- ** 3. Department of General Planning
- * 4. Department of Housing and Community Development
- ** 5. Department of Land Utilization
- ** 6. Department of Parks and Recreation
- * 7. Fire Department
- * 8. Police Department

B. STATE AGENCIES

- ** 1. Department of Accounting and General Services
- * 2. Department of Agriculture
- * 3. Department of Defense

- ** 4. Department of Health
- ** 5. Department of Land and Natural Resources (2 letters)
- * 6. Department of Planning and Economic Development
- ** 7. Department of Transportation
- ** 8. Office of Environmental Quality Control
- ** 9. University of Hawaii, Environmental Center
- ** 10. University of Hawaii, Vice President for Administration
- ** 11. University of Hawaii, Water Resources Research Center

C. FEDERAL AGENCIES

- * 1. Department of the Navy
- ** 2. U.S. Army Corps of Engineers
- * 3. U.S. Department of Agriculture, Soil Conservation Service
- ** 4. U.S. Department of Interior, Fish and Wildlife Service
- * 5. U.S. Department of Transportation, U.S. Coast Guard

D. GOVERNMENT OFFICIALS

- ** 1. Representative James T. Shon, 28th Representative District

E. NEIGHBORHOOD BOARDS

- ** 1. Diamond Head/Kapahu'u/St. Louis Heights Neighborhood
Board No. 5
- ** 2. Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10

F. UTILITY COMPANIES

- * 1. Hawaiian Electric Company
- ** 2. Hawaiian Telephone Company

G. ORGANIZATIONS & INDIVIDUALS

- ** 1. Honolulu Academy of Arts
- ** 2. Kotake Shokai, Ltd. (Comments provided regarding construction techniques)
- ** 3. Mr. Milton Staackmann

**COMMENTS TO DRAFT EIS
WHICH REQUIRED RESPONSES**

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BOARD OF WATER SUPPLY RECEIVED
CITY AND COUNTY OF HONOLULU

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COPY

DIV. OF
WASTEWATER
MANAGEMENT

July 5, 1985

ENV 7/9/85 P+PS.7
WWM [Signature]

TO
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Ms. Letitia N. Uyehara
Director
Office of Environmental
Quality Control
Room 301
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Your Letter of June 28, 1985 on the Draft
Environmental Impact Statement for Sewer Tunnel
Relief

We have no objections to the proposed sewer reconstruction project and anticipate no adverse impacts to potable ground water resources in the area.

The document adequately addresses impacts to our water mains in the project area as well as our concerns on the blasting operations.

If you have any questions, please contact Lawrence Whang at 527-6138.

Very truly yours,

For KAZU HAYASHIDA
Manager and Chief Engineer

cc: Mr. Ed Arakawa
(DPW, Wastewater Management)

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DIV. OF
WASTEWATER
MANAGEMENT

PB 85-643

July 10, 1985

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[Signature]

PEPS

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. Uyehara:

Subject: Draft Environmental Impact Statement (EIS)
Sewer Tunnel Relief

We have reviewed the subject draft EIS and have no comments.

Thank you for the opportunity to review the draft EIS
for the Sewer Tunnel Relief project.

Very truly yours,

[Signature]

HERBERT K. MURAOKA
Director and Building Superintendent

TH:jo
cc: J. Harada
E. Arakawa, Public Works
(Wastewater Management)

TO
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DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

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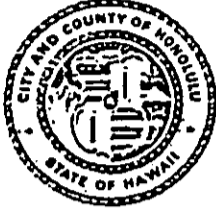
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE 523-4161

PaRS
(initials)

DIV. OF
WASTEWATER
MANAGEMENT

FRANK F. FASI
MAYOR



ENU al 7/19/85
WWM

ALVIN K.H. PANG
DIRECTOR

July 17, 1985

TO
JUL 19 11 01 AM '85
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DEPT. OF PUBLIC WORKS

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Draft EIS for Sewer Tunnel Relief

Thank you for the opportunity to comment on the subject EIS. Despite the inconveniences to be experienced by the public during the lengthy construction period, we believe the project is a necessary one whose long term benefits far outweigh the inconveniences. The new sewer tunnel relief system will provide sufficient capacity for population growth in the Primary Urban Center through the year 2005, allowing unsewered areas to hook into the City's sewer system as well as providing sewage capacity for additional residential units.

Sincerely,

(Signature)
ALVIN K. H. PANG

cc: Ed Arakawa, Department of Public Works

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU

1455 S BERETANIA STREET, ROOM 305
HONOLULU, HAWAII 96814

FRANK F. FASI
MAYOR



FRANK K. KAHOSHANOHANO
FIRE CHIEF

LIONEL E. CAMARA
DEPUTY FIRE CHIEF

July 9, 1985

Ms. Letitia N. Uyehara
Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

SUBJECT: DRAFT EIS FOR SEWER TUNNEL RELIEF

This is in response to your memorandum of June 28, 1985 requesting comments pursuant to Environmental Impact Statement for Sewer Tunnel Relief.

Other than those included in our response of January 9, 1985, we have no further comments to offer.

We enclose a copy of our January 9 response. We are also returning your Draft EIS.

Sincerely,


FRANK K. KAHOSHANOHANO
Fire Chief

FKK:sb

cc: Mr. Ed Arakawa
Department of Public Works
Division of Wastewater Management

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

1455 SOUTH HIHI TANIA STREET
HONOLULU, HAWAII 96814 - AREA CODE (808) 941-7111

RECEIVED

'85 JUL -8 PM 1:57

GP
HP
WJH

FRANK F. FASI
MAYOR



DIV. OF DOUGLAS G. GIBB
WASTEWATER CHIEF
MANAGEMENT LAUREN FERREIRA
DEPUTY CHIEF

OUR REFERENCE ES-DB

July 3, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara,

We have reviewed the draft EIS for Sewer Tunnel Relief, which was forwarded to us by your office on June 28, 1985. We found nothing in it that requires comment by us at this time.

Sincerely,

DOUGLAS G. GIBB
Chief of Police

By *Edwin Ross*
EDWIN ROSS
Assistant Chief of Police
Administrative Bureau

cc: Mr. Ed Arakawa

GEORGE R. ARIYOSHI RECEIVED
GOVERNOR

'85 JUL 31 PM 2 04



JACK K. SUWA
CHAIRMAN, BOARD OF AGRICULTURE

SUZANNE D. PETERSON
DEPUTY TO THE CHAIRMAN

85-1353
P-PS

DIV. OF
WASTEWATER
MANAGEMENT

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822

July 25, 1985

MEMORANDUM

To: Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control

Subject: Draft Environmental Impact Statement (EIS)
for Sewer Tunnel Relief
Department of Public Works
City and County of Honolulu
TMK: 2-4: 01, 02, 07-09, 11, 12, 17,
19-25, 29, 30
2-8: 07, 09, 12-18, 23, 27-30
3-3: 01-03, 55, 56
Honolulu, Hawaii

The Department of Agriculture has reviewed the subject Draft EIS and does not have any comments to offer. We are returning the document for your further use.

Thank you for the opportunity to comment.

JACK K. SUWA
Chairman, Board of Agriculture

Enclosure

cc: Mr. Ed Arakawa,
Department of Public Works

"Support Hawaiian Agricultural Products"

RECEIVED

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STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3319 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96810
DIV. OF
WASTEWATER
MANAGEMENT

HIENG

JUL 8 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

Dear Ms. Uyehara:

Draft EIS for Sewer Tunnel Relief
Honolulu, Hawaii

Thank you for providing us the opportunity to review the above subject development.

We have completed our review and have no comments to offer at this time.

Yours truly,

SIGNED

Jerry M. Matsuoka
Major, Hawaii Air
National Guard
Contr & Engr Officer

Enclosure

cc: Dept. of Public Works, Div.
of Wastewater Management

DEPARTMENT OF PLANNING AND
ECONOMIC DEVELOPMENT
P. O. Box 2657
Honolulu, Hawaii 96804

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DIV. OF
WASTEWATER
MANAGEMENT

Ref. No. P-2152

July 29, 1985

Ms. Letitia Uyehara
Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: DEIS for the Proposed Sewer Tunnel Relief, Honolulu, Hawaii

We have reviewed the subject draft environmental impact statement (DEIS) and have no comment.

Thank you for the opportunity to review the document.

Very truly yours,

Kent M. Keith

cc: ✓ Mr. Ed Arakawa
Division of Wastewater Management
Department of Public Works



RECEIVED
DEPARTMENT OF THE NAVY
HEADQUARTERS
NAVAL BASE PEARL HARBOR 85 JUL 11 PM 4 17
BOX 110
PEARL HARBOR, HAWAII 96860-5020

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9 JUL 1985

DIV. OF
WASTEWATER
MANAGEMENT

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

DRAFT ENVIRONMENTAL IMPACT STATEMENT
SEWER TUNNEL RELIEF

The Draft EIS for the Sewer Tunnel Relief has been reviewed and the Navy has no comments to offer. Since we have no further use for the EIS, the EIS is being returned to the Office of Environmental Quality Control, by copy of this letter.

Thank you for the opportunity to review the Draft EIS.

Sincerely,

HENRY J. RINNERT
Captain, CEC, U. S. Navy
Facilities Engineer
By direction of the Commander

Enclosure

Copy to:
Mr. Ed Arakawa
Dept. of Public Works,
Division of Wastewater Management
650 South King Street
Honolulu, Hawaii 96813

Office of Environmental Quality Control



United States
Department of
Agriculture

Soil
Conservation
Service

P.O. Box 50004
Honolulu, Hawaii
96850

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July 26, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

RECEIVED
85 JUL 29 AM 10 26
DIV. OF
WASTEWATER
MANAGEMENT

Dear Ms. Uyehara:

Subject: Draft EIS for Sewer Tunnel Relief (Manoa-Kaimuki)

We reviewed the subject draft environmental impact statement and have no comments to make.

Thank you for the opportunity to review the document.

Sincerely,

Francis C. H. Lum
FRANCIS C.H. LUM
State Conservationist

cc:
Mr. Ed Arakawa ✓
Department of Public Works
Division of Wastewater Management
650 South King Street
Honolulu, HI 96813



The Soil Conservation Service
is an agency of the
United States Department of Agriculture



U.S. Department
of Transportation
United States
Coast Guard



Commander (dpl)
Fourteenth Coast Guard District

Prince Kalaniana'ole
Federal Building
300 Ala Moana Blvd.
Honolulu, Hawaii 96850
Phone: (808) 546-2861

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Serial No. 5/158
July 8, 1985

*From
OK
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CO
HP 7/11/85*

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street,
Room 301
Honolulu, Hawaii 96813

DIV. OF
WASTEWATER
MANAGEMENT

RECEIVED
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Dear Ms. Uyehara:

The Fourteenth Coast Guard District has reviewed the DRAFT ENVIRONMENTAL IMPACT STATEMENT for the PROPOSED SEWER TUNNEL RELIEF IN THE CITY AND COUNTY OF HONOLULU and has no objection or constructive comments to offer at the present time.

Sincerely,

J. F. MILBRAND
Commander, U. S. Coast Guard
District Planning Officer
By direction of Commander,
Fourteenth Coast Guard District

Copy: Mr. Ed Arakawa
Dept. of Public Works
650 South King Street
Honolulu, HI 96813

SI-1320

ENV 2-1
NV/G

P+PS
[Signature]
115



Brenner Munger, Ph.D., P.E.
Manager
Environmental Department
(808) 548-6880

July 23, 1985

DIV. OF
WASTEWATER
MANAGEMENT

'85 JUL 25 PM 4 21

RECEIVED

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Draft EIS for Sewer Tunnel Relief

We have reviewed the attached Draft EIS and have nothing further to add to the comments contained in HECO's attached letter of January 8, 1985 pertaining to this project.

Thank you for letting us review this project.

Sincerely,

Brenner Munger

Brenner Munger, Ph.D., P.E.
Manager, Environmental Department

SLC:cal
Attachment

cc: Mr. Ed Arakawa
C&C, Public Works

RECEIVED
JUL 25 1985

RECEIVED

RECEIVED

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

DIV. OF
WASTEWATER
MANAGEMENT



FRANK P. PARI
MAYOR

DONALD A. CLEGG
CHIEF PLANNING OFFICER
SENE CONNELL
DEPUTY CHIEF PLANNING OFFICER

Ms. Letitia N. Uyehara
July 11, 1985
Page 2

JB/DQP 7/85-1827

July 11, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Draft Environmental Impact Statement (dEIS)
for the Sewer Tunnel Relief Project
Your Letter Dated June 28, 1985

We have the following comments for your consideration.

1. Implementation of the Sewer Tunnel Relief (Increments 1-B, 2, 3 & 4) project is in basic accord with the Development Plan (DP) Land Use Map and the DP Public Facilities Map for the Primary Urban Center.
2. However, in the case of Line "A" of Increment 1-B and Line "B" of Increment 2, steps are underway to place these two sewerline improvements on the DP Public Facilities Map. It is anticipated that the amendments for Lines "A" and "B" of the project will be approved by City Council in May 1986.

We might also add that the amendment for Increment 5 of the Sewer Tunnel Relief project, while not a part of this dEIS, is also being processed at this time.

If you require further information on these three amendment applications, please call Gary Okino at 527-6054 or Bennett Mark at 527-6067.

3. Ordinance No. 85-58, effective July 1, 1985, appropriates the following sums of money to carry out the proposed Sewer Tunnel Relief Project:

Increment 1-B	\$ 6,601,000
(This includes \$628,000 and \$6,706,000 from the State and Federal government, respectively)	
Increment 2	15,959,000
Increment 3	8,811,000
Increment 4	14,534,000

This is approximately \$5.7 million more than the \$40.2 million given as the estimated total project cost reflected on page II-15 of the dEIS.

Some clarification on the difference between the Project cost figures shown under Ordinance No. 85-58 and page II-15 of the dEIS may be appropriate.

4. The disposal site for the "muck" material and the effect on the disposal site(s), not noted in the dEIS, might be mentioned.

Thank you for extending us the opportunity to review and comment on this particular dEIS.

Sincerely,

Donald Clegg
DONALD A. CLEGG
Chief Planning Officer

cc: vDPW (Ed Arakawa)

August 23, 1985

MEMORANDUM

TO: MR. DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: RUSSELL L. SMITH, JR., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: YOUR LETTER OF JULY 11, 1985, REGARDING THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR
PROPOSED SEWER TUNNEL RELIEF

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

The project cost estimates provided in the Draft EIS document are for construction only. The amounts appropriated under Ordinance 85-58 include additional costs for design, construction management and administration.

As discussed in the Draft EIS document, Section III.C - Disposal of Spoil Material, both temporary and permanent stockpile sites will be secured by the contractor and will conform with all applicable rules and regulations of the State Department of Health and the City and County of Honolulu. For example, should there be a baseyard or stockpile area located adjacent to residences, precautions to reduce the noise in those areas, such as barriers or berms, must be implemented. Contingency plans must also be developed in the event that complaints are received regarding noise emanating from these areas.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Russell L. Smith, Jr.
 For RUSSELL L. SMITH, JR.
 Director and Chief Engineer

cc: Office of Environmental Quality Control

E & C Branch

Water Operations & Administration

RECEIVED
DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
550 SOUTH KING STREET
HONOLULU, HAWAII 96813

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DIV. OF
WASTEWATER
MANAGEMENT



August 7, 1985

Ms. Letitia Uyehara, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Draft Environmental Impact Statement (EIS)
For Sewer Tunnel Relief in Honolulu, Oahu, Hawaii
Tax Map Keys: 2-4-01, 02, 07-09, 11, 12, 17, 19-25, 29, 30;
2-8-07, 09, 12-18, 23, 27-30; 3-3-01-03, 55, 56

We appreciate the opportunity to review the above Draft EIS and have the following comments for your consideration:

1. Reference: VI. B. 1. f. Hydrologic, Page VI-26.
Comment: The potential for dewatering perennial streams as a result of tunneling under them should be assessed with respect to maintaining minimum levels of stream flow. Further, stream flow monitoring requirements as well as potential mitigative measures, such as lining the streambed, should be examined in consultation with appropriate State and Federal agencies.
2. Reference: VI. B. 1. k. Archaeological/Historic Sites.
Comment: In addition to historic sites which are listed in the National and State registers, those sites along the corridor which are being considered for listing should also be identified.

The feasibility of and methods for identifying, examining and salvaging archaeological remains, particularly along the tunnel corridor, should be discussed. The proposed methods

Ms. Letitia Uyehara, Director
Page 2

for extracting rubble as well as limited space in the tunnel and safety factors would appear to severely restrict archaeological work.

If there are any questions or comments, please contact Earl Matsukawa of our staff at 527-5032.

Very truly yours,

John P. Whalen
JOHN P. WHALEN
Director of Land Utilization

JPW:sj
2317A

cc: ✓ DPW, Div. of Wastewater Mgmt.
ATTENTION: Mr. Edward Apakawa
Wilson Okamoto & Assoc., Inc.

JOHN P. WHALEN
DIRECTOR

(EH)

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK P. FARO
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-525

September 3, 1985

MEMORANDUM

TO: MR. JOHN P. WHALEN, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: RUSSELL L. SMITH, JR., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: YOUR LETTER OF AUGUST 7, 1985
REGARDING THE DRAFT ENVIRONMENTAL IMPACT
STATEMENT FOR PROPOSED SEWER TUNNEL RELIEF

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

The possibility of streamflow losses at the Makiki, Manoa and Palolo Streams by seepage into the tunnel and possible mitigative measures are addressed in the EIS document. Mitigative measures are anticipated to provide effective means of maintaining existing stream flows. If stream dewatering during construction is experienced, implementation of mitigative measures will be coordinated with appropriate agencies.

In coordination with the State Department of Land and Natural Resources, sites along the project corridor which are being considered for addition to the National and/or State Register of Historic Places are being identified, and will be listed in the EIS document.

Mr. John P. Whalen -2- September 3, 1985

As stated in the EIS document, if archaeological remains are encountered during construction, the State Historic Sites Office will be notified to direct and determine the proper course of action. In large surface excavation areas where the possibility of archaeological remnants may be encountered, the Department of Public Works will employ a qualified archaeologist to monitor construction activities. Additionally, the feasibility of and methods for identifying, examining and salvaging archaeological remains will conform to requirements specified by the State Historic Preservation Office.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

MM:da

Ed Arakawa
DPM/Wastewater Management

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DIV. OF
WASTEWATER
MANAGEMENT

Letitia N. Uyehara, Director -2- August 7, 1985

Cartwright Field: The softball field is one of the most heavily used fields in the City. The use of the field would seriously affect league play. If the basketball and/or tot lots are considered essential, these facilities could be transferred to Hakiki District Park. Field restoration costs would be significant.

Hakiki District Park: Open space portions at the corner of Hakiki Street and Milner Avenue would have less impact than the use of other areas. Also, the area makai of the developed portion of the park could be considered for possible use.

Punahou Square: If used, this site would require restoration of the grass area, sprinkler system and replacement of trees if damaged.

Kanewai Field: Use of portions of this site is not recommended due to access problems. (See alternative sites - University land next to Kanewai Field.)

Holiliili Field: The possible use of this site is not recommended. This site is a considerable distance from the construction site and is again one of the more heavily used fields in the City.

Sheridan Park: The possible use of this site is not recommended. This playground is a considerable distance from the construction site and is the only recreational and park space in this neighborhood.

Alternative Sites

The Department suggests consideration to these additional sites for staging or storage areas.

1. Linekona School grounds
2. Neal Blaisdell Center parking lot
3. City Alapai bus facility
4. Piikoi Mini Park - Piikoi and Lunaliilo Streets
5. Under the Lunaliilo Freeway between Piikoi and Kewalo Streets
6. University of Hawaii grounds at Dole Street and University Avenue
7. University of Hawaii land next to Kanewai Field - This site was recently used as a construction site for storm drain improvements project. It is proposed to be transferred to Department of Parks and Recreation for park use. It is also a potential site for fill material.
8. Pukele Playground, Palolo.

August 7, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Draft EIS for Sewer Tunnel Relief

Thank you for the opportunity to review and comment on the Draft EIS for Sewer Tunnel Relief, Honolulu, Hawaii. We understand from the Draft EIS that several City and County parks may be affected by this project. Several parks are identified as possible sites for staging sites.

General Comments

The Department recognizes the critical nature of the project and the possible unavoidable impact on the use of certain parks during construction. We feel, however, that other sites, both private sites and other public sites, should also be included in potential sites for staging areas. In addition, the cost of repairing park sites should be taken into account. It may be more cost effective to use other sites which will not require rehabilitation costs.

The Department would also like to be consulted in advance on possible sites considered. Potential park and staging locations should be considered in advance by the City rather than allowing the contractors to select actual locations (page XII-2).

Specific Comments

The report identifies the following sites which may be considered as possible construction staging sites: Cartwright Field, Hakiki District Park, Punahou Square, Kanewai Field, Sheridan Park and Holiliili Field.

Letitia H. Uyehara, Director -3- August 7, 1985

Please contact Mr. Yukio Taketa at 527-6306 for any additional information or points of clarification.

