EVALUATION OF POTENTIAL LIGHT RAIL TRANSIT (LRT) CORRIDORS

PRIMARY CORRIDOR STUDY

Oahu, Hawaii

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I. INTRODUCTION

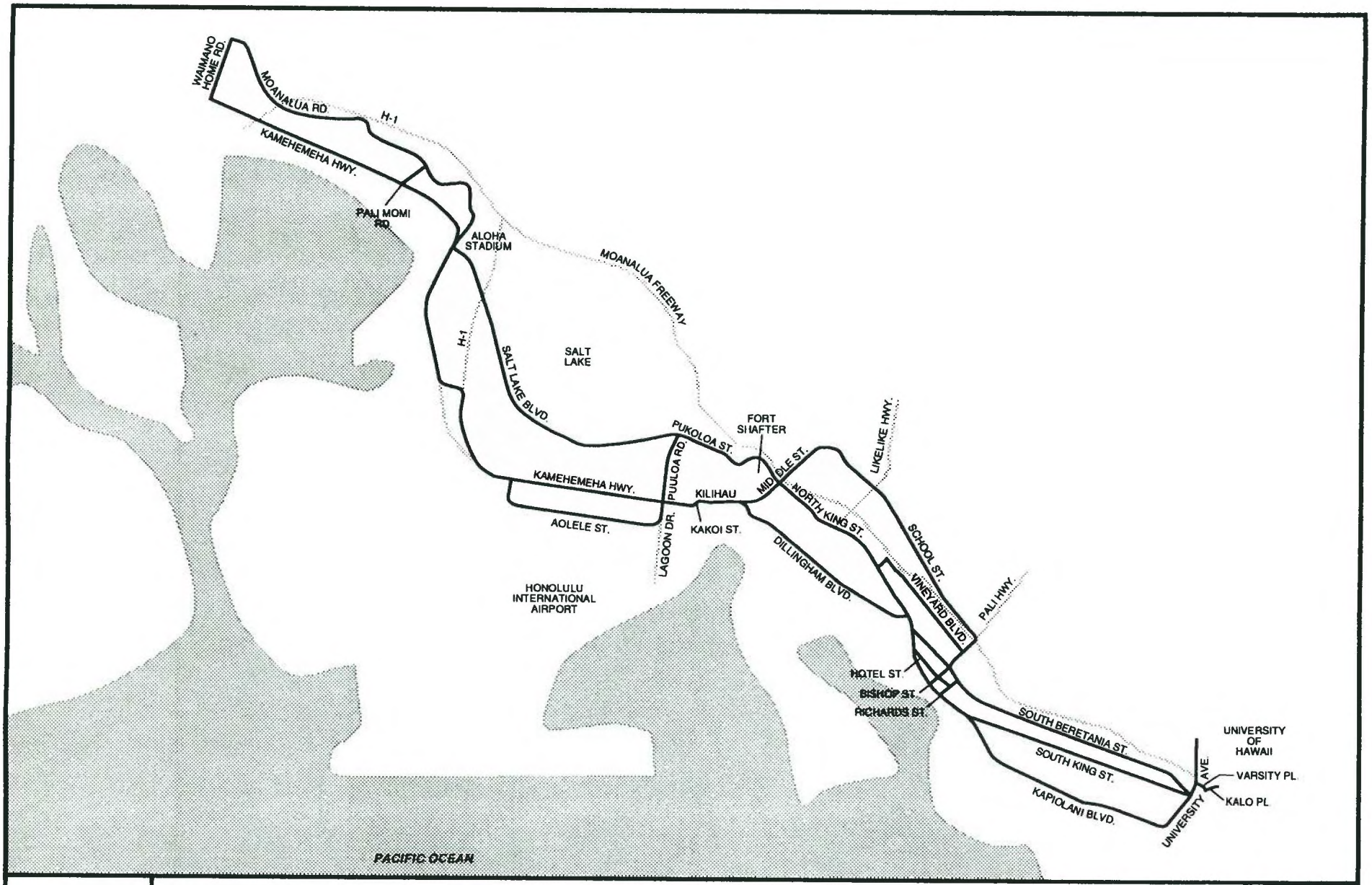
The City and County of Honolulu Department of Transportation Services (DTS) requested an investigation of alternate routes for an at-grade light rail transit (LRT) system between Pearl City and the University of Hawaii as part of the Primary Corridor Study. Windshield and foot surveys were conducted shortly thereafter to evaluate the impact of an at grade, two-track LRT system on various corridors linking Pearl City with the University of Hawaii. Existing striping plans, where available, were also used in this evaluation to determine the existing traffic lanes available. The corridors evaluated in this study are shown in Figure 1. The corridors evaluated in this report serve as a starting point that will ultimately lead to the identification of a potential LRT corridor between Pearl City and the University of Hawaii.

The assumed at-grade LRT system for this study has a dynamic envelope of twenty-three feet wide by twenty feet high. The twenty-three foot width allowed for a one foot clearance on either side of the LRT and the adjacent traffic lanes, and the system was generally located in the center of the roadway.

This initial evaluation was based on the assumption that the LRT would be accommodated within the existing street system with a minimum amount of road widening or right-of-way acquisition. Based on this assumption, an at-grade LRT line would displace existing traffic lanes on the streets, and the resulting physical impacts to the existing street system were identified. This evaluation does not include the impacts of LRT stations on the street system or the right-of-way needed for the stations. Also, this evaluation does not include quantitative analyses of the operational impacts at intersections or on roadway segments.

This report organizes the evaluated corridors into five segments:

1. Pearl City to Aloha Stadium;
2. Aloha Stadium to Puuloa Road;
3. Puuloa Road to Middle Street;
4. Middle Street to Downtown;
5. Downtown to University of Hawaii.



LIGHT RAIL TRANSIT CORRIDORS

Figure **1**

Each segment has alternative at-grade LRT alignments that are evaluated. There are also several "connector" alignments that serve primarily to allow the alternative alignments within one segment to be connected to alternative alignments in other segments. Each alternative alignment corridor's physical characteristics are identified and then the corridor is evaluated and its impacts identified.

II. ALTERNATIVES FROM PEARL CITY TO ALOHA STADIUM

There are two major alternative alignments within this segment, one in Moanalua Road and the other in Kamehameha Highway. Both corridors are major roadways with Kamehameha Highway being higher in classification.

A. WAIMANO HOME ROAD CORRIDOR

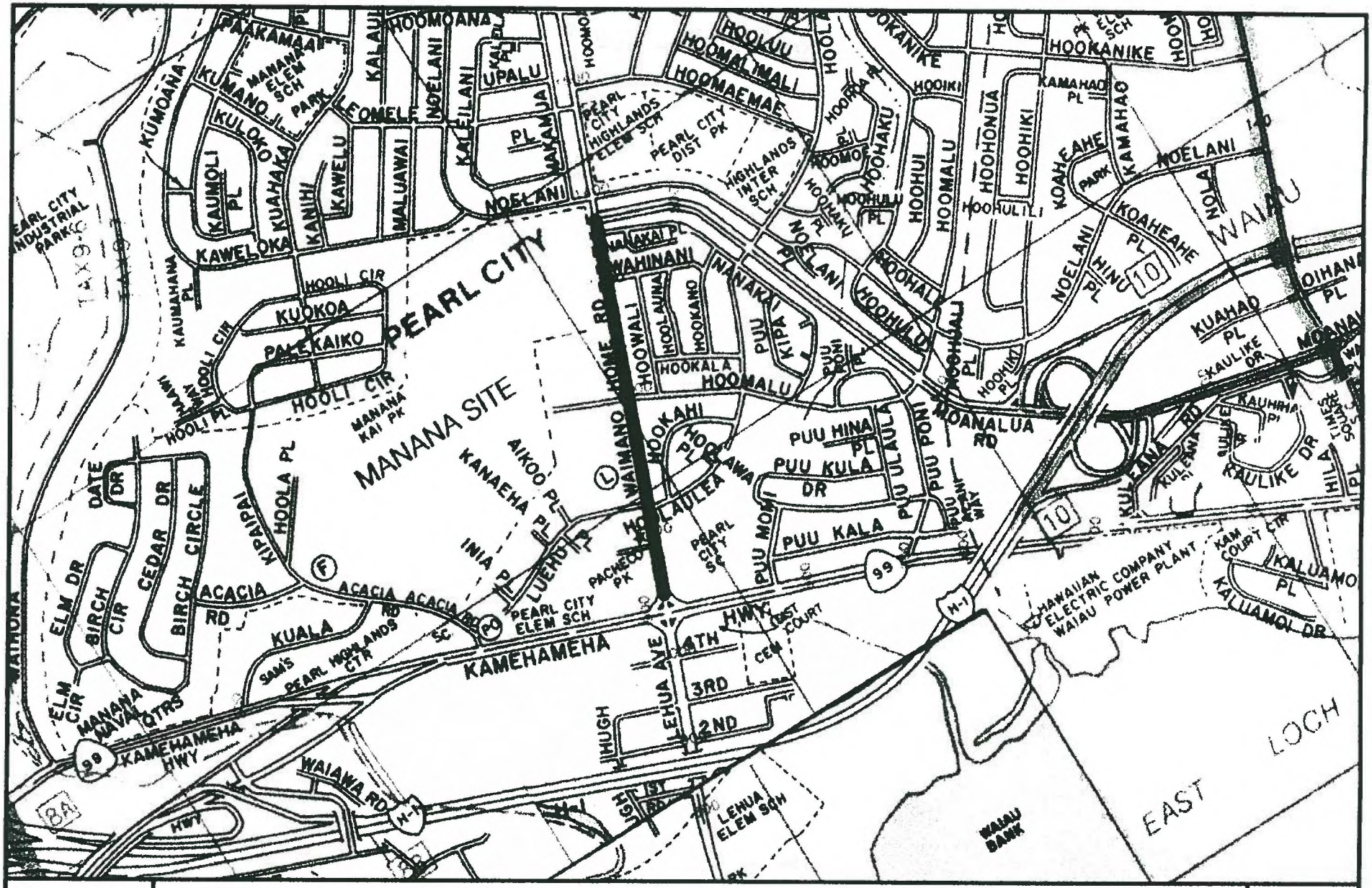
As shown in Figure 2, Waimano Home Road corridor in Pearl City runs north-south between the two primary east-west corridors of Kamehameha Highway and Moanalua Road. The Manana site, a potential stabling yard, fronts Waimano Home Road. The Waimano Home Road Corridor would probably serve as the starter segment of the at-grade LRT alignment. Using the Manana site as a potential LRT facility, it would either proceed north to Moanalua Road or south to Kamehameha Highway. Table 1 summarizes its physical characteristics and Table 2 summarizes the physical impacts identified.

TABLE 1

PHYSICAL CHARACTERISTICS

WAIMANO HOME ROAD CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North-south
Functional Classification	Principal Arterial
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	2
Existence of Median Turn Lanes	Yes (1)
Edge Treatment	Improved with curb and gutter
Sidewalks	Both Sides
Vertical alignment	Vertical gradient of about 5% upgrade northbound
Horizontal alignment	Straight
On-street parking	Yes - on northbound side of road, off-peak hours
Right-of-way width	80 ft.
Flowline-to-flowline width	64 ft. curb to curb
Landscaping presence	Trees on the west side of the road in sidewalk



PB 100 YEARS

WAIMANO HOME ROAD CORRIDOR

Figure **2**

TABLE 2

LRT IMPACTS

WAIMANO HOME ROAD CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	None, but lane widths would be reduced to 10 ft.
Median turn lanes affected	Yes – would eliminate median turn lanes.
Parking impacts	On-street parking would be eliminated.
Operational traffic impacts	Intersections located at Moanalua Rd. or Kamehameha Highway due to elimination of median turn lanes.
Structural impacts	No apparent impacts.
Clearance impacts	Overhead utility lines on east side.
Turning radius impacts	No apparent constraints.
Other impacts	No apparent constraints.

The primary impacts of a Waimano Home Road Corridor are the loss of on-street parking and the taking of the median left-turn lanes.

North of Hoolaulea Street, most of the east side of Waimano Home Road is single-family, detached residential development. Many of these homes utilize on-street parking to supplement the area available in their respective garages and driveways. Eliminating this parking would probably be an issue with this area.

The loss of the median turn lanes will disrupt through traffic flow within a heavily-traveled corridor. The lack of median left-turn lanes will mean that vehicles waiting to execute their left turns will block a through traffic lane, increasing traffic congestion.

Assuming that an LRT line would begin within the Manana site, a critical intersection will be the Waimano Home Road/Moanalua Road intersection if the LRT line utilizes the Moanalua Road corridor or the Waimano Home Road/Kamehameha Highway intersection if the LRT line utilizes the Kamehameha Highway corridor.

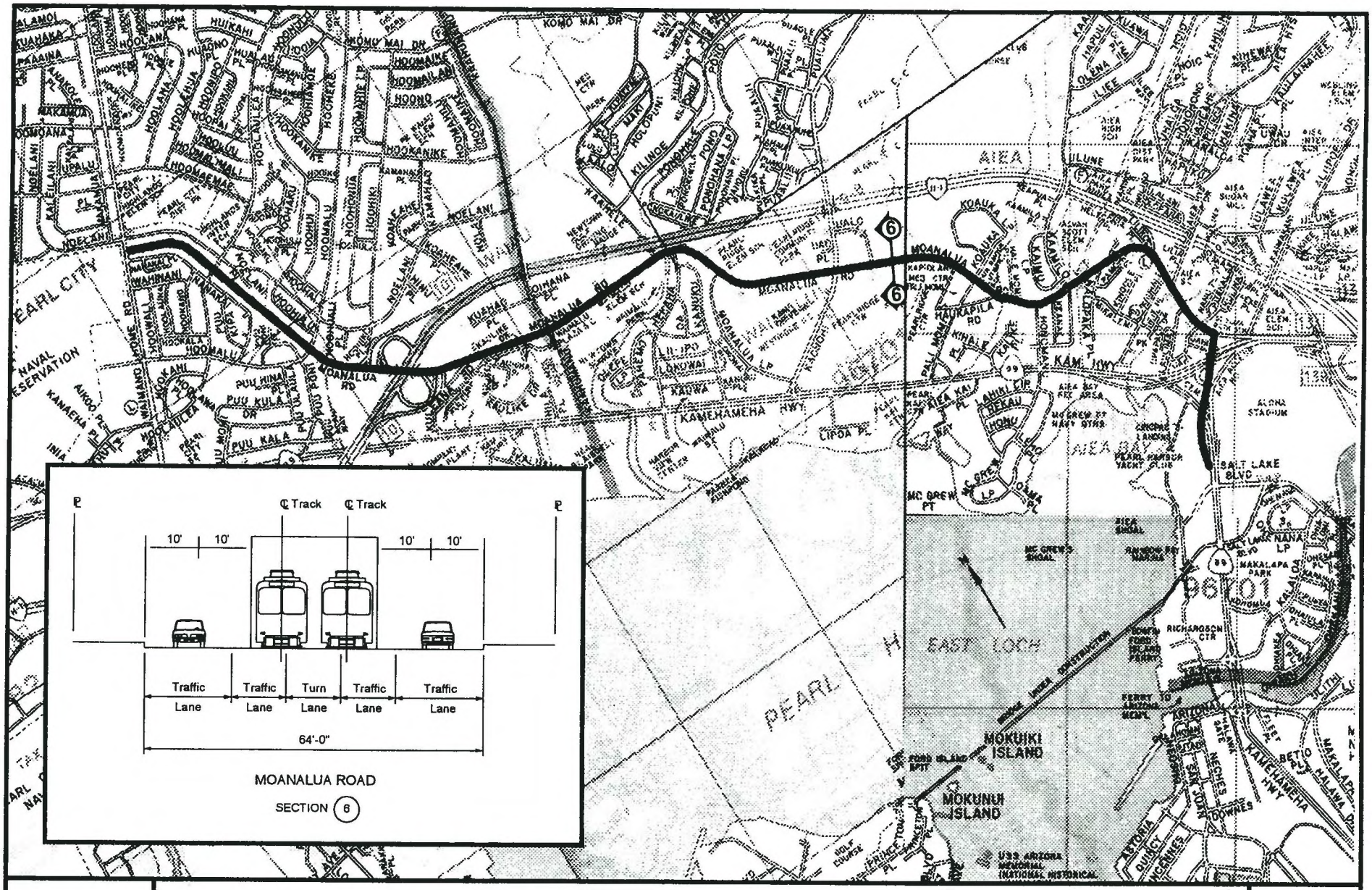
Care must also be taken when crossing the overhead distribution utility lines running along the east side of Waimano Home Road. This crossing will occur where the LRT line turns from Waimano Home Road onto Moanalua Road.

B. MOANALUA ROAD CORRIDOR

As shown in Figure 3, Moanalua Road is one of the two east-west corridors through Pearl City and Aiea. It is a four-lane arterial roadway along its entire length. Table 3 summarizes its physical characteristics and Table 4 summarizes the physical impacts identified.

TABLE 3
PHYSICAL CHARACTERISTICS
MOANALUA ROAD CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Principal arterial from Waimano Home Rd. to Pearl City Interchange.; Minor arterial from Pearl City Interchange. To Aiea Interchange.
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	2
Existence of Median Turn Lanes	Yes (1)
Edge Treatment	Improved with curb and gutter except between Hoomalu St. and Kaahumanu St. where it is unpaved shoulder.
Sidewalks	Yes: 8-ft sidewalks between Kaahumanu St. & Moanalua Freeway; No sidewalk between Kaahumanu St. & Waimano Home Rd.
Vertical alignment	Vertical gradient appears to about 3-5% except at the eastbound approach to Kaonohi St. (about 8%).
Horizontal alignment	Generally straight with relatively flat curves; winds along the terrain with a min. curve radius of about 300 ft.
On-street parking	Yes - on the south side of the street in the vicinity of Waimalu Elementary School and between Kaonohi and Pali Momi.
Right-of-way width	80 ft.
Flowline-to-flowline width	Generally, 64 ft. with widening at selected intersections.
Landscaping Presence	Trees near Kaahumanu St. and Kaonohi St.



MOANALUA ROAD CORRIDOR

Figure 3

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TABLE 4

LRT IMPACTS

MOANALUA ROAD CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	None, but width of through lanes would be reduced to 10 ft.
Median turn lanes affected	Yes – median turn lanes would be eliminated.
Parking impacts	On Street parking would be removed.
Operational traffic impacts	Aiea Interchange bridge over Moanalua Road not wide enough to accommodate both traffic and at-grade LRT; Key intersections affected are at Pearl City Interchange ramp terminals, Kaahumanu St., Kaonohi St., Pali Momi St. and Aiea Heights Drive due to loss of median turn lane.
Structural impacts	Existing bridges and drainage crossings would require strengthening.
Clearance impacts	Pedestrian bridges at Waimano Home Rd. and at Hoolaulea St.; Overhead utility lines at Hoomalu St.; H-1 Fwy. Overpass (Pearl City Interchange); Transmission towers/lines east of Kaahumanu St.
Turning radius impacts	Tight turn radius from Moanalua to Aiea Interchange Bridge
Other impacts	

An at-grade LRT located in the median will maintain four narrow lanes (two lanes in each direction) on Moanalua Road from Waimano Home Road to Aiea Interchange. The primary impact of the at-grade LRT on this corridor would be the elimination of the median left-turn lanes. Moanalua Road is a high-volume roadway with significant left-turn demand at major intersections. Key intersections that would be affected by the loss of median left-turn lanes are located at Waimano Home Road, Hoomalu Street, H-1 Interchange (Pearl City Interchange), Kaahumanu Street, Kaahele Street, Kaonohi Street, Pali Momi Street, Kaamilo Street, and Aiea Heights Drive. Alternatives for accommodating left-turn demand could be to designate the inside lanes as left-turn lanes or to allow shared left/through operation from the inside lanes. Either way, through traffic capacity in the inside lanes will be reduced to the extent that Moanalua Road will essentially operate as a two-lane (one lane in each direction) roadway.

Physically, there are several drainage structures (bridges and culverts) that may need to be strengthened to accommodate the added load of the LRT. Vertical clearance could be an issue at the Pearl City Interchange where H-1 Freeway crosses over Moanalua Road. There is also an overhead transmission line crossing just east of Moanalua Loop that should be checked for minimum vertical separation from any potential catenary. There are mature trees located along the sidewalks that would need to be removed if the LRT were to be moved from the median to the outside edge of Moanalua Road. The Aiea Interchange bridge is not wide enough to allow present traffic movements and accommodate the LRT line at-grade.

D. KAMEHAMEHA HIGHWAY CORRIDOR

Kamehameha Highway is a primary state highway which runs east-west through Pearl City and Aiea. This segment of Kamehameha Highway corridor begins at Waimano Home Road and runs east to Salt Lake Boulevard at Aloha Stadium. Figure 4 shows the Kamehameha Highway corridor from Waimano Home Road to Salt Lake Boulevard near Aloha Stadium. Table 5 summarizes the physical characteristics of this corridor and Table 6 summarizes the at-grade LRT impacts to this corridor.