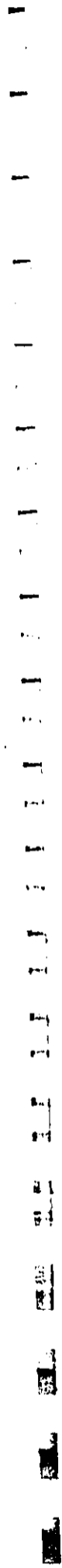
Sincerely yours,

Tom J. Nekota

TOH T. HEKOTA, Director

TTT:ct (S. Sallis, Advance Planning)

cc: Mr. Ed Arakawa
Department of Public Works
Division of Wastewater Management



DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER
WPP 85-542

September 5, 1985

MEMORANDUM

TO: MR. TOM T. NEKOTA, DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: RUSSELL L. SMITH, JR., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: YOUR LETTER OF AUGUST 7, 1985
REGARDING THE DRAFT ENVIRONMENTAL IMPACT
STATEMENT FOR PROPOSED SEWER TUNNEL RELIEF

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

With respect to your concerns regarding the possible use of City parks as staging areas, other sites, including those mentioned in your letter will be considered for potential staging area use. The cost of repairing park sites will be considered in evaluating the economic implications of park use.

Selection of potential portal and staging locations will be determined during the design stage when detail requirements are specified by the tunnel consultant. Exact sites will be shown on construction plans.

A thorough study will be performed during the design stage to select the best possible staging areas. Consideration will be given to other areas, besides public parks, especially in Increment 1-B. The Land Division of the Department of Public Works is presently exploring the possibility of using three sites within Increment 1-B. Two of these sites are privately owned. Landownership of the third site, located under the freeway at Pihkol and Kunalilo Streets, is held by the State of Hawaii. If use of these sites is secured, no additional staging areas will be required for Increment 1-B.

Mr. Tom T. Nekota

-2-

September 5, 1985

In view of your expressed concerns, every effort will be made to avoid using Cartwright Field, Makiki District Park, Kaneohe Field, Mollili Field and Sheridan Park.

However, should use of portions of any of these parks be determined to be in the greater interest of the City and County, we will coordinate with you as early as possible to assure that recreational needs are met to the maximum extent possible.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Russell L. Smith, Jr.
RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

MHida

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
630 SOUTH KING STREET
HONOLULU, HAWAII 96813



RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER
WPP 85-517

September 3, 1985

Mr. Teuane Tomlinaga
State Public Works Engineer
Division of Public Works
Department of Accounting and General Services
State of Hawaii
P. O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Tomlinaga:

Subject: Your Letter of August 7, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental
Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

In coordinating construction near the Queen Kaahumanu School
with the Department of Education, we have indicated that the
sewer construction work within the immediate vicinity of the
school is planned for the summer vacation months. Work along
the immediate boundaries of the school on Pensacola and Kinau
Streets involves installation of about 1000 feet of 60-inch
sewer pipe and about 600 feet of 8-inch water line. By
necessity, the water line relocation work must precede the
sewer installation work and we expect the combined construction
duration to last approximately 5 months.

Mr. Teuane Tomlinaga

-2-

September 3, 1985

Accordingly, we may not be able to complete all construction
work within the vicinity of the school during any 3-month
summer vacation period. Please be assured that we intend to
closely coordinate construction with the DOE to minimize
interruptions to school activities as much as possible.

We also recognize the need for part-time street crossing guards
during the morning and afternoon hours when elementary school
students have to cross near construction zones on their way to
and from school. In this regard, coordination with schools is
proposed to suggest the possibility of volunteer guardpersons,
such as PTA members. Volunteer aid notwithstanding,
specifications will require the contractor to provide needed
pedestrian safety measures to include the hiring of flagmen or
police officers.

A copy of your letter will be appended to the EIS document. If
there are any questions, please contact Mr. Ed Arakawa at
523-4067.

Very truly yours,

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

M:da

GEORGE B. ANTOSHI
DEPUTY DIRECTOR OF HEALTH

RECEIVED

JUL 19 AM 8 40



DIV. OF
WASTE WATER
MANAGEMENT
STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3370
HONOLULU, HAWAII 96811

CHARLES G. CLINE
DIRECTOR OF HEALTH

In reply, please refer to
EPM-85

July 15, 1985

COPY

MEMORANDUM

To: Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Sewer Tunnel Relief, Honolulu,
Hawaii

Thank you for allowing us to review and comment on the subject EIS.

Concerns toward noise impacts resulting from construction activities, vehicular traffic and demolition for the proposed project were addressed in Section VI, B.i.a. of the EIS. Specific conditions to which the construction work must adhere include:

1. The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the regulations.
2. The contractor must comply with the conditional use of the permit as specified in the regulations and the conditions issued with the permit.
3. Should there be a backyard or stockpile area located adjacent to residences, precautions to reduce the noise in these areas, such as barriers or berms, must be implemented. Contingency plans must be developed in the event that complaints are received regarding noise emanating from these areas.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

MELVIN K. KOIZUMI

cc: Mr. Ed Arakawa ✓

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASH
DIRECTOR



RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-471

Mr. Melvin K. Koizumi -2- August 15, 1985

August 15, 1985

Mr. Melvin K. Koizumi
Deputy Director for Environmental Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Koizumi:

Subject: Your Letter of July 15, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental
Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

To minimize noise impacts resulting from construction
activities, vehicular traffic and demolition, the contractor
will be required to comply with Chapters 42 and 43 of Title 11,
State Department of Health Administrative Rules. Accordingly,
the following conditions will be adhered to:

1. The contractor must obtain a noise permit if the noise
levels from the construction activities are expected to
exceed the allowable levels of the regulations.
2. The contractor must comply with the conditional use of the
permit as specified in the regulations and the conditions
issued with the permit.

3. Should there be a baseyard or stockpile area located
adjacent to residences, precautions to reduce the noise in
these areas, such as barriers or berms, must be
implemented. Contingency plans must be developed in the
event that complaints are received regarding noise
emanating from these areas.

To assure proper coordination with the State Department of
Health, construction plans and specifications will be submitted
for your review and approval.

A copy of your letter will be appended to the EIS document. If
there are any questions, please contact Mr. Ed Arakawa at
523-4067.

Very truly yours,

For RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

JUL 8 4 1985

WPP 85-505

August 23, 1985

Ms. Letitia M. Uyebara, Director
Office of Environmental Quality Control
550 Halekaunaha Street
Honolulu, Hawaii 96813

Dear Ms. Uyebara:

We have reviewed the draft environmental impact statement (EIS) for the relief sewer extending from Ward Avenue to Palolo Valley.

Potential adverse impacts of the project on the Makiki, Manoa, and Palolo Streams should be minimal since the new sewer system, like the existing one, would tunnel under the streams. In this regard, however, the possibility of streamflow losses from seepage into the tunnel needs to be addressed further in the forthcoming documents along with measures to prevent such losses.

Because of the stream crossings, it is also emphasized that during construction of the project, erosion-sedimentation control measures be implemented to protect the quality of these stream waters.

Sincerely,

Susumu Ono

SUSUMU ONO
Chairperson

cc: Mr. Ed Arakara,
C&C Honolulu DPH, DMH

Mr. Susumu Ono, Chairman
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ono:

Subject: Your Letter of July 24, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

The possibility of streamflow losses at the Makiki, Manoa and Palolo Streams by seepage into the tunnel and possible mitigative measures are addressed in the EIS document. Mitigative measures include monitoring to assure structural integrity of channels, ground treatment (grouting) of basalt layers overlying the tunnel and lining stream beds with a non-porous geotextile fabric.

To protect the quality of stream waters, erosion-sedimentation control measures will be implemented at stream crossings during construction.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,
Russell L. Smith, Jr.

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control

E & C Branch

Wilson Environmental Associates, Inc.

MS:da

AUG 15 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

In addition to the comments on the Draft EIS for Sever Tunnel Relief made by our Department on July 24, 1985, we also wish to express the following concerns:

The Draft EIS on page IV-15 identifies four significant historic properties within the project area, all of which are listed in the National Register of Historic Places. Other properties within the project area also appear to meet the criteria for inclusion in the National Register of Historic Places. These include: Saint Louis High School, the University of Hawaii, Sacred Heart Roman Catholic Church, Saint Clements Episcopal Church, Jodo Mission of Hawaii, and the residences at 1022, 1026 and 1148 Kinau Street. *Scottish Rite Temple*

*Hawai
Society
Historical
Assocn
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pck*

Page VI-38 mentions that all work in the vicinity of historic sites will be coordinated with the State Historic Preservation Officer. As this project involves the use of federal funds, mention should also be made of the Advisory Council on Historic Preservation and compliance with Section 106 of the National Historic Preservation Act.

Sincerely yours,

/s/SUSUONO

SUSUONO ONO
Chairperson and State Historic
Preservation Officer

DH:pan

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. FASI
11100

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-534

August 30, 1985

Mr. Susumu Ono
Chairperson and State Historic Preservation Officer
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ono:

Subject: Your Letter of August 15, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental
Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

The EIS document will be revised to list properties within the
project area which may also meet the criteria for inclusion in
the National Register of Historic Places. This list will
include Saint Louis High School, the University of Hawaii,
Sacred Heart Roman Catholic Church, St. Clement's Episcopal
Church, Jodo Mission of Hawaii, the Scottish Rite Cathedral,
Hawaii Sugar Planter's Association buildings in Makiki Park and
the residences at 1022, 1026 and 1148 Kinau Street.

As the proposed project will involve the use of Federal funds,
the EIS document will be revised to mention the role of the
Advisory Council on Historic Preservation and compliance with
Section 106 of the National Historic Preservation Act.

Mr. Susumu Ono

-2-

August 30, 1985

A copy of your letter will be appended to the EIS document. If
there are any questions, please contact Mr. Ed Arakawa at
523-4067.

Very truly yours,

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

RM:da

RECEIVED

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DIV. OF
WASTEWATER
MANAGEMENT

8.10762

August 7, 1985

Ms. Leticia M. Uyehara
Director
Office of Environmental
Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Draft EIS for Sewer Tunnel Relief

We have the following comments on the draft environmental impact statement:

1. Chapter III
Tunneling under H-1 by jacking is preferred.
2. Chapter V
Either Figures 11B or 11C should have included a sketch of H-1's existing utilities which would have to be crossed by the proposed sewer tunnel.
3. Chapter VI
Lunalilo Street leads to the H-1 on-ramp that serves traffic from the Ala Moana area. It may not be possible to re-route traffic away from the intersection of Pensacola and Lunalilo Streets.

Thank you for the opportunity to review this document.

Very truly yours,

Wayne J. Yamasaki
Wayne J. Yamasaki
Director of Transportation

KYA:ko

cc: HAR
HWY-C
HWY-PA
STP(kya)
Ed Arakawa, DPM, C&C Honolulu

August 29, 1985

WPP 85-526

Mr. Wayne J. Yamasaki, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Yamasaki:

Subject: Your Letter of August 7, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

The method of crossing the H-1 Freeway, including jacking, will be considered during the design phase. Jacking will be difficult due to width of the freeway corridor.

The revised EIS will describe the existing utilities within the H-1 freeway corridor which will be crossed by the relief sewer. Construction plans for the Sewer Tunnel Relief, Increment 1-B, includes traffic control plans that have been coordinated and approved by the State Department of Transportation, Highways Division.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,

Russell L. Smith, Jr.
RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

MW:da

GEORGE R. ANTONIO
Director



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
540 HALEKAWILA STREET
ROOM 301
HONOLULU, HAWAII 96813

July 5, 1985

RECEIVED

85 JUL 11 PM 2 56

LETITIA N. UYEHARA
Director

TELEPHONE NO.
249-8615

DIV. OF
WASTEWATER
MANAGEMENT

FRANK P. PAI
Mayor

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



RUSSELL L. SMITH, JR.
Director and Chief Engineer

WPP 85-473

August 15, 1985

Mr. Ed Arakawa
Department of Public Works
Division of Wastewater Management
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Arakawa:

Subject: Draft EIS for Sewer Tunnel Relief, Honolulu, Hawaii

Since this sewer tunnel project will take place over an extended period of time, the environmental impact statement should discuss in greater detail the impacts of the project at each portal area and suggest mitigating measures to minimize those impacts.

Sincerely,

Letitia N. Uyehara
Director

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Your Letter of July 5, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comment concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

The selection of portal locations will be the contractor's responsibility and will be dependent upon the contractor's equipment and method of construction. The location of portals will determine the magnitude and extent of impacts to the surrounding environment. Since portal locations are uncertain at this time, this aspect of the project is addressed in Chapter XII, "Summary of Unresolved Issues". This chapter will be expanded to discuss in greater detail the extent and magnitude of probable impacts which may be anticipated at portal locations and will suggest possible mitigating measures to minimize those impacts.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,

For RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Wilson Okamoto & Associates, Inc.
E & C Branch

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RECEIVED

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University of Hawaii at Manoa

WASTEWATER
MANAGEMENT

Environmental Center
Crowford 317 • 2550 Campus Road
Honolulu, Hawaii 96823
Telephone (808) 948-7301

August 9, 1985

RE:0419

Ms. Letitia N. Uyebara
Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyebara:

Draft Environmental Impact Statement
(Manoa-Kaimuki) Sewer Tunnel Relief
Honolulu, Oahu

The above cited Draft Environmental Impact Statement (DEIS) addresses the potential environmental impacts related to the proposed Manoa-Kaimuki Sewer Tunnel Relief which extends from the intersection of South Beretania Street and Ward Avenue to the intersection of Keolu Street and Palolo Avenue in Kaimuki. Under this proposal, the existing Manoa-Kaimuki Interceptor sewer, which is deteriorating and posing a potential threat to public health and safety, is to be replaced with a new Sewer Tunnel Relief.

The Environmental Center review of the above cited document has been prepared with the assistance of James Parrish, Hawaii Cooperative Fishery Research Unit; Donk Cox, Emeritus Professor of Geology; Jim Woodruff, Wallington Yee, and Pamela Behnson, Environmental Center.

Due to the absence of many of our University of Hawaii faculty during the summer months, the Center was unable to conduct its standard complete review process.

General Comments

We wonder if it would be advantageous to the community, to coordinate with the utility companies and place transmission lines underground for aesthetic value. Two possibilities are available: 1) adjacent piping or, 2) within the tunnel.

Possible methods to be used in construction of the tunnel are in greater detail than required. The EIS requirements would have been satisfied by listing the methods, coupled with the citation of a standard tunnel construction manual, and by identifying the tunnel increments in which the several methods are likely to be used along with the problems that might be encountered in each increment.

AN EQUAL OPPORTUNITY EMPLOYER

Ms. Letitia N. Uyebara

-2-

August 9, 1985

The DEIS does not include a profile along the tunnel that would greatly facilitate understanding of the relationship of the tunnel grade to the geology, soils, and topography.

Impacts on Stream

As recognized in the EIS, the tunnel will pass under Palolo and Manoa Streams in Increment 4 and under Makiki Stream in Increment 2. The potential impact of the tunnel construction on stream flow, hence on stream quality and biota is discussed. The impacts of intercepted stream water on the tunnel during and subsequent to construction, is also mentioned. It is indicated that, "Should loss of water (from the stream) be observed...the City and County and the contractor may consider (these methods)." The interception of stream water may not only adversely affect the stream biota, but may also increase the cost of construction and, if continued after construction, add to the flow to the sewage treatment plant. Hence the EIS should assure that means for mitigation will be not only considered but adopted if the interception is significant.

We appreciate the opportunity to comment on this DEIS and hope you will find our comments useful in the preparation of the revised document.

Yours truly,

Jim Woodruff

Jacquelin N. Miller
Acting Associate Director

cc: Ed Arakawa
Patrick Takahashi, Acting Director
Environmental Center
James Parrish
John Burgess
Gordon Dugan
Edwin Murebayashi } for your information
Jim Woodruff
Wallington Yee
Pamela Behnson
Wilson Okamoto & Associates

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. PARR
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-527

Ms. Jacquelin N. Miller -2- August 29, 1985

August 29, 1985

Ms. Jacquelin N. Miller
Acting Associate Director
Environmental Center
University of Hawaii
Crawford 317
2250 Campus Road
Honolulu, Hawaii 96822

Dear Ms. Miller:

Subject: Your Letter of August 9, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental
Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

Construction of the proposed project will be coordinated with
other utility improvements. We are coordinating implementation
of the proposed project with all utility companies. To assure
proper coordination, construction plans will be submitted to
these companies for their review and approval.

Major impacts of the proposed Sewer Tunnel Relief are
anticipated to be those associated with construction. To
facilitate the assessment of construction related impacts,
research on probable construction operations for the project
was conducted. While methods discussed in the EIS document may
not necessarily be employed for the project, since the selected
method of construction will in large part be determined by the
contractor, the methods do identify the likely options to be
considered by the contractor. The documentation of
construction methods provides insight to potential project
impacts, as well as possible mitigative measures to address
impacts.

Preliminary engineering analysis indicates sewer depths below
ground surface ranging from approximately 12.5 feet at the
intersection of Ward Avenue and Beretania Street to over 70
feet at Keanu Street, near Palolo Avenue. Sewer profiles will
be finalized during the detailed design phase of the project.

If stream dewatering is experienced during construction,
implementation of mitigative measures will be coordinated with
the appropriate agencies. Mitigative measures identified in
the EIS, as well as other measures identified during design
will be implemented to minimize potential adverse impacts of
stream dewaterment.

A copy of your letter will be appended to the EIS document. If
there are any questions, please contact Mr. Ed Arakawa at
523-4067.

Very truly yours,

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

MM:da

RECEIVED

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UNIVERSITY OF HAWAII

Vice-President for Administration

OFFICE OF
WASTEWATER
MANAGEMENT

August 6, 1985

Mr. Russell Smith
Director and Chief Engineer
Department of Public Works
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Smith:

SUBJECT: Comments for the Draft EIS
for the Proposed Sewer
Tunnel Relief, Honolulu

The University of Hawaii has reviewed the subject Draft EIS and submits the following comments for your consideration.

The Draft EIS has been found to be very general in its context and lacks the details that are needed to more fully evaluate the impacts of the project. An example of this appears on Page II-10, which discusses the possibility of the construction of an adit at the University Quarry. The lack of descriptive details and dimensions makes it difficult to offer any constructive comments. Also lacking is a plan for the disposition of discharge of sewage through the adit in the event of a major blockage in the tunnel. Will there be any gases escaping from the adit? How will it be covered and used?

The substrata under Dole Street and part of University Avenue is solid basalt. Any trenching into this basalt will require the use of heavy drilling equipment, large tractors and possible use of explosives. More information needs to be included in the EIS concerning the possible impacts of this operation to the surrounding areas rather than simply stating that it is the discretion of the Contractor on the method of excavation to be employed. At the University, there are numerous delicate and sensitive equipment whose use are adversely affected by

Mr. Russell Smith
Page 2
August 6, 1985

excessive vibrations. Also, the classrooms in the proximity of the construction site, especially at the Law School, will be severely impacted by loud noises and vibrations. To reduce this impact, the work on the section of Dole Street along the Manoa Campus should be scheduled, to the extent possible, in the Summer months.

The proposed diverting of the traffic in the University Quarry through Wai'alae Avenue and Varsity Place will result in severe congestion, safety hazards, and serious disruptions to University operations. A more thorough assessment of this problem should be made, giving consideration to other alternatives. Also, the closing of campus roads leading to Dole Street will severely impact University operations.

The University recently completed a section of its campus drainage system along the mauka side of Dole Street. The EIS should address the measures that will be taken to minimize damage to this drainage system.

Our greatest concern is the apparent lack of a contingency plan to control the flow of sewage in the event a major blockage should occur in the existing tunnel. This blockage can cause a large volume of sewage to flood surrounding roads and low lying areas very rapidly. One possible alternative to preclude this event may be to start the project from the West or Ward Avenue terminus. If this approach is followed, any major blockage in the existing sewer could be controlled by diverting or pumping the sewer around the blockage into the completed section.

Unless the EIS more adequately describes the anticipated impacts, it appears that each major action to be taken, later should be addressed by a Supplemental Statement. Since the EIS is to be an informational document to acquaint the public with the project, it should contain, we feel, more of the necessary details.

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DEPT. OF PUBLIC WORKS
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DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

630 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK P. PARI
-2-

Mr. Harold Masumoto

-2-

September 3, 1985

RUSSELL L. SMITH, JR.
DIRECTOR
WPP 85-518

September 3, 1985

Mr. Harold Masumoto
Vice President for Administration
University of Hawaii
2444 Dole Street, Room 201
Honolulu, Hawaii 96822

Dear Mr. Masumoto:

Subject: Your Letter of August 6, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental
Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

Inasmuch as tunnel construction methods have yet to be
determined, the Draft EIS attempts to address the impacts of
the range of reasonable approaches which may be considered.
With this in mind, construction of an adit through the face of
the University Quarry is considered only one option for tunnel
construction access.

If an adit is implemented, it will be used for construction
access only. In the event of sewage backup, once the new
relief tunnel is operational, flows will not be discharged
through the adit. Moreover, once implemented, the adit will
not be a release point for sewer-related gases.

Should an adit be constructed, it may serve as a future access
point for sewer tunnel maintenance crews. If this is the case,
the adit entrance will be completely secured.

With regard to tunnel excavation work along the University of
Hawaii, development of the construction program will consider
the special needs and requirements of the University. The cut
and cover method of construction will not be employed through
basalt conditions which are found along Dole Street. Possible
methods of excavation include drilling and blasting
(underground) or use of a tunnel boring machine. Current
state-of-the-art of employing either of these methods is such
that surface impacts are minimal. Moreover, impacts to
structures are not anticipated to pose any problem for
excavation work. Under the drill and blast method, blast
vibrations can be computed based on rock characteristics and
appropriate blast designs developed to provide for maintaining
the integrity of adjacent structures (including underground
utilities). If blasting is required, a strict monitoring
program (to include the use of field seismographs) will be
prescribed in the contract documents.

Should the contractor elect to use the tunnel boring machine
method, impacts at ground elevation and at adjacent structures
will be virtually imperceptible.

Regardless of the method of construction used, however, the
City and County will coordinate development of the construction
program with the University to assure that other requirements
for vibration sensitive equipment, and other needs are
identified and properly addressed.

Traffic control plans developed during the design phase will be
coordinated with the University of Hawaii to assure an
acceptable strategy which minimizes traffic disruptions at the
University.

Construction of the proposed Sewer Tunnel Relief will proceed
incrementally, beginning at the intersection of Ward Avenue and
Beretania Street. The existing sewer will remain in use until
the proposed project is completed. Construction of the Sewer
Tunnel Relief will not interfere with existing operations. The
existing sewer will be inspected and rehabilitated to ensure
its continued integrity and availability for standby use upon
completion of the proposed project. Should blockage in the new
relief sewer occur, sewage will be diverted to the existing
tunnel, thus avoiding surface discharge of flows.

Mr. Harold Masumoto

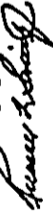
-3-

September 3, 1985

As mentioned, the Draft EIS attempts to address the broadest possible range of impacts based on probable construction methods. Performance specifications will be prepared during the project design phase to establish further detail with regard to acceptable methods of construction. This phase of the project will be closely coordinated with the University to assure that your needs and concerns are addressed to the maximum extent possible. With this in mind, we ask your understanding and support of this most essential project.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,



RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

MM:da



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AUG 13 PM 1 13

University of Hawaii at Manoa DIV. OF ENVIRONMENTAL MANAGEMENT

Water Resources Research Center Holmes Hall 263 - 2540 Dole Street Honolulu, Hawaii 96822

8 August 1985

Ms. Letitia N. Uyebara, Director Office of Environmental Quality Control 550 Halekauwila St., Room 301 Honolulu, Hawaii 96813

Dear Ms. Uyebara:

SUBJECT: Draft Environmental Impact Statement for the Proposed Sewer Tunnel Relief, Honolulu, Hawaii, City & County of Honolulu, June 1985

We have reviewed the subject DEIS and offer the following comments:

- 1. There is a need to state definitely what actions will be taken to mitigate adverse environmental impacts rather than couch them in terms of may and should. Some examples of 'may' and 'should' that need to be re-placed with will are given below.
P. VI-7 bottom of page. 'If necessary, surfaces equipment may (emphasis added) be surrounded by sound attenuating enclosures.' If it's necessary, why shouldn't it be attenuated?
P. VI-11 bottom of page. 'Roads at construction sites should be paved or frequently watered to minimize dust.'
P. VI-38 middle paragraph. 'Should the Lower Route through the Saint Louis High School/Oaminiade University campuses be implemented, monitoring of vibrations should begin when the tunnel face approaches 100-feet from the edge of the Regency Park Condominium building (Harding-Lawson Associates, 1979). Moreover, reduction in blasting intensity should be required when peak particle velocities exceed 2.0 inches per second.'
Vibration monitoring needs to be done all the time. The EIS seems to forget that the route is highly urbanized and blast vibrations can travel a long ways in surprisingly unpredictable patterns.
P. VI-37 bottom of page. 'Any signs of damage such as cracking, settlement, or other indications should be carefully studied and modifications in the blasting program made accordingly.'
The proposing agency needs to take a more active and responsible role in mitigating unavoidable environmental impacts rather than passing it on to the discretion of the contractor as this document would allow.

Ms. Letitia N. Uyebara 8 August 1985 Page 2

2. The public has been conditioned through television, newspaper, and radio coverage, that the existing tunnel is so dilapidated that its collapse is imminent. Yet the DEIS does not say what effects the new construction activity will have on the old tunnel. Since the alignment is almost side by side within the confines of the street right-of-way, adverse effects are bound to occur. That will be the environmental impacts if the old tunnel should collapse during construction, how will the problem be resolved if it occurs, and what measures can be taken to minimize the possibility of this happening? These items need to be addressed in some detail, particularly because blasting will greatly increase the possibility of adverse effects on the old tunnel.

3. P. VI-46. A vacant area adjacent to Kaneohe Park on Dole Street may be a suitable staging area without using Kaneohe Park.

4. P. VI-28, 'Construction near Manoa Well 1.' The recent drainage trench cut along Dole Street at the University of Hawaii did not penetrate below the basalt and is therefore unlikely to have any effect on water in strata below it. That trench was sloped to flow into Manoa Stream and is therefore above the sewer invert....

5. The map 'Proposed Sewer Tunnel Relief', between pp. 11-7 & 8 indicate at least 5 probable manhole locations as the tunnel traverses through the University of Hawaii campus (under Dole Street). At the great depths and solid blue rock that the tunnel will be bored through, it will be very difficult to install the manholes, not to mention the traffic problems it will create on Dole Street. What is the need for manholes spaced every 550 feet more or less as judged by scaling in a tunnel this large, ... and (having) velocities of flows (that) will be high enough to provide for self-cleaning.' (P. VI-1, Long-term Impacts)

6. P. VI-27. If anything is done to the stream or streambed, such as lining it, there is a distinct possibility that the Corps of Engineers will be interested.

Thank you for the opportunity to comment. This material was reviewed by WRUC personnel.

Sincerely, Edwin T. Murabayashi EIS Coordinator

ETM:jo

cc: Ed Arakawa, C & C Env. Center, UI

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. PASH
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER
WPP 85-528

August 29, 1985

Mr. Edwin T. Murabayashi, EIS Coordinator
Water Resources Research Center
University of Hawaii
Holmes Hall 283
2540 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Murabayashi:

Subject: Your letter of August 8, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental
Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

The EIS document will be revised as follows:

- P. VI-7 bottom of page. "If necessary, surface equipment will be surrounded by sound attenuating enclosures."
- P. VI-II bottom of page. "Roads at construction sites will be paved or frequently wetted to minimize dust."
- P. VI-36 middle paragraph. "Should the Lower Route through the Saint Louis High School/Chaminade University campuses be implemented, monitoring of vibrations will begin when the tunnel face approaches approximately 100-feet from the edge of the Regency Park Condominium building (Harding-Lawson Associates, 1979). Moreover, reduction in blasting intensity will be required when peak particle velocities exceed 2.0 inches per second."
- P. VI-36 bottom of page. "Any signs of damage such as cracking, settlement, or other indications will be carefully studied and modifications in the blasting program made accordingly."

Mr. Edwin T. Murabayashi

-2-

August 29, 1985

Please be assured that the City and County will be heavily involved in controlling the contractor's operation. It is the purpose of the EIS document to address the broadest possible range of impacts and appropriate mitigation measures based on probable construction methods. Given the present uncertainty as to what specific construction methods and the selected contractor's requirements are, the EIS document is unable to specify mitigative measures which must be employed. It is a major goal of the City and County of Honolulu to implement a strong construction management program which is responsive to corridor residents', businesses', and institutions' concerns, and which assures that construction impacts are, to the maximum extent practicable, minimized.

A contingency plan has been prepared in coordination with the Civil Defense Agency in the event of the collapse of the existing tunnel. The effect of the proposed relief sewer construction upon the existing tunnel will be fully evaluated during the design phase. Subsurface exploration, soils analyses, and geological studies to be performed during the design phase will aid in the determination of compatible tunnel boring methods and precautions required to minimize the risk of damage to the existing tunnel. It is noted that blasting is only one of several methods which may be implemented. If use of a tunnel boring machine is determined to be appropriate, impacts to the existing tunnel are anticipated to be insignificant.

We concur that the vacant area adjacent to Kaneohe Field on Dole Street may be a suitable staging area, selection of which could preclude use of Kaneohe Field. The Department of Public Works will investigate and consider the use of non-park lands as staging areas.

The EIS document, page VI-28, "Construction near Manoa Well I", will be corrected to delete reference to the extent of the cut required for recent drainage improvements along Dole Street.

Although flows will be at self-cleaning velocities, the tunnel will not be entirely maintenance free. In addition to providing access for cleaning purposes, manholes are required for connections to local sewers and facilitate venting the tunnels prior to the descent of crewmen into the tunnel. Great distances between manholes require long venting periods and increases safety hazards in emergency situations where escape from the tunnel is required. The proposed relief sewer intercepts several 8-inch sewers as well as a 12-inch, 18-inch and a 36-inch sewer on Dole Street, accounting for the close manhole spacing.

Mr. Edwin T. Murabayashi

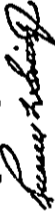
-3-

August 29, 1985

The appropriate agencies will be contacted and the required permits obtained before any work to streams or streambeds is performed.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,



RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

MM:da



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96826

July 31, 1985

WPP 85-515

August 28, 1985

Mr. Ed Arakawa
Department of Public Works
Division of Wastewater Management
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Arakawa

Thank you for the opportunity to review and comment on the Draft EIS for Sewer Relief Tunnel. The following comments are offered:

- a. The flood hazards have been addressed in the draft document in Section IV.H. Flood Hazards on page IV-14.
- b. Page VI-38(K) - Archaeological/Historic Sites. The EIS stated that no impacts are anticipated along the project corridor. This is probably true except in areas where there may be large surface excavation. The tunnel cuttings should be no problem. Other activities should be monitored by a qualified archaeologist rather than leaving it to the construction contractor to notify the State Historic Preservation Officer.

Sincerely,

Kisuk Cheung
Chief, Engineering Division

Mr. Kisuk Cheung
Chief, Engineering Division
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

Subject: Your letter of July 31, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

In large surface excavation areas where perchance archaeological remnants may be encountered, the Department of Public Works will employ a qualified archaeologist to monitor construction activities.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

MMida



RECEIVED
 United States Department of the Interior
 Fish and Wildlife Service

100 ALA MOANA BOULEVARD
 P. O. BOX 50187
 HONOLULU, HAWAII 96850
 DIV. OF
 WASTEWATER
 MANAGEMENT
 ROOM 6307
 JUL 31 1985

Ms. Letitia M. Uyebara, Director
 Office of Environmental Quality Control
 650 Halekauwila Street
 Honolulu, Hawaii 96813

Re: Draft Environmental Impact Statement (DEIS), Sewer Tunnel
 Relief Project, Honolulu, Hawaii

Dear Ms. Uyebara:

The U.S. Fish and Wildlife Service has reviewed the referenced project and offer the following comments for your consideration.

The Service's primary concern with the proposed project is the potential dewaterment of Manoa and Palolo Streams caused by infiltration of stream water into the tunnel. As discussed in the Draft EIS, the loss of water may reduce stream flow and may negatively affect stream fauna.

The Service recommends that grouting of cracks and voids in the basalt layer overlying the tunnel be selected in the event of stream water infiltration into the tunnel. Lining the stream bed with an impervious barrier will reduce the amount of habitat available to stream organisms.

We appreciate the opportunity to comment.

Sincerely,

Original signed by
 Ernest Kosaka
 Project Leader
 Office of Environmental Services

cc: Dept. of Public Works, Div. of Wastewater Management

MPP 85-516

August 28, 1985

Mr. Ernest Kosaka, Project Leader
 Office of Environmental Services
 Fish and Wildlife Service
 U.S. Department of the Interior
 Honolulu, Hawaii 96850

Dear Mr. Kosaka:

Subject: Your Letter of July 31, 1985
 Regarding the Draft Environmental
 Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

Mitigative measures suggested in the EIS document regarding dewaterment of the Manoa and Palolo Streams include ground treatment (grouting) of basalt layers overlying the tunnel and temporary lining of stream beds with a non-porous fabric. If the stream bed is lined, it is anticipated that the total length of stream requiring lining would be on the order of 50-100 feet.

Should stream water infiltration into the tunnel be experienced, the selection of an appropriate mitigative measure will consider impacts to stream fauna.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,

RUSSELL L. SMITH, JR.
 Director and Chief Engineer

cc: Office of Environmental Quality Control
 E & C Branch
 Wilson Okamoto & Associates, Inc.

RM:da

RECEIVED HOUSE OF REPRESENTATIVES
 JUL 31 PM 2 53
 STATE OF HAWAII
 HONOLULU, HAWAII 96813
 Representative Jim Shon

DIV. OF
 WASTEWATER
 MANAGEMENT

Comments on: Draft Environmental Impact Statement for
 Sewer Tunnel Relief Prepared for the Depart-
 ment of Public Works, City & County of
 Honolulu, prepared by Wilson Okamoto &
 Associates

Submitted by: Representative Jim Shon
 28th District
 Makiki-Kaimuki
 August 1, 1985

General Remarks

The residents who will feel the impact of this
 substantial project have the right to ask two fundamental
 questions:

1. What exactly is the project plan?
2. Will it be implemented in such a way as to
 reasonably minimize adverse impacts?

This Draft EIS does outline the general scope of the
 project, but time and time again the actual details are
 left to the discretion of the contractor and the Depart-
 ment of Public Works. In most cases there are several
 options which range in impacts. It appears that no
 decisions have yet been made on the details, and there-
 fore it is impossible to judge whether or not impacts
 will be within the range of reasonable tolerance.

Example: On pages VI-7 and VI-8 noise abatement
 potentials are outlined for construction equipment.
 Several types of equipment are clearly candidates for
 significant reductions. Keeping in mind that a reduc-
 tion in ten decibels actually reduces the impact by
 one-half, backhoes, trucks, and concrete mixers could
 have their noise impacts reduced by at least one-half.
 However, there is no mention as to whether or not such
 standards will be required, or even if such standards
 will be incorporated as goals for the project. We do
 not know if the department considers the upper range
 of noise acceptable, or if the contractors will be
 given the options.

It would be important to compare these noise levels
 with those cited on page VI-7, the DOI's Title 11, and
 Chapters 42 and 43. Would compliance, for example, be
 even require noise abatement strategies? It may be that



the standards do not mandate the use of mufflers at all times, while the
 department should consider whether or not higher standards are in order.
 Most standards were not developed with such a massive project in mind.
 Short term impacts are often considered by some to be more tolerable
 because of their short duration. But this does not mean that the existing
 standards are acceptable for a project of this nature.

Certainly if the project is to be let out to bid, and noise abatement
 standards are not incorporated into the specifications, then the lowest
 bidder might very well be one who does not plan to use these strategies.

An additional concern would be if the abatement strategies so outlined
 in the Draft EIS are economically feasible. While perhaps technically
 possible, it would be important to know if the reduction of backhoe noise by
 ten decibels, for example, would be within the bounds of prudent costs.

Example: On pages VI-41 to VI-48 regarding the use of parks for
 staging areas, the information is particularly sketchy. The amount of time
 a particular park might be disrupted and limited for use is not suggested,
 and thus it is difficult to judge whether or not residents should be
 especially concerned. Disruption for a month might be one thing, but for
 several months it could be intolerable.

Of special concern are Makiki Park and Kaneohe Field. The area sug-
 gested for staging in Makiki Park is quite near a church pre-school.
 Especially in the mornings, traffic is quite heavy as cars turn down Makiki
 Street to drop off children. Would the project require the pre-school to
 change its hours, or even suspend operations? While it would be unreason-
 able to expect all the details at this time, at least an exploration of the
 standards for staging area impacts might be in order. One must ask: What
 does a staging area look like? Would it eliminate parking along Makiki
 Street? Would the presence of dangerous equipment require the closing of
 the park for young children? What kinds of safety and security will be
 insisted upon by the department?

The possible impacts on Kaneohe Field are even more serious because of
 the close proximity of houses to the proposed staging area. Already at
 least one family has moved simply because of the dust raised by the nearby
 baseball diamond. The adjacent residential area has many senior citizens,
 and one might wonder how long the dust and noise is likely to last and
 whether it might pose any health risk. Again, the explicit details of the
 operation can not be expected at this time, but the present EIS does not
 warn residents of what to expect. Certainly the standards which the depart-
 ment will insist upon should be outlined. At present too many important
 standards are being left up to negotiations later in the project.

The lack of detail and standards noted above does not detract from
 the considerable amount of information that is presented. The Draft EIS
 is a useful compilation of general information on what to expect. But
 since we do know the exact route of the sewer, it should be possible to
 flush out in more detail some site by site impacts and standards.

Jim Shon
 Jim Shon

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. ZAK
DIRECTOR

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

WPP 85-507

September 9, 1985

The Honorable Jim Shon
House of Representatives
The Thirteenth Legislature
State of Hawaii
State Capitol
Honolulu, Hawaii 96813

Dear Representative Shon:

Subject: Your Comments of August 1, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

We appreciate your concerns expressed on the probable impacts of construction upon the residents along the project corridor. As you have pointed out, details regarding construction operations are not totally definable at this stage of the project. The Draft EIS is based on preliminary engineering plans and studies which we consider appropriate for the "EIS-level" of impact analysis. Where possible, the Draft EIS addresses specific impacts and mitigative measures which may be anticipated. However, since there are uncertainties in the specific method of the contractor's operations, the Draft EIS attempts to discuss, in more general terms, the range of probable impacts which may occur. The nature of construction projects, in general, requires that some degree of contractor discretion (with respect to method of operation) be allowed in order to promote the competitive bidding process. It is this consideration which governs, in large part, the approach in which impacts are addressed in the Draft EIS.

Representative Jim Shon

-2-

September 9, 1985

Let me personally assure you, however, that we are sensitive to environmental constraints and that project design and construction will be subject to strict review and monitoring to assure that those unavoidable construction-related impacts are minimized.

As you know, the City and County is proceeding toward initiating construction plans and specifications. Design consultant teams, which will include reputable civil engineers, soils engineers, and tunneling specialists will be working closely with our staff to develop plans that meet the requirements of constructability while minimizing adverse impacts. It is during this construction documents preparation phase that construction details, including formulation of environmental-related specifications, will be developed.

With respect to noise abatement, contract specifications will require the contractor's compliance with the Department of Health's Title 11, Chapters 42 and 43, regarding vehicular and community noise control. We do not anticipate implementing standards higher than those prescribed by the foregoing rules. To comply with the regulation, however, we expect the contractor to implement necessary noise abatement measures. Specific conditions to which construction work must adhere will include the following:

1. The contractor must obtain a noise permit from the State Department of Health if the noise levels from the construction activities are expected to exceed the allowable levels of the regulations.
2. The contractor must comply with the conditional use of the permit as specified in the regulations and the conditions issued with the permit.
3. Should there be a baseyard or stockpile area located adjacent to residences, precautions to reduce the noise in these areas, such as barriers or berms, must be implemented. Contingency plans must be developed in the event that complaints are received regarding noise emanating from these areas.

With regard to the potential use of parks as staging areas, the duration of park use for staging purposes could conceivably be the duration of construction for the project increment. For example, one contractor may determine it more conducive to his

Representative Jim Shon

-3-

September 9, 1985

operations to work from one staging area throughout the duration of his contract. Another contractor may relocate his staging areas to two or three other sites as construction progresses. Contract specifications are not anticipated to impose upon the contractor restrictions on the duration of use of individual staging areas.

For your information, staging areas would probably include the contractor's field office, as well as areas set aside for storage of construction materials such as pipe sections and formwork materials. Traffic ingress and egress to and from the staging areas may temporarily inconvenience roadway users. Should traffic conflict become serious, particularly at the St. Clement's Church and Pre-School adjacent to Makiki Park, we will direct the contractor to adjust delivery/haul away schedules, as economically feasible, to minimize these impacts. With this in mind, hours of operation of the church and pre-school will not be disrupted by the use of Makiki Park as a staging area.

Generally speaking, where traffic control around staging areas does become problematic, measures for mitigating local traffic conflicts will be implemented. These measures may include the temporary elimination of street parking along the affected area, and/or the use of flagmen or police officers to direct traffic.

In the interest of public safety, all staging and construction areas will be completely secured through the use of fencing or barricades. As such, all equipment and materials stored and used for construction will be completely separated from park users.

In seeking to minimize impacts to residences situated near staging areas, contract specifications will also require the contractor to comply with the Department of Health's Title 11, Chapter 60 concerning air pollution control. In this regard, the contractor, pursuant to section 11-60-26 of the regulations, will be required to take reasonable precautions to prevent particulate matter from becoming airborne. Again, these regulations will be strictly enforced upon the contractor.