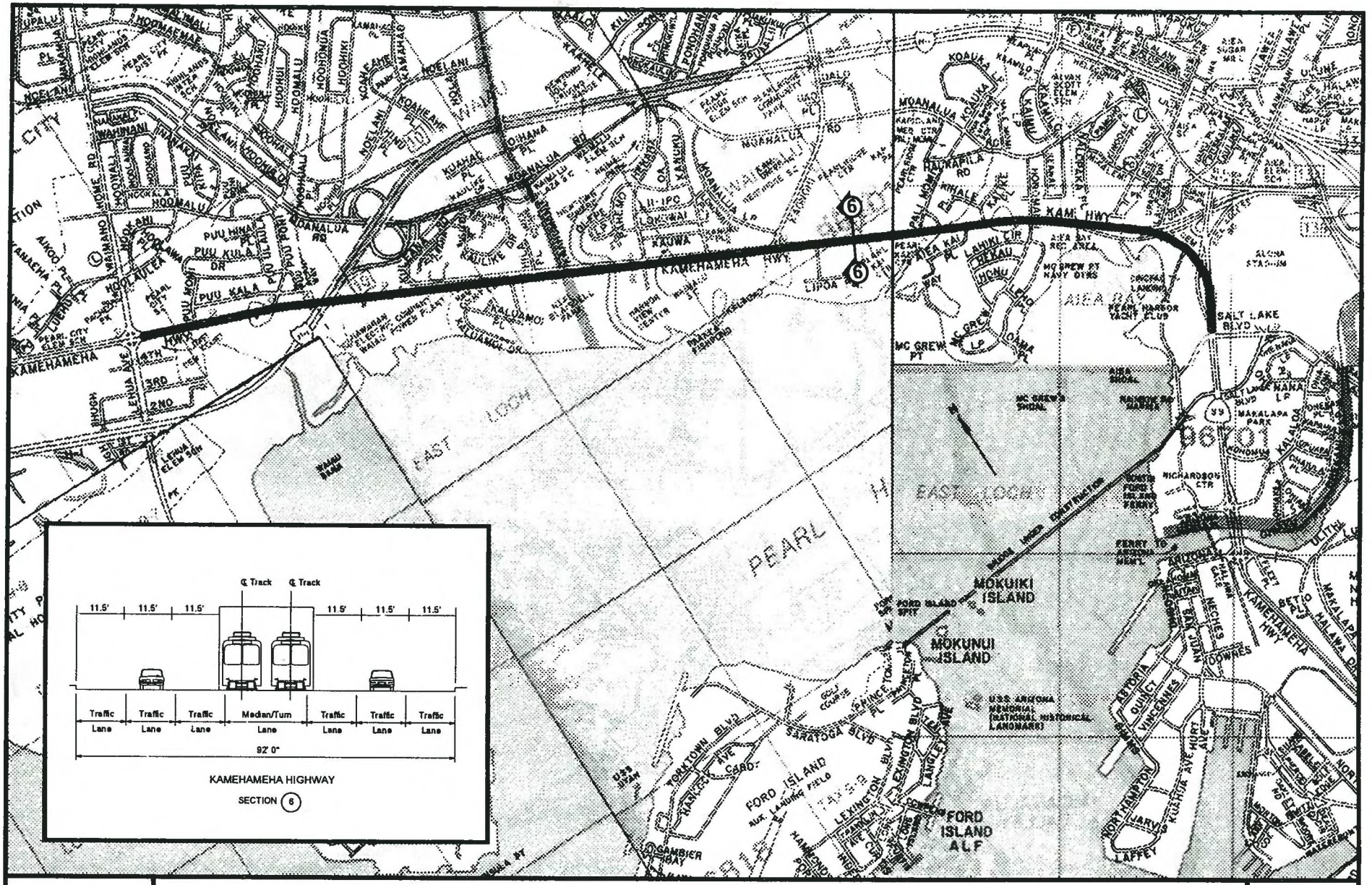
TABLE 5

PHYSICAL CHARACTERISTICS

KAMEHAMEHA HIGHWAY CORRIDOR

FROM WAIMANO HOME ROAD TO SALT LAKE BOULEVARD

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Principal arterial
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	3 (2 eastbound, 3 westbound- east of Honomanu St.)
Existence of Median Turn Lanes	Yes. Left-turn lanes in 20-ft median. Double left-turn lanes at Kaahumanu Street, Kaonohi Street, and Pali Momi Street. Narrow median east of Honomanu St.
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grade
Horizontal alignment	Relatively straight
On-street parking	No
Right-of-way width	115 ft.
Flowline-to-flowline width	92 ft. outside travelway to outside travelway.
Landscaping presence	Intermittent trees on both sides of the street



KAMEHAMEHA HIGHWAY CORRIDOR FROM WAIMANO HOME ROAD TO SALT LAKE BLVD.

Figure **4**

TABLE 6

LRT IMPACTS

KAMEHAMEHA HIGHWAY FROM WAIMANO HOME ROAD TO SALT LAKE BOULEVARD

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	None but would slightly reduce through lane widths from 12 ft to 11-1/2 ft.
Median turn lanes affected	Yes; LRT would eliminate the median
Parking impacts	None
Operational traffic impacts	Impacts to turning movements at key intersections such as Waimano Home Road, Kaahumanu St., Kaonohi St., Pali Momi St., and Honomanu St. due to loss of median left-turn lane; Impacts to through traffic east of on-ramp to Moanalua Freeway due to loss of through lane.
Structural impacts	Existing bridges and drainage crossings could require strengthening including Kalauao Stream Bridge
Clearance impacts	Transmission towers/lines along the south side of the street; Check H-1 Freeway overpass for vertical clearance.
Turning radius impacts	No apparent impacts
Other impacts	

An at-grade LRT located in the median will maintain six lanes (three lanes in each direction) on Kamehameha Highway from Waimano Home Road to the Moanalua Freeway on-ramp. The primary impacts of the at-grade LRT on this corridor would be the taking of the median left-turn lanes. Kamehameha Highway is a high-volume roadway with significant left-turn demand at major intersections. Key intersections that would be affected by the loss of median left-turn lanes are located at Waimano Home Road, Kaahumanu Street, Kaonohi Street, Pali Momi Street, and Honomanu Street. Alternatives for accommodating left-turn demand could be to designate the inside lanes as left-turn lanes or to allow shared left/through operation from the inside lanes. Either way, through traffic capacity in the inside lanes will be reduced to the extent that Kamehameha Highway will essentially operate as a four-lane (two lanes in each direction) roadway.

Vertical clearance could be an issue where H-1 Freeway crosses over Kamehameha Highway between Kaahumanu Street and Waimano Home Road.

Along Kamehameha Highway, there are numerous drainage crossings that may need strengthening to accommodate the LRT. Some bridge crossings use a separate bridge for each direction of travel on Kamehameha Highway. An LRT alignment in the median would require construction of bridge deck to fill the void between the separate bridges.

Just east of Honomanu Street, one eastbound lane is dedicated to the ramp to Moanalua Freeway. At the same time, the median within Kamehameha Highway decreases to a narrow width. At this point, an at-grade LRT alignment would require the taking of one through lane in each direction, leaving two westbound and one eastbound lane on Kamehameha Highway. This reduction in through capacity would need to be evaluated further but is expected to have a significant impact on this high volume corridor.

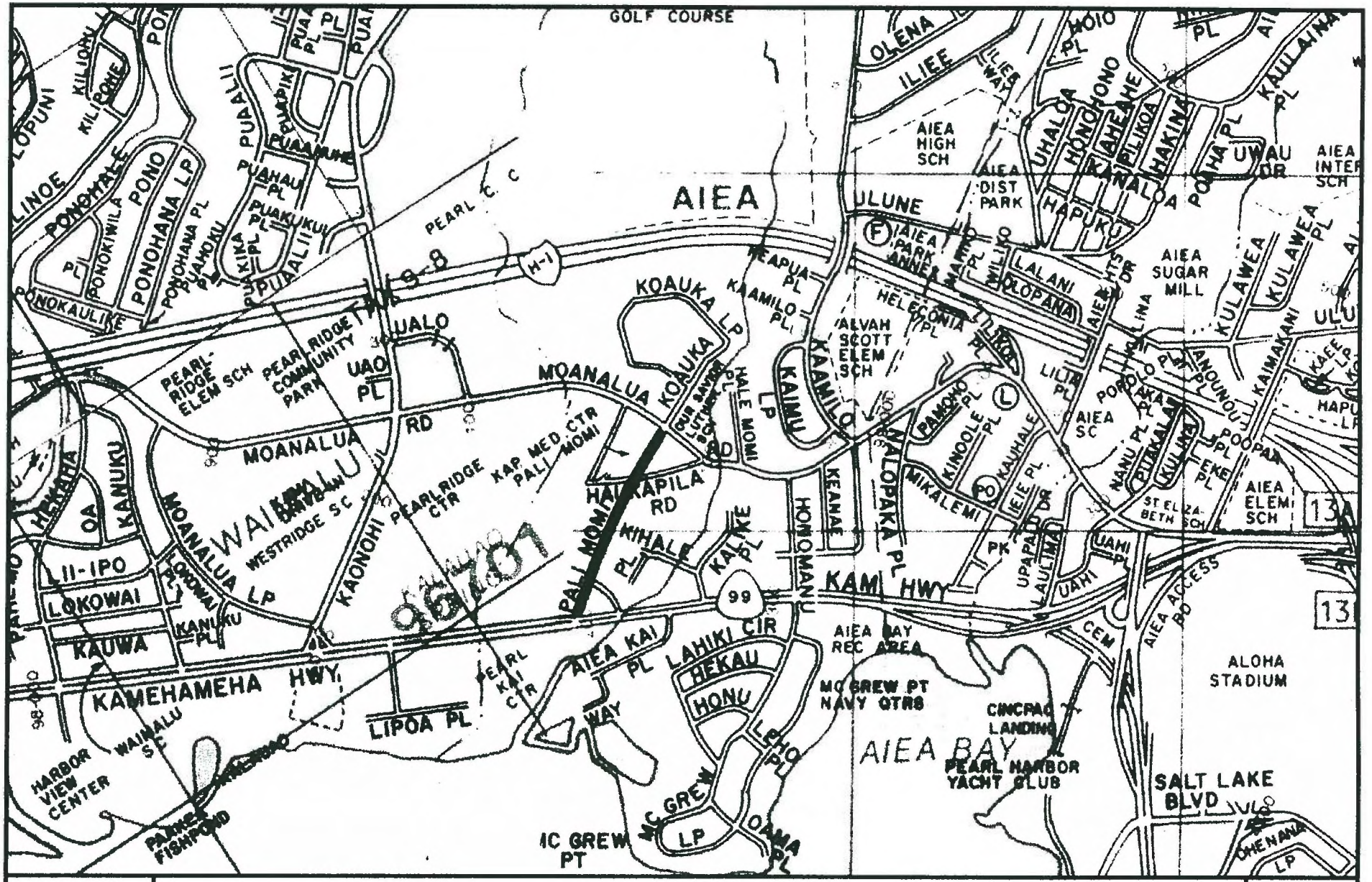
C. PALI MOMI STREET CONNECTOR CORRIDOR

The Pali Momi Connector Corridor is not so much an alternative alignment but a connector alignment that would enable a transition from one alignment to another if that is deemed appropriate. For example, it would enable the use of a Moanalua Road alignment from Pearl City to Pearl Ridge with a Kamehameha Highway alignment from Pearl Ridge to Aloha Stadium.

As shown in Figure 5, Pali Momi Street runs north-south through the Pearlridge Shopping Center complex between Moanalua Road and Kamehameha Highway. This street has an unusual intersection at Kamehameha Highway. Approximately 300 feet from Kamehameha Highway, the street bifurcates into a one-way couplet three traffic lanes wide.

Table 7 summarizes the physical characteristics of this corridor and Table 8 summarizes the impacts of the at-grade LRT.

The primary impacts would be operational and would be focused at the Pali Momi intersections at Moanalua Road and Kamehameha Highway. There is a potential vertical clearance issue with the traffic bridge that connects parking areas of the Pearl Ridge Shopping Center. There is also an upgrade on the Pali Momi approach to Moanalua Road.



PB 100 YEARS

PALI MOMI STREET CONNECTOR CORRIDOR

Figure **5**

TABLE 7

PHYSICAL CHARACTERISTICS

PALI MOMI STREET CONNECTOR CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North-south
Functional Classification	(No official designation)
One-way or Two-way	Generally two-way; One-way at Kamehameha Highway intersection
Number of Through Lanes in Each Direction	Varies: 3 traffic lanes (southbound) towards Kamehameha Hwy.; 2 traffic lanes (northbound) towards Moanalua Rd.
Existence of Median Turn Lanes	Yes (1)
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Slight upgrade toward Moanalua Rd.
Horizontal alignment	Relatively straight, but note divided intersection with Kamehameha Highway
On-street parking	No – existing elevated structure on the second level connects the parking structures on either side of Pali Momi St.
Right-of-way width	76 ft.
Flowline-to-flowline width	70 ft.
Landscaping presence	

TABLE 8

LRT IMPACTS

PALI MOMI STREET CONNECTOR CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	1; LRT would eliminate one traffic lane and the median, leaving two lanes in each direction.
Median turn lanes affected	Yes (1)
Parking impacts	None
Operational traffic impacts	One-way section towards Kamehameha Hwy. Would require widening into the Pearl Ridge Shopping Center parking lot, or the tracks could bifurcate, which would leave the one-way couplet with two narrow traffic lanes (less than 10 ft.)
Structural impacts	No apparent impacts
Clearance impacts	Elevated structure connects parking structures on either side of Pali Momi Street
Turning radius impacts	Turning radius from Pali Momi onto Kamehameha Hwy. About 60 ft; turning radius from Moanalua Rd. onto Pali Momi St. about 60 ft.
Other impacts	

D. SUMMARY

Both the Moanalua Road and Kamehameha Highway Corridors will be severely impacted operationally by an at-grade LRT located in the median. The loss of the left-turn lanes in the median will significantly decrease the through traffic capacity of these roadways. Of the two corridors, the Kamehameha Highway Corridor retains a much better ability to maintain traffic flow after losing the median turn lanes than the Moanalua Road Corridor.

There are no insurmountable physical obstacles over most of the corridor alignments. Both corridor alignments have significant physical constraint issues at the Aloha Stadium end of their respective alignments. Of these, the lack of space to accommodate both the LRT and existing traffic movements at the Aiea Interchange is the more serious one.

III. ALTERNATIVES FROM ALOHA STADIUM TO PUULOA ROAD

There are two major alternative alignments within this segment, one in Kamehameha Highway and the other in Salt Lake Boulevard. Both corridors are major roadways with Kamehameha Highway being higher in classification.

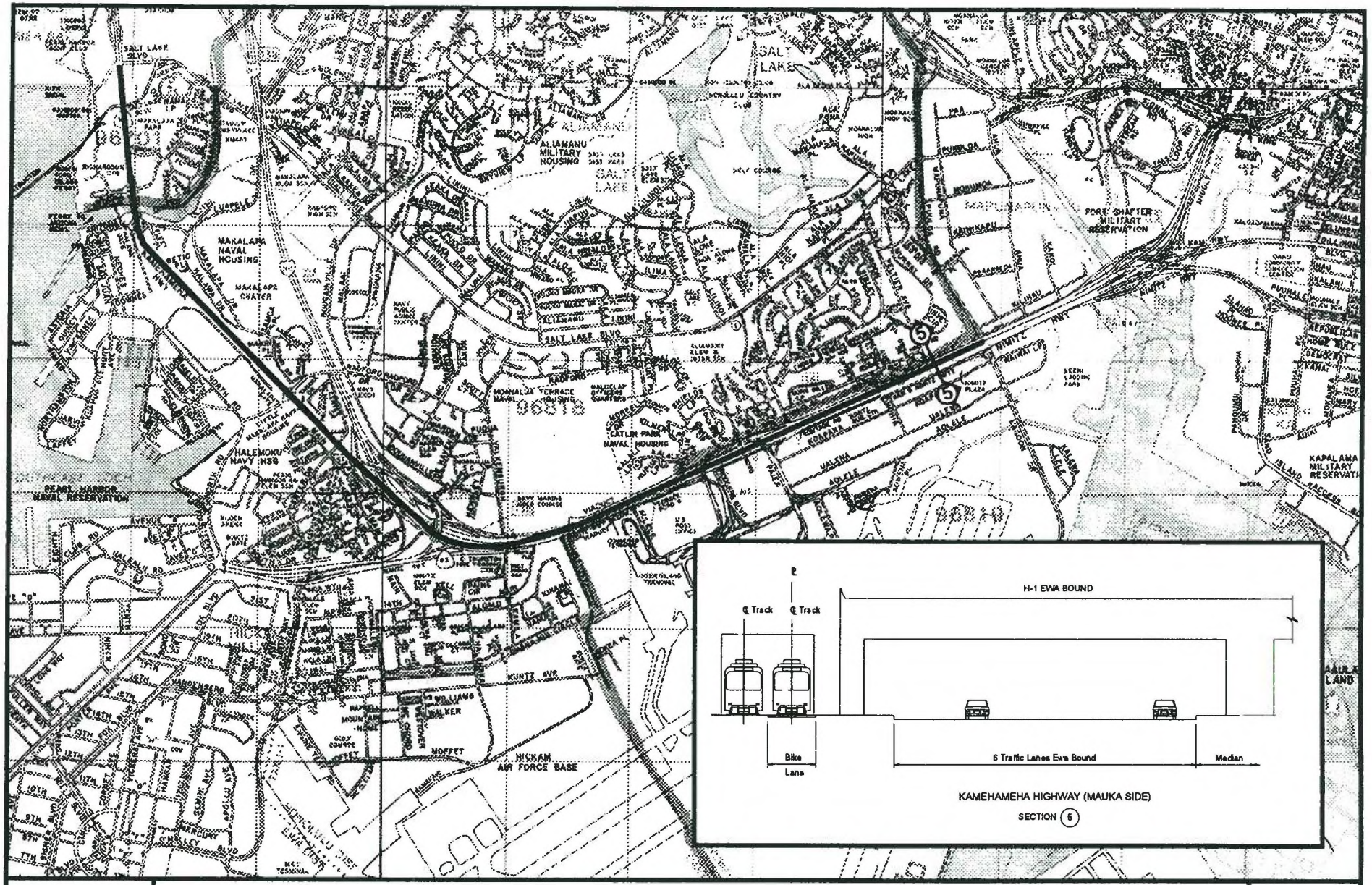
A. KAMEHAMEHA HIGHWAY CORRIDOR

The Kamehameha Highway corridor begins at Aloha Stadium and proceeds to Radford Drive, where it turns and crosses the H-1 Freeway on the Radford Drive bridge. Then it follows the existing bikepath along the H-1 Freeway, bypassing the Pearl Harbor Interchange. The alignment would continue east along Nimitz Highway/Kamehameha Highway under the H-1 Freeway viaduct to Puuloa Road. Figure 6 shows Kamehameha Highway corridor from Salt Lake Boulevard to Puuloa Road. Table 9 summarizes the physical characteristics, while Table 10 summarizes the at-grade LRT impacts.

TABLE 9

PHYSICAL CHARACTERISTICS
KAMEHAMEHA HIGHWAY CORRIDOR
FROM SALT LAKE BOULEVARD TO PUULOA ROAD

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Principal arterial
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	2 westbound, 3 eastbound from Aloha Stadium to Radford Drive; 3 through lanes in each direction under the H-1 Freeway viaduct.
Existence of Median Turn Lanes	Yes. Located within 14-ft raised median from Aloha Stadium to Radford Drive.
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grade
Horizontal alignment	Relatively straight
On-street parking	No
Right-of-way width	Varies: 110 ft. to 160 ft.
Flowline-to-flowline width	Varies: 100 ft. to 125 ft. outside travelway to outside travelway.
Landscaping presence	Trees/landscaping along north side of segment under H-1 Fwy. Viaduct.



KAMEHAMEHA HIGHWAY CORRIDOR FROM SALT LAKE BLVD. TO PUULOA RD.

Figure **6**

TABLE 10

LRT IMPACTS
KAMEHAMEHA HIGHWAY CORRIDOR
FROM SALT LAKE BOULEVARD TO PUULOA ROAD

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	1 (eastbound) between Aloha Stadium and Radford Drive. 4 through lanes would remain.
Median turn lanes affected	Yes; LRT would eliminate the median between Aloha Stadium and Radford Drive.
Parking impacts	None
Operational traffic impacts	Salt Lake Blvd., Kalaloa, Halawa Gate, and Radford Dr. intersections.
Structural impacts	Existing bridges would require strengthening and widening.
Clearance impacts	No apparent impact.
Turning radius impacts	No apparent impact.
Other impacts	Once across the H-1 Freeway near Radford Drive, there is a possibility of locating the LRT on the north side of Kamehameha Highway between the bikepath (along the H-1 Freeway) and the U. S. Navy property. This location would likely require additional right-of-way from the Navy. LRT would also impact an electrical switching station located between the bikepath and the Navy's property, which might require relocation. LRT would bike/pedestrian path and landscaping along north side of Kamehameha Hwy. under H-1 Freeway viaduct.

An at-grade LRT located in the median will leave four lanes (two lanes in each direction) on Kamehameha Highway from Aloha Stadium to Radford Drive. The primary impacts of the at-grade LRT on this corridor would be the taking of the median left-turn lanes. Kamehameha Highway is a high-volume roadway with significant left-turn demand at major intersections. Key intersections that would be affected by the loss of median left-turn lanes are located at Salt Lake Boulevard, Kalaoa Drive (Arizona Memorial), Halawa Drive (Halawa Gate), and Radford Drive (Makalapa Gate). Alternatives for accommodating left-turn demand could be to designate the inside lanes as left-turn lanes or to allow shared left/through operation from the inside lanes. Either way, through traffic capacity in the

inside lanes will be reduced to the extent that Kamehameha Highway will essentially operate as a two-lane (one lane in each direction) roadway.

Along this segment of Kamehameha Highway, there are drainage crossings that may need strengthening to accommodate the LRT. Some bridge crossings use a separate bridge for each direction of travel on Kamehameha Highway. An LRT alignment in the median would require construction of bridge deck to fill the void between the separate bridges.