While we realize that construction inconveniences will temporarily affect many residents in your District, we ask for your understanding and support of this project which is essential to protect the well being of the general public.

Representative Jim Shon

-4-

September 9, 1985

A copy of your letter will be appended to the EIS document. If there are any questions, please contact me at 523-4341.

Very truly yours,



RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

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65 AUG -9 AM10 32
DIAMOND HEAD/KAPAHULU/ST. LOUIS HEIGHTS
NEIGHBORHOOD BOARD #5

DIV. OF
WASTEWATER
MANAGEMENT
August 7, 1985

Mr. Russell Smith Jr.
Director and Chief Engineer
Department of Public Works
City & County of Honolulu
650 So. King St.
Honolulu, HI 96813

Dear Mr. Smith:

Subject: DRAFT ENVIRONMENTAL IMPACT STATEMENT, SEWER TUNNEL RELIEF

The Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board concurs with the appropriateness of the subject project and finds that the draft environmental impact statement generally adequately addresses the substantial impacts on neighboring communities.

Additionally, the following comments relative to Increment 4 are offered:

1. We would like to be kept abreast of the more detailed construction planning, especially method of tunneling and blast monitoring and selection of staging areas.
2. Use of Kaneohe Field and the attendant disruption of its much used recreational facilities is of prime concern. We suggest use of an alternative site and if absolutely not feasible, than only as minimal use of the field as possible.
3. In the interest of preventing project delays due to labor strike interruptions as has occurred with the Kaho Avenue widening project, this Board would support (no strike clauses) as being part of the contractual agreements with the various construction firms.

Thank you.

George H. West
George H. West
Member, Neighborhood Board #5

Kenneth Chang
Kenneth Chang
Chairman, Neighborhood Board #5

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RECEIVED MAKIKI/LOWER PUNCHBOWL/TANTALUS BOARD NO. 10
c/o NEIGHBORHOOD COMMISSION OFFICE
CITY HALL, 4TH FLOOR
HONOLULU, HAWAII 96813-3014

'85 AUG -8 PM 2 29

DIV. OF
WASTEWATER
MANAGEMENT



August 6, 1985

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila St. Room 301
Honolulu, HI 96813

Dear Ms. Uyehara:

Since the major impact of the proposed new Sewer Relief Tunnel is in our neighborhood, we are very concerned with the environmental impact of this project. We are also concerned with the implementation of the Environmental Impact Statement.

The Makiki/Lower Punchbowl/Tantalus Neighborhood Board held a special meeting on August 1, 1985 and discussed the Environmental Impact Statement (EIS), dated June 19, 1985. The following are the concerns expressed by the Board:

1. No parks in our neighborhood should be used for construction. The parks in our neighborhood are heavily used and should not be taken for the convenience of the contractor. It should be noted that the statement is in error in regard to Makiki District Park. The open areas are used by various team sports and not just an occasional jogger.
Four of the possible non-park sites that could be used are the state owned land on Dole, Eva of Kaneohe Park; under the H-1 Freeway between Piikoi and Kewalo; Academy Business Center, THK 2-4-13.3; and the state owned parcel, THK 2-4-14.26, at Ward and Kinau.
2. The noise problem has not been adequately addressed. The proposed mitigation measures still leave the noise in the range of hearing loss. The time saved by using a sixteen hour work day should be indicated in the EIS.
3. Access to property is requested but no details or requirements are given in the EIS.
4. Safety considerations for school children and pedestrians are not addressed.

MAKIKI/LOWER PUNCHBOWL/TANTALUS
NEIGHBORHOOD BOARD NO. 10
L. Uyehara, Director, OEQC
August 6, 1985
Page 2

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5. Traffic planning is deferred. The Board wishes to review the proposed plan. Parking and bus routing should be in the traffic plan.
6. Blasting notification procedures should be specified.
7. Complaint and damage-claim procedures should be identified. It appears that a conflicting situation where neither the city or the selected contractor will acknowledge responsibility is being created. An appointed complaint coordinator could be useful for this project.
8. There are many schools in the area so it will not be possible to do all construction near schools during the summer. A detailed consideration of school impact should be made.
9. The possibility of using the opportunity for underground utilities in conjunction with the sewer trenching should be investigated. This is a common practice in some other cities.

We appreciate the opportunity to comment on this project and wish to be involved in future decisions concerning our neighborhood. If possible we would like the Department of Public Works to discuss this project with us at either of our next meetings on August 15 or September 19, 1985.

Sincerely,
Charles J. Carole
John Steulquist
President

cc: Department of Public Works
Councilmember Marilyn Bornhorst
Councilmember Tony Harvaes
Kaneohe Neighborhood Board
Neighborhood Commission

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. ZARI
MAYOR

RUSSELL L. SMITH, JR.
DIRECTOR
WPP 85-521

August 30, 1985

Mr. John Steelquist, President
Makiki/Lower Punchbowl/Tantalus Board No. 10
c/o Neighborhood Commission Office
City Hall, 4th Floor
530 South King Street
Honolulu, Hawaii 96813-3014

Dear Mr. Steelquist:

Subject: Your Letter of August 6, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief. The following discussion responds to your comments in the order presented in your letter.

Park Use

The discussion of Makiki District Park in the EIS document will be corrected to include usage of the open areas for various team sports.

We recognize your concerns regarding park usage for construction and wish to clarify an apparent misunderstanding expressed in your letter regarding the use of parks for the convenience of the contractor. The alternative of addressing parks has the merit of obtaining lower bid prices and thereby reducing the cost for the benefit to taxpayers. The purpose of the EIS document is to address all possible options regarding operations available to the contractor. In this respect, potential construction yard sites suggested in the EIS document are public open space areas which include the City parks. Open space, non-park areas which will also be considered for construction staging areas include those suggested in your letter. Development of the detailed construction plans and

Mr. John Steelquist

-2-

August 30, 1985

Program will, to the maximum extent practicable, minimize the use of public park areas. Every effort will be made to coordinate the construction program with State and private landowners for purposes of securing non-park space for staging areas. For Increment 1-B we are presently investigating three sites (other than parks) as staging areas, two of which are privately owned and the other State owned. If these areas can be obtained, parks will not be required for Increment 1-B.

Coordination with the Department of Parks and Recreation has been initiated and will continue during the pre-construction and construction phases to follow. In the event that the use of City lands is necessitated due to cost constraints, and parks are selected as staging areas, only that portion necessary for construction will be set aside for the contractor's use and all parks will be restored to pre-construction conditions upon completion of construction activities.

Noise/Extended Work Hours

With respect to noise abatement, contract specifications will require the contractor's compliance with the Department of Health's Title 11, Chapters 42 and 43, regarding vehicular and community noise control. We do not anticipate implementing standards higher than those prescribed by the foregoing rules. To comply with the regulation, however, we expect the contractor to implement necessary noise abatement measures. Specific conditions of the Department of Health to which construction work must adhere will include the following:

1. The contractor must obtain a noise permit from the State Department of Health if the noise levels from the construction activities are expected to exceed the allowable levels of the regulations.
2. The contractor must comply with the conditional use of the permit as specified in the regulations and the conditions issued with the permit.
3. Should there be a backyard or stockpile area located adjacent to residences, precautions to reduce the noise in these areas, such as barriers or berms, must be implemented. Contingency plans must be developed in the event that complaints are received regarding noise emanating from these areas.

Blasting

Blasting is one of three tunneling methods which may be employed. If underground blasting is employed, the public will be notified in advance of the proposed blasting operations. If blasting is required at sensitive areas however, such as near the University of Hawaii (which houses vibration sensitive scientific instruments), the contractor will be required to coordinate his blasting program to assure that blast designs meet the requirements of the affected party.

The contractor will be required to obtain a blasting permit in accordance with provisions set forth by the State Department of Labor and Industrial Relations, Occupational Safety and Health Office.

Complaints

Coordination of complaint and damage procedures will be the responsibility of the Construction Section, Division of Wastewater Management, Department of Public Works.

Schools

Probable impacts of construction near school and mitigative measures are discussed generally in Section VI.B.1 of the BIS document. Design and project scheduling shall consider all reasonable means to minimize or eliminate impacts to schools.

Underground Utilities

Construction of the proposed project will be coordinated with other utility improvements. We are coordinating implementation of the proposed project with all utility companies. To assure proper coordination, construction plans and specifications are reviewed by all utility companies in accordance with procedures adopted by the Utilities Coordinating Committee where concerns as mentioned are addressed.

While we realize that construction inconveniences will temporarily affect many residents within the Makiki/Lower Punchbowl/Wantalus Board No. 10, we ask for your understanding and support of this project which is essential to protect the well being of the general public. With due respect to your concerns, however, we will be happy to meet with the Neighborhood Board to discuss any questions or concerns you may

Approval of a variance by the State Department of Health will be required for implementation of extended work hours. Time saved by using a sixteen hour work day would be dependent on construction operations employed, final design and contract specifications. While it is difficult to estimate the total time savings without these details, it appears reasonable to assume that the construction period can be reduced by more than 50 percent, particularly since total time required for daily mobilization and demobilization by the contractor will be substantially decreased.

Access

Construction specifications will require that continuous access to all properties be provided by the contractor.

Safety

As stated in the BIS document, necessary measures to assure public safety will be provided throughout all phases of construction. For example, security barriers will be provided to separate pedestrian and other traffic from construction work areas. Additionally, we recognize the need for part-time street crossing guards during the morning and afternoon hours when elementary school students have to pass close to construction zones on their way to and from school. In this regard, preliminary coordination with elementary schools is proposed to suggest the possibility of volunteer guardpersons, such as PTA members. Volunteer aid notwithstanding, the contractor will be responsible to provide needed pedestrian safety measures, to include the hiring of flagmen and police officers.

Traffic

Increment 1-B traffic control plans coordinated with the State Department of Transportation are being completed. Traffic control plans for increments 2 to 4 will be developed during the design phase. Traffic control plans will be available for inspection at the Department of Public Works. Our staff will, of course, be more than happy to discuss these plans with members of the Neighborhood Board.

Mr. John Steelquist

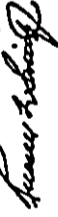
-5-

August 30, 1985

have. For you information, a public hearing to be conducted by the State Department of Health regarding our Noise Variance Request for Increment 1-B is being planned for sometime in September 1985.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact me at 523-4341.

Very truly yours,



RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

MM:da

RECEIVED
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DIV. OF
WASTEWATER
MANAGEMENT

July 26, 1985

Mr. Russell L. Smith, Jr.
Director and Chief Engineer
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

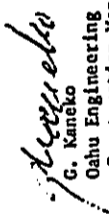
Dear Sir:

Draft Environmental Impact
Statement for Sewer Tunnel
Relief, Honolulu, Hawaii

We have reviewed the Draft EIS for the sewer tunnel relief and have no comments to offer. However, we request that the specification governing excavation and backfill near our facilities, and contractor's method for propping existing telephone facilities be submitted for our review and comments.

Thank you for giving us the opportunity to comment on the Draft EIS.

Sincerely,


G. Kaneko
Oahu Engineering &
Construction Manager

WPP 85-519

August 28, 1985

Mr. George Kaneko
Oahu Engineering and Construction Manager
Hawaiian Telephone Company
P. O. Box 2200
Honolulu, Hawaii 96841

Dear Mr. Kaneko:


Subject: Your Letter of July 26, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

To assure proper coordination with the Hawaiian Telephone Company, construction plans and specifications will be submitted for your review and approval. Plans and specifications will be coordinated with utility companies in accordance with procedures adopted by the Utilities Coordinating Committee of which the Hawaiian Telephone Company is a member.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours,


RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

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Honolulu Academy of Arts 16 2 32 PM '85

TO THE CHIEF ENGINEER OF THE
WASTEWATER
MANAGEMENT

150 SOUTH KALANOAUAVI STREET, HONOLULU, HAWAII 96813, TELEPHONE 838-3400

15 July 1985

Miss Letitia N. Uyehara, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Miss Uyehara:

I have received a letter from Mr. Russell L. Smith, Jr., Director and Chief Engineer of the Department of Public Works informing me of the availability of Draft Environmental Impact Statement for Sewer Tunnel Relief, Honolulu, Hawaii. I have subsequently had the opportunity to review this document and continue to have serious concerns regarding the impact of the sewer project on the Academy of Arts, both to the building and its contents and the services which we offer.

Although I am relieved that no blasting will occur in Increment 1B, I am very concerned about the driving of piles in the immediate vicinity. Vibration is dangerous for the building as well as the collections. In addition I note that ground movement may result from the excavation, an exceedingly dangerous potential as well. Also mentioned is the use of air hammers and other "special" equipment if coral is encountered. Here both vibration and noise are of concern.

From the standpoint of collections the considerable increase of dust and vehicle emissions in the air are of grave concern. A large percentage of the space at the Academy is not climatized and doors and windows open directly to the outdoors.

Higher noise levels will directly impact all our services, and many activities, such as gallery tours, concerts, etc. require that any noise be minimized if they are effectively conducted. In addition the possibility of noise levels above those approved by the Department of Health may exist after 6:00 p.m., if increment 1B employs extended work hour operations. This could adversely affect our evening theatre operations.

A letter of March 27, 1985 from Mr. Smith states that "these issues will be discussed in greater detail in the forthcoming EIS," but the level of detail included is not adequate to dispel our concerns. You further state that to minimize traffic congestion, some of the measures being considered are restrictions on parking and construction during both peak and non-peak hour periods. To restrict parking would increase problems

Miss Letitia N. Uyehara
15 July 1985
Page 2

of access if alternative parking is not possible.

If extended work hour operations are put into effect, the Academy will be subject to the same dangers and interruption of services on the week-ends as during the week. I realize that the project would be completed sooner under these circumstances but am not convinced that this constitutes a reasonable trade-off.

I would also like to know whether there will be any loss of service for electricity, water and telephones during the construction period. Any such loss will directly affect our climate controls and security.

There seems to be no question that the new sewer system is needed and the Academy will cooperate in every way which is reasonable. It is my responsibility, however, to assure that any possible adverse impact on the Academy is carefully weighed and solutions sought. I note that consultation with the Academy before work begins is recommended in the Environmental Impact Statement. Your consideration and concern is greatly appreciated and I would like to request a meeting as soon as possible.

Thank you for soliciting our comments and opinions.

Sincerely,

George R. Ellis

George R. Ellis
Director

GRZ:lh

cc: Mr. Russell L. Smith, Jr.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK FARR
DIRECTOR

Mr. George R. Ellis

-2-

August 15, 1985

RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER

HPP 85-472

August 15, 1985

Mr. George R. Ellis, Director
Honolulu Academy of Arts
900 S. Beretania Street
Honolulu, Hawaii 96814

Dear Mr. Ellis:

Subject: Your Letter of July 15, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental
Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

Probable impacts and mitigative measures specifically related to the Honolulu Academy of Arts are discussed in Chapter Six of the EIS. Unfortunately, impacts associated with construction by nature of the work involved cannot be totally mitigated and, therefore, are acknowledged to be unavoidable. Construction plans and specifications for the project are being formulated to minimize construction impacts within reasonable levels which are economical, practical and consistent with the State's statutes regarding noise and air pollution control. Impacts to motorists and the general public, as well as occupants along the project corridor, are and should be considered in the project plans. We realize that during construction inconveniences would arise and adjustments to the norm by occupants along the corridor may be required. These inconveniences and impacts are temporary and we ask for your understanding and support of this project which is essential to protect the safety and health of the general public.

It should be noted that the project corridor environment in its pre-construction state, particularly along Beretania Street, is typical of a major urban thoroughfare which is high in noise, dust, traffic congestion and vehicular emissions. These are permanent long-term impacts and, if critical, certain improvements to existing facilities should be considered by occupants as permanent solutions. We also recommend that contingency plans be formulated by those along the project corridor in anticipation of some degree of construction related impacts. Recognizing your concerns however, we are willing to initiate preconstruction consultations with you in order to assure that all reasonable measures necessary to minimize impacts to the Academy of Arts are considered.

We will be contacting your office shortly to arrange an initial project orientation meeting. We anticipate follow-up meetings both prior to and during construction to address specific impacts which are of concern to you. We look forward to a cooperative effort which will enable the timely completion of the project.

For your information, utility services to the Academy (barring accidental breakage) will not be affected by the project.

A copy of your letter will be appended to the EIS document and your concerns further documented in Chapter XII, Summary of Unresolved Issues. If there are any questions, please contact me at 523-4341.

Very truly yours,

For RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

RECEIVED

'85 JUL 26 AM 9



DIV. OF WASTE WASTE STATE OF HAWAII OFFICE OF ENVIRONMENTAL QUALITY CONTROL 151 HALEKUAHILA STREET ROOM 301 HONOLULU, HAWAII 96813

GEORGE R. ANTONIOMI

LETITIA M. UYEHARA DIRECTOR TELEPHONE NO. 544-8013

KOTAKE SHOKAI, LTD.

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED DATE 05/11/00 BY 60322 UCBAW/BJS/STP

WHOLESALE DISTRIBUTOR MANUFACTURING REPRESENTATIVE OF HAWAII HONOLULU HAWAII 96813

July 10, 1985

Office of Environmental Quality Control 550 HalekuaHila St., Rm. 301 Honolulu, Hawaii 96813

RECEIVED DEPT. OF PUBLIC WORKS JUL 25 2 02 PM '85

July 22, 1985

Mr. Ken Morioka Sales Manager Kotake Shokai, Ltd. P.O. Box 4512 Honolulu, Hawaii 96813-0612

Dear Mr. Morioka:

I have transmitted the information that you have supplied us regarding your "Bristar," non-explosive agent, to the City and County of Honolulu Department of Public Works. That is the agency responsible to over see work on the sewer tunnel relief project.

Sincerely,

Letitia M. Uyehara Director

cc: DPW, C&C Hnl.

Dear Sirs:

In response to the attached copy of an article that appeared in the July 2, 1985 edition of the Honolulu Advertiser concerning the use of explosives to construct the new sewage line through the Kaimuki and Kapaehulu area. These areas are known to have many massive blue rock boulders. As you have already known, blasting will create vibrations that cannot always be controlled safely. These vibrations if not controlled can have an unanticipated damages as human tragedies, property and pollution.

We at Kotake Shokai Ltd., have the alternative to blasting. It is a "NON-EXPLOSIVE" demolition agent called "BRISTAR" (pronounced bri-star). "BRISTAR" is safe and easy to handle, has no toxic fumes, quiet when it works, no dust or fly rock and is pollution free. There would be no need for a licensed person to secure as in blasting. It can be handled safely by any layman with a minimal amount of instructions, there by cutting expenses and time.

"BRISTAR" has been used effectively here in Hawaii by Hawaiian Dredging Co., at the Hospital Point located in Pearl Harbor (motor mounts and pier demolition), and the Moanalua Bridge where traffic is usually heavy during the day (footing demolition). Allied Construction, Ralph Inouye Co. Ltd. and Geo. Engineering have used it to excavate massive amounts of blue rock boulders for the footing and storm drain laying at the Kapiolani Community College located at the old Ft. Ruger site.

The most recent use of "BRISTAR" was at the corner of Charles and 4th Ave. S. Masonary who use it to excavate a massive blue rock boulder under the house to build an addition under the existing house. Included are photographs of the job site showing that the house remained on stilts when "BRISTAR" did its work. Because of no vibration the work progressed safely. We hope that the attached catalogs, technical data and the photographs will be of assistance to you in the construction of the new sewage line.

Thank you very much for your most valuable time given and should more detailed information is needed, please feel free to call us.

Very truly yours, KOTAKE SHOKAI, LTD.

Ken Morioka Sales Manager

Enc.

Overhaul of sewers called worth noise, traffic jams, pollution

By Gerald Kato
Advertiser Government Bureau

There will be blast vibrations, traffic jams, lots of noise, open trenches and probably air pollution when the city gets to work on Honolulu's deteriorating sewer system.

But the long-term benefits of overhauling the sewers far outweigh the short-term construction drawbacks, according to a draft environmental impact statement for the project. To do nothing, according to the document prepared for the city by Wilson Okamoto and Associates, would increase health and safety hazards.

The City Council this year set aside \$16 million to pay for construction of the first four phases of the Kaimuki-Manana relief sewer tunnel.

The improvements would run from the intersection of Ward Avenue and South Beretania Street to Palolo Avenue at Keanu Street. Work will involve cutting open trenches and excavating tunnels.

The project travels over some of the city's most

crowded residential, educational, commercial and financial centers. For instance, construction would straddle house lots to St. Louis Drive, and continue across St. Louis High School/Chaminade University campus under an existing park and interior road to the athletic field.