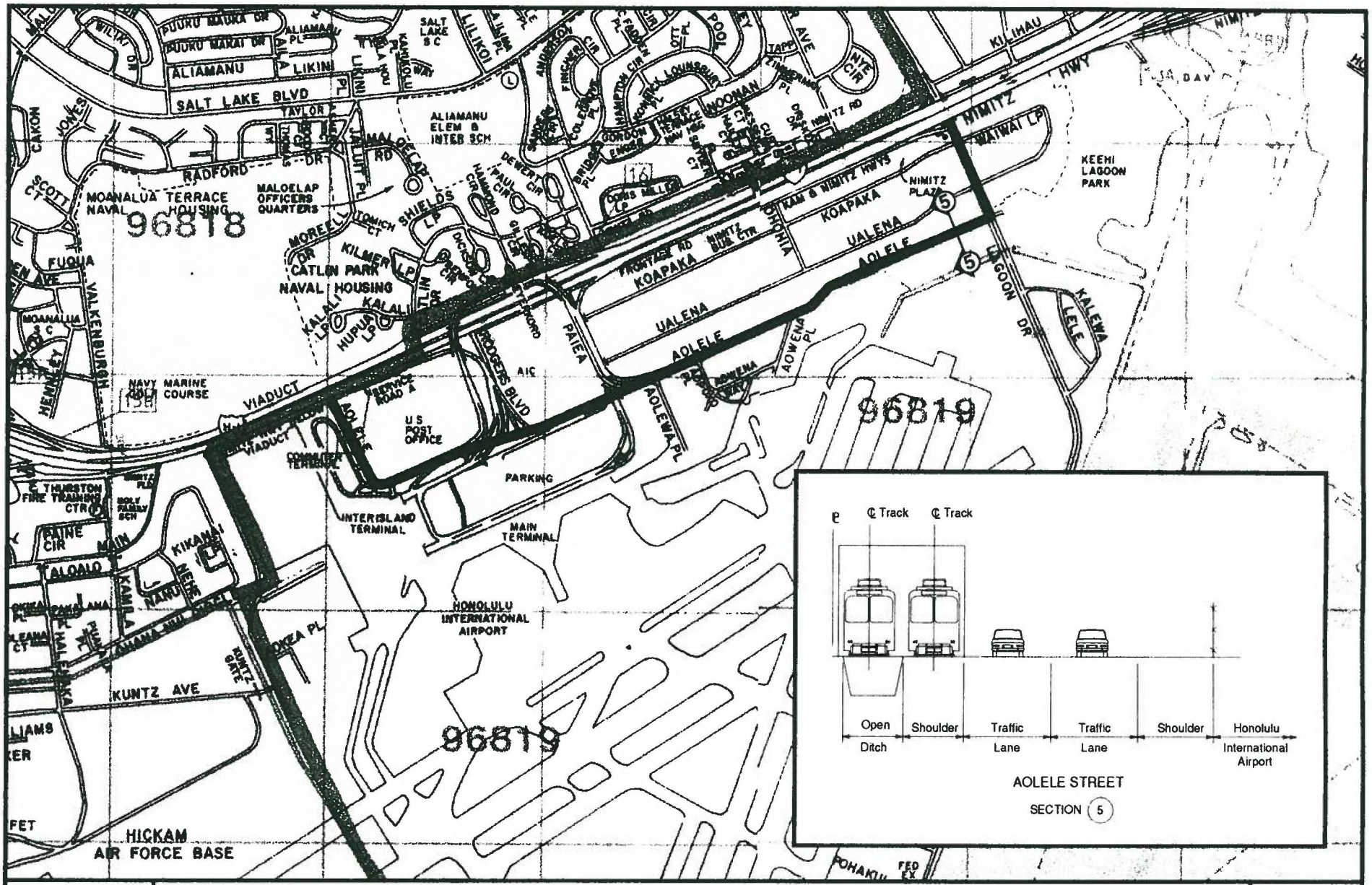
At Radford Drive, the at-grade LRT would cross H-1 Freeway on the Radford Drive bridge and then turn onto an alignment that roughly follows the existing bike/pedestrian path located between H-1 Freeway and Bougainville Drive. This alignment would narrow Radford Drive to a two-lane roadway and would impact both the bike/pedestrian path and the landscaping along H-1 Freeway and Kamehameha Highway. As it continued along Kamehameha Highway/Nimitz Highway under the H-1 Freeway viaduct, an at-grade LRT alignment would continue to impact the bicycle/pedestrian path and the landscaping along the path.

B. AOLELE STREET/LAGOON DRIVE SUB-CORRIDOR

A variant of the Kamehameha Highway corridor would conduct the at-grade LRT alignment into the Honolulu International Airport, roughly along the Aolele Road alignment to Lagoon Drive, as shown in Figure 7.

1. Aolele Street

Aolele Street is a collector street that provides access to Honolulu International Airport and, within the airport, becomes part of the airport circulation roadway system. Table 11 summarizes the physical characteristics, and Table 12 summarizes the at-grade LRT impacts.



PB 100 YEARS

AOLELE STREET/LAGOON DRIVE SUB-CORRIDOR

Figure **7**

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TABLE 11

PHYSICAL CHARACTERISTICS

AOLELE STREET SUB-CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	(No official classification)
One-way or Two-way	Two-way from Lagoon to Paiea, One-way westbound through airport from Paiea to US Post Office, Two-way US Post Office to Nimitz Hwy.
Number of Through Lanes in Each Direction	1
Existence of Median Turn Lanes	No (except at airport)
Edge Treatment	Unpaved shoulder from Lagoon Drive to drainage channel, curb and gutter from that point west.
Sidewalks	No
Vertical alignment	Flat grades
Horizontal alignment	Relatively straight
On-street parking	None
Right-of-way width	
Flowline-to-flowline width	24 ft. Lagoon Dr. to concrete channel crossing, 33 ft. from channel to Paiea, 30 ft. through airport.
Landscaping presence	No significant landscaping

Parts of Aolele Street are wide enough to accommodate the at-grade LRT and maintain one through lane in each direction. Other segments, especially toward Lagoon Drive, could work by placing the at-grade LRT alignment over the open drainage and using the shoulder area. Within the airport, an at-grade LRT would probably occupy the entire width of Aolele Road between the Airport Post Office and Paiea Street. There is very little room for expansion of Aolele Road, so an at-grade LRT alignment in this segment would probably need to share the road with traffic. An alternate LRT alignment could follow the ground level terminal access road through the airport. East of Paiea Street, it would return to Aolele Street.

TABLE 12

LRT IMPACTS

AOLELE STREET SUB-CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	0 (leaves one 10-ft. lane in each direction) from Lagoon Drive to Paiea Street and from Post office to Nimitz Highway. 2 lanes through airport.
Median turn lanes affected	Within segment between Post Office and Nimitz.
Parking impacts	N/A
Operational traffic impacts	Nimitz/Aolele and Aolele/Lagoon intersections
Structural impacts	Drainage ditch on the north side (32' 9" from north fence to edge of roadway across drainage ditch); existing elevated structure crossing
Clearance impacts	Ramp structures in airport
Turning radius impacts	Tight turning radius near Post Office
Other impacts	May not be wide enough at the airport access columns to support the LRT and traffic lane near the airport

2. Lagoon Drive

At Lagoon Drive, the LRT would turn north, following Lagoon Drive to Nimitz Highway. As illustrated in Figure 7, Lagoon Drive Corridor runs north-south between Kamehameha Highway and is the part of the Aolele Street Sub-corridor that connects it back to the Kamehameha Highway Corridor. Table 13 summarizes its physical characteristics, and Table 14 summarizes the at-grade LRT impacts.

TABLE 13

PHYSICAL CHARACTERISTICS

LAGOON DRIVE SUB-CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North South
Functional Classification	(No official classification)
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	2 southbound, 3 northbound
Existence of Median Turn Lanes	Yes- median and turning lane (16 ft.)
Edge Treatment	Curb and gutter
Sidewalks	Yes- both sides
Vertical alignment	Flat grades
Horizontal alignment	Straight
On-street parking	Yes- metered (west side of southbound)
Right-of-way width	
Flowline-to-flowline width	≈76 ft.
Landscaping presence	N/A

TABLE 14

LRT IMPACTS

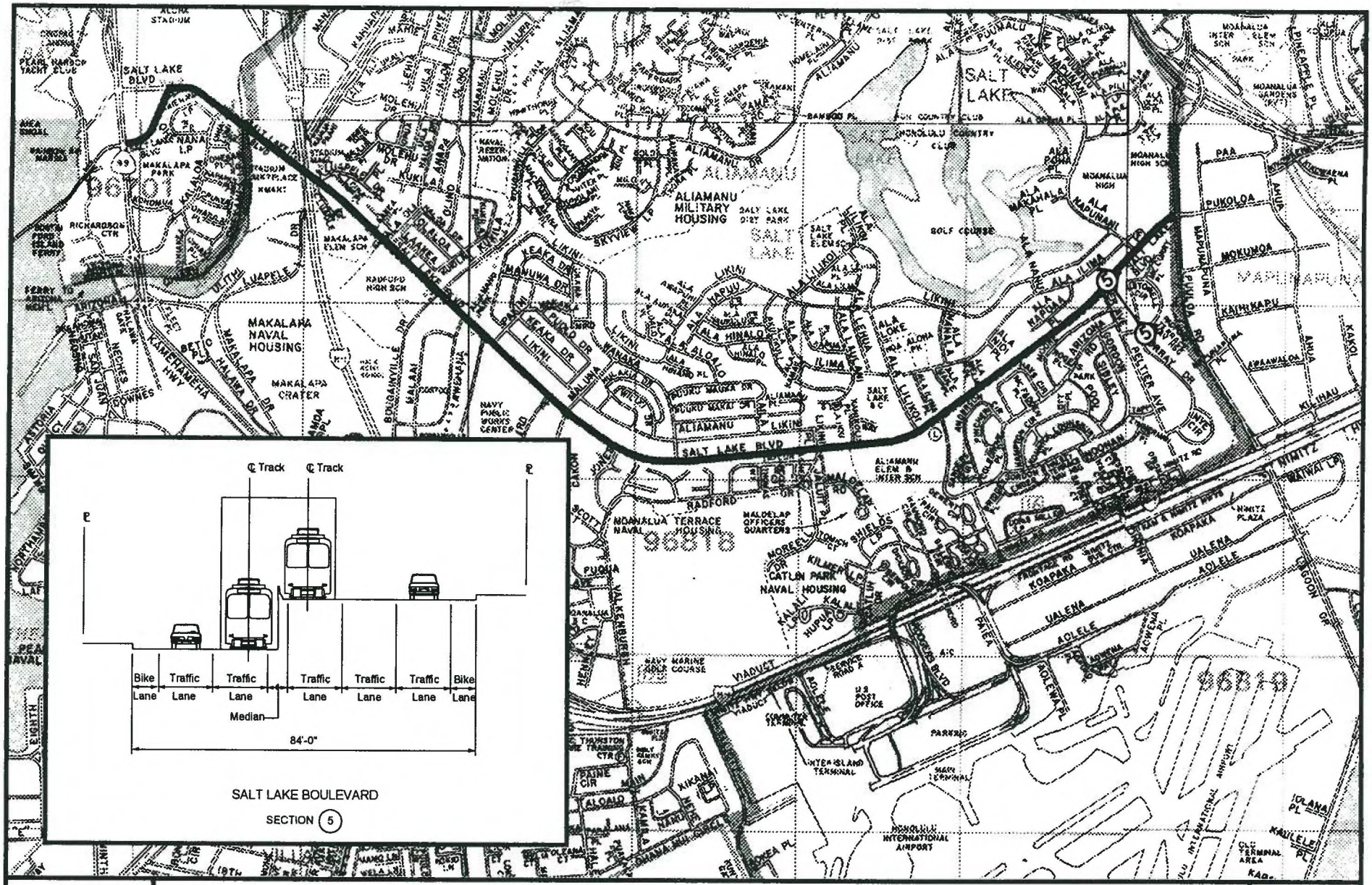
LAGOON DRIVE SUB-CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	0
Median turn lanes affected	Yes- LRT would eliminate the median and left turn lane
Parking impacts	Eliminate on-street parking
Operational traffic impacts	LRT would eliminate left turn lanes
Structural impacts	No apparent impacts
Clearance impacts	No apparent impacts
Turning radius impacts	Turning radius from Lagoon Dr. onto Aolele St. about 60 feet.
Other impacts	

If located in the median, the impacts would be similar to other roadways with median turn lanes. The Aolele Street and Nimitz Highway intersections are key intersections affected by the LRT within this sub-corridor.

C. SALT LAKE BOULEVARD CORRIDOR

As Figure 8 illustrates, Salt Lake Boulevard corridor is a segment for an alternative east-west corridor between Aloha Stadium and Puuloa Road. Salt Lake Boulevard runs though commercial and residential areas.



PB 100 YEARS

SALT LAKE BOULEVARD CORRIDOR

Figure **8**

TABLE 15

PHYSICAL CHARACTERISTICS

SALT LAKE BOULEVARD CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Minor arterial
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	Kamehameha Hwy. to Kahuapaani has 3 lanes in each direction with 14-foot median. Kahuapaani Street to Bougainville is under construction for widening to 2 lanes in each direction with median; Bougainville to Ala Lilikoi is generally unimproved with one traffic lane in each direction and intermittent left-turn lanes. Ala Lilikoi to Puuloa Road has 3 eastbound, 2 westbound with bike lanes in both direction.
Existence of Median Turn Lanes	Current widening project will include median; Intermittent medians east of Bougainville.
Edge Treatment	Improved sections with curb and gutter/ others with shoulder.
Sidewalks	Yes
Vertical alignment	Vertical grades generally flat except at the intersection of Puuloa Rd., Ala Lilikoi St. and Kahuapaani St. where grades ranges from 4 to 8%.
Horizontal alignment	Relatively straight
On-street parking	No
Right-of-way width	100 ft. (from Kamehameha Highway to Kahuapaani Street)
Flowline-to-flowline width (or edge of pavement to edge of pavement)	Varies: 84 ft. from Kamehameha. Hwy to Luapele Rd.; 36 ft. from Luapele Rd. to Lawehana St. (currently being widened); 33 ft. from Lawehana St. to Maluna St.; 28 ft. from Maluna St. to Reeves St.; 32 ft. from Reeves St. to Wanaka St.; 24 ft. from Wanaka St. to Likini Pl./Radford Drive; 33 ft. from Likini Pl./Radford Dr. to Ala Lilikoi St.; 80 ft. from Ala Lilikoi St. to Arizona St.; 75 ft. from Arizona St. to Puuloa Rd.
Landscaping presence	

TABLE 16

LRT IMPACTS

SALT LAKE BOULEVARD CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	None, at-grade LRT through segment between Kamehameha and Kahuapaani would eliminate median and result in 6 - 10 foot lanes; None, at-grade LRT through the widened section would eliminate median leaving two narrow lanes of traffic in each direction with bike lanes; 2 lanes, at-grade LRT through the unimproved sections would require widening to accommodate LRT corridor. 2 lanes, at-grade LRT from Ala Lilikoi to Puuloa Road would eliminate one through lane in each direction leaving 2 lanes eastbound and 1 lane westbound.
Median turn lanes affected	Medians would be eliminated.
Parking impacts	N/A
Operational traffic impacts	At-grade LRT would eliminate median turn lanes resulting in traffic impacts to the key intersections of Kahuapaani, Bougainville, Maluna, Likini, Ala Lilikoi, Ala Napunani, and Puuloa Road.
Structural impacts	Existing bridge in the vicinity of Kahuapaani St. would require strengthening.
Clearance impacts	H-1 Freeway viaduct in vicinity of Kahuapaani St.
Turning radius impacts	No apparent impact.
Other impacts	One-way entrance/exit at intersection with Kamehameha Highway; Petroleum pipeline on the south side Salt Lake Blvd.

An at-grade LRT located in the median will leave six narrow lanes (three lanes in each direction) on Salt Lake Boulevard from Kamehameha Highway to Kahuapaani Street and four narrow lanes (two lanes in each direction) on Salt Lake Boulevard from Kahuapaani Street to Bougainville Drive. From Bougainville Drive to Ala Lilikoi, Salt Lake Boulevard will require widening to maintain the existing one traffic lane in each direction. From Ala Lilikoi to Puuloa Road, an at-grade LRT located in the median will leave two lanes eastbound and one lane westbound.

The primary impacts of the at-grade LRT on this corridor would be the taking of the median left-turn lanes. Salt Lake Boulevard is a medium-volume roadway with significant left-turn demand at major intersections. Key intersections that would be affected by the loss of median left-turn lanes are located at Kahuapaani Street, Bougainville Drive, Likini Place/Radford Drive, Ala Lilikoi, Arizona Road, Peltier Avenue, Ala Napunani, and Puuloa Road. In segments where there are four through lanes, left-turn demand could be accommodated by designating the inside lanes as left-turn lanes or to allow shared left/through operation from the inside lanes. Either way, through traffic capacity in the inside lanes will be reduced to the extent that Salt Lake Boulevard will essentially operate with one less through lane than its configuration would indicate. Between Kamehameha Highway and Kahuapaani Street, this would means that Salt Lake Boulevard would operate like a four-lane roadway which could be acceptable. East of Kahuapaani, however, this would make Salt Lake Boulevard operate as a two-lane (one lane in each direction) roadway. This would negate the benefits of the current roadway widening project between Kahuapaani and Bougainville.

The reduction of westbound through lanes from two to one between Ala Lilikoi and Ala Napunani will probably have a significant impact on traffic flow through this area.

Physically, there are several areas in which there are significant grades that could affect the performance of the LRT. There is an upgrade in the eastbound direction between Kahuapaani Street and Bougainville Drive. The Ala Lilikoi area is in a low spot, so Salt Lake Boulevard segments leaving the area must climb grades. Salt Lake Boulevard westbound from Puuloa Road is also a steep upgrade. Vertical clearance needs to be checked as H-1 Freeway passes over Salt Lake Boulevard in the vicinity of Kahuapaani Street.

D. SUMMARY

Both the Salt Lake Boulevard and Kamehameha Highway Corridors will be severely impacted operationally by an at-grade LRT located in the median. The loss of the left-turn lanes in the median will significantly decrease the through traffic capacity of these roadways.

The Salt Lake Boulevard impacts are distributed throughout the corridor, especially along the two-lane segments. In these two-lane segments, Salt Lake Boulevard will have to be widened and additional right-of-way may be needed to accommodate an at-grade LRT alignment. Within the segment between Ala Lilikoi and Ala Napunani, the a reduction to one through lane would severely impact westbound traffic capacity.

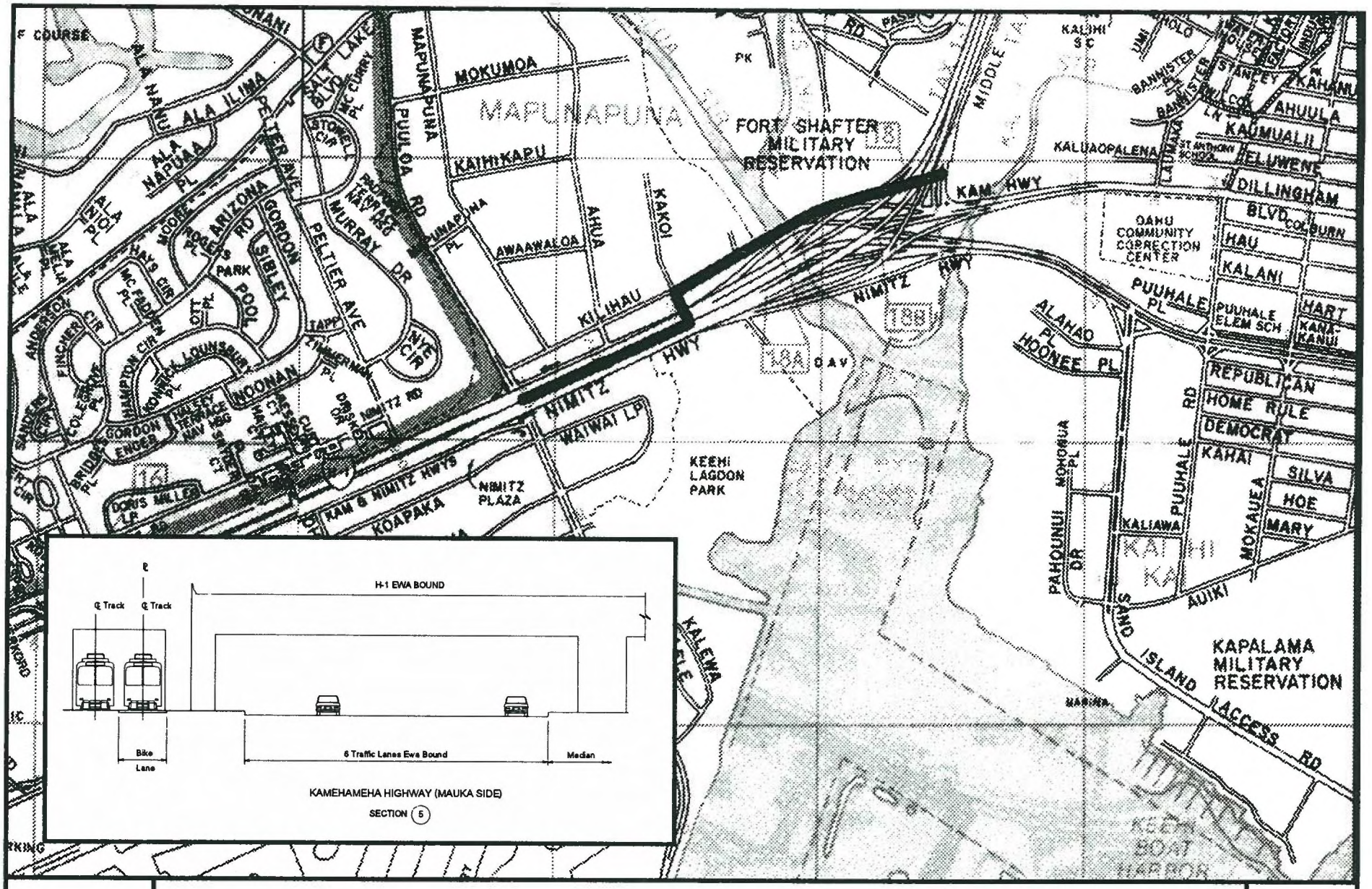
The Kamehameha Highway corridor traffic impacts would be felt primarily in the segment between Aloha Stadium and Pearl Harbor Interchange. East of the Pearl Harbor Interchange, the operational impacts are less severe because the at-grade LRT alignment would be located outside of the roadway. There would be physical impacts to the existing bike/pedestrian path and landscaping located on the north side of Kamehameha Highway/Nimitz Highway, however. The Aolele Street Sub-corridor variant that services the Honolulu International Airport could utilize Aolele Street for access, but within the airport, using Aolele Street could be extremely disruptive to airport traffic. An alignment along the ground-level terminal access road may be more feasible than Aolele Street.

III. ALTERNATIVES FROM PUULOA ROAD TO MIDDLE STREET

There are two alternative alignments from Puuloa Road to Middle Street: Pukuloa Road and Kamehameha Highway Corridor. This is a transition corridor in that it serves to connect the Aloha Stadium to Puuloa Road segments to the Middle Street to Downtown segments. The alternatives in this corridor pass partially through Fort Shafter property. The Pukuloa Road Corridor is a logical extension of the Salt Lake Corridor, and the Kamehameha Highway Corridor is a logical extension of the like named alternative from the previous segment. However, each could work with any alternative, using the Puuloa Road Corridor as a connector.

A. KAMEHAMEHA HIGHWAY CORRIDOR

This corridor begins at Puuloa Road, follows Kamehameha Highway/Nimitz Highway to Kakoi Street, turns north onto Kakoi Street, east onto Kilihau Street, and then continues into Lower Fort Shafter to Middle Street. Figure 9 illustrates the Kamehameha Highway corridor from Puuloa Road to Middle Street. Table 17 summarizes the physical characteristics and Table 18 summarizes the impacts of the at-grade, LRT impacts.



KAMEHAMEHA HIGHWAY CORRIDOR FROM PUULOA RD. TO MIDDLE ST.

Figure **9**

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TABLE 17

PHYSICAL CHARACTERISTICS

KAMEHAMEHA HIGHWAY FROM PUULOA TO MIDDLE STREET

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North-south
Functional Classification	Principal Arterial to Kakoi Street; Kakoi Street and Kilihau Street are collector roadways.
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	Kamehameha/Nimitz has 6 lanes; Kakoi and Kilihau have 1 lane.
Existence of Median Turn Lanes	Kamehameha/Nimitz yes, Kakoi and Kilihau, no.
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grade
Horizontal alignment	Relatively straight
On-street parking	Yes
Right-of-way width	
Flowline-to-flowline width	Kamehameha/Nimitz 72 ft per direction, Kakoi 40 feet; and Kilihau 44 feet.
Landscaping presence	Median landscaping

East of Puuloa Road, the Kamehameha Highway Corridor is more constrained. The bicycle/pedestrian path is narrower and constrained on the north side by commercial/ industrial properties and on the south by the columns supporting the H-1 Freeway viaduct. Therefore, unless right-of-way is acquired from the commercial/industrial properties, it appears that an at-grade LRT alignment would need to use lanes on Kamehameha/Nimitz Highway under the viaduct. This could cause further operational disruption at the Puuloa Road/Lagoon Drive/ Nimitz Highway intersection.

If the at-grade LRT alignment is located in the center lanes of Kamehameha/Nimitz Highways, vertical clearance under the H-1 Freeway viaduct may be an issue at the point the at-grade LRT alignment would cross under it to turn into Kakoi Street. At this point, the Nimitz Highway ramp portion of H-1 Freeway viaduct is starting to descend to meet Nimitz Highway at ground level.

TABLE 18

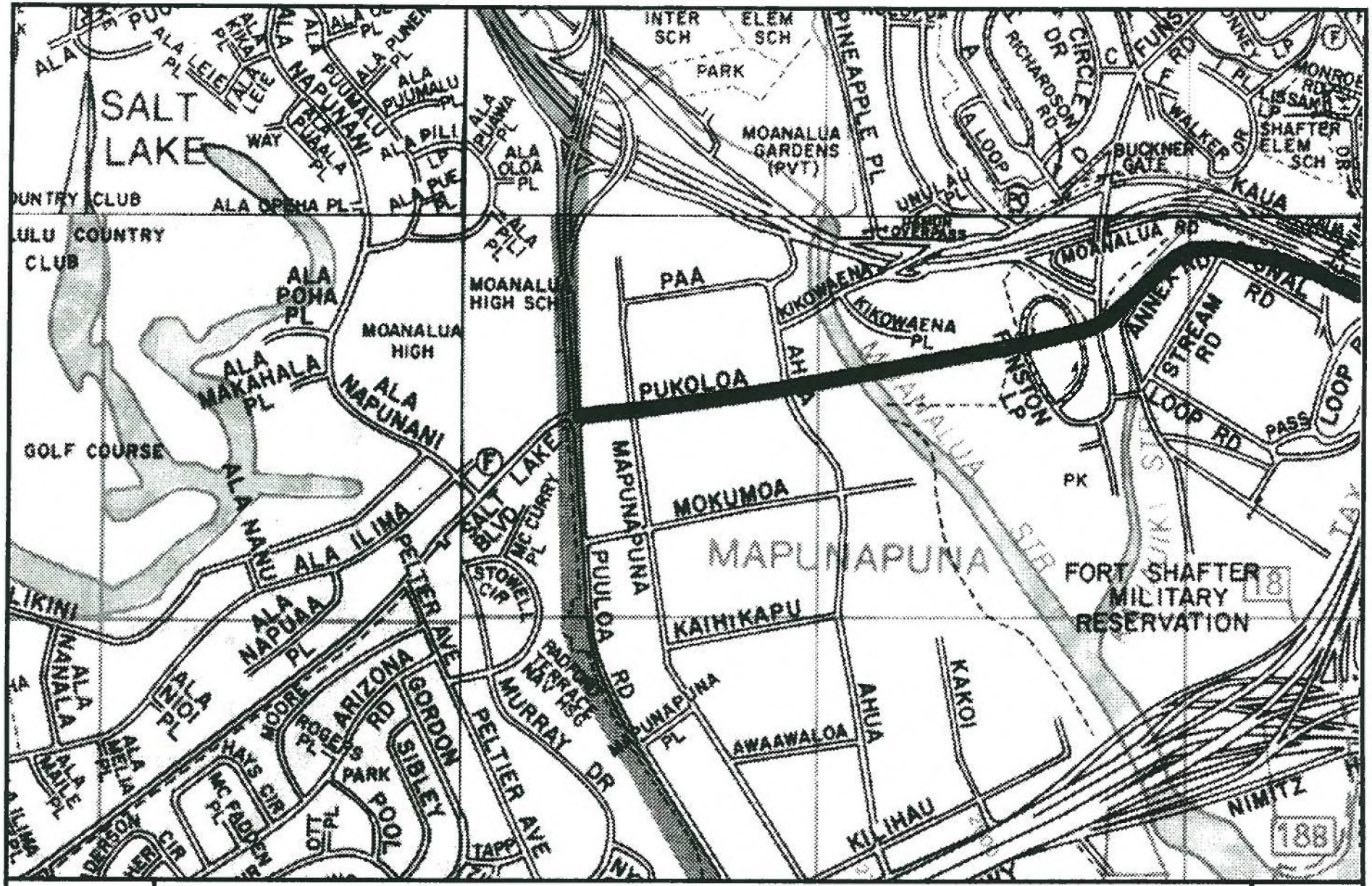
LRT IMPACTS
KAMEHAMEHA HIGHWAY FROM PUULOA TO MIDDLE STREET

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	Kamehameha/Nimitz - None if located on bike/pedestrian path, but could need additional width requiring right-of-way acquisition; Kakoi/Kilihau - None
Median turn lanes affected	None if bike/pedestrian path alignment used.
Parking impacts	On-street parking will be eliminated on Kilihau
Operational traffic impacts	Puuloa Road/Nimitz Highway intersection; Kakoi St./Kamehameha Hwy. intersection is currently a right-in/right-out intersection and LRT would complicate vehicle conflicts.
Structural impacts	Existing bridges would require strengthening. New structures for the Moanalua Stream crossing would be required.
Clearance impacts	Potential H-1 Fwy. Viaduct at Kakoi Street.
Turning radius impacts	Kakoi to Kilihau turn is tight.
Other impacts	Existing building at 2669 Kilihau St. (Oceanic Cablevision) has parking lot that would be eliminated by an at-grade LRT alignment if bike/pedestrian path is not used. If bike/pedestrian path used, parking lot would not be affected.

An at-grade LRT on Kilihau Street would leave one lane in each direction. On-street parking would need to be removed. There is a building, currently occupied by Oceanic Cablevision, located where the logical extension of the LRT would proceed. It appears the an at-grade LRT alignment could miss the building, but it would take most of its parking lot. An alternative would be to use the bike/pedestrian path, but in that case, it would not be necessary to use Kakoi Street or Kilihau Street. Once past this building, the LRT alignment would be in lower Fort Shafter. No assessment of the alignment within Fort Shafter was conducted.

B. PUKOLOA STREET CORRIDOR

Pukoloa Street corridor is an extension of the Salt Lake Boulevard corridor, running east-west between Puuloa Road and Ahua Street (see Figure 10). The corridor continues through lower Fort Shafter. The at-grade LRT alignment would probably run through lower Fort Shafter along the perimeter adjacent to the H-1 Freeway to Middle Street. Table 19 summarizes the physical characteristics of the Pukoloa Road Corridor, and Table 20 summarizes the impacts of the at-grade LRT



PB 100 YEARS

PUKOLOA STREET CORRIDOR

Figure **10**

TABLE 19

PHYSICAL CHARACTERISTICS

PUKOLOA STREET CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Major collector
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	2
Existence of Median Turn Lanes	No
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Grades are flat except at the approaches to Puuloa Rd. where the grade ranges from 3-5%
Horizontal alignment	Straight
On-street parking	Yes (both sides of street through Mapunapuna industrial area)
Right-of-way width	60 ft.
Flowline-to-flowline width	40 ft.
Landscaping presence	

TABLE 20

LRT IMPACTS

PUKOLOA STREET CORRIDOR

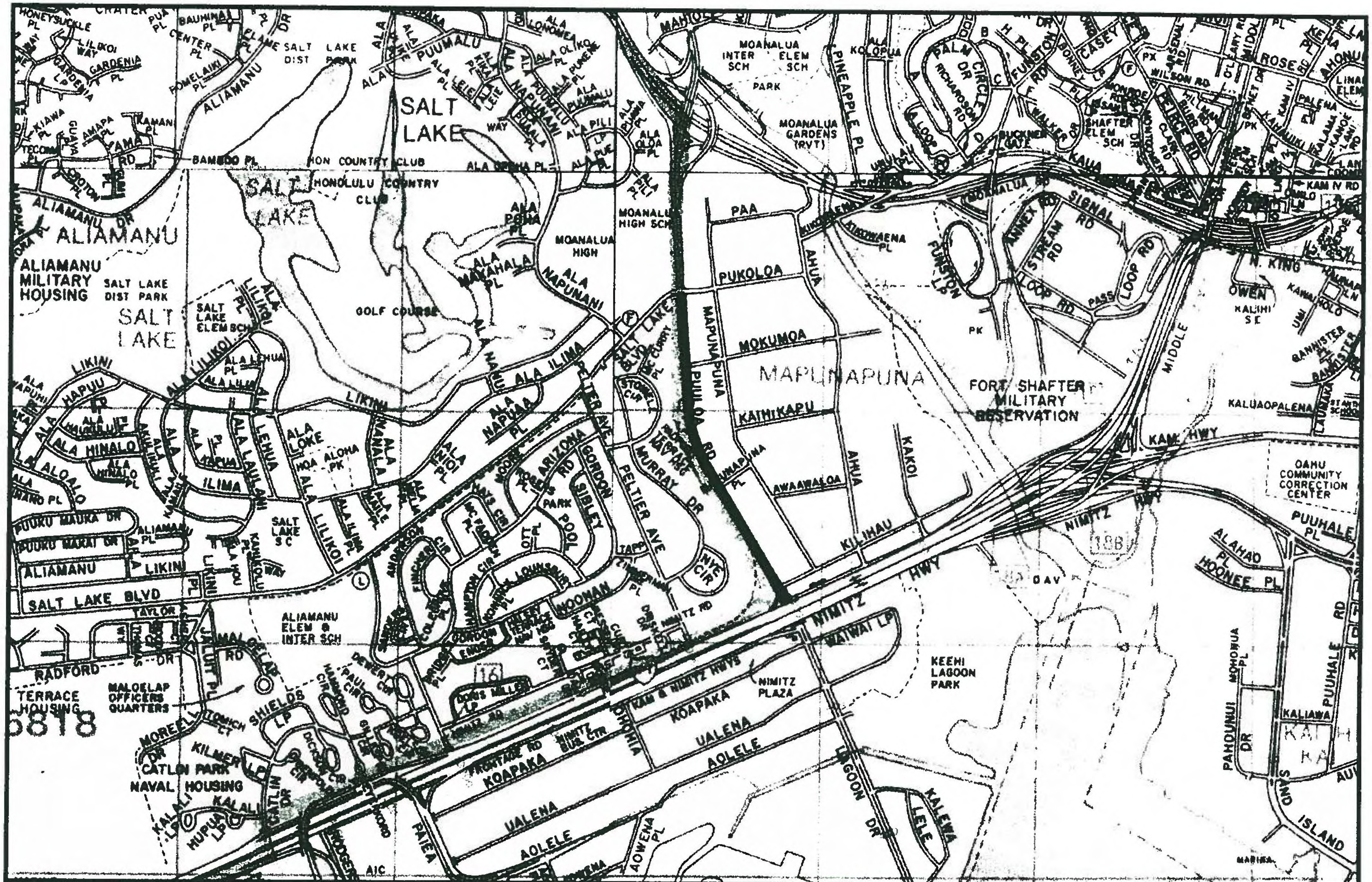
LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	1, leaving one wide lane.
Median turn lanes affected	N/A
Parking impacts	On-street parking would be eliminated
Operational traffic impacts	Puuloa, Mapunapuna, Ahua intersections
Structural impacts	New structure for the LRT crossing over Moanalua Stream would be required
Clearance impacts	No apparent conflicts
Turning radius impacts	No apparent conflicts
Other impacts	Right-of-way acquisition would be required through Mid-Pac Lumber site.

The Pukoloa Road Corridor is the continuation of the Salt Lake Boulevard Corridor. An at-grade LRT would require the removal of the existing on-street parking to maintain a traffic lane. Even then, only one lane of traffic could be accommodated within the existing curbs, probably requiring one-way operation between Mapunapuna and Ahua. The Pukoloa Road Corridor would continue the alignment through lower Fort Shafter. No evaluation of the alignment through Fort Shafter was conducted.

The Mid-Pac Lumber Company parcel located east of the Pukoloa/Ahua intersection would need to be acquired for the Pukoloa Road Corridor to proceed into Fort Shafter. There is a significant upgrade in the westbound direction between Mapunapuna Street and Puuloa Road.

C. PUULOA ROAD CONNECTOR CORRIDOR

Puuloa Road could serve as the connector alignment between the Salt Lake Boulevard Corridor and the Kamehameha Highway Corridor. Currently, Puuloa Road is a two-lane, undivided roadway between Nimitz Highway and Salt Lake Boulevard. However, Puuloa Road is programmed for widening into a four-lane, divided roadway in the short-range future. Puuloa Road corridor is shown in Figure 11.



PB 100 YEARS

PUULOA ROAD CONNECTOR CORRIDOR

Figure 11

TABLE 21

PHYSICAL CHARACTERISTICS

PUULOA ROAD CONNECTOR CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North South
Functional Classification	Principal arterial
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	1; at the intersections of Kamehameha Hwy. and Salt Lake Blvd., the corridor widens to two traffic lanes in each direction (with a turning lane in the middle)
Existence of Median Turn Lanes	Yes- at the intersections of Kamehameha Hwy. And Salt Lake Blvd.
Edge Treatment	Unpaved shoulder
Sidewalks	No
Vertical alignment	Flat grades
Horizontal alignment	Relatively straight
On-street parking	Informal on shoulder
Right-of-way width	Wide right-of-way between Salt Lake Blvd. and Kamehameha Hwy.
Flowline-to-flowline width	
Landscaping presence	N/A

Puuloa Road is scheduled for widening to a four-lane roadway with median in the near future. Locating an at-grade LRT along the median of Puuloa Road after its widening would have similar impacts to the other arterial type roadways described so far. The Puuloa Road/Salt Lake Boulevard and Puuloa Road/Nimitz Highway intersections will be key intersections to address in terms of operational impacts.

TABLE 22

LRT IMPACTS

PUULOA ROAD CONNECTOR CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	At-grade LRT would require widening of Puuloa Road. If Puuloa Road widening project is completed before at-grade LRT is implemented, one traffic lane will be eliminated, leaving 2 narrow lanes in each direction.
Median turn lanes affected	Yes- at the intersections of Kamehameha Hwy. and Salt Lake Blvd., the turn lane would be eliminated
Parking impacts	None
Operational traffic impacts	Major traffic impact to the intersections at Kamehameha Hwy. and Salt Lake Blvd.
Structural impacts	Drainage structures may need strengthening.
Clearance impacts	No apparent impacts
Turning radius impacts	Turning radius from Salt Lake Blvd. onto Puuloa Rd. about 60 ft.
Other impacts	

D. SUMMARY

Both the Pukoloa Road and Kamehameha Highway Corridors of the at-grade LRT alignment are transition segments in that they serve to connect other segments whose alignments are based more on the service and patronage issues. Choosing a Salt Lake Boulevard Corridor alignment would suggest a Pukoloa Road alignment as a logical continuation, while choosing an alignment through the Honolulu International Airport would suggest a Kamehameha Highway alignment. However, having the Puuloa Road Corridor provides the flexibility to make either segment work with the other.

There are still significant operational issues such as disruption to the Nimitz Highway/ Lagoon Drive/Puuloa Road and the Salt Lake Boulevard/Puuloa Road intersections.

Physical issues such as vertical clearance under the H-1 Freeway viaduct, the building that houses Oceanic Cablevision, and the Mid-Pac Lumber Company site are larger than operational issues in these segments.

If the at-grade LRT alignment is located along the existing bicycle/pedestrian path, the path will be eliminated. The replacement of this path will be a major issue.

IV. ALTERNATIVES FROM MIDDLE STREET TO DOWNTOWN

There are four alternative alignments from Middle Street to Downtown: North King Street, Dillingham Boulevard, Vineyard Boulevard, and School Street.

A. NORTH KING STREET

North King Street corridor runs generally east-west between Middle Street and Nuuanu Avenue. The corridor runs through commercial and residential areas and the Central Business District. There are several distinct segments in terms of roadway cross-section.

1. North King Street from Middle Street to Kalihi Street

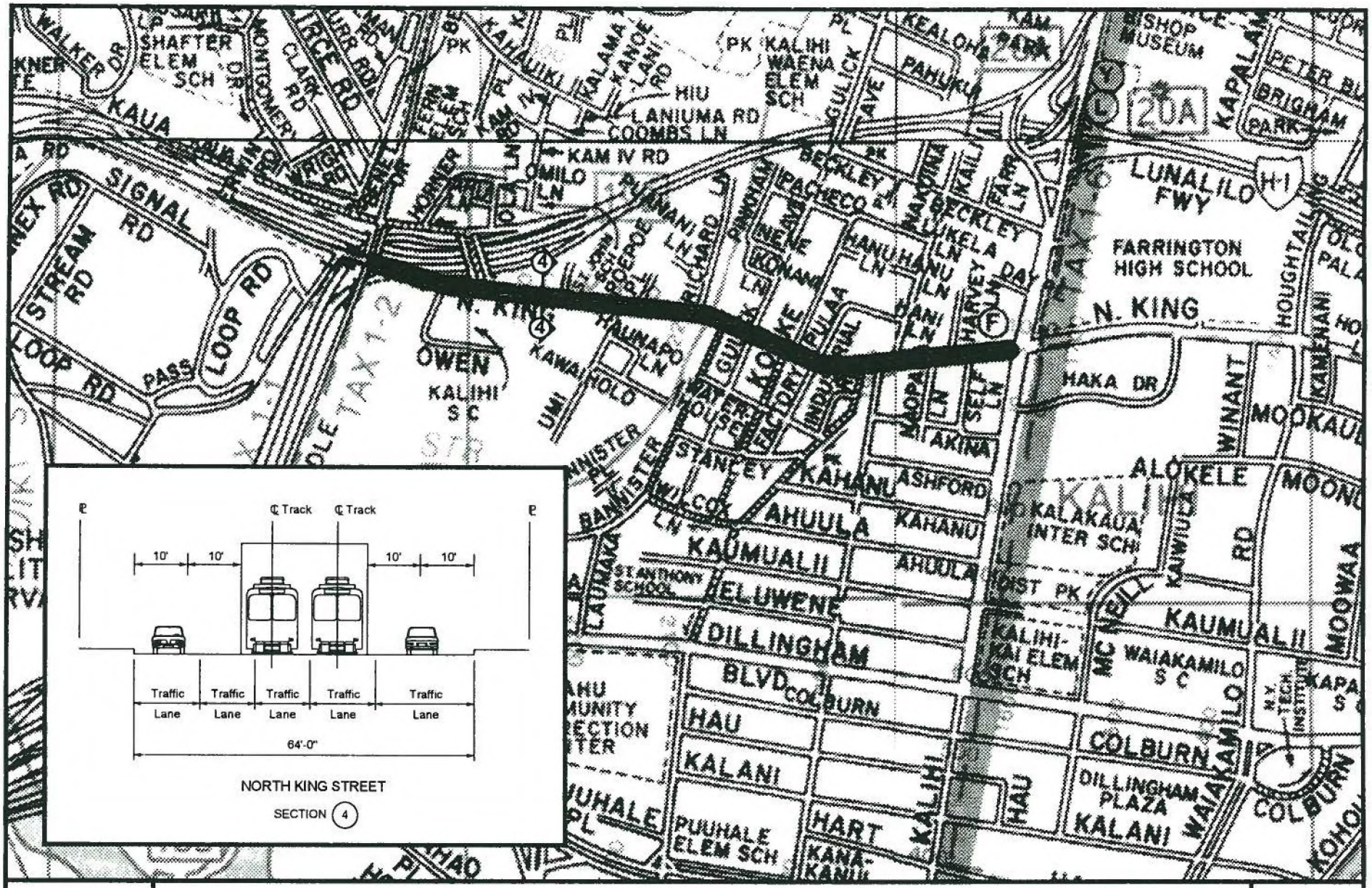
Figure 12 shows the North King Street corridor from Middle Street to Kalihi Street.