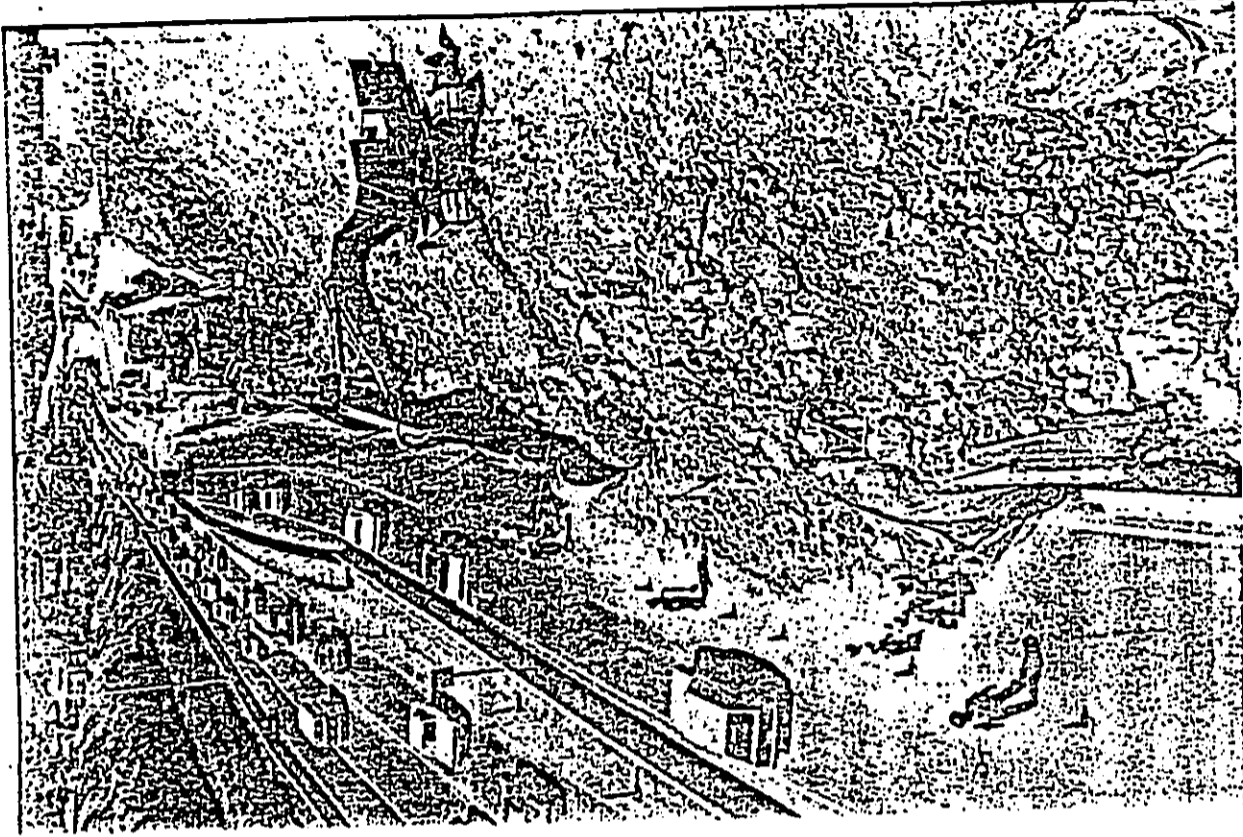
If construction begins by January, work is expected to be completed by 1991, the environmental study said.

The public will feel the effects of construction along sections where trenches will be dug. Going to a 16-hour work day along segments such as those at Beretania and Pensacola streets may lessen the problems, the study said.

In some sections, tunnels will be used. Blasting will be prohibited and if vibrations include the sewer blasting, it will be stopped and an alternative method found.

The city Department of Public Works and the state Office of Environmental Quality Control will be accepting comments on the project from government agencies and community groups until Aug. 8.

ONODA'S
"BRISTAR"
CAN PREVENT THIS
FROM HAPPENING!



I-1 on the rocks

falling rocks on east-bound lanes of the I-1 Freeway yesterday delayed homebound motorists for several hours, police said. The rocks were loosened about 3 p.m. by a crane clearing the way for a widened I-1. Motorists had to squeeze through the only open lane during the work.

Associated Press photo by Alan Tan

KOIKE SHOKAI, LTD.

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P. O. BOX 8112
HONOLULU HAWAII 96813-0812
PHONE: (808) 533-7612 34

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"BRISTAR - NON-EXPLOSIVE DEMOLITION AGENT"

Non-blasting Tunneling Method (BT-Method)

1. Introduction

Where tunneling is conducted by the conventional blasting method, nearby inhabitants are often exposed to the blasting vibration and noise and this has recently been taken up as a pollution problem requiring effective countermeasures.

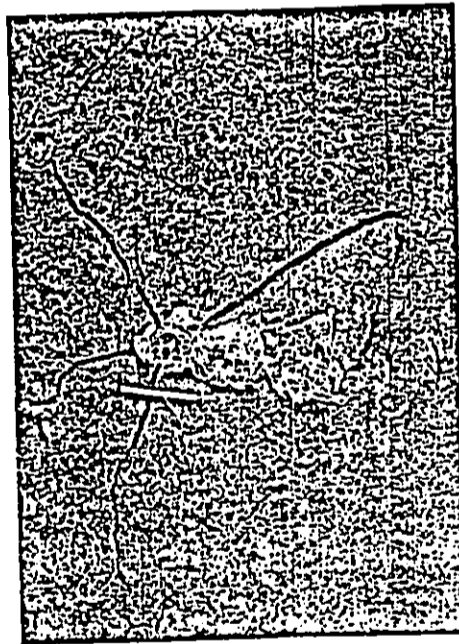
If tunneling is to be done without blasting, the following methods are technically feasible at present.

- 1) Using the tunnel boring machine
- 2) Boring honeycombed holes and excavation by percussions of the breaker
- 3) Rock breaking using the rock splitter

However, these methods are inefficient and costly and cannot be put to practical use without substantial improvement. Now we have found a solution to the problem with our recent success in developing the BT-method as an epoch-making non-blasting tunneling method.

2. What is the BT-method (Bristar Tunneling Method) ?

The center cut is performed very efficiently by a combination of a non-explosive demolition agent (BRISTAR), a large hydraulic rock splitter (BIGGER) and a hydraulic rock breaker (BREAKER). The BT-method, a non-blasting tunneling method, elevates the finishing accuracy of the outer circumference (Patent pending).



3. Characteristics of the BT-method

- 1) Vibration and noise are very small.
- 2) The method can be applied to any shape of cross section of tunnels.
- 3) The tunneling speed is faster compared with other non-blasting methods.
- 4) Overbreak digging can be minimized by using "BRISTAR", the non-explosive demolition agent.
- 5) Since the method does not cause much damage to rocks on the outer circumference, falling stones, cave-in and other accidents can be avoided, which adds great to the safety of the tunneling work.
- 6) The BT-method is cheaper than other non-blasting methods in cost.

Note: Since the machines must be used for boring and secondary breaking, the tunnel, to which this method is to be applied, should have dimensions no less than the following.

Width : 4 m
 Height : 4 m
 (Cross Section : 15 m²)

4. Construction method

1) The characteristics of this construction method are summarized as follows.

- a) Slot cutting method (Patent pending) --
 Slot cutting is performed against the working faces with the use of a large hydraulic rock splitter so as to make two free surfaces of good efficiency.
- b) Method of enlarging the center cut
 The circumference of the slot cutting portion is expanded with the use of "BREAKER".
- c) Method of enlarging the outer circumference

The outer circumference of the excavated portion is enlarged by utilizing the cracks connecting the holes, which is very characteristic of the rock breaking by "BRISTAR".

Instead of applying the smooth blasting method which makes use of explosives, line drilling is performed on the utmost outer circumference with holes drilled at a space of 30 - 50 cm, and, by filling in "BRISTAR", the overbreak digging can be minimized.

August 29, 1985

Mr. Ken Morinaka, Sales Manager
Kotake Shokai, Ltd.
P. O. Box 4512
Honolulu, Hawaii 96813-0612

Dear Mr. Morinaka:

Subject: Your letter of July 10, 1985
Regarding the Proposed
Sewer Tunnel Relief

We have received a copy of your letter and accompanying enclosures regarding the demolition agent, "BRISTAR". The construction technique described in your letter is addressed in the Draft Environmental Impact Statement.

A copy of your letter will be appended to the EIS document. If there are any questions, please contact Mr. Ed Arakawa at 523-4067.

Very truly yours
Russell L. Smith, Jr.

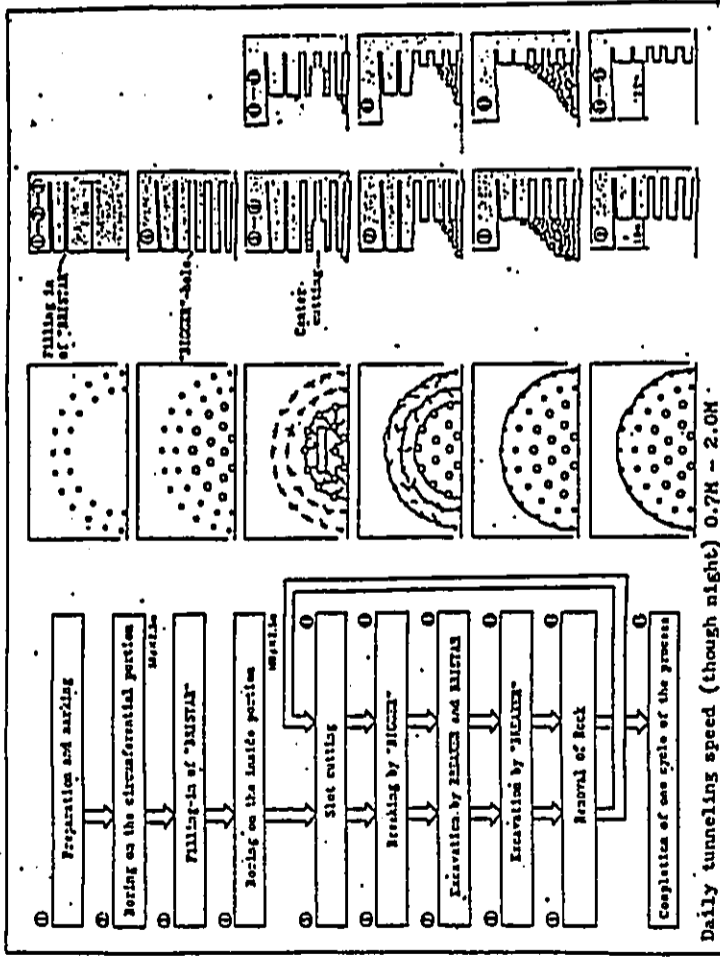
RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

WRda

2) Construction Process

The following process is considered as one cycle of the BT-method.



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Ms. Letitia M. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

AUG 08 PM 2 37
DIV. OF WASTEWATER
MANAGEMENT
August 2, 1985

Dear Ms. Uyehara:

This letter constitutes my comments on the Draft Environmental Impact Statement for Sewer Tunnel Relief, which I found and read at the HUGully-Moiliili Library on August 1, 1985. The overall document generally appears to be extremely well done, with close attention to detail and superb graphics which delineate the project well. The only comments I have are related to the construction expenditures and employment.

The document makes it clear that the proposed project will provide "temporary economic benefits resulting from construction expenditures and employment opportunities" (page IV-1). It would be easier to appreciate the magnitude and significance of such benefits if they could be at least grossly quantified. With regard to the expenditures, it might be nice to know the gross kinds of spending in the regional economy which would take place. A question which comes to mind is: what percentage of the total expenditures will be made here on the island economy and what percentage would be for items ordered from the mainland? With regard to the construction employment, it would be useful to know the approximate numbers of construction workers which would be employed in the different phases of the project. Other questions are: what percentage of the workers utilized would be expected to come from the local labor force -- how many mainland workers might be drawn for the project -- would the labor utilization have any effect on the local unemployment rate -- what about transportation problems of the construction workers vehicles? A brief attention to such concerns seems in order for a project of this magnitude.

Sincerely,
Milton Stackmann

copy to: Mr. Ed. Arakawa
of the
Div. of Wastewater Management
650 S. King St., Honolulu, HI 96813

Milton Stackmann
Honolulu, HI 96814

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

630 SOUTH KING STREET
HONOLULU, HAWAII 96813



RUSSELL L. SMITH, JR.
DIRECTOR AND CHIEF ENGINEER
WPP 85-522

FRANK F. PARI
CLERK

August 30, 1985

Mr. Milton Staackmann
415 Atkinson Drive, Apt. 1507
Honolulu, Hawaii 96814

Dear Mr. Staackmann:

Subject: Your Letter of August 2, 1985
Regarding the Draft Environmental
Impact Statement for
Proposed Sewer Tunnel Relief

Thank you for your comments concerning the Draft Environmental
Impact Statement (EIS) for the Proposed Sewer Tunnel Relief.

As discussed in the EIS document, resources committed to the
project will include materials, labor, energy and funding to
implement construction which will provide temporary economic
benefits. Cost estimates are provided in Section II-F for
construction only (excludes design, administration and
construction management).

Unfortunately, more detailed information regarding expenditures
and employment cannot be provided during this phase of project
development, as economic impacts will be dependent upon the
design, and the contractor's selected method of operations.
The contractor's method of operation is of particular
significance since the method will dictate equipment, material,
and manpower requirements. While these factors are unknown, we
feel that a substantial portion of the construction resources
will be from Hawaii.

Mr. Milton Staackmann

-2-

August 30, 1985

Certainly, a project of this magnitude will have a positive
bearing on local employment. It is also recognized, however,
that specialized needs such as tunnel construction engineers,
and sophisticated tunnel excavating equipment may not be
available in Hawaii. These specialized needs would not
constitute a significant portion of the overall construction
cost.

With respect to construction worker transportation, the
contractor will be responsible for coordinating worker
transportation, particularly since availability of parking for
worker vehicles at the project site will be limited.

A copy of your letter will be appended to the EIS document. If
there are any questions, please contact Mr. Ed Arakawa at
523-4067.

Very truly yours,

RUSSELL L. SMITH, JR.
Director and Chief Engineer

cc: Office of Environmental Quality Control
E & C Branch
Wilson Okamoto & Associates, Inc.

MM:da

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APPENDIX A
DESIGN CONSIDERATIONS

APPENDIX A
SEWER TUNNEL
DESIGN CONSIDERATIONS

A Technical Supplement to
the Environmental Impact
Statement for the Proposed Sewer Tunnel Relief

Prepared for
Department of Public Works
City and County of Honolulu

Prepared by
Wilson Okamoto & Associates, Inc.
Engineers, Architects and Planners

April, 1985

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I. INTRODUCTION

The purpose of this report is to document technical characteristics for the proposed Sewer Tunnel Relief. Information contained herein updates wastewater flow data previously documented in Chung Dho Ahn and Associates' 1971 study on the Manoa-Kaimuki Interceptor Sewer. In addition, discussion and results of hydraulic capacities of both the existing sewer and the proposed Sewer Tunnel Relief are presented.

Finally, this report examines alternative sewer lining materials which may be considered for the proposed Sewer Tunnel Relief. This consideration is important from a long-term maintenance standpoint as tunnel lining will be a primary factor in preventing sulfide-related corrosion in the sewer.

II. WASTEWATER FLOWS

This section presents data on wastewater flows which are projected to be conveyed through the Sewer Tunnel Relief for the design year of 2005. Wastewater flow computations were prepared in accordance with the City and County of Honolulu's Design Standards of the Division of Wastewater Management, Volume I, (February, 1984).

The following constants were used in computing wastewater flows.

- o Average Wastewater Flow = 80 gpcd
- o Dry Weather Infiltration/Inflow = 35 gpcd
- o Wet Weather Infiltration/Inflow = 2,750 gpad

The design peak flow at the Waialae Drive-In Theater is 17.7 MGD. At the downstream end of the line at Ward Avenue, the design peak flow is 56.5 MGD. Flow computations are presented in Table A-1.

III. HYDRAULIC CHARACTERISTICS

A. Existing Manoa-Kaimuki Interceptor

The existing Manoa-Kaimuki Interceptor Sewer is comprised of two types of tunnel sections: (1) a 4 x 5-ft. horseshoe-shaped tunnel; and (2) a 4 x 6.25-ft. horseshoe-shaped tunnel.

The 4 x 5-ft. section which extends from Ward Avenue to Palolo Avenue, is over 50-years old. The 4 x 6.25-ft. section extends from Palolo Avenue to the Waialae Drive-In and is 37-years old.

TABLE A-1
COMPUTATION OF WASTEWATER FLOW

SEWER: Proposed Sewer Tunnel Relief (Design Year 2005)

PAGE: 1 of 4

COMPUTED BY: MK

DATE: 1/9/85

DISTRICT:

REFERENCE MAPS:

SEWER LOCATION	TRIBUTARY AREA* (ACRES)		TRIBUTARY EQUIVALENT POPULATION*				WASTEWATER FLOW COMPUTATION								EXISTING	
	INCREMENT	TOTAL	RESIDENTIAL		OTHER		TOTAL	MAX FLOW FACTOR	MAX FLOW (MGD)	DRY WEATHER INFL. FLOW (MGD) @ 1.35 CPD	DESIGN AVE. FLOW (MGD)	DESIGN MAX. FLOW (MGD)	WET WEATHER INFL. FLOW (MGD) @ 2.75 CPD	DESIGN PEAK FLOW (MGD)	PIPE DIAMETER (IN)	SLOPE (%)
			INCREMENT	TOTAL	INCREMENT	TOTAL										
Waialae to Niu Valley	2624		27609		7656		35265		2.82				7.21			
Aina Koa	252		3572		219		3791		.30				.69			
Waialae Nui Valley	111		3122		270		3392		.27				.30			
East Kaimuki	306	2987	5084		2208		7292		.58				.84			
East Maunalan Heights	120		2508				2508		.20				.33			
West Maunalan Heights	163		3652				3652		.29				.44			
							55900		4.47	2.30	10.28	6.42	12.24	9.83	22.07	

REMARKS: *Data Provided by City and County of Honolulu, Department of Public Works, Division of Wastewater Management.

Table A-1 - Continued
COMPUTATION OF WASTEWATER FLOW

SEWER: Proposed Sewer Tunnel Relief (Design Year 2005)
DISTRICT: _____
REFERENCE MAPS: _____

PAGE: 2 of 4
COMPUTED BY: MK
DATE: 1/9/85

SEWER LOCATION DISTRICT ZONE OR STREET	POINT	TRIBUTARY AREA* (ACRES)		TRIBUTARY EQUIVALENT POPULATION*				WASTEWATER FLOW COMPUTATION							EXISTING PIPE DIAMETER (IN)	SLOPE (%)		
		INCREMENT	TOTAL	RESIDENTIAL		OTHER		TOTAL	AVERAGE WASTEWATER FLOW (MGD) @ 100 CPCD	MAX FLOW FACTOR	MAX FLOW (MGD)	DRY WEATHER INFLOW (MGD) @ 100 CPCD	DESIGN AVE. FLOW (MGD)	DESIGN MAX. FLOW (MGD)			WET WEATHER INFLOW (MGD) @ 2750 CPCD	DESIGN PEAK FLOW (MGD)
				INCREMENT	TOTAL	INCREMENT	TOTAL											
Wilhemina Rise		202		3569		824		4393		.35		.15			.55			
Palolo Valley		823		4968		2613		7581		.60		.26		2.26				
Chaminade		98		1554		1281		2835		.22		.09		.27				
West Kaimuki		298		7486		1645		9131		.73		.32		.82				
St. Louis Heights		145		3284				3284		.26		.11		.39				
								83124		6.65	2.30	15.29	2.90	9.55	18.20	14.14	32.34	

REMARKS: *Data Provided by City and County of Honolulu, Department of Public Works, Division of Wastewater Management

TABLE A-1 - Continued
COMPUTATION OF WASTEWATER FLOW

PAGE: 3 of 4
COMPUTED BY: MK
DATE: 1/9/85

SEWER: Proposed Sewer Tunnel Relief (Design Year 2005)

DISTRICT:

REFERENCE MAPS:

SEWER LOCATION DISTRICT ZONE OR STREET	POINT	TRIBUTARY AREA* (ACRES)		TRIBUTARY EQUIVALENT POPULATION*				WASTEWATER FLOW COMPUTATION							EXISTING PIPE DIAMETER (IN)	SLOPE (%)		
		INCREMENT	TOTAL	RESIDENTIAL		OTHER		TOTAL	MAX FLOW FACTOR	AVERAGE WASTEWATER FLOW (MGD)	MAX FLOW (MGD)	DRY WEATHER INFILTRATION (MGD)	DESIGN AVE. FLOW (MGD)	DESIGN MAX. FLOW (MGD)			WET WEATHER INFILTRATION @ 2.75" CPD (MGD)	DESIGN PEAK FLOW (MGD)
				INCREMENT	TOTAL	INCREMENT	TOTAL											
Manoa Valley	Donaghy Road	1258		19008		10504		29512		2.36		1.03			3.46			
								112636		9.01	2.30	3.94	12.95	24.66	17.60	42.26		
Metcalf Area	Nakia Pl.	96		1660		725		2385		.19		.08			.26			
								115021		9.20	2.30	4.02	13.22	25.19	17.86	43.05		
Punahou Area	Punahou St.	134		3048		1250		4298		.34		.15			.36			
								119319		9.54	2.30	4.17	13.72	26.13	18.23	44.36		
Makiki Area	Makiki St.	413		18730		999		19729		1.57		.69			1.13			
								139048		11.12	2.30	4.86	15.99	30.45	19.36	49.82		
Kaahumanu School Area	Piikoi St.	13.7		2504				2504		.20		.08			.03			
								141552		11.32	2.30	4.95	16.27	31.00	19.40	50.40		

REMARKS: *Data Provided by City and County of Honolulu, Department of Public Works, Division of Wastewater Management.