TABLE 23

PHYSICAL CHARACTERISTICS

NORTH KING STREET FROM MIDDLE STREET TO KALIHI STREET

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Minor arterial
One-way or Two-way	Two-way.
Number of Through Lanes in Each Direction	2 westbound, 3 eastbound
Existence of Median Turn Lanes	Yes (eastbound)
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Relatively straight
On-street parking	Yes –south side of the street
Right-of-way width	
Flowline-to-flowline width	48 ft. in front of Kalihi Shopping Center; 64 ft. from Kalihi Shopping Center to Kaili St.; 52 ft. from Kaili St. to Kalihi St.
Landscaping presence	N/A



PB 100 YEARS

NORTH KING STREET CORRIDOR
NORTH KING ST. FROM MIDDLE ST. TO KALIHI ST.

Figure **12**

AR00051512

TABLE 24

LRT IMPACTS

NORTH KING STREET FROM MIDDLE STREET TO KALIHI STREET

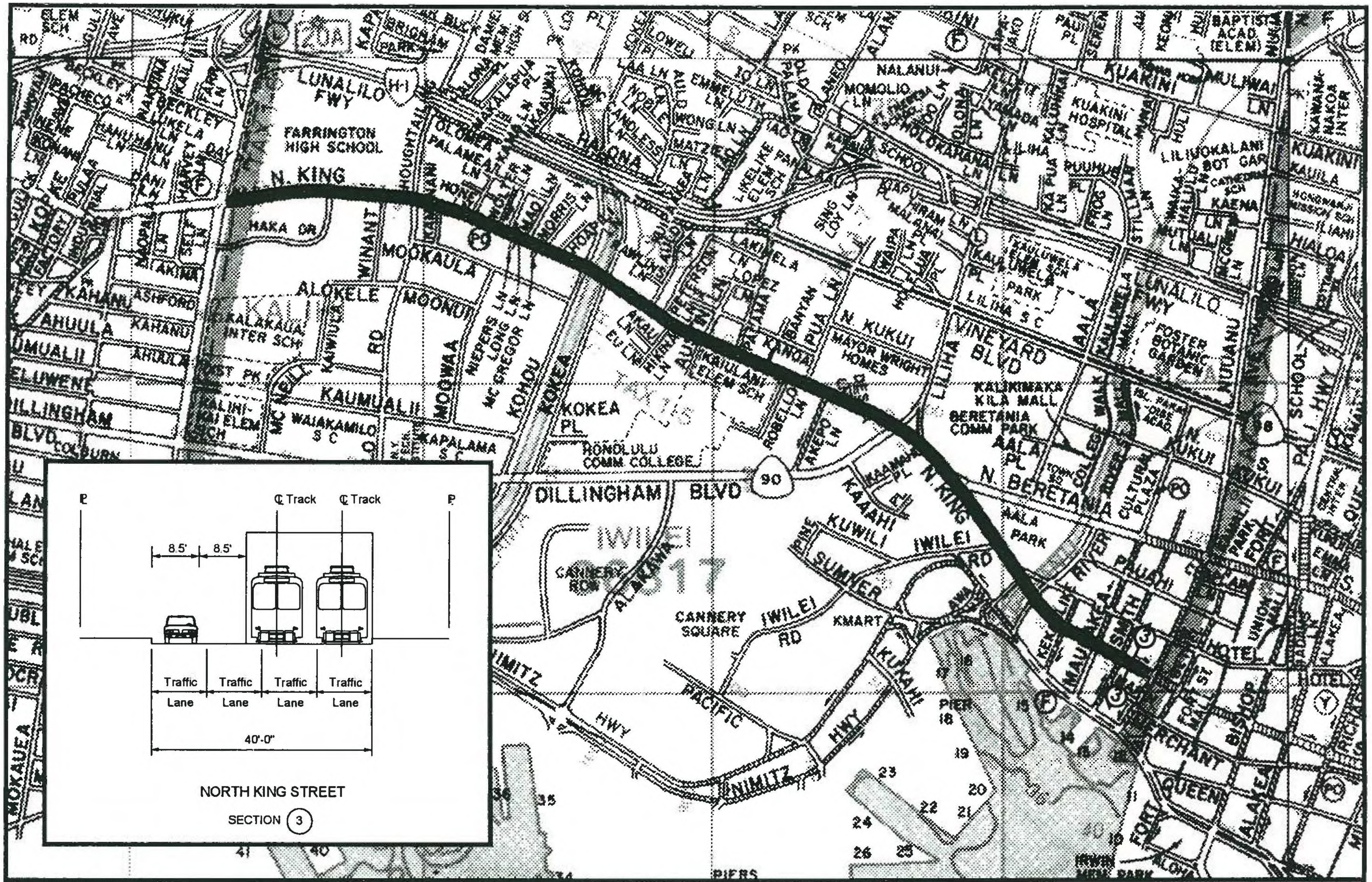
LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	2, leaving one through lane in each direction: Middle Street to Kalihi Union Church Kaili Street to Kalihi Street 0 leaving two 10-foot lanes in each direction: Kalihi Union Church to Kaili Street
Median turn lanes affected	Gulick Avenue, Kopke Street, Factory Street/Pulaa Lane, Kalihi Street
Parking impacts	LRT would eliminate on-street parking
Operational traffic impacts	Key intersections affected by loss of median left-turn lanes are Gulick Avenue, Kopke Street, Factory Street/Pulaa Lane, and Kalihi St. Also, Middle Street intersection will be a key impact area.
Structural impacts	Existing bridges would require strengthening
Clearance impacts	No apparent impact.
Turning radius impacts	No apparent impact.
Other impacts	

An at-grade LRT in the median would mostly leave four narrow through lanes (two in each direction) on North King Street between Middle Street and Kalihi Street. Within this segment, there are two bottlenecks where North King Street narrows: Middle Street to Kalihi Union Church and Kaili Street to Kalihi Street. These are located at the two ends of this segment of North King Street. These bottleneck segments will only allow two lanes (one in each direction) if an at-grade LRT corridor is implemented without any roadway widening. In all cases, on-street parking and median turn lanes would be lost. The loss of median turn lanes and through lanes will have impacts on traffic operations. Key intersections are Middle Street, Gulick Avenue, Kopke Street, Factory Street/Pulaa Lane, and Kalihi Street.

Existing bridges could require strengthening to accommodate the LRT.

2. North King Street from Kalihi Street to Nuuanu Avenue

Figure 13 shows the North King Street corridor from Kalihi Street to Nuuanu Avenue.



PB 100 YEARS

NORTH KING STREET CORRIDOR
NORTH KING ST. FROM KALIHI ST. TO NUUANU AVE.

Figure 13

TABLE 25

PHYSICAL CHARACTERISTICS

NORTH KING STREET FROM KALIHI STREET TO NUUANU AVENUE

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Principal arterial
One-way or Two-way	Two-way between Kalihi St. and Beretania St.; One-way eastbound between Beretania St. and Nuuanu Ave.
Number of Through Lanes in Each Direction	Two lanes in each direction and a turning lane between Kalihi St. to Liliha St. (3 westbound lanes, 2 eastbound lanes from Kalihi St. to Waiakamilo Rd.); Three traffic lanes in each direction between Liliha St. to Beretania St.; Four traffic lanes in the eastbound direction between Beretania St. and Nuuanu Ave. (north side of lane is used for loading/unloading)
Existence of Median Turn Lanes	Yes
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Relatively straight
On-street parking	Yes – during off-peak hours
Right-of-way width	
Flowline-to-flowline width	62 ft. from Kalihi St. to Waiakamilo Rd/Houghtailing St. to Dillingham Blvd.; 48-52 ft. from Kamenani to Mao 62 ft. from Mao Lane to Austin Lane 54 ft. from Austin Lane to Palama Street 62 ft. from Palama Street to Pua Lane 50 ft. from Pua Lane to Desha Lane 64 to 78 ft. from Desha Lane to Liliha 64 ft. from Beretania St. to Hotel St.; 54 ft. from Hotel St. to River St.; 40 ft. from River St. to Nuuanu Ave.
Landscaping presence	Trees along curb lanes

TABLE 26

LRT IMPACTS

NORTH KING STREET FROM KALIHI STREET TO NUUANU AVENUE

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	2, leaving one through lane in each direction Kamenani to Mao Lane Austin Lane to Palama Street Pua Lane to Desha Lane 0, leaving two narrow through lanes in each direction Kalihi Street to Kamenani Mao Lane to Austin Lane Palama Street to Pua Lane Desha Lane to Liliha Street 2, leaving two one-way through lanes Liliha to Nuuanu
Median turn lanes affected	Kalihi Street, Waiakamilo/Houghtailing, Kohou Street, Kokea Street
Parking impacts	LRT would eliminate on-street parking
Operational traffic impacts	Key intersections affected by loss of median turn lanes: Houghtailing/Waiakamilo, Kohou St., Kokea St., and Liliha St.
Structural impacts	Existing bridges would require strengthening
Clearance impacts	No apparent impact
Turning radius impacts	No apparent impact
Other impacts	

An at-grade LRT alignment through this segment of North King Street will mostly leave 4 narrow through lanes (2 in each direction). There are short segments where North King Street is narrower and an at-grade LRT alignment will result in 2 through lanes (1 in each direction). One of these, the Kamenani to Mao segment, is mostly wide enough to provide 4 through lanes, but is constrained by intermittent narrow spots.

The most severe impact is expected to be from the elimination of median left-turn lanes at Kalihi Street, Waiakamilo/Houghtailing, Kohou Street, and Kokea Street.

B. DILLINGHAM BOULEVARD

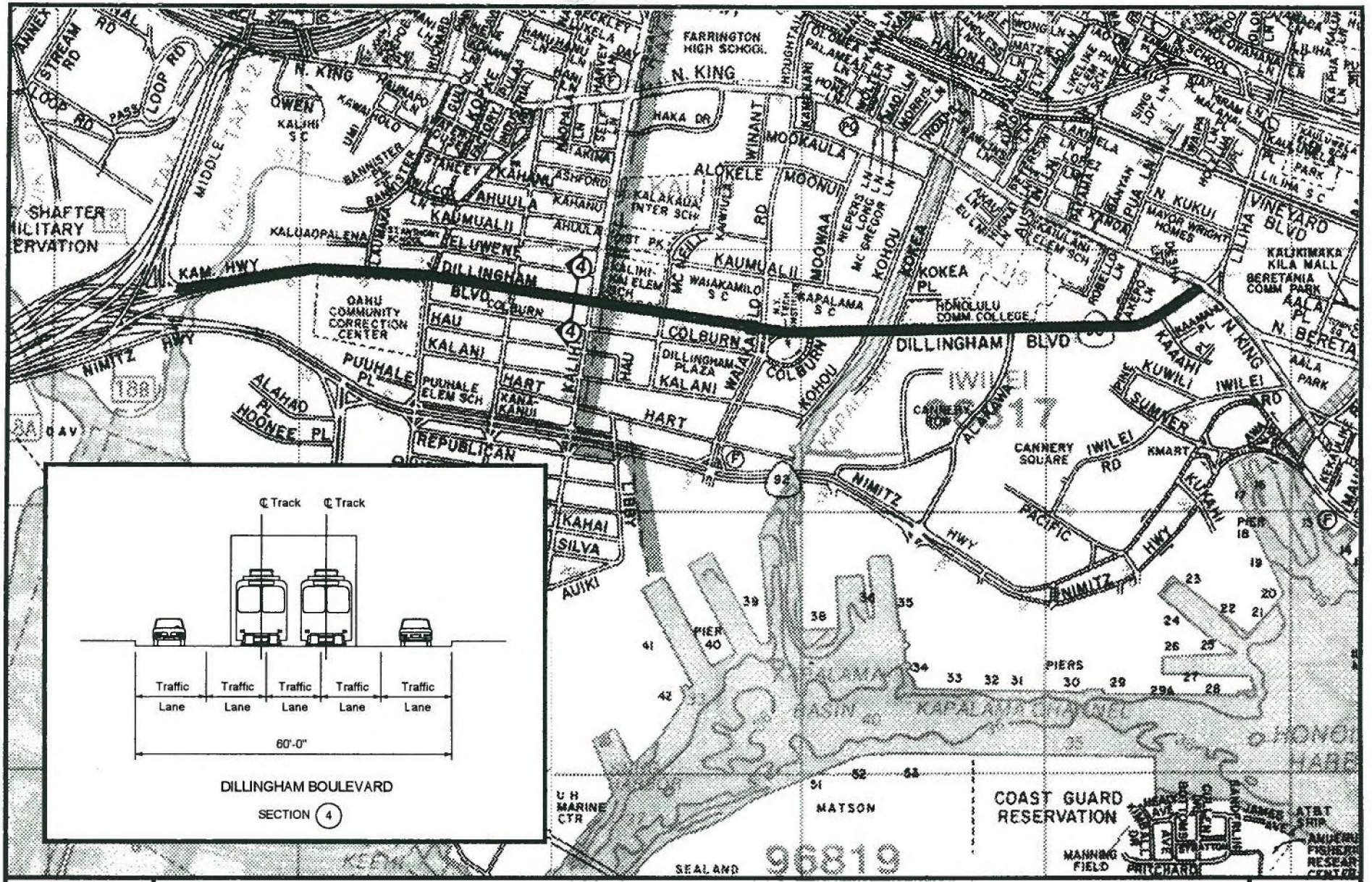
Dillingham Boulevard corridor runs east-west between Middle Street and Liliha Street as illustrated in Figure 14. The western end of Dillingham Boulevard is characterized by primarily industrial uses which transition to more commercial uses on its eastern end. Between Kokea Street and North King Street, Dillingham Boulevard is heavily landscaped with mature trees along its sidewalks.

TABLE 27

PHYSICAL CHARACTERISTICS

DILLINGHAM BOULEVARD

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Minor arterial
One-way or Two-way	Two-way.
Number of Through Lanes in Each Direction	2
Existence of Median Turn Lanes	Yes (1)
Edge Treatment	Improved with curb and gutter between Puuhale St. and Liliha St.
Sidewalks	Yes – between Puuhale St. and Liliha St.
Vertical alignment	Flat grades
Horizontal alignment	Horizontal alignment has slight curves
On-street parking	No
Right-of-way width	84 ft.
Flowline-to-flowline width	65 ft. between Laumaka St. and Puuhale Rd.; 60 ft. between Puuhale Rd. and Waiakamilo Rd.; 55 ft. between Waiakamilo Rd. and N. King St.
Landscaping presence	Mature trees on either side of the street between Waiakamilo Rd. and Liliha St.



DILLINGHAM BOULEVARD

Figure **14**

TABLE 28

LRT IMPACTS

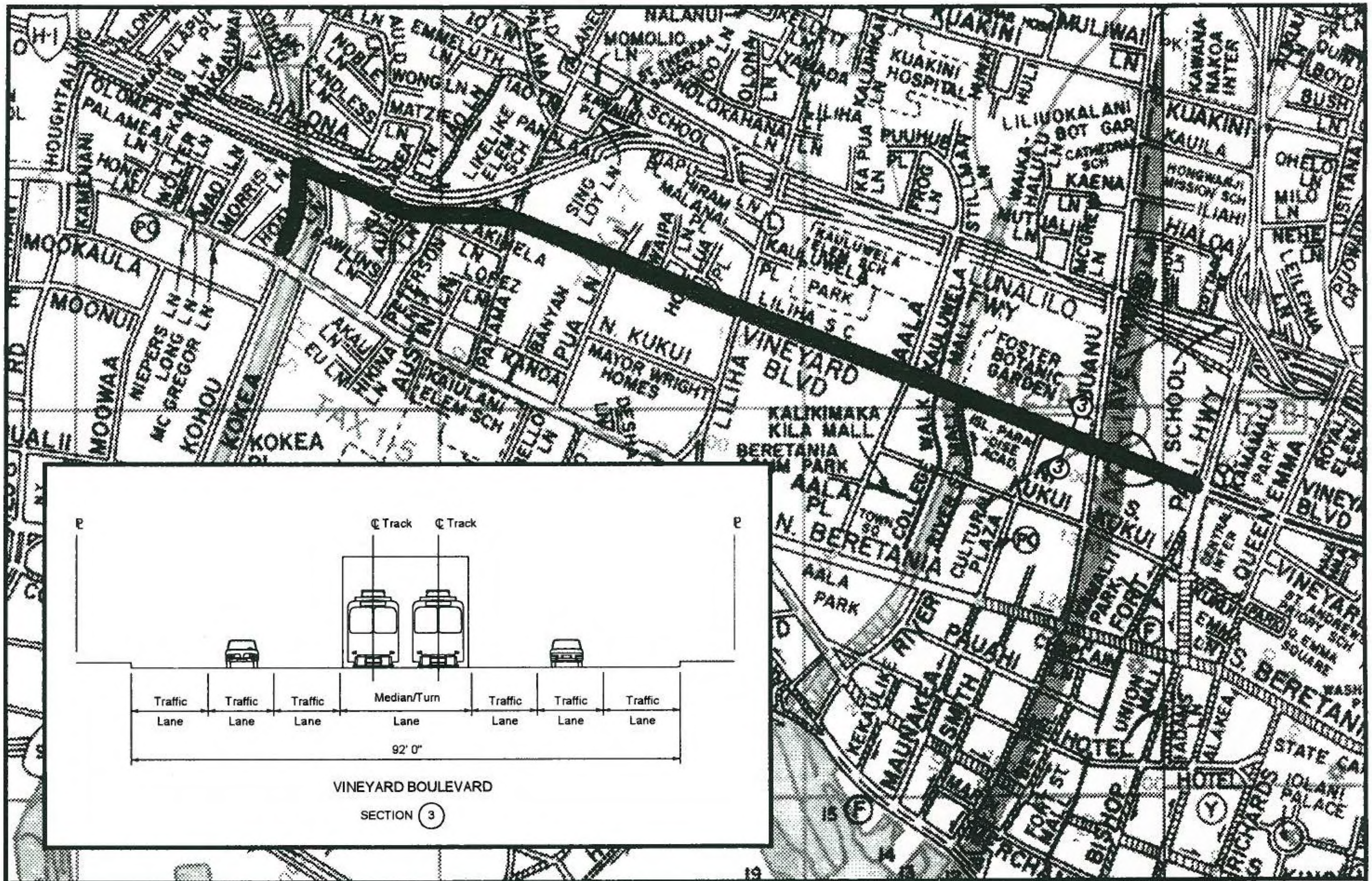
DILLINGHAM BOULEVARD

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	0, leaving two narrow through lanes in each direction-Middle Street to Waiakamilo Rd. 2, leaving one wide traffic lane in each direction
Median turn lanes affected	Yes – LRT would eliminate the turning lane in each direction
Parking impacts	N/A
Operational traffic impacts	Major traffic impact to the intersections of Middle St., Kalihi St., Waiakamilo Rd., Kohou Street, Kokea Street, and Liliha St./N. King St.
Structural impacts	Existing bridges would require strengthening
Clearance impacts	High voltage electrical transmission lines on the north side of the street
Turning radius impacts	No apparent impact.
Other impacts	

An at-grade LRT in the median would leave four narrow lanes on Dillingham Boulevard (two in each direction) from Middle Street to Waiakamilo Road. East of Waiakamilo Road, Dillingham Boulevard is narrower and locating an at-grade LRT alignment in this segment would result in only two through lanes (one in each direction) between Waiakamilo Road and North King Street. The loss of the median turning lanes would create severe operational impacts at major intersections. Key intersections are Middle Street, Kalihi Street, and Waiakamilo Road, Kohou Street, Kokea Street, and Liliha Street/North King Street.

C. VINEYARD BOULEVARD

Vineyard Boulevard corridor runs east-west between H-1 Freeway and Pali Highway on the fringes of the CBD, including the frontage road between Kohou Street and H-1 Freeway (see Figure 15). Generally, there are commercial and residential areas on both sides of the corridor.



PB 100 YEARS

VINEYARD BOULEVARD CORRIDOR

Figure 15

TABLE 29

PHYSICAL CHARACTERISTICS

VINEYARD BOULEVARD

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Principal arterial
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	3
Existence of Median Turn Lanes	Yes
Edge Treatment	Improved with curb and gutter, and raised median
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Straight
On-street parking	Yes- westbound on off-peak hours
Right-of-way width	
Flowline-to-flowline width	Approx. 92 ft.
Landscaping presence	Mature trees in median

TABLE 30

LRT IMPACTS

VINEYARD BOULEVARD

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	On one-way frontage road section, LRT would share space with vehicular traffic. On two-way road section, LRT would displace median. Through lanes will be narrowed slightly but all 6 lanes will remain.
Median turn lanes affected	Yes- LRT would eliminate median and turning lanes located in the median east of Palama St.
Parking impacts	Existing on-street parking might be eliminated.
Operational traffic impacts	Impact to eastbound traffic exiting H-1 onto Vineyard Blvd. Impacts at Liliha, Nuuanu, Pali Hwy. intersections due to loss of median left-turn lanes
Structural impacts	Existing bridges would require strengthening
Clearance impacts	No apparent impact
Turning radius impacts	Turning radius from Vineyard Blvd. To Pali Hwy. at about 120 ft.
Other impacts	Median landscaping would be eliminated

An at-grade LRT alignment would eliminate the median and the median turn lanes within Vineyard boulevard. The loss of the median turn lanes would have a negative impact on traffic operations at major intersections such as Liliha Street, Nuuanu Avenue, and Pali Highway.

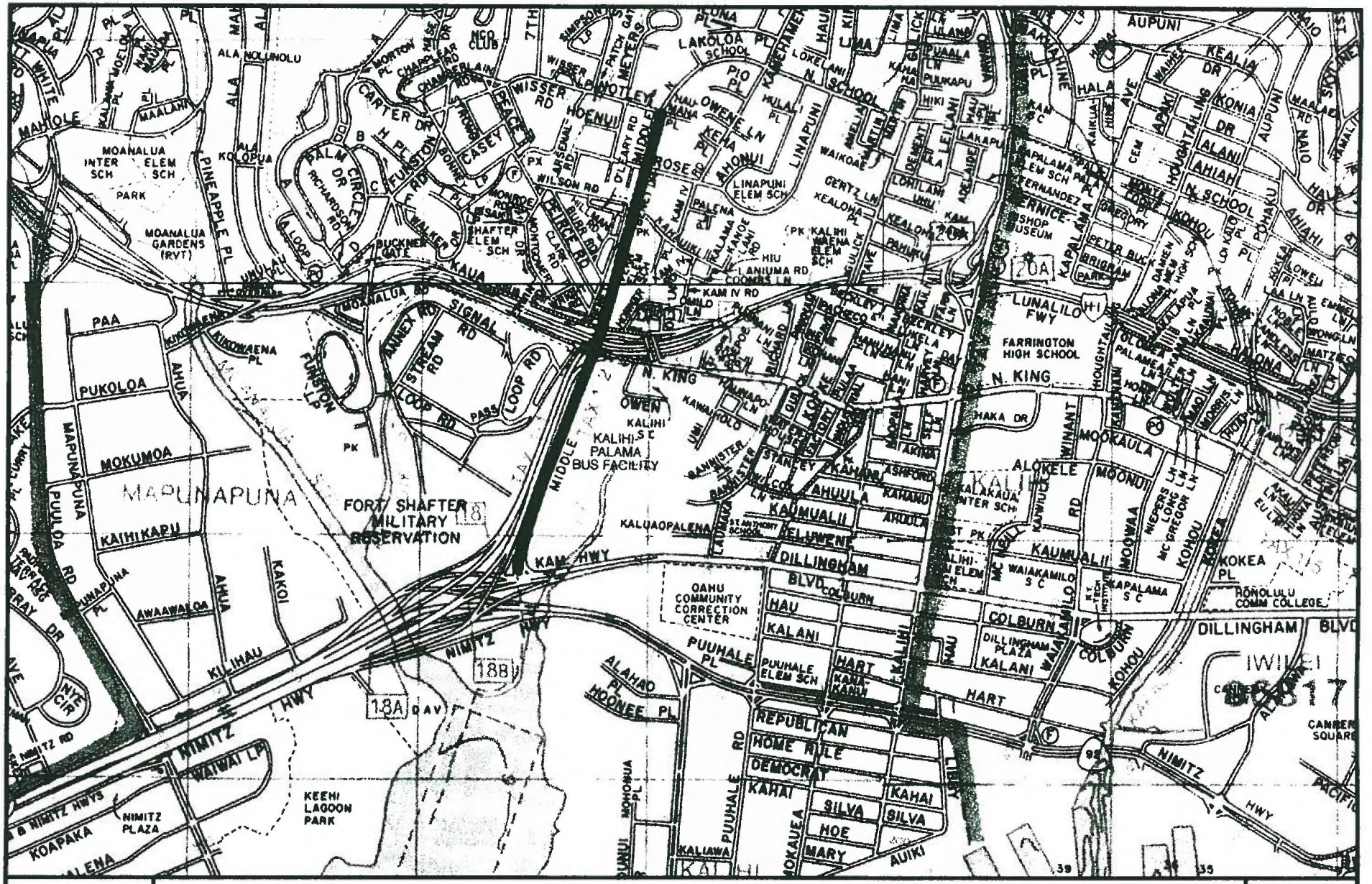
D. MIDDLE STREET CONNECTOR CORRIDOR

Middle Street Connector Corridor runs north-south between Dillingham Boulevard and School Street as shown in Figure 16. It would serve as a connector between the various potential LRT alignments.

The lower section (Dillingham Boulevard to North King Street) runs through mostly commercial/light industrial area, and passes by the Kalihi-Palama Bus Facility, providing potential opportunities to adapt that facility for use with the LRT.

The upper section passes by more residential uses and an LRT on this alignment could also provide service to the Fort Shafter Patch Gate.

Generally, the lower section of the Middle Street Connector Corridor should be able to accommodate an at-grade LRT alignment. The upper section would have significant impacts to traffic operations if the roadway is not widened. An at-grade LRT alignment would severely impact the Middle Street interchange if the bridge deck over H-1 Freeway is not widened to replace traffic lanes lost to the LRT alignment.



MIDDLE STREET CONNECTOR CORRIDOR

Figure **16**

TABLE 31

PHYSICAL CHARACTERISTICS

MIDDLE STREET CONNECTOR CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North-south
Functional Classification	Minor arterial
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	2 (between School St. and Dillingham Blvd.)
Existence of Median Turn Lanes	No between School and King, Yes between King and Dillingham.
Edge Treatment	Improved with curb and gutter
Sidewalks	Upper section (N. King St. to School St.) improved with sidewalks; Lower section (N. King St. to Dillingham Blvd.) improved with sidewalks on the east side of the street.
Vertical alignment	Grades in the range of about 3-4%
Horizontal alignment	Straight except in the vicinity of Kamehameha IV Road where Middle St. curves from north-south to east-west
On-street parking	On-street parking during off-peak hours on upper section.
Right-of-way width	60 ft.
Flowline-to-flowline width	40 ft. from School to King, 64 ft. from King to Dillingham
Landscaping presence	

TABLE 32

LRT IMPACTS

MIDDLE STREET CONNECTOR CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	LRT on the lower section would run on the shoulder area (west side) and the traffic lanes would be narrowed. LRT on the upper section would eliminate three lanes of traffic (leaving one wide 17 ft. lane or two very narrow 8.5 ft. lanes).
Median turn lanes affected	N/A
Parking impacts	On-street parking on the upper section will be eliminated.
Operational traffic impacts	Ramp terminal intersections at Middle Street interchange will be impacted due to loss of both through and turn lanes. Left-turn lane channelization at selected intersections along the upper section will impact traffic operations. Key intersections affected are Notley Road, Rose Street, and Kahauiki Street.
Structural impacts	Existing bridge over H-1 Freeway would require strengthening
Clearance impacts	No apparent constraints
Turning radius impacts	Turning radius from N. King St. onto Middle St. about 60 ft.
Other impacts	

E. SCHOOL STREET

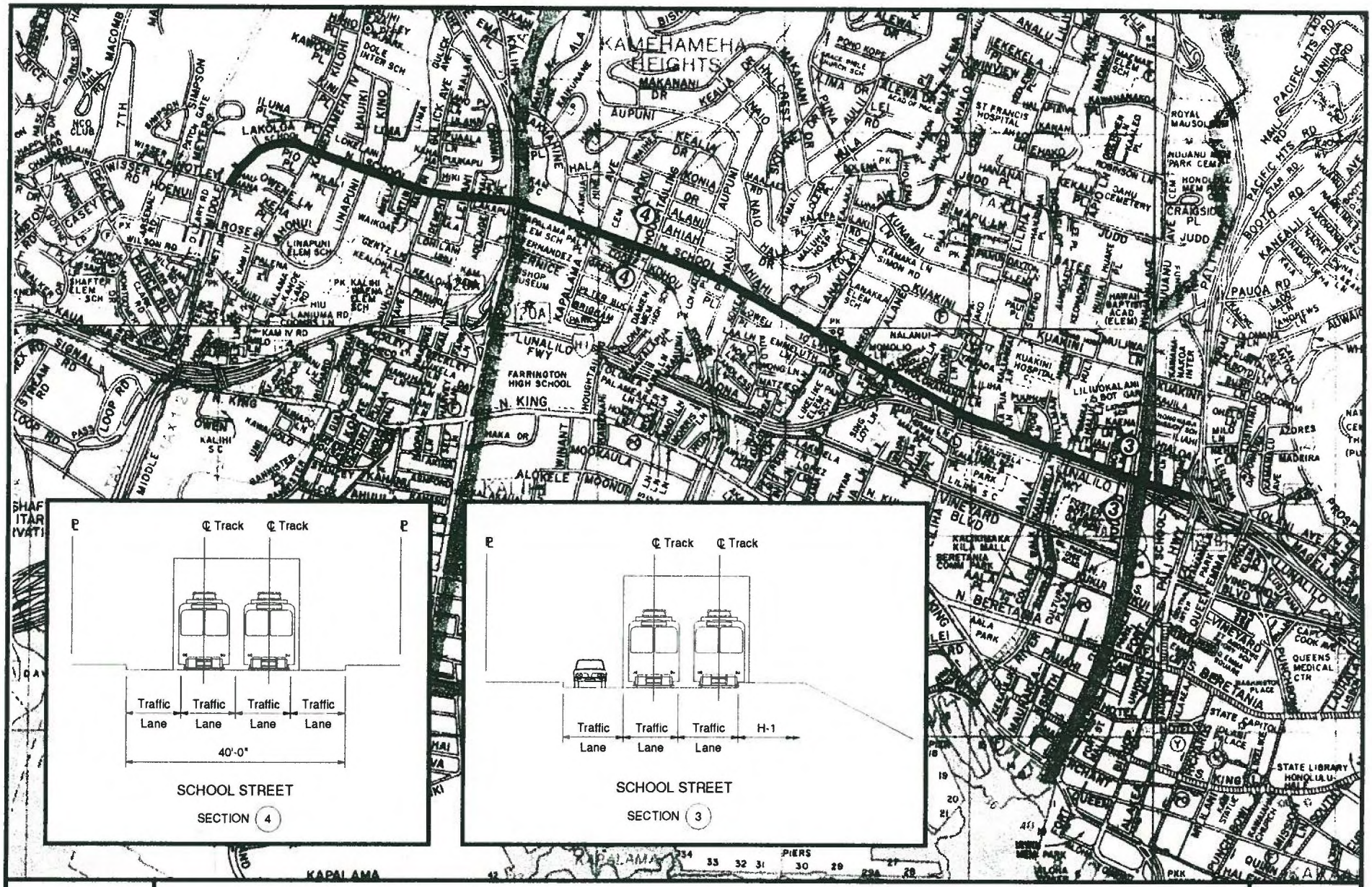
The School Street corridor runs east-west generally through residential areas between Middle Street and Pali Highway (see Figure 17).

TABLE 33

PHYSICAL CHARACTERISTICS

SCHOOL STREET CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Minor arterial
One-way or Two-way	Two-way traffic between Middle St. and Liliha St.; One-way traffic westbound between Nuuanu Ave. and Liliha St.; Two-way traffic between Pali Hwy and Nuuanu Ave.
Number of Through Lanes in Each Direction	Two lanes in each direction between Middle St. and Liliha St.; Two lanes in the westbound direction between Pali Hwy. and Liliha St. One lane in each direction between Pali Hwy and Nuuanu Ave.
Existence of Median Turn Lanes	No
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Straight
On-street parking	On-street parking on north side of road east of Liliha; no street parking west of Liliha to Kanakila Ave.; on-street parking between Lanakila Ave. and Houghtailing; numerous residential driveway accesses
Right-of-way width	
Flowline-to-flowline width	40 ft.
Landscaping presence	



PB 100 YEARS

SCHOOL STREET CORRIDOR

Figure **17**

TABLE 34

LRT IMPACTS

SCHOOL STREET CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	LRT would eliminate one through lane in each direction leaving either one wide 17 ft traffic lane or two very narrow 8.5 ft. lanes; LRT would only leave one lane between Pali Highway and Liliha Street
Median turn lanes affected	N/A
Parking impacts	LRT would eliminate on-street parking
Operational traffic impacts	Major traffic impact to intersections of Kamehameha IV Road, Likelike Highway, Lanakila Ave., Houghtailing Street, Makuahine St. due to loss of median turn lanes and through lanes. Interference with exit and entrance ramps to the H-1 Freeway between Nuuanu and Liliha.
Structural impacts	Existing bridges would require strengthening
Clearance impacts	High voltage electrical transmission lines on the north side of the street in vicinity of Liliha Street.
Turning radius impacts	Turning radius at Pali Hwy of about 60 ft.
Other impacts	

The impacts to traffic operations of an at-grade LRT alignment on School Street could be severe if no widening is done. The loss of median left-turn lanes and potential loss of through lanes on School Street will impact operations from Middle Street to Liliha Street. Especially impacted will be the intersection of Likelike Highway and School Street. There are other intersections that do not have exclusive left-turn lanes, but the inside through/left lanes act as de facto left-turn lanes. By eliminating one through lane in each direction, this opportunity is lost and significant impacts are expected at these intersections. The more significant of these are located at Kamehameha IV Road, Houghtailing Street, and Lanakila Avenue.

East of Liliha Street, an at-grade LRT alignment would probably leave one lane in the westbound direction and remove all on-street parking. The two-way segment of School Street between Pali Highway and Nuuanu Avenue would probably need to be converted to one-way westbound operation. The merge and diverge areas for the off and on-ramps

from and to H-1 Freeway will be significantly impacted, creating potentially hazardous conditions, especially at the off-ramp merge.

Physically, the turn from School Street to Pali Highway would be very tight for an at-grade LRT.

F. PALI HIGHWAY/BISHOP STREET CONNECTOR CORRIDOR

Pali Highway/Bishop Street corridor runs north-south between School Street and South King Street and would serve to connect the School Street and Vineyard Boulevard corridors into the Central Business District (CBD).

1. Pali Highway from H-1 Freeway to Vineyard Boulevard

Figure 18 illustrates the Pali Highway/Bishop Street corridor from the H-1 Freeway to Vineyard Boulevard.

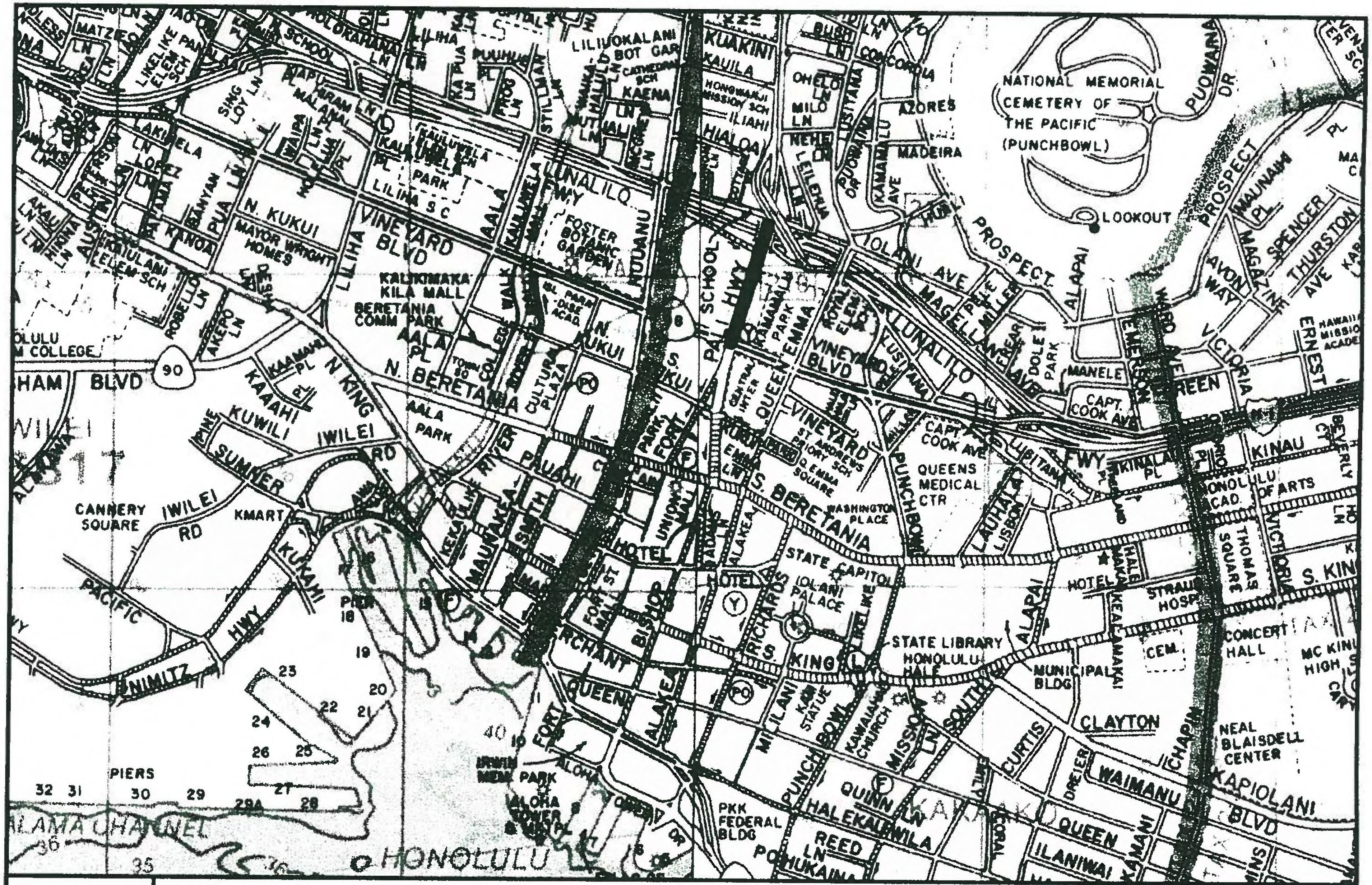
TABLE 35

PHYSICAL CHARACTERISTICS

PALI HIGHWAY CONNECTOR CORRIDOR

H-1 FREEWAY TO VINEYARD BOULEVARD

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North-south
Functional Classification	Expressway
One-way or Two-way	Two-way traffic between School St. and Vineyard Blvd.
Number of Through Lanes in Each Direction	Varies: Two lanes in each direction at the bridge section over the H-1 Freeway Three traffic lanes in each direction between H-1 and Vineyard Blvd.
Existence of Median Turn Lanes	Yes (wide medians)
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat
Horizontal alignment	Straight
On-street parking	No
Right-of-way width	
Flowline-to-flowline width	Approx. 72 ft. from School St. to Pali Off-ramp Approx. 96 ft. from Pali Off-ramp to Vineyard Blvd.
Landscaping presence	In median between School St. and Beretania St.



PALI HIGHWAY/BISHOP STREET CONNECTOR CORRIDOR
PALI HWY./BISHOP FROM H-1 FREEWAY TO VINEYARD BLVD.