TABLE A-1 - Continued
COMPUTATION OF WASTEWATER FLOW

SEWER: Proposed Sewer Tunnel Relief (Design Year 2005)

DISTRICT:

REFERENCE MAPS:

PAGE: 4 of 4

COMPUTED BY: MK

DATE: 1/8/85

SEWER LOCATION DISTRICT ZONE OR STREET	POINT	TRIBUTARY AREA (ACRES)		TRIBUTARY EQUIVALENT POPULATION *				WASTEWATER FLOW COMPUTATION								EXISTING () ULTIMATE ()		
		INCREMENT	TOTAL	RESIDENTIAL		OTHER		TOTAL	AVERAGE WASTEWATER FLOW (MGD) @ 1.50	MAX FLOW FACTOR	MAX FLOW (MGD)	DRY WEATHER INFILTRATION FLOW (MGD)	DESIGN AVE. FLOW (MGD)	DESIGN MAX. FLOW (MGD)	WET WEATHER INFILTRATION @ CRAP (MGD)	DESIGN PEAK FLOW (MGD)	PIPE DIAMETER (IN)	SLOPE (%)
				INCREMENT	TOTAL	INCREMENT	TOTAL											
Punchbowl Area	Pensa Cola St.	120		24853		188		25041	2.00			.87						
Academy of Arts	Victo Sta	9		655		655		66593	13.32	2.30	30.655	.83	19.15	36.48	19.73	56.22		
Ward Ave.	Ward Ave.	1		468		468		167248	13.38	2.30	30.775	.85	19.23	36.62	19.76	56.38		
								167716	13.41	2.30	30.865	.87	19.28	36.73	19.76	56.49		

REMARKS: *Data Provided by City and County of Honolulu, Department of Public Works, Division of Wastewater Management.

The capacity of the existing tunnel, between Ward Avenue and Palolo Avenue is based on the Mannings formula:

$$V = \frac{1.486}{n} R^{2/3} S^{1/2}$$

Where V = Velocity
R = Hydraulic Radius
S = Slope
n = Manning's "n"

Previous studies by Chung Dho Ahn and Associates (1971) document hydraulic data which reflect Manning's "n" value at various points along the existing sewer tunnel. As shown in Table A-2, these values range from a low of 0.016 at Waialae Drive-In, to a high of 0.029 at St. Louis High School. The average of "n" values measured at the various locations is 0.021.

At the time that measurements were taken, the tunnel was not regularly maintained. Therefore, values reflect "unmaintained" conditions.

The Chung Dho Ahn study also established an "n" value of 0.018 for "improved with maintenance and regular cleaning" conditions. While this value is assumed valid, consideration were also given to the likelihood that additional degradation has occurred since 1971. Therefore, hydraulic characteristics for the existing tunnel were evaluated using "n" value range of 0.018 to 0.021.

Capacities of the existing interceptor using Manning's equation and "n" values of 0.018 and 0.021 were calculated to be 35.33 mgd and 30.29 mgd, respectively. Based on projected wastewater flows for the year 2005, the existing Manoa-Kaimuki Interceptor would be flowing full at the Manoa Trunk connection and at Saint Louis Drive for "n" values of 0.018 and 0.021, respectively. Equation parameters and results are shown in Table A-3.

TABLE A-2
SUMMARY OF "n" VALUES
FROM FIELD MEASUREMENTS MADE ON FEBRUARY 19, 1970

<u>Location</u>	<u>Ave. Velocity (fps)</u>	<u>Depth of Flow (ft)</u>	<u>Estimated "Q" (mgd)</u>	<u>Manning's "n"</u>
Waialae Drive-In Theater	1.94	2.00	9.05	0.016
St. Louis High School	1.58	1.47	5.25	0.029
Dole St. at U. of H.	2.91	2.52	16.16	0.021
Wilder Avenue at Makiki St.	1.65	2.35	13.99	0.022
Victoria St. at Kinau St.	2.69	1.70	11.27	<u>0.017</u>
			Average	0.021

Source: Chung Dho Ahn & Associates, Inc., March 1971.

TABLE A-3

HYDRAULIC PARAMETERS OF THE
EXISTING MANOA-KAIMUKI INTERCEPTOR SEWER

<u>Parameter</u>	<u>n = 0.018</u>	<u>n = 0.021</u>
Slope	0.001	0.001
Area	18.86 ft ²	18.86 ft ²
Hydraulic Radius	1.17	1.17
Tunnel Capacity	35.33 MGD	30.29 MGD
Point of Full Flow	Manoa Trunk	St. Louis Drive
Flow Downstream of Point of Full Flow <u>1/</u>	42.27 MGD	31.25 MGD
Flow Upstream of Point of Full Flow <u>1/</u>	32.35 MGD	27.52 MGD

1/ Based on projected flows for 2005 (Table A-1).

B. Proposed Sewer Tunnel Relief

The proposed Sewer Tunnel Relief will consist of a 60-inch reinforced concrete pipe section, and a 4-ft x 6.25-ft concrete-lined tunnel section. The inside surface of the pipe/tunnel will be lined to protect the concrete surface against hydrogen sulfide corrosion.

Generally, manufactured concrete (pre-cast) pipe have "n" values ranging from 0.012 to 0.013. The "n" value for cast-in-place concrete conduits vary from 0.013 for trowel finish, to 0.015 for smooth wood forms. A value of 0.013 is assumed to be reasonable in calculating the hydraulic capacity of the proposed Sewer Tunnel Relief, particularly since "n" values for tunnel lining material such as

Amer-Plate T-Lock are below that of concrete. (It is noted that the 60-inch sewer on Ward Avenue, which also uses Amer-Plate, has a design "n" value of 0.013).

As the proposed relief sewer is placed in operation, slime build-up on the walls and muck along the invert will degrade the smoothness of the tunnel, thus affecting its carrying capacity.

For the evaluation of the proposed Sewer Tunnel Relief, therefore, a range between 0.013 to 0.015 is considered appropriate.

High and low flows would produce velocities in the proposed relief sewer in the 3.3 fps to 6.0 fps range. These velocities are above the minimum required for self-cleaning of the sewer invert.

The capacities of the Sewer Tunnel Relief at Ward Avenue and Beretania Street are 67.34 mgd and 58.36 mgd for "n" values of 0.013 and 0.015, respectively. The projected wastewater flow for the year 2005 at that point is 56.49 mgd. Thus, additional capacity (3%-19%) beyond the design year would be provided by the relief sewer. Capacities and other hydraulic parameters at selected points along the sewer are summarized in Table A-4. Technical charts

TABLE A-4
 SUMMARY OF HYDRAULIC DATA FOR THE
 PROPOSED SEWER TUNNEL RELIEF

Area	Conduit	Slope ft/ft	Design Peak Flow (MGD)	Normal Depth			Full Flow Capacity (MGD)	Full Flow Velocity (fps)
				Normal Depth	Velocity at Normal Depth (FPS)	Velocity at Normal Depth (FPS)		
				0.013	0.015	0.013	0.013	0.015
Ward Ave. & Beretania St.	60"	0.0016	56.39	3.50	3.96	5.94	5.23	5.30
Kinau St. & Pensacola St.	60"	0.0014	50.41	3.39	3.79	5.52	4.88	4.96
Kinau St. & Makiki St.	60"	0.0012	49.82	3.55	4.04	5.16	4.54	4.59
Wilder Ave. & Metcalf St.	4' x 6.25'	0.002	43.05	3.10	3.44	5.85	5.21	5.91
Dole St. @ Manoa Trunk Delineation of Increment 3 & 4	4' x 6.25'	0.0018	32.35	2.62	2.90	5.27	4.71	5.61

developed for hydraulic analyses are attached hereto as Supplement A. The low flows are designated design average flow, while high flows are design peak flows.

IV. ALTERNATIVE SEWER LININGS

A. Corrosion in Sewers

Sanitary sewers, under anaerobic conditions form sulfide, which combines with hydrogen to form hydrogen-sulfide. Hydrogen sulfide may then be chemically oxidized into sulfuric acid on the unsubmerged portions of the pipe, when exposed to moisture. Sulfuric acid is extremely corrosive to concrete while hydrogen sulfide gas can react directly with metals such as iron, silver, copper, cadmium, and lead causing extreme corrosion to the metal.

B. Corrosion Protection

Corrosion protection of the sewer system can be accomplished with the use of corrosion-resistant materials, such as vitrified clay or protective linings. Because hydrogen sulfide is oxidized only on the unsubmerged portions of the conduit, it is necessary only to place the protective material above the expected low flow. Typical vinyl liner plate applications usually line

the upper 300-degrees of pipe. With other materials that are sprayed on, it is desirable to line the entire surface, eliminating edges through which wastewater seepage could occur.

While protective lining is of primary consideration in corrosion protection, concrete quality is of equal importance in assuring the long-term integrity of the sewer. In general, the concrete should be of adequate strength and of low permeability to withstand the exposures of the wastewater on the inside and water on the outside. A good sound concrete product requires proper proportioning, placing, and curing of the concrete mix. Considerations should be given to the use of admixtures to improve the impermeability, while also improving workability and increasing the strength of the concrete.

For spray applications surface preparation of the concrete is especially important because it assures a good bond between the protective lining and the concrete. The concrete should be well cured, and free of any surface oils, grease, dirt, laitance, efflorescence, and loose particles. Preparation can be accomplished by scarifying, sandblasting, grinding, and acid etching.

Protective treatments for concrete are available through a wide range of substances which vary widely in composition. For the proposed Sewer Tunnel Relief, linings should have the ability to resist acids particularly sulfuric acid, and to form an impermeable moisture barrier. Each individual coating has its own recommendations for application thickness, surface preparation, primers, and application procedures. These recommendations should be strictly adhered to.

C. Protective Materials

Materials currently used to resist the detrimental effects of wastewater are vitrified clay, vinyl, epoxies, and polyurethanes. Vitrified clay has proven itself to be inert to degradation from the effects of wastewater. However, standard vitrified clay pipes are only made in sizes up to 36-inches in diameter. The use of clay liner plates have been used in the past, however, corrosion of the bonding material has resulted in dislodging of the plates and subsequent erosion of the concrete.

While discussion will focus on vinyl, epoxy, and polyurethane linings, which are now considered state-of-the-art, recent development of polymer concretes is also noted. This product differs from portland cement concrete, as cementitious material is replaced by

polymers. The material is stable and highly resistant to chemical attack. Polymer concretes today are found mostly as chemical resistant mortars used to form thick coatings. Polymer concretes are usually trowelled on. To date the use of polymer concrete to replace the structural concrete has not been economically feasible.

Vinyl

The vinyl sheet lining is made from high polymer vinyl chloride resins, formed under temperature and pressure, creating an inert plastic liner sheet. The sheet normally has numerous projections which, when cast into the concrete will form a mechanical bond between the concrete and the liner. At joints and other places where the liner material is not continuous, vinyl patches can be heat fused onto the original material. Amer-Plate T-Lock is a widely recognized vinyl lining product.

Vinyl lining has a history of uses, having been installed since the early 1950's. The lining's reliability has been proven over time, with failures usually traced to poor workmanship during installation. Improper installation results in a separation of the liner material and the concrete, allowing the underlying concrete to be attacked by corrosive acids. Generally, the installation quality

is better when the vinyl lining can be placed at the precast plant.

Epoxies

Chemical resistant epoxy coatings are generally two components systems which are mixed at application. Surface preparation is important to assure a good bond between the concrete and the liner material. Certain products require a primer to be placed prior to the installation of the epoxy coating. The epoxy should be applied with multiple coatings to eliminate pinholes. Certain epoxies can be applied *in damp or even submerged* conditions.

Epoxy linings are hard and durable, and resistant to abrasion. Corrosion problems with epoxies arise due to its lack of elasticity and its hard, brittle nature. Cracks due to settlement, shrinkage, or impact may crack the epoxy coating thereby allowing the wastewater to attack the underlying concrete. Recent developments have entrained fibers within the epoxy coating to increase its resistance to cracking.

Epoxy products have been approved for use in many municipalities.

Polyurethanes

Polyurethane coatings, which are relatively recent in development, are used in sewer environments as two part systems, generally polyol-cured. The finished product is not as hard as epoxies but show good abrasion resistance and elasticity with ability to bridge fairly significant cracks.

Polyurethanes are extremely sensitive to moisture during application. Most failures of this material have been traced to the application.

D. PRODUCT AVAILABILITY

Contacts and discussions with various product representatives were undertaken to identify various vinyl, epoxy, and polyurethane products. A product summary is presented in Table A-5. Each product can be considered a potential candidate for application in the Sewer Tunnel Relief.

Product data are presented for information only. Other qualified products not listed in the table may also be considered by the City and County of Honolulu.

TABLE A-5
SUMMARY OF VINYL, EPOXY, AND POLYURETHANE PRODUCTS

TYPE	PRODUCT	MANUFACTURER	LOCAL PRODUCT REPRESENTATIVE	APPLICATION THICKNESS	METHOD OF APPLICATION	REMARKS
1. Vinyl Liner	Amer-Plate	Ameron	HC & D ECR Ltd.		Cast with Concrete	Previously used by the City & County of Honolulu
2. Epoxy	Concrete 1305	Adhesive Engineering	Burke-Honolulu Epoxy Systems	30-60 mil	Spray, Roller	Approved for used by City of Los Angeles
3. Epoxy	Aquatapoxy	American Chemical Corp.	Aloha State	60-mil min.	Spray, brush roller	Approved for used by City of Los Angeles
4. Epoxy	Uniclad 426	United Coatings	Brewer Chemical		Spray, brush roller	Approved for used by City of Los Angeles
5. Epoxy	System 66-4	Tnamac	Bonded Material	8-12 mil	Spray	
6. Polyurethane	Zebtron	Zebtron Corp.	Honolulu Industrial Coatings Company	80-100 mil	Spray	Approval for use City of Los Angeles
7. Polyurethane	Amerthane	Ameron	ECR Ltd.	125 mil	Spray	Approval for use in City of Los Angeles pending
8. Polyurethane	Vibraspray 80	Unifroyal	Walsh & Assoc.	40-125 mil	Spray	
9. Polyurethane	Elastuff 125	United Coatings	Brewer Chemical		Spray	

LIST OF REFERENCES

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Root, Barry and Kim, Dr. Keun Y., An Investigation of Health, Safety and Working Conditions of Honolulu Sewer Workers, Honolulu, Hawaii, November 30, 1977.

Portland Cement Association, Effects of Substances on Concrete and Guide to Protective Treatments, Skokie, Illinois, 1981.

U.S. Environmental Protection Agency, Process Design Manual for Sulfide Control on Sanitary Sewerage Systems, October 1974.

PERSONAL CONTACTS AND CORRESPONDENCE

Division of Wastewater Management

Mr. George Ishida - Cement & Concrete Products Industry of Hawaii

Mr. Lloyd Lau & Mr. Jackson Uyeda - Aloha State Sales

Mr. Bruce Christensen - Brewer Chemical

Mr. Pat Walsh - Walsh & Associates

Mr. Tom Boomer - Adhesive Engineering

Mr. Kirk Anderson - Burke Honolulu

Mr. Jay Byrne - Epoxy Systems Honolulu

Mr. Jeff Deer - Bonded Materials

Mr. Bruce Shadbolt - Bruce Shadbolt Sales

Mr. Hub Grosswendt - ECR, Ltd.

Mr. Bill Warner - American Chemical

Mr. Don Chituning - Sigma Coatings

Mr. Kent Peterson & Mr. Fran Veater - Swindress Bond

Mr. Pin Van Sisieren - MAC Industries

Mr. Roger Decker - Honolulu Industrial Coatings (Zebron)

San Diego, Water Utilities Department

County of Sacramento, Department of Public Works, Water Quality Division

Metropolitan Waste Control Commission, Twin Cities Area, Minnesota

City of Los Angeles, Department of Public Works

Metropolitan Sanitary District of Greater Chicago

SUPPLEMENT A
HYDRAULIC CHARTS
FOR THE
PROPOSED SEWER TUNNEL RELIEF

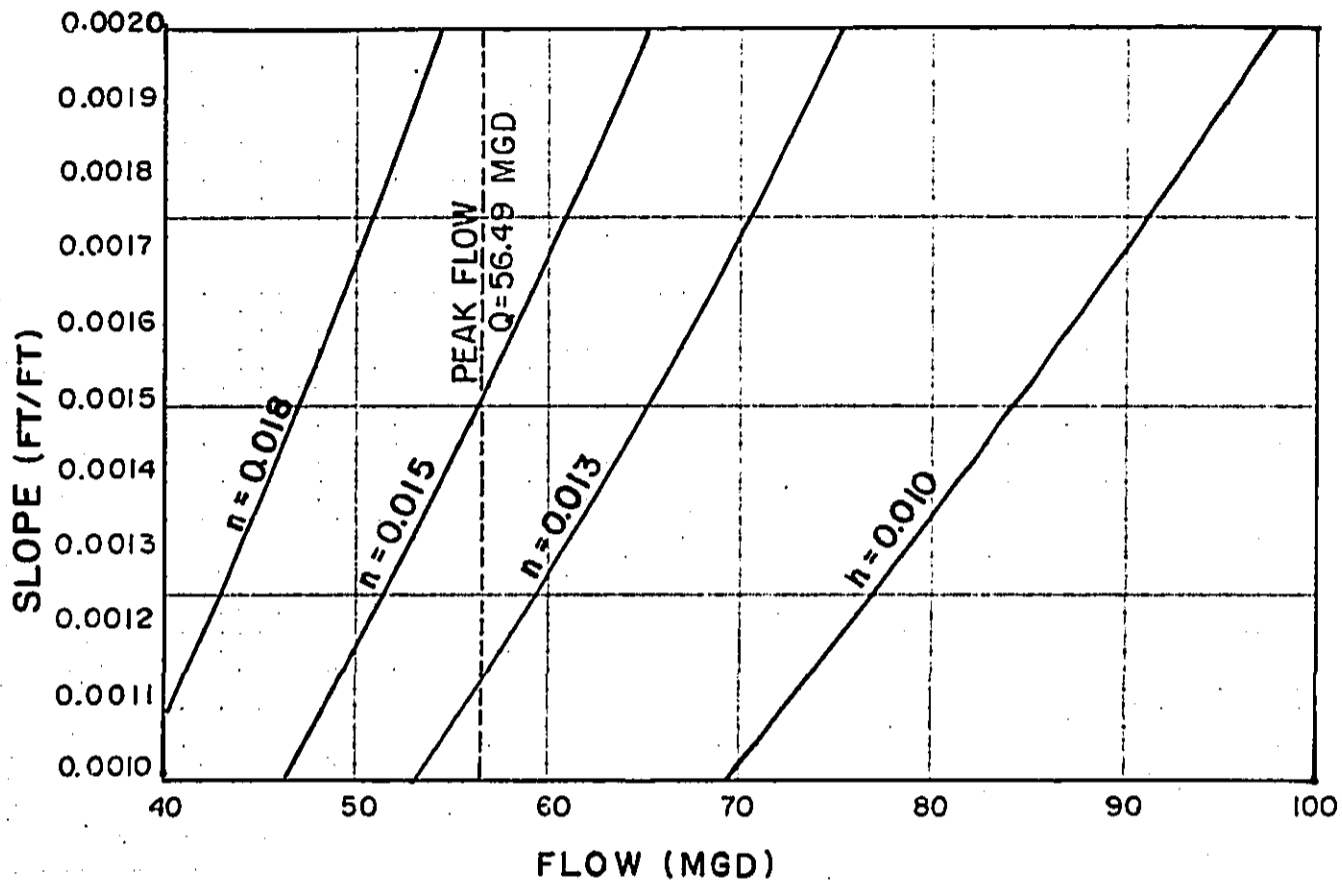


Fig. A-1
FLOW VS. SLOPE FOR 60" RCP.