Figure
18

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TABLE 36

LRT IMPACTS

PALI HIGHWAY CONNECTOR CORRIDOR

H-1 FREEWAY TO VINEYARD BOULEVARD

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	None at bridge, but reduce width of lanes to 10 ft.; None between H-1 Freeway and Vineyard Blvd.
Median turn lanes affected	Medians would be eliminated at H-1 Freeway bridge and from H-1 to Vineyard Blvd.
Parking impacts	N/A
Operational traffic impacts	Major traffic impact to the intersection of Vineyard Blvd. due to loss of median left-turn lanes.
Structural impacts	Existing bridge over H-1 Freeway would require strengthening
Clearance impacts	No apparent constraints
Turning radius impacts	Turn from School Street appears tight
Other impacts	Removal of landscaping for median

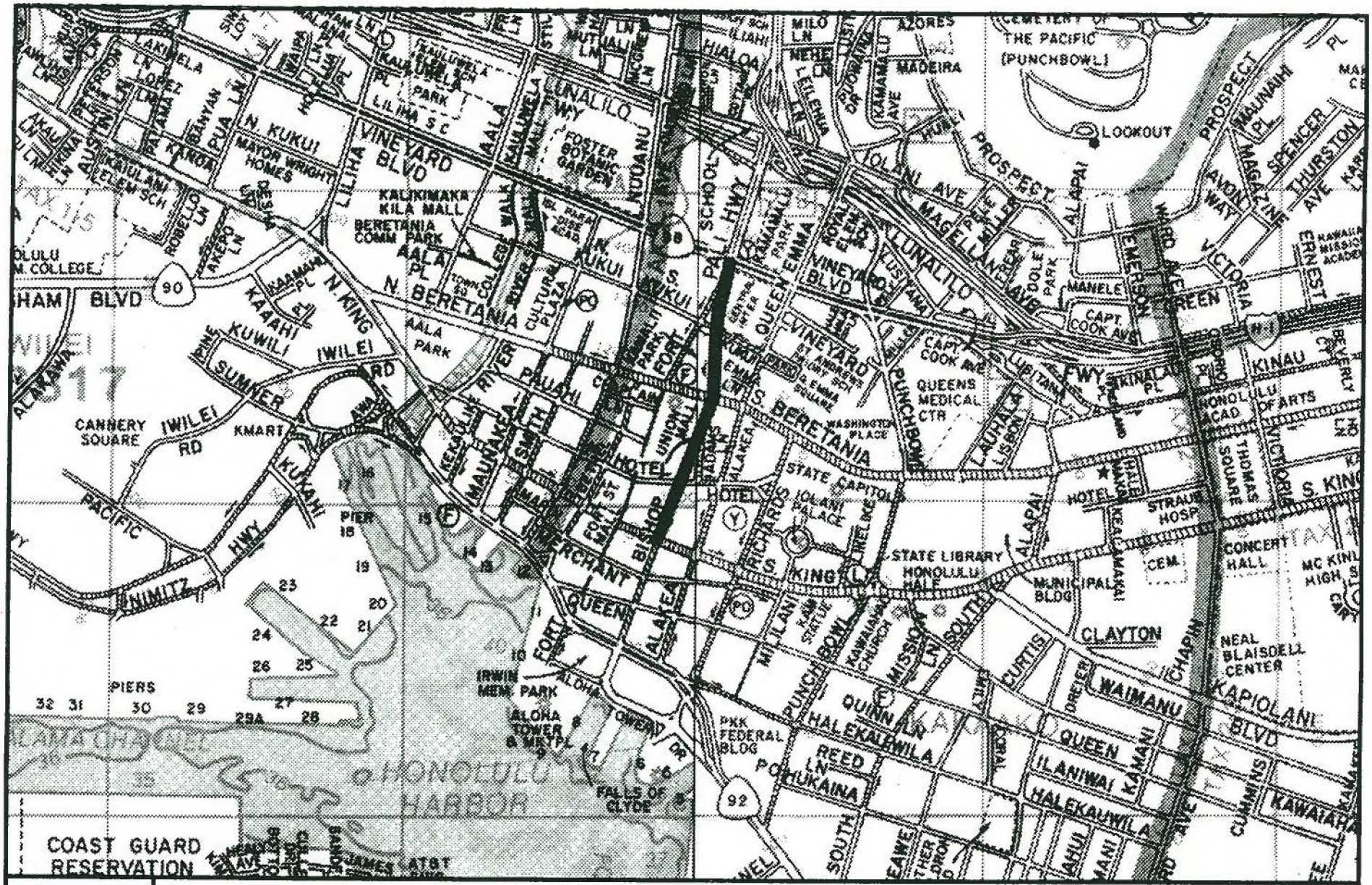
This segment of the Pali Highway Connector corridor is a major arterial route into Downtown from the Nuuanu Valley and Windward Oahu areas. Although an at-grade LRT alignment would not require a reduction in the number of through lanes, the loss of the median left-turn lanes could have a severe traffic impact on through as well as left-turn traffic at Vineyard Boulevard. Because of the relatively short distances between Vineyard Boulevard and the Pali Off-ramp and School Street, traffic operational problems at Vineyard Boulevard would probably be transmitted throughout this corridor.

Pali Highway is conveyed over H-1 Freeway by two separate bridges, leaving a gap where the median would otherwise be. An at-grade LRT alignment in the median would require that the two separate bridges be joined by a new bridge deck.

The current landscaped median between the Pali Off-ramp and Vineyard Boulevard would be displaced by the at-grade LRT alignment.

2. Pali Highway/Bishop Street from Vineyard Boulevard to King Street

Figure 19 shows the Pali Highway/Bishop Street corridor from Vineyard Boulevard to King Street.



PB 100 YEARS

PALI HIGHWAY/BISHOP STREET CONNECTOR CORRIDOR
PALI HWY./BISHOP FROM VINEYARD BLVD. TO S. KING ST.

Figure **19**

TABLE 37

PHYSICAL CHARACTERISTICS

PALI HIGHWAY/BISHOP STREET CONNECTOR CORRIDOR

VINEYARD BOULEVARD TO KING STREET

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North-south
Functional Classification	Principal arterial from Nimitz Hwy. To Vineyard Blvd.
One-way or Two-way	Two-way traffic between Vineyard Blvd. and Kukui Street One-way traffic between Kukui Street and S. King Street
Number of Through Lanes in Each Direction	Varies: Three traffic lanes in each direction between Vineyard Blvd. and Kukui St. Four lanes with a median (one-way) from Kukui St. to Beretania St. Five traffic lanes (one-way) between Beretania St. and South King St.
Existence of Median Turn Lanes	Yes at Vineyard Boulevard
Edge Treatment	Improved with curb and gutter
Sidewalks	Both sides
Vertical alignment	Flat
Horizontal alignment	Straight
On-street parking	No parking from Vineyard to Beretania Both sides from Beretania to Hotel except during peak periods No parking from Beretania to S. King
Right-of-way width	
Flowline-to-flowline width	
Landscaping presence	Along curb lanes

An at-grade LRT alignment down the median would disrupt the Vineyard Boulevard intersection due to the loss of median left-turn lanes.

TABLE 38

LRT IMPACTS

PALI HIGHWAY/BISHOP STREET CONNECTOR CORRIDOR

VINEYARD BOULEVARD TO KING STREET

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	One traffic lane at the approaches to Beretania St. leaving three through lanes. Two traffic lanes between Beretania St. and S. King St. leaving three through lanes.
Median turn lanes affected	Medians would be eliminated for Vineyard to Beretania
Parking impacts	On-Street parking removed between Beretania and Hotel.
Operational traffic impacts	Traffic impacts to the intersection of Vineyard Blvd. due to loss of median left-turn lane. Potential traffic impacts at Beretania, Hotel, and S. King due to loss of through traffic lanes.
Structural impacts	No apparent impacts
Clearance impacts	No apparent impacts
Turning radius impacts	Turning radius of about 60 ft. from Bishop St. onto S. King St.
Other impacts	Median landscaping eliminated from Vineyard to Beretania

Between Vineyard Boulevard and Kukui Street, it may be advisable to shift the at-grade LRT alignment from the median to the west side of Pali Highway /Bishop Street. That would enable the remaining three through lanes between Kukui and S. King Street to be consolidated. An alignment down the west side of Pali Highway/Bishop Street also allows an easier turn onto S. King Street in to the east.

G. SUMMARY

An at-grade LRT alignment within either the Dillingham Boulevard or School Street corridor would result in roadway corridors with only one lane in each direction if the roadways are not widened. Most of the segments offer little opportunity for widening.

The North King Street and the Vineyard Boulevard corridors could accommodate and still maintain existing roadway laneage. North King Street would need spot widening to accomplish this.

All corridors would experience operational impacts at intersections due to the loss of median turn lanes. Intersection operational issues are anticipated to be the worst at intersections involving Kalihi Street/Likelike Street, Waiakamilo Road/Houghtailing Street, Liliha Street, Nuuanu Avenue, and Pali Highway.

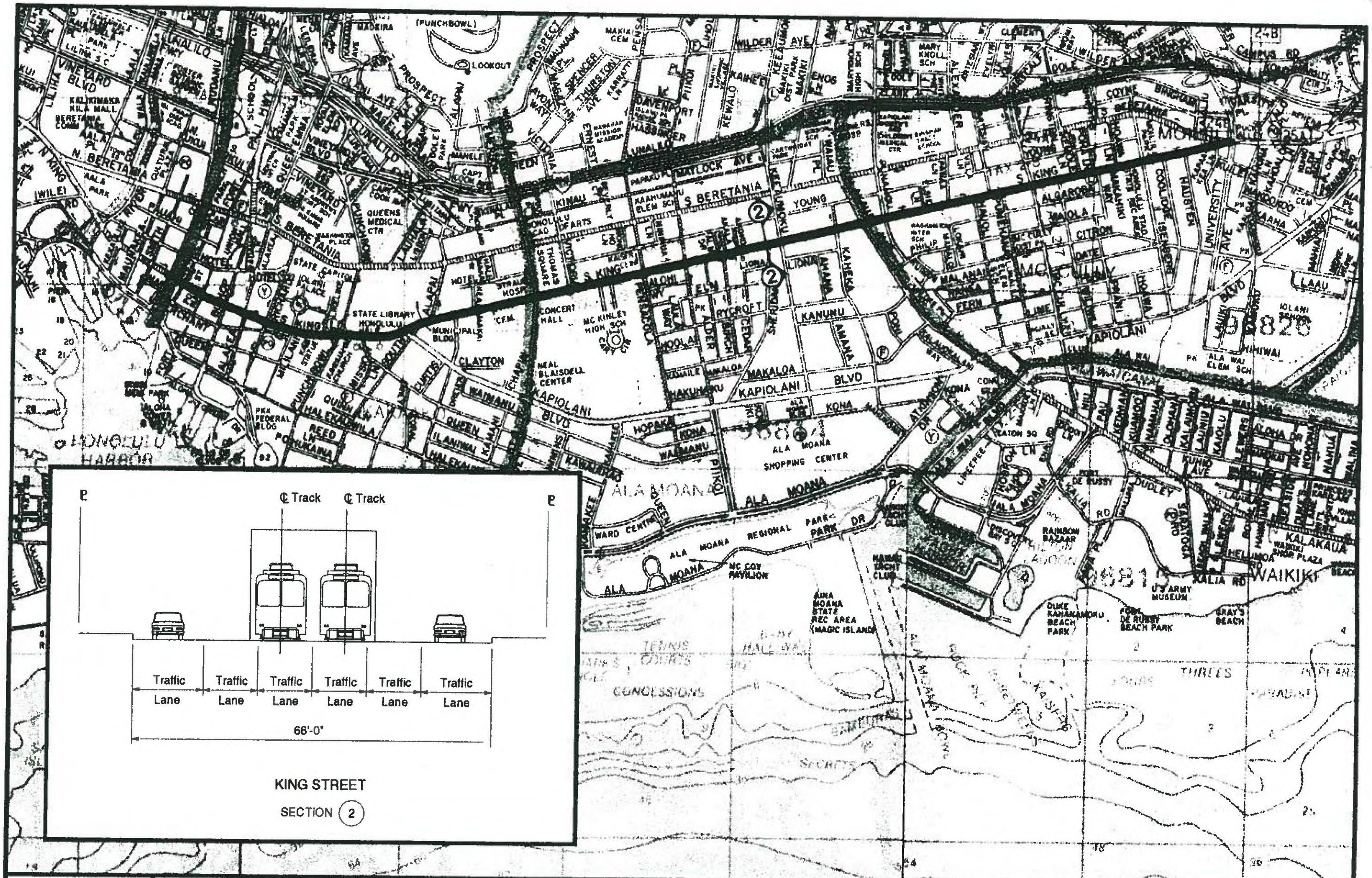
V. ALTERNATIVES FROM DOWNTOWN TO UNIVERSITY OF HAWAII

There were four alternative alignments evaluated for the segment from Downtown to the University of Hawaii at Manoa: South King Street, Hotel Street, South Beretania Street, and Kapiolani Boulevard. Two connector segments of Richards Street and University Avenue and access segments of Varsity Place and Kalo Place were also evaluated.

A. SOUTH KING STREET CORRIDOR

The South King Street corridor runs east-west between Nuuanu Avenue and University Avenue (see Figure 20). The corridor runs through Downtown, the Civic Center, and along the King Street commercial corridor.

Most of the impacts to South King Street will be the reduction of through lane capacity. This evaluation did not include a quantitative analysis of through lane capacity, but the reduction will probably have negative implications for traffic flow on South King Street.



PB 100 YEARS

SOUTH KING STREET CORRIDOR

Figure 20

TABLE 39
PHYSICAL CHARACTERISTICS
SOUTH KING STREET CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Principal arterial
One-way or Two-way	One-way
Number of Through Lanes in Each Direction	Four traffic lanes between Nuuanu Ave. to Fort Street Mall; Five traffic lanes from Fort Street Mall to Punchbowl St.; Six traffic lanes from Punchbowl St. to Kapiolani Blvd. (1 eastbound lane used for off-peak parking); Five traffic lanes between Kapiolani Blvd. to Alapai St.; Six traffic lanes between Alapai St. to Isenburg St.; Five traffic lanes from Isenburg St. to University Ave.
Existence of Median Turn Lanes	Not Applicable
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Relatively straight
On-street parking	Yes – during off-peak hours
Right-of-way width	
Flowline-to-flowline width	4- Lanes: 44 ft. 5- Lanes: 55 ft. 6- Lanes: 66 ft.
Landscaping presence	Mature trees both sides of the street

TABLE 40

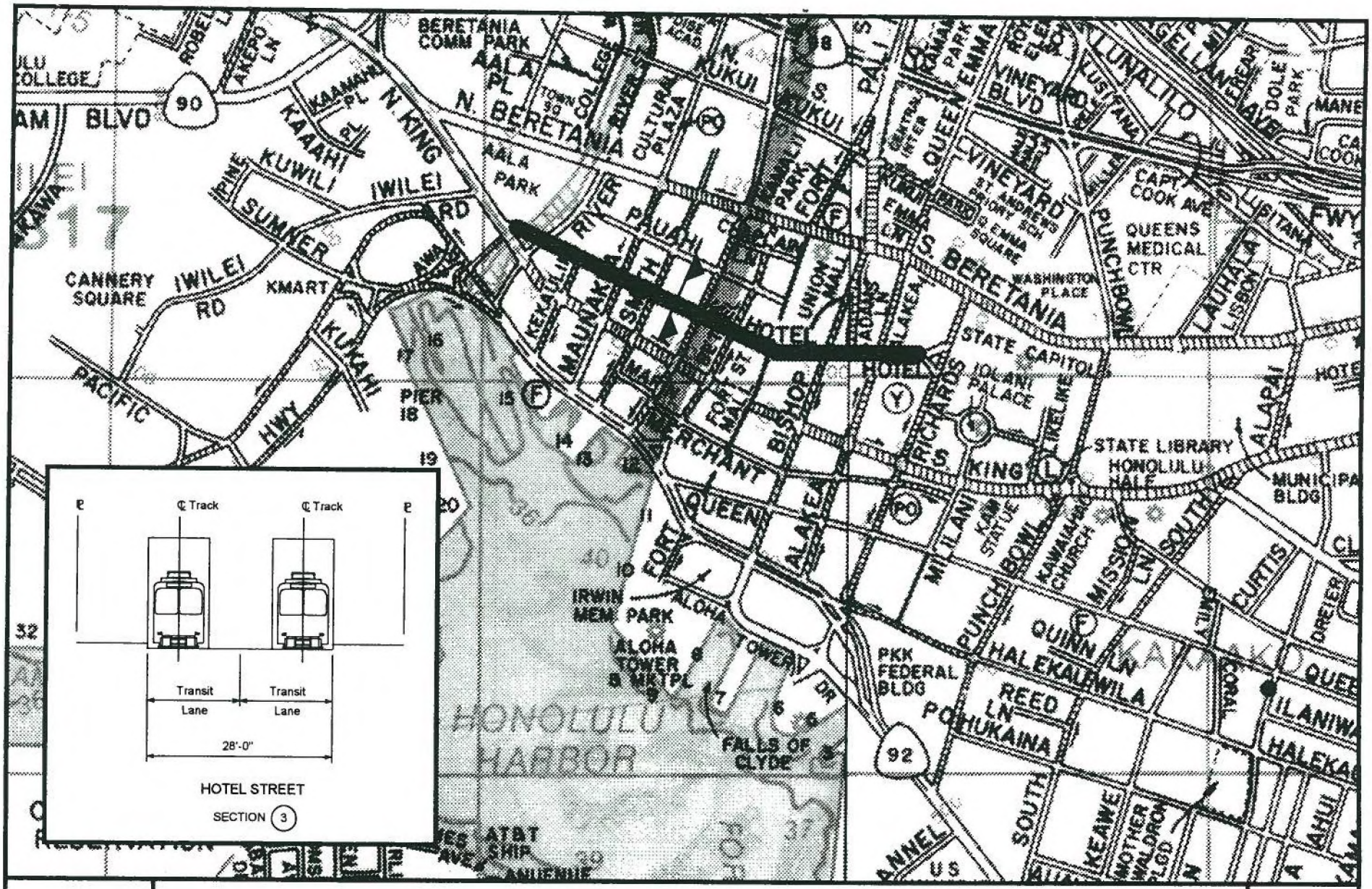
LRT IMPACTS

SOUTH KING STREET CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	LRT would eliminate two through traffic lanes between Fort Street Mall and Alapai St. (leaving three lanes in the eastbound direction). LRT would eliminate two traffic lanes between Alapai St. and Isenburg St. (leaving four traffic lanes in the eastbound direction). LRT would eliminate two traffic lanes between Isenburg St. and University Ave. (leaving three traffic lanes in the eastbound direction).
Median turn lanes affected	At University Ave./S. King Street intersection
Parking impacts	On-street parking would be eliminated on one side of the street
Operational traffic impacts	Major traffic impact at 5 leg intersection of University Ave., King St. and Beretania St.
Structural impacts	Existing bridges and box culverts would require strengthening
Clearance impacts	
Turning radius impacts	Turning radius from King St. onto University Ave. is about 60 ft; turning radius from King St. on Kalo Place is about 120 ft.
Other impacts	

B. HOTEL STREET CORRIDOR

As shown in Figure 21, Hotel Street corridor runs east-west between North King Street and Richards Street through Downtown. Hotel Street is currently used as a transit corridor by City buses.



PB 100 YEARS

HOTEL STREET CORRIDOR

Figure **21**

TABLE 41

PHYSICAL CHARACTERISTICS

HOTEL STREET CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Major collector/ Transit Mall
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	1 (wide lanes)
Existence of Median Turn Lanes	No
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Straight
On-street parking	No
Right-of-way width	
Flowline-to-flowline width	28 ft. from North King St. to Richards St.
Landscaping presence	

TABLE 42

LRT IMPACTS

HOTEL STREET CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	None, this is a transit corridor
Median turn lanes affected	N/A
Parking impacts	N/A
Operational traffic impacts	Coordination with buses, need to share corridor with traffic from Alakea Street to Richards Street
Structural impacts	Bridge over Nuuanu Stream may need strengthening
Clearance impacts	No apparent impact
Turning radius impacts	Turning radius at Hotel St. and Richards St. is about 60 feet
Other impacts	

Hotel Street is already a transit corridor and would be a compatible corridor for an at-grade LRT alignment.

C. RICHARDS STREET CONNECTOR CORRIDOR

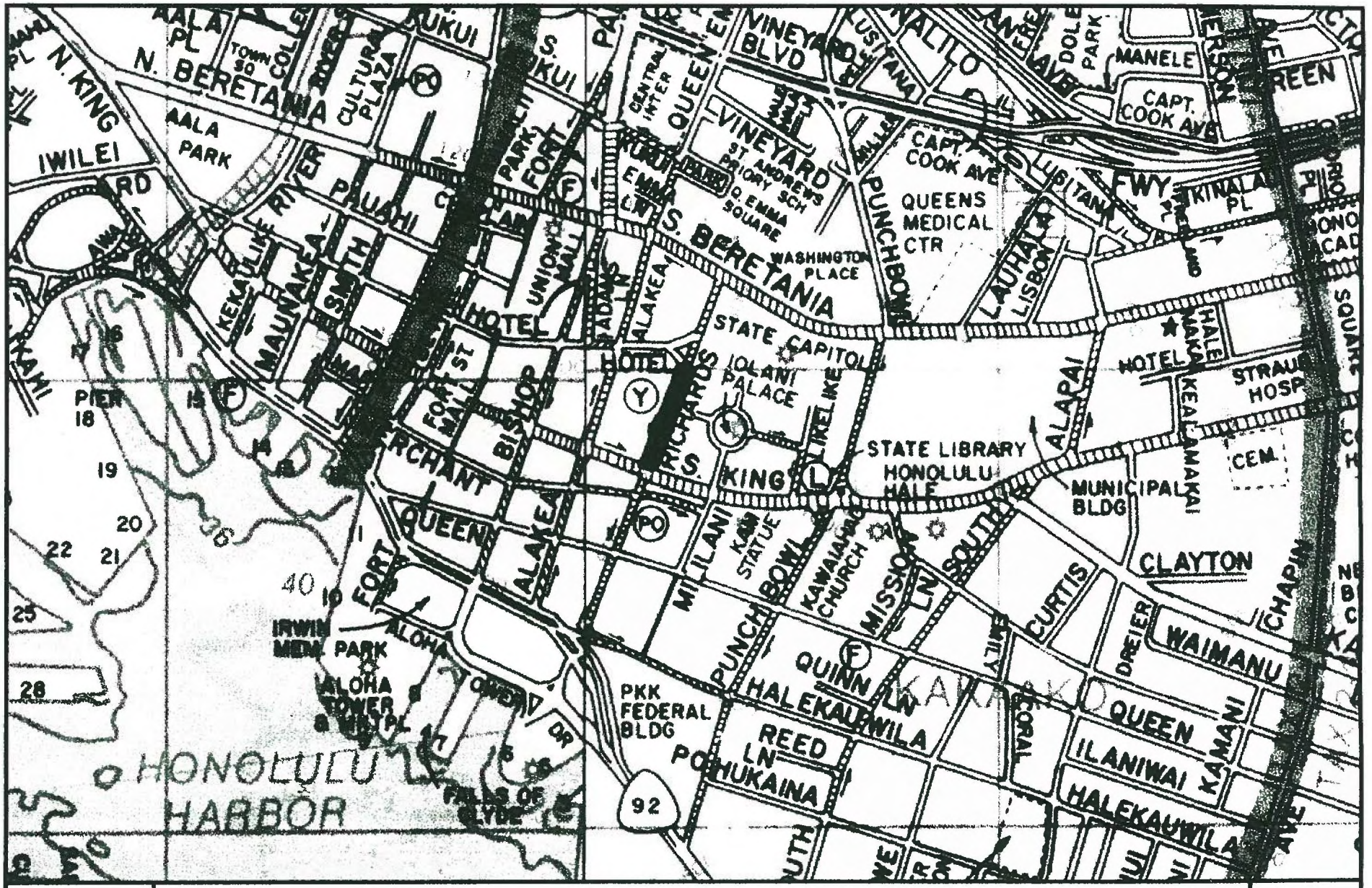
Richards Street corridor runs north-south between Hotel Street and South King Street t and would serve to connect the Hotel Street alignment to the South King Street corridor. Figure 22 illustrates this corridor location.