SEWER TUNNEL RELIEF

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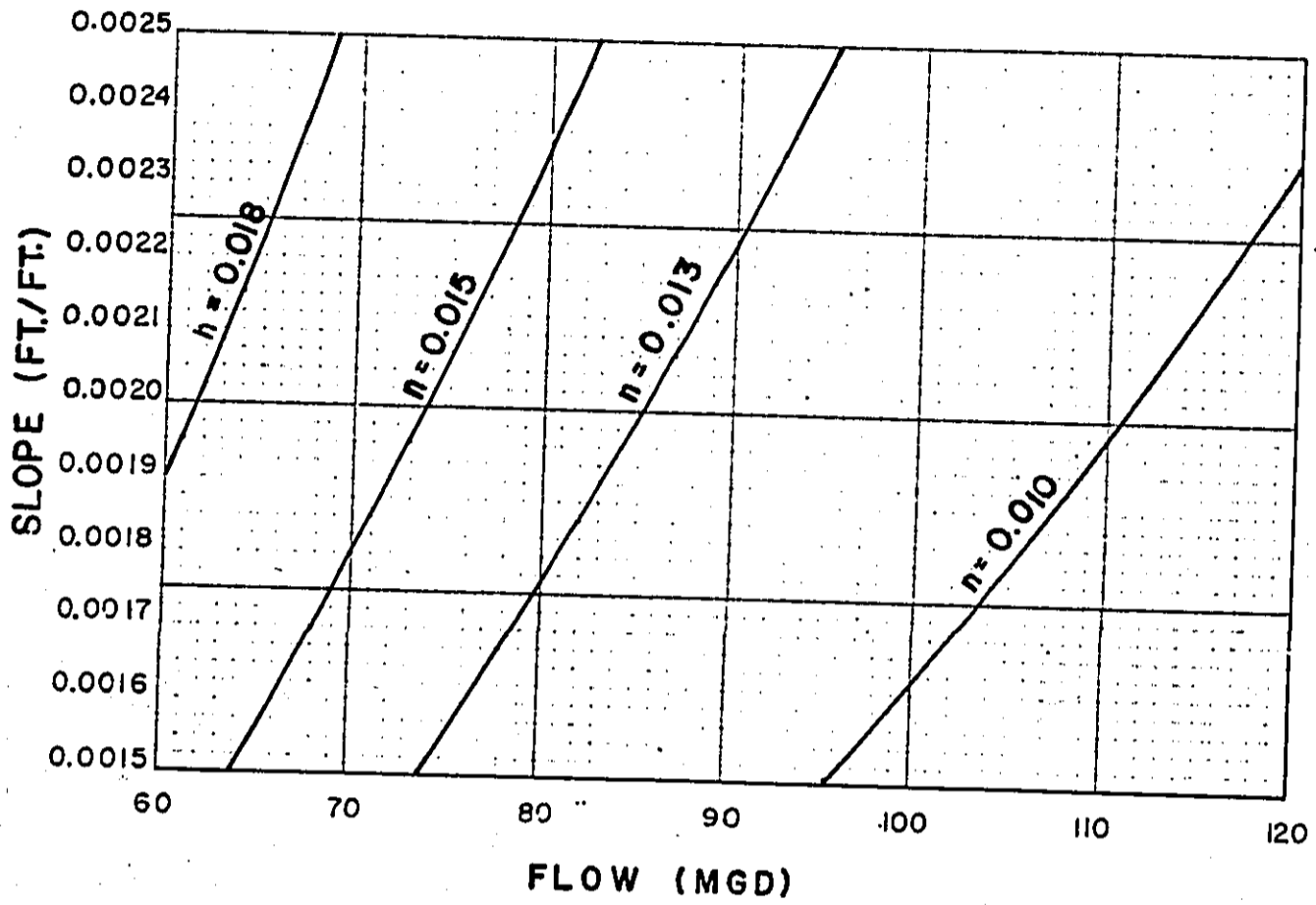
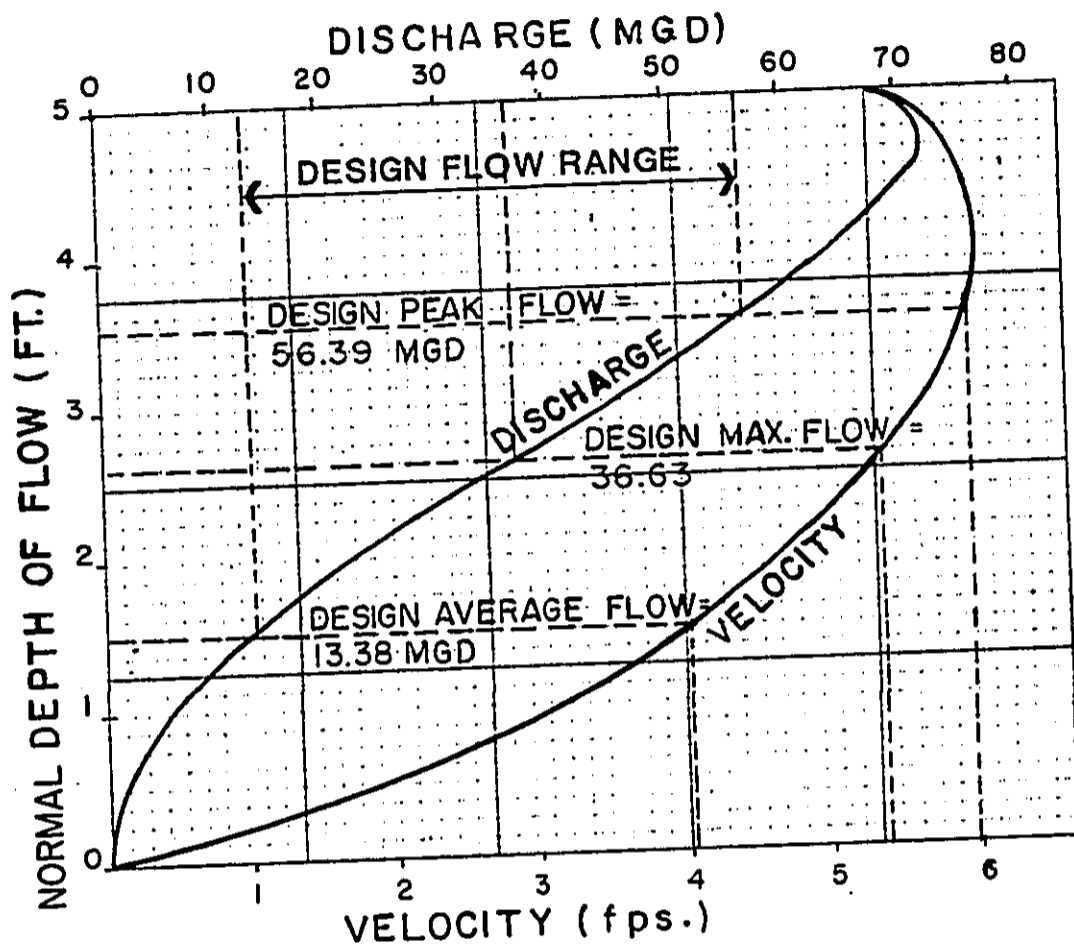


Fig. A-2
FLOW VS. SLOPE FOR 4' x 6.25' TUNNEL.

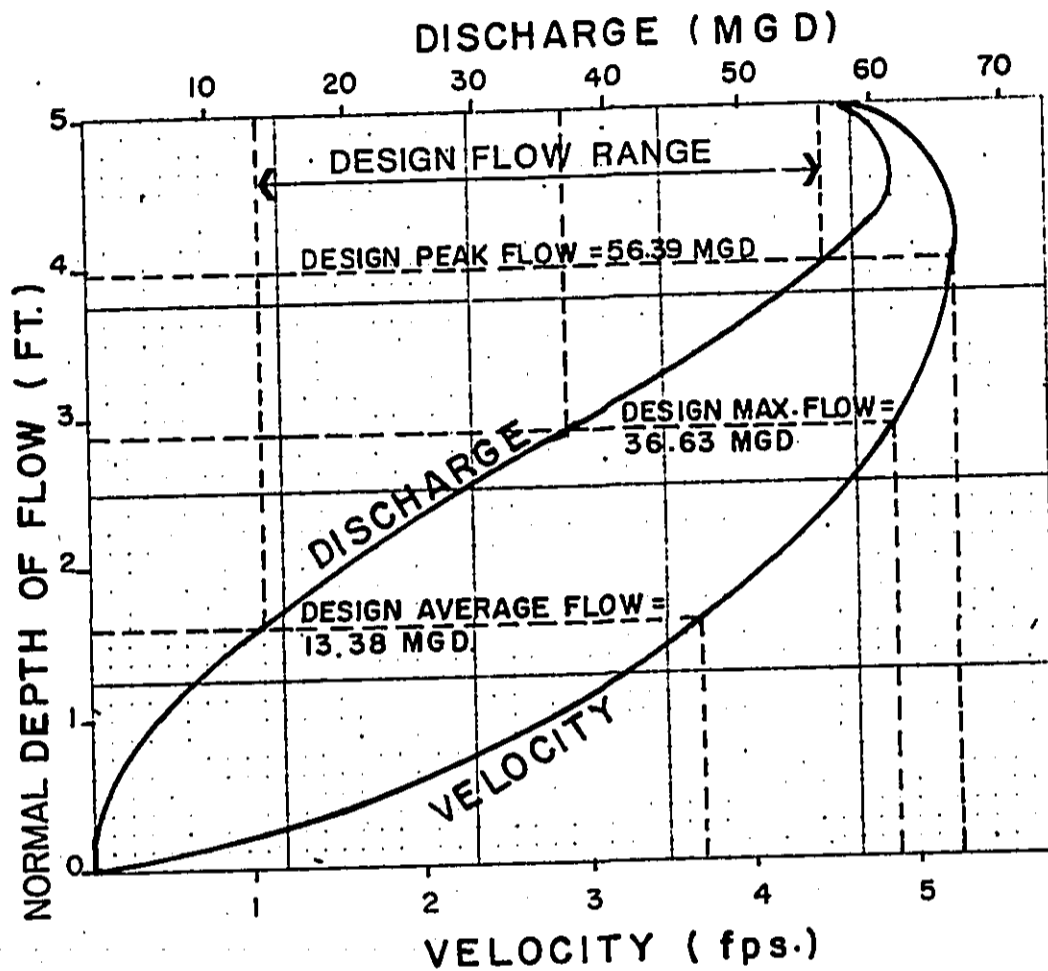
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$S = 0.0016$ FT./FT. = SLOPE
 $Q_f = 67.34$ MGD = FULL FLOW
 $V_f = 5.306$ fps = FULL FLOW VELOCITY

Fig. A-3
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 60" RCP AT WARD AVENUE &
 BERETANIA STREET ($n=0.013$)

SEWER TUNNEL RELIEF
 DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU
 PREPARED BY WILSON OKAMOTO & ASSOCIATES, INC.

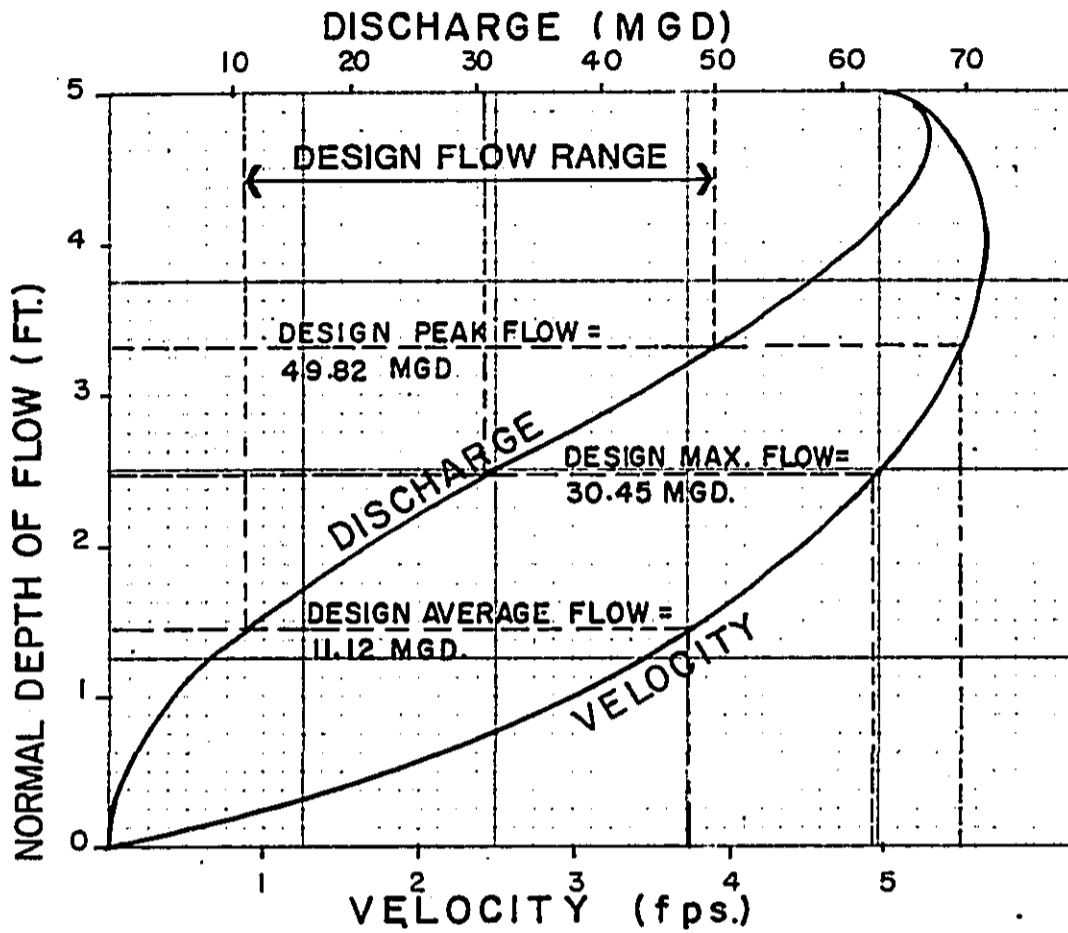


$S = 0.0016$ FT./FT.= SLOPE
 $Q_f = 58.36$ MGD=FULL FLOW
 $V_f = 4.60$ fps=FULL FLOW VELOCITY

Fig. A-4
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 60" RCP AT WARD AVENUE &
 BERETANIA STREET ($n=0.015$)

SEWER TUNNEL RELIEF

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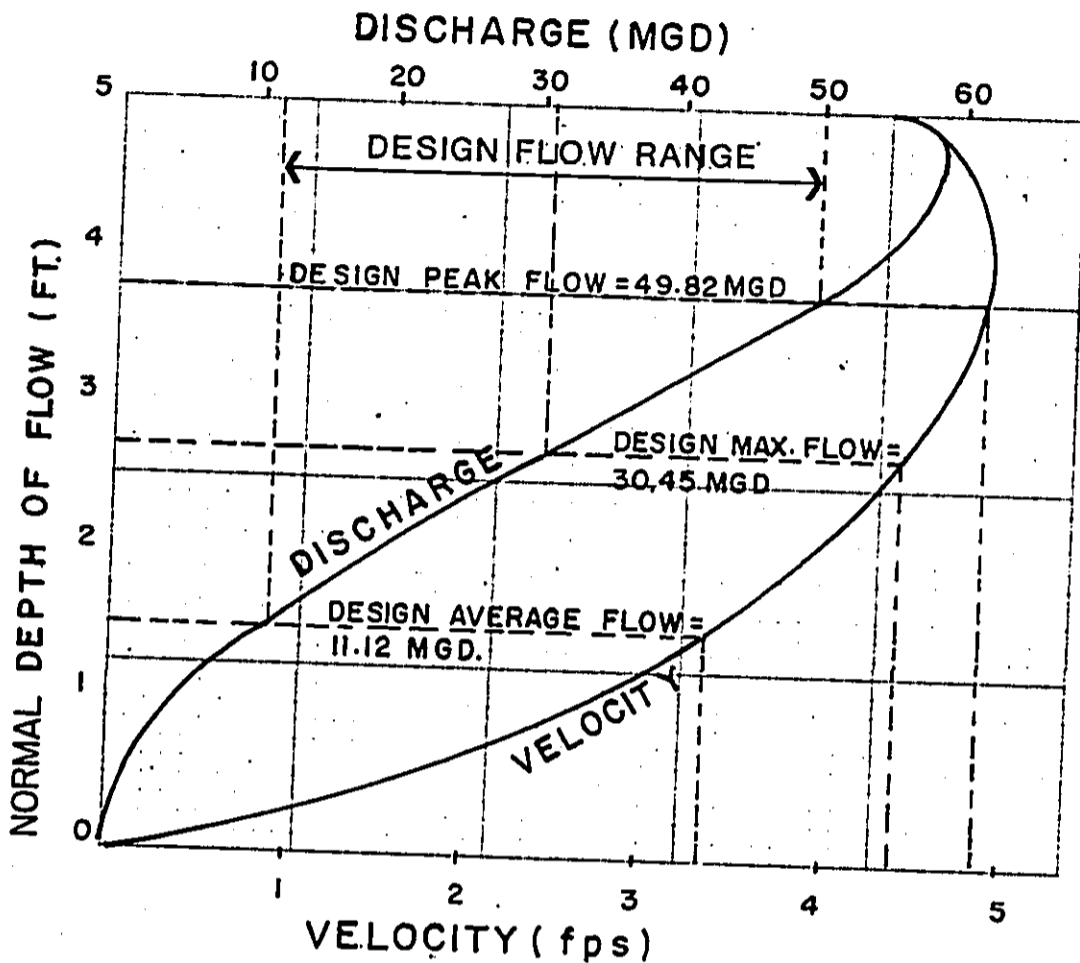


S = 0.0014 FT./FT.= SLOPE
 Qf = 62.99 MGD = FULL FLOW
 Vf = 4.96 fps = FULL FLOW VELOCITY

Fig. A-5
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 60" RCP BETWEEN PENSACOLA &
 KINAU STREETS TO MAKIKI STREET
 & WILDER AVENUE (n=0.013)

SEWER TUNNEL RELIEF

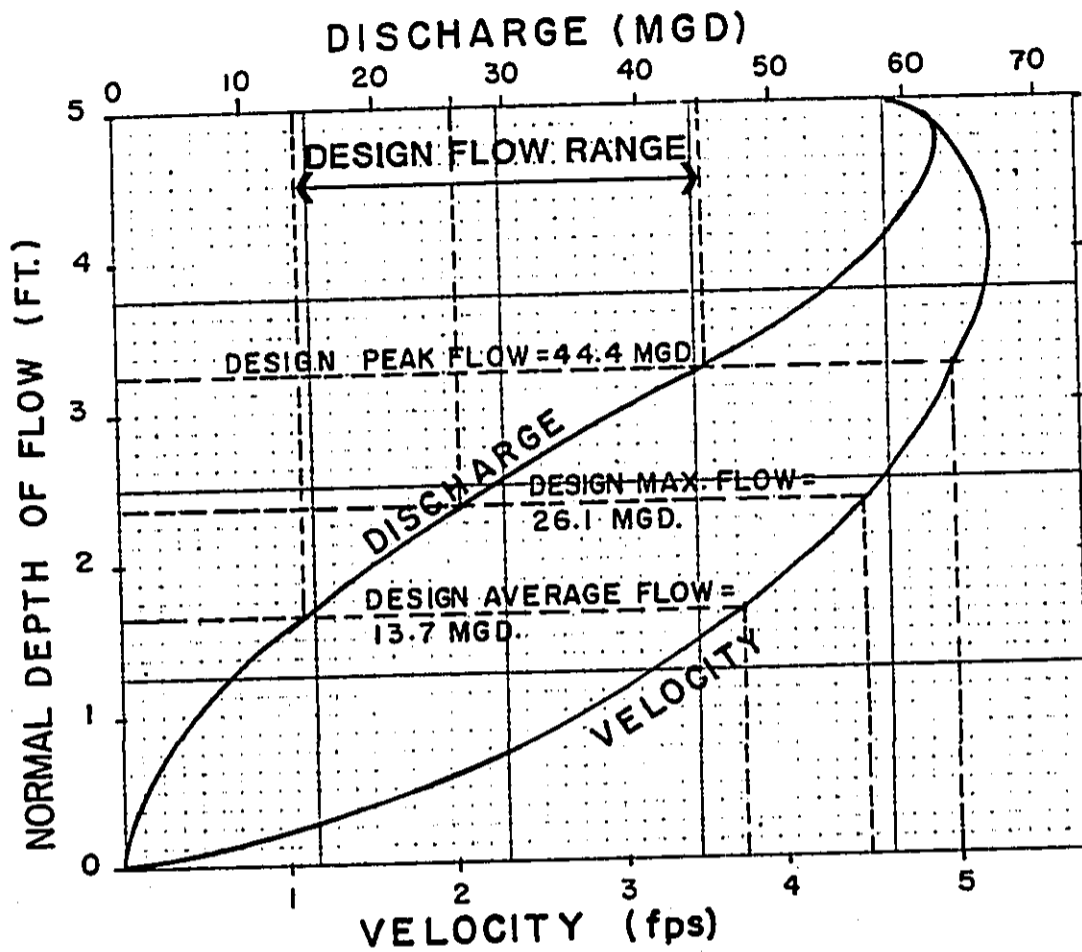
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S = 0.0014 FT./FT.=SLOPE
 Qf = 54.59 MGD=FULL FLOW
 Vf = 4.30 fps =FULL FLOW VELOCITY

Fig. A-6
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 60" RCP BETWEEN PENSACOLA &
 KINAU STREETS TO MAKIKI STREET & WILDER AVENUE
 (n=0.015)

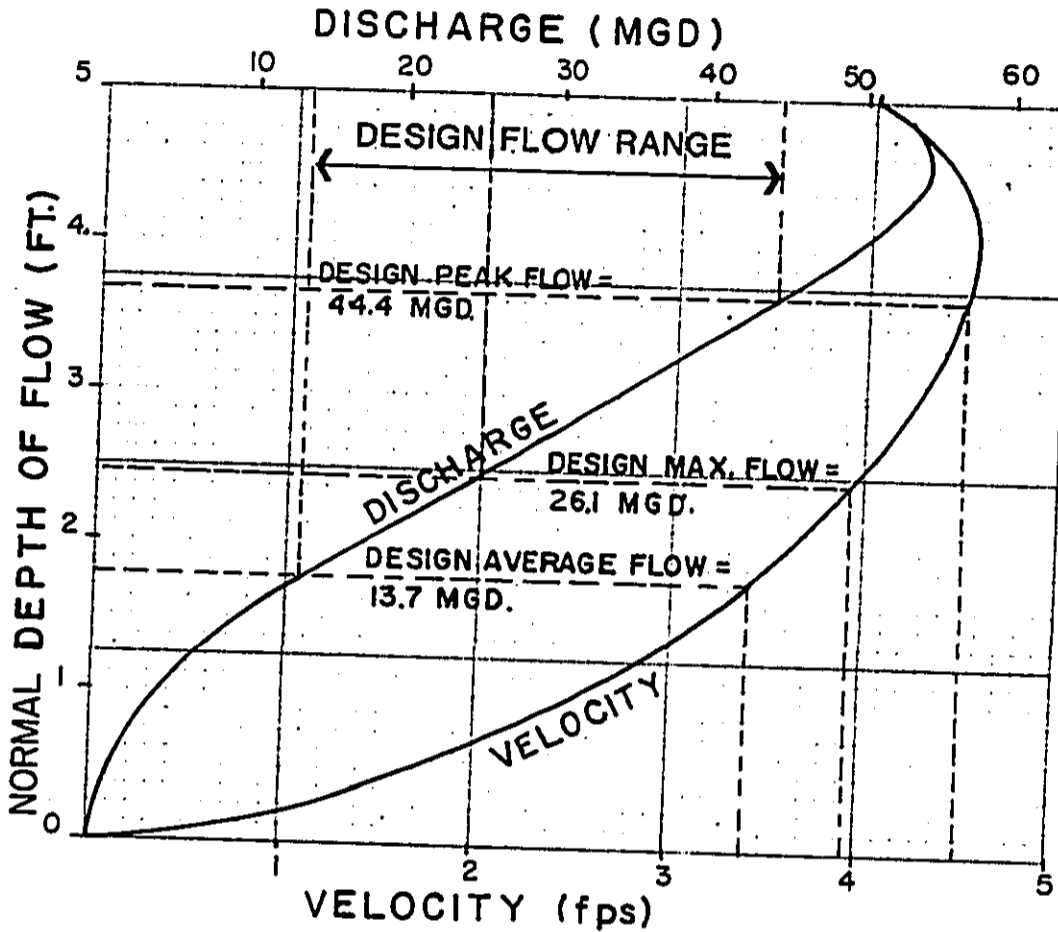
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S = 0.0012 FT./FT. = SLOPE
 Q_f = 58.32 MGD = FULL FLOW
 V_f = 4.59 fps = FULL FLOW VELOCITY

Fig. A-7
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 60" RCP AT MAKIKI STREET &
 WILDER AVENUE (n=0.013)

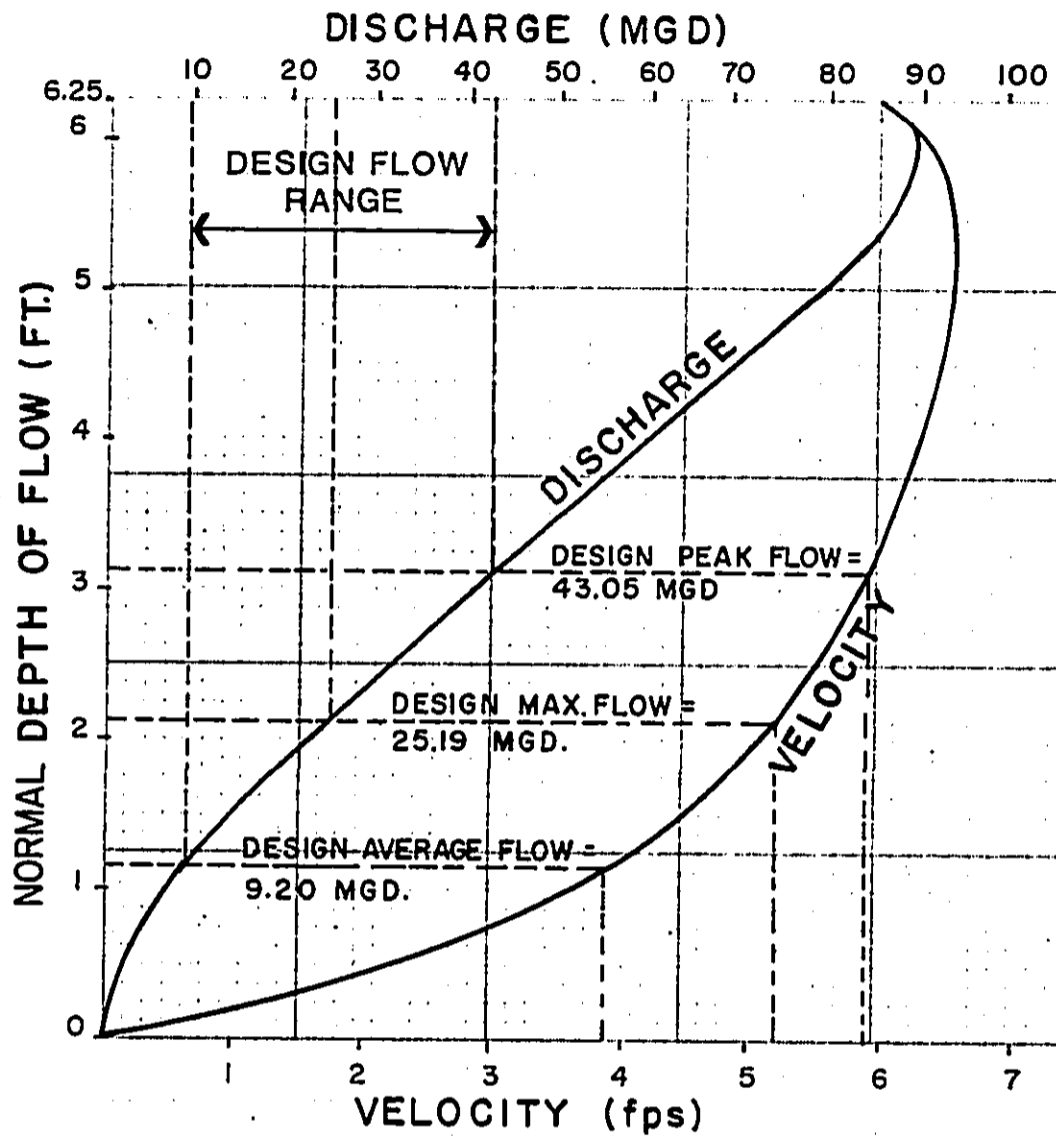
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S = 0.0012 FT./FT.=SLOPE
 Q_f = 50.54 MGD.=FULL FLOW
 V_f = 3.98 fps=FULL FLOW VELOCITY

Fig. A-8
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 60" RCP AT MAKIKI STREET &
 WILDER AVENUE (n=0.015)

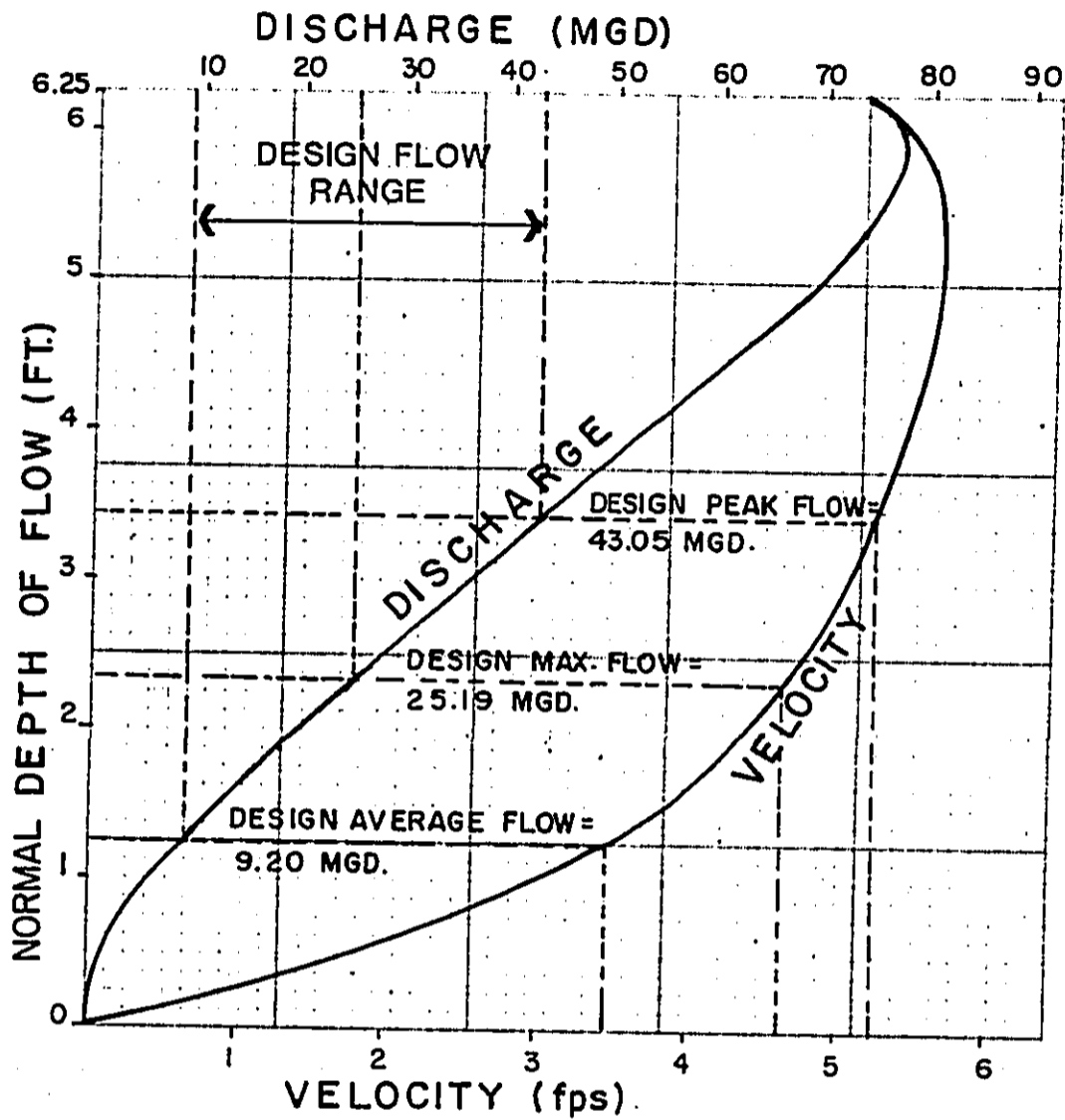
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S = 0.002 FT./FT.= SLOPE
 Qf = 85.19 MGD=FULL FLOW
 Vf = 5.91 fps=FULL FLOW VELOCITY

Fig. A-9
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 4'x 6.25' TUNNEL AT WILDER AVENUE
 & METCALF STREET (n=0.013)

SEWER TUNNEL RELIEF
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 CITY & COUNTY OF HONOLULU
 WILSON OKAMOTO & ASSOCIATES, INC.

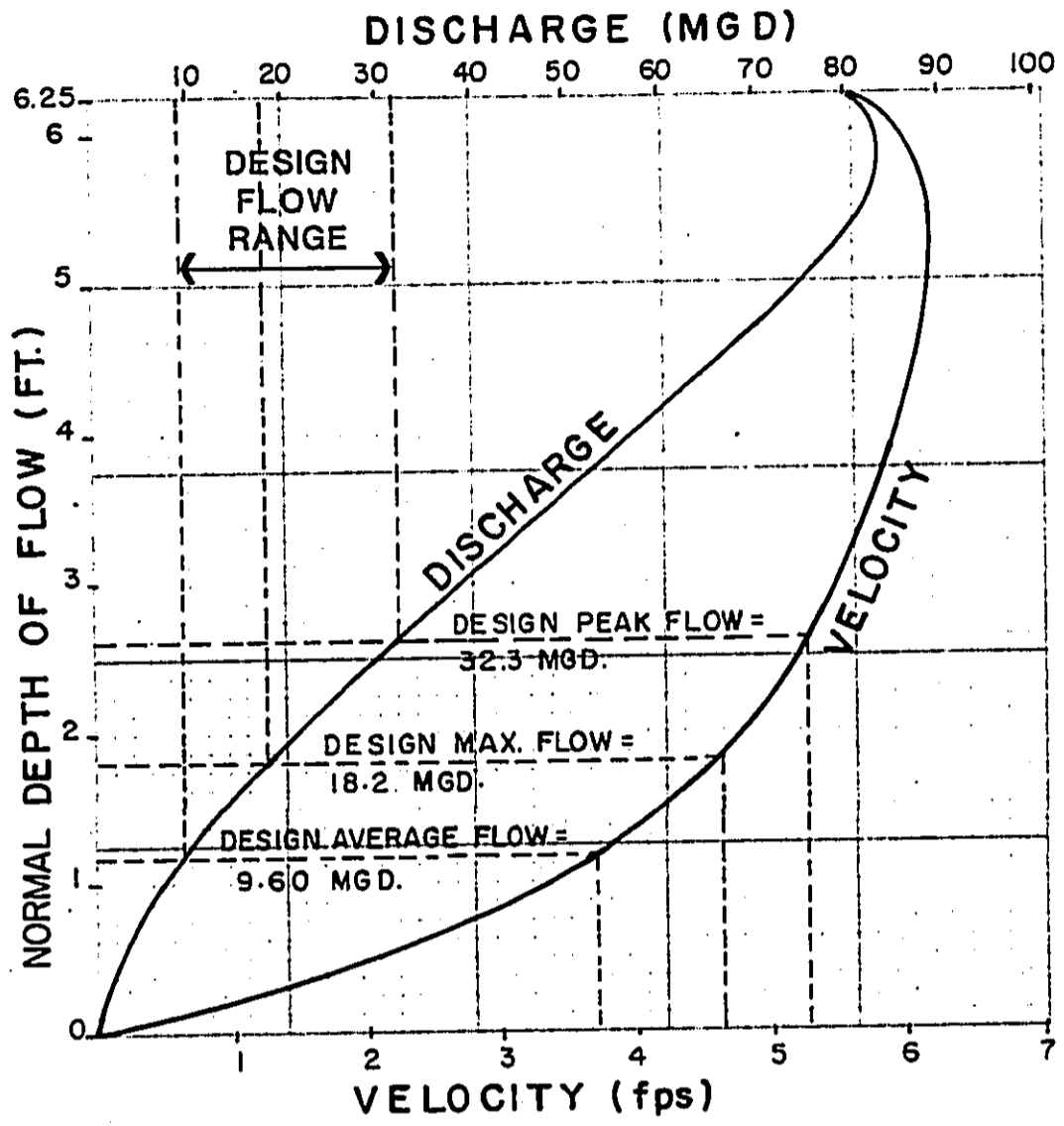


S = 0.002 FT./FT.=SLOPE
 Q_f = 73.83 MGD.=FULL FLOW
 V_f = 5.13 fps=FULL FLOW VELOCITY

Fig. A-10
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 4'x6.25' TUNNEL AT WILDER AVENUE
 & METCALF STREET (n=0.015)

SEWER TUNNEL RELIEF

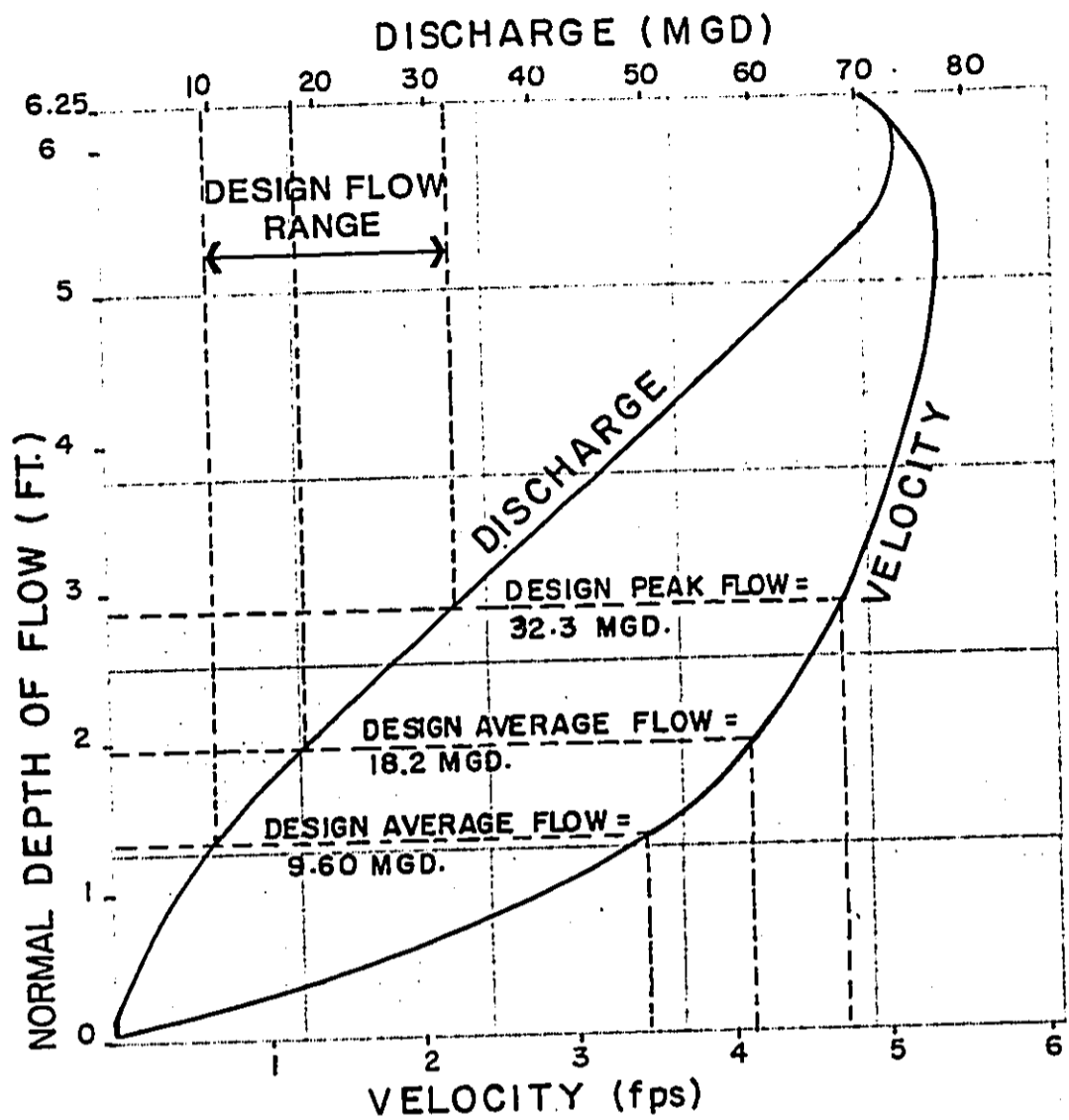
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S = 0.0018 FT./FT.=SLOPE
 Q_f = 80.82 MGD.=FULL FLOW
 V_f = 5.61 fps.=FULL FLOW VELOCITY

Fig. A-11
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 4'x6.25' TUNNEL ON DOLE STREET
 AT THE MANOA TRUNK (n=0.013)

SEWER TUNNEL RELIEF
 DEPARTMENT OF PUBLIC WORKS
 CITY & COUNTY OF HONOLULU
 WILSON OKAMOTO & ASSOCIATES, INC.



S = 0.0018 FT./FT.=SLOPE
 Qf = 70.04 MGD.=FULL FLOW
 Vf = 4.86 fps.=FULL FLOW VELOCITY

Fig. A-12
 DISCHARGE, NORMAL DEPTH OF FLOW AND VELOCITY
 RELATIONSHIP FOR 4'x6.25' TUNNEL ON DOLE STREET
 AT THE MANOA TRUNK (n=0.015)

SEWER TUNNEL RELIEF

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