TABLE 43

PHYSICAL CHARACTERISTICS

RICHARDS STREET CONNECTOR CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North-south
Functional Classification	Major collector (King St. to Beretania St.)
One-way or Two-way	One-way
Number of Through Lanes in Each Direction	2
Existence of Median Turn Lanes	No
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Straight
On-street parking	Yes – on both sides of the street between Hotel St. and King St.
Right-of-way width	
Flowline-to-flowline width	39 ft. from Hotel St. to King St.
Landscaping presence	



PB 100 YEARS

RICHARDS STREET CONNECTOR CORRIDOR

Figure **22**

TABLE 44

LRT IMPACTS

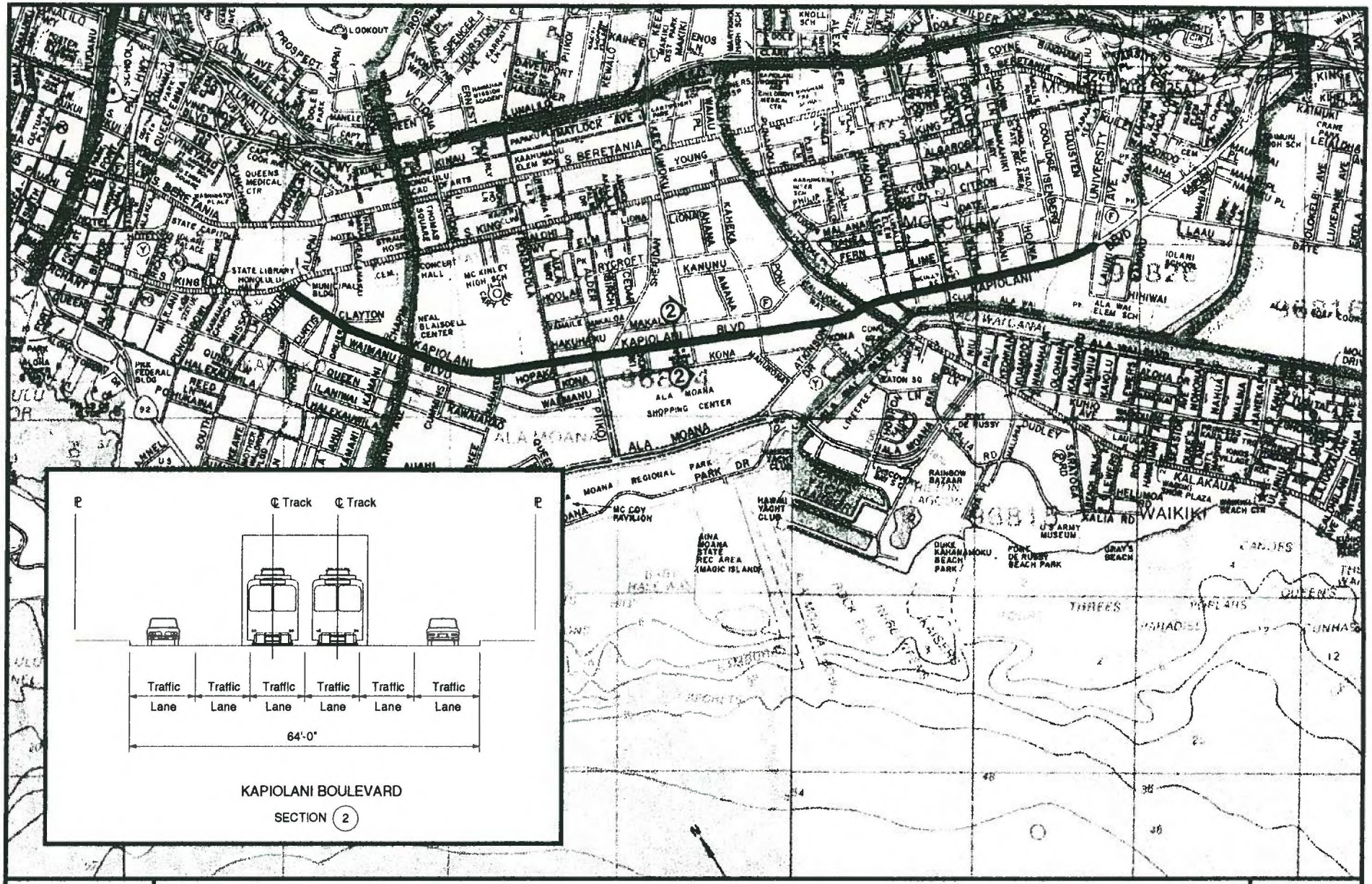
RICHARDS STREET CONNECTOR CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	0 lanes, leaving two through lanes.
Median turn lanes affected	N/A
Parking impacts	LRT would eliminate on-street parking between Hotel St. and S. King St.
Operational traffic impacts	Reduction in traffic lanes could impact Richards Street operations
Structural impacts	No apparent impacts
Clearance impacts	No apparent impacts
Turning radius impacts	Tight turns between Hotel and Richards and between Richards and S. King
Other impacts	

Richards Street would serve to connect a Hotel Street corridor with a South King Street corridor. If on-street parking is removed, it appears that two narrow traffic lanes can be maintained in this segment.

D. KAPIOLANI BOULEVARD CORRIDOR

Kapiolani Boulevard corridor runs east-west between South King Street and University Avenue (see Figure 23). In general, there are commercial areas on both sides of the corridor. The segment between McCully Street and South Street is coned for contra-flow operation during the AM and PM peak hours. A median exists between University Avenue and Kalakaua Avenue, and it is landscaped between University Avenue and McCully Street.



KAPIOLANI BOULEVARD CORRIDOR

Figure **23**

TABLE 45

PHYSICAL CHARACTERISTICS

KAPIOLANI BOULEVARD CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Principal arterial
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	3; coned for contraflow during peak hours
Existence of Median Turn Lanes	Between McCully St. and University Ave. Westbound inside lane becomes dedicated left-turn lane at Atkinson Drive Westbound inside lane becomes dedicated left-turn lane at Ward Ave.
Edge Treatment	Improved with curb, gutter, and raised median between McCully St. and University Ave.
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Relatively straight, reverse curve between Atkinson Blvd. And McCully St.
On-street parking	Yes – during evening hours.
Right-of-way width	
Flowline-to-flowline width	64 ft. from King St. to Atkinson Dr. 76 ft. from Atkinson Dr. to Kalakaua Ave. 73 to 66 ft. from Kalakaua Ave. to Hauoli St. 64 ft. from Hauoli St. to Pumehana St. 72 ft. from Pumehana St. to McCully St. 80 ft. from McCully St. to University Ave.
Landscaping presence	There are mature trees in the sidewalk area between South St. and McCully St.; there are mature trees in the median between McCully St. and University Ave.

TABLE 46

LRT IMPACTS

KAPIOLANI BOULEVARD CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	2 through lanes (1 in each direction) between S. King Street and Kalakaua Avenue. 0 through lanes between Kalakaua Avenue and University Avenue.
Median turn lanes affected	LRT would eliminate the median between Kalakaua Avenue and University Ave.
Parking impacts	Parking may need to be banned completely instead of just during daytime
Operational traffic impacts	LRT would eliminate turning lanes at key intersection of Kapiolani-Ward, Kapiolani-Atkinson, Kapiolani-McCully and Kapiolani-University. Interference with existing contraflow operations
Structural impacts	Existing bridges and box culverts would require strengthening
Clearance impacts	Canopies of large trees would need to be trimmed to provide clearance for LRT catenary
Turning radius impacts	Turning radius from Kapiolani Blvd. To University Ave. about 120 ft.
Other impacts	Landscaping in median between McCully and University would be eliminated

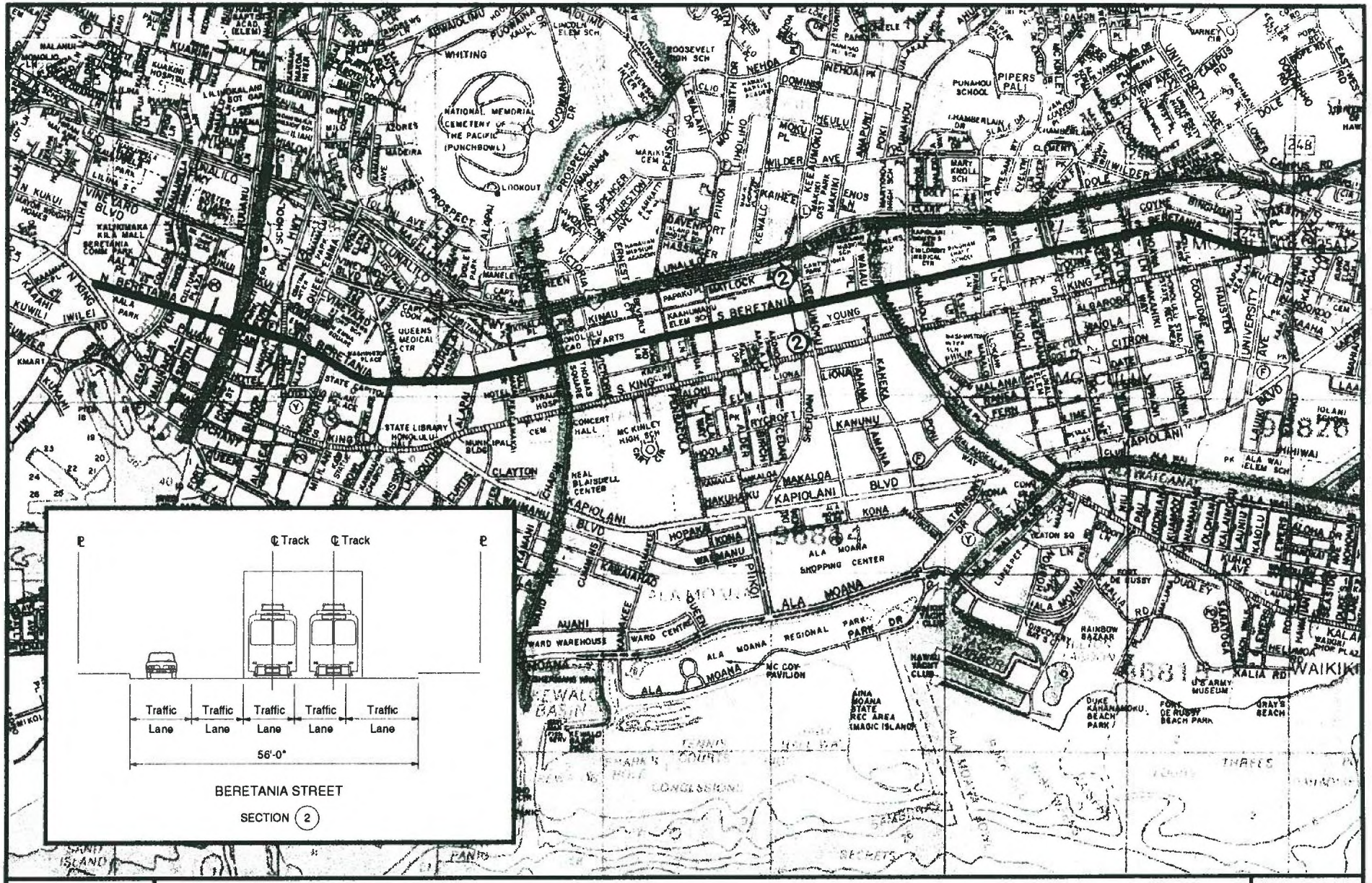
Kapiolani Boulevard would lose a lane in each direction between South King Street and Kalakaua Avenue. Within this segment, left-turn lane impacts are not as great as in other arterial streets, since left-turns at major intersections are generally banned. Three intersections that have major left-turning activity, Ward Avenue, Keeaumoku Street, and Atkinson Drive would be impacted.

Between Kalakaua Avenue and University Avenue, an at-grade LRT alignment would displace the existing median and part of a through lane, leaving the same number of narrower through lanes. Median left-turn lanes will be eliminated, resulting in intersection impacts at McCully Street and University Avenue.

An at-grade LRT alignment in the middle of Kapiolani would interfere with the existing contra-flow lane operations during both the AM and PM peak periods.

E. BERETANIA STREET

Beretania Street corridor runs east-west between University Avenue and North King Street as shown in Figure 24. Commercial/Residential areas on both sides of the corridor. Beretania Street is one-way between University Avenue and Maunakea Street. Between Maunakea Street and North King Street, it is a two-way roadway with 4 through lanes westbound and 2 through lanes eastbound.



BERETANIA STREET CORRIDOR

Figure **24**

TABLE 47
PHYSICAL CHARACTERISTICS
BERETANIA STREET CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	Principal arterial
One-way or Two-way	One-way traffic Honolulu-bound between University Ave. and Maunakea St.; Two-way traffic between Maunakea St. and N. King St.
Number of Through Lanes in Each Direction	3 lanes one-way between Artesian and University Ave.; 4 lanes one-way from Artesian Lane to Punahou St.; 5 lanes one-way from Punahou St. to Alapai St.; 6 lanes one-way from Alapai St. to Pali Hwy.; 5 lanes one-way from Pali Hwy. to Maunakea; 2 lanes eastbound, 4 lanes westbound from Maunakea St. to N. King St. (two-way)
Existence of Median Turn Lanes	No
Edge Treatment	Improved with curb and gutter.
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Relatively straight
On-street parking	Yes – during evening hours.
Right-of-way width	
Flowline-to-flowline width	56 to 60 ft. from King St. to Richards St. 60 ft. from Richards St. to Alapai St. 56 to 57 ft. from Alapai St. to Punahou St. 52 ft. from Punahou St. to Shinsu Kyokai Mission 41 ft. from Shinsu Kyokai Mission to Alexander St. (52 ft. approx. 300 ft before Alexander St.) 47 to 48 ft. from Alexander St. to Artesian St. 48 ft. to 37 ft. from Artesian St. to University Ave. (45 ft to 61 ft. widths at intersections)
Landscaping presence	

TABLE 48

LRT IMPACTS

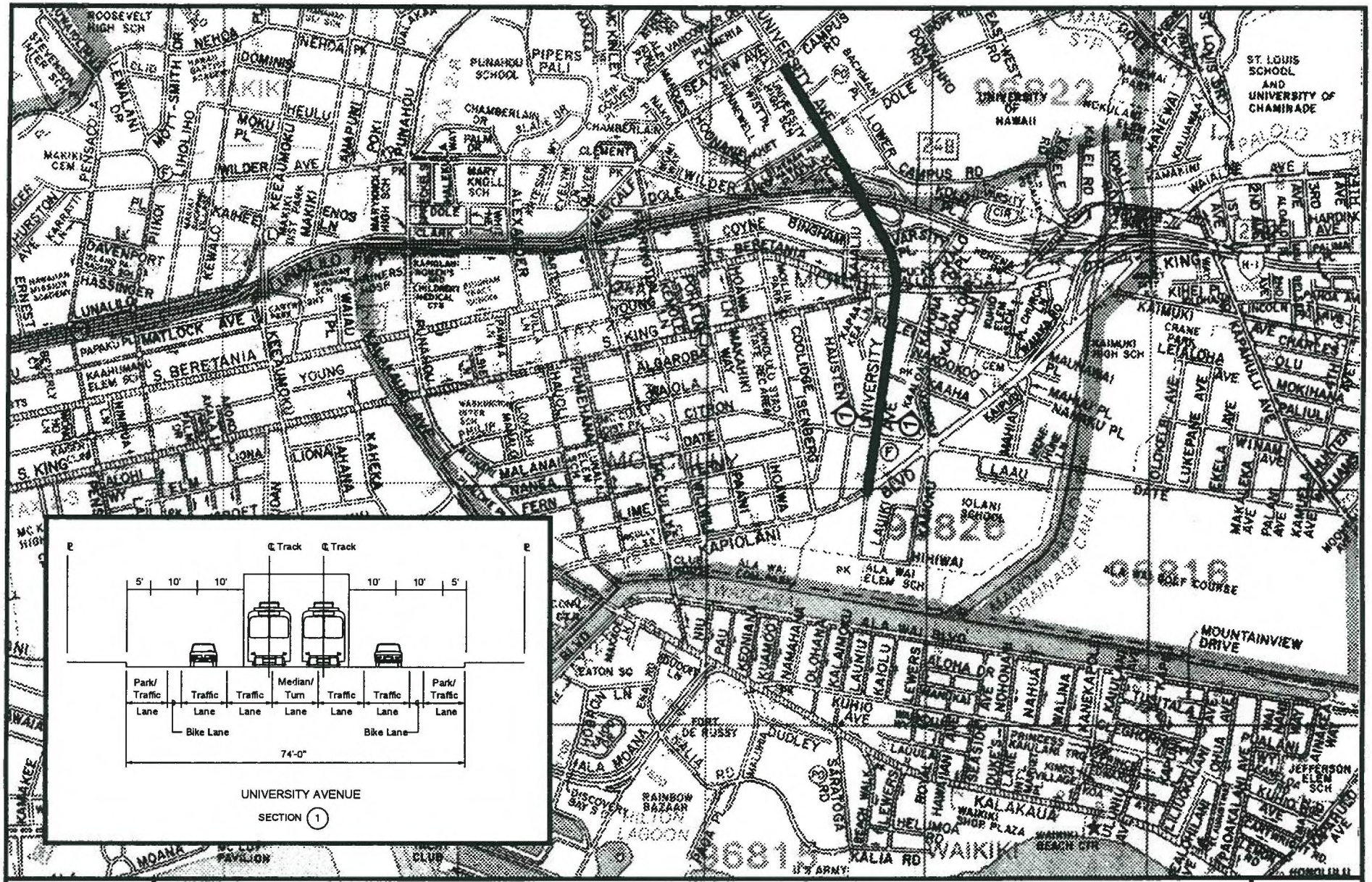
BERETANIA STREET CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	LRT would eliminate two lanes between University Ave. and Artesian Lane (leaving one lane for traffic). LRT would eliminate two lanes between Artesian Lane and Punahou St. (leaving two narrow lanes for traffic). LRT would eliminate two lanes between Punahou St. and Alapai St. (leaving three lanes for traffic). LRT would eliminate three lanes between Alapai St. and Smith St. (leaving three lanes for traffic). LRT would eliminate three lanes between Maunakea St. and N. King ST. (leaving one lane of traffic in the eastbound direction and two lanes of traffic in the west bound direction).
Median turn lanes affected	N/A
Parking impacts	Parking may need to be eliminated.
Operational traffic impacts	Reduction in through lanes would probably impact traffic flow on Beretania. Especially impacted is segment between University and Artesian Lane if both LRT tracks are located on Beretania.
Structural impacts	Existing bridges and box culverts would require strengthening.
Clearance impacts	No apparent constraints.
Turning radius impacts	No apparent constraints.
Other impacts	

The most constrained section of Beretania Street is located between University Avenue and Artesian Lane. An at-grade LRT alignment within this segment leave only one through lane, creating a potential bottleneck area.

F. UNIVERSITY AVENUE CONNECTOR CORRIDOR

University Avenue corridor runs north-south between Kapiolani Boulevard and Metcalf Street as illustrated in Figure 25. There are residential areas between Kapiolani Boulevard and King Street, and there are commercial/school areas between King Street and the University of Hawaii.



UNIVERSITY AVENUE CORRIDOR

Figure **25**

PB 100 YEARS

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TABLE 49
PHYSICAL CHARACTERISTICS
UNIVERSITY AVENUE CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North-south
Functional Classification	Minor arterial between Kapiolani Blvd. and King St.; principal arterial between King St. and Dole St.; minor arterial between Dole St. and Metcalf St.
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	3 (plus a narrow bike lane in each direction)
Existence of Median Turn Lanes	Yes (1)
Edge Treatment	Improved with curb and gutter.
Sidewalks	Yes
Vertical alignment	Flat grades between Kapiolani Blvd. And King St.; Grades up to about 6% between Varsity Place and Metcalf St.
Horizontal alignment	Straight
On-street parking	Some parking on west side of street, north of Dole St.; parking on both sides between Kapiolani Blvd. and King St.
Right-of-way width	
Flowline-to-flowline width	74 ft from Kapiolani Blvd. to Puaena Place 85 ft. from Puaena Place to Dole St. 74 ft. from Dole St. to Metcalf St.
Landscaping presence	Trees on sidewalk

TABLE 50

LRT IMPACTS

UNIVERSITY AVENUE CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	1 (in each direction) leaving two through lanes in each direction. If at-grade LRT corridor were continued up north of Varsity Place on University Ave., it would reduce the through lanes to one lane in each direction where H-1 Freeway crosses over University Ave.
Median turn lanes affected	Median would be eliminated
Parking impacts	On Street parking would be eliminated
Operational traffic impacts	LRT would eliminate turning lanes at key intersections of University/Kapiolani, University-King-Beretania and University-Dole causing major traffic operational impacts. Especially affected would be the University Ave./ King St./ Beretania St. due to loss of median left-turn lanes.
Structural impacts	No apparent constraints
Clearance impacts	Insufficient clearance under the H-1 bridge
Turning radius impacts	Turn from University Avenue to Varsity Place is tight.
Other impacts	

An at-grade LRT alignment on University Avenue will eliminate on-street parking and median left-turn lanes. The loss of parking is expected to be a major issue in the highly residential segment between Kapiolani and King Street.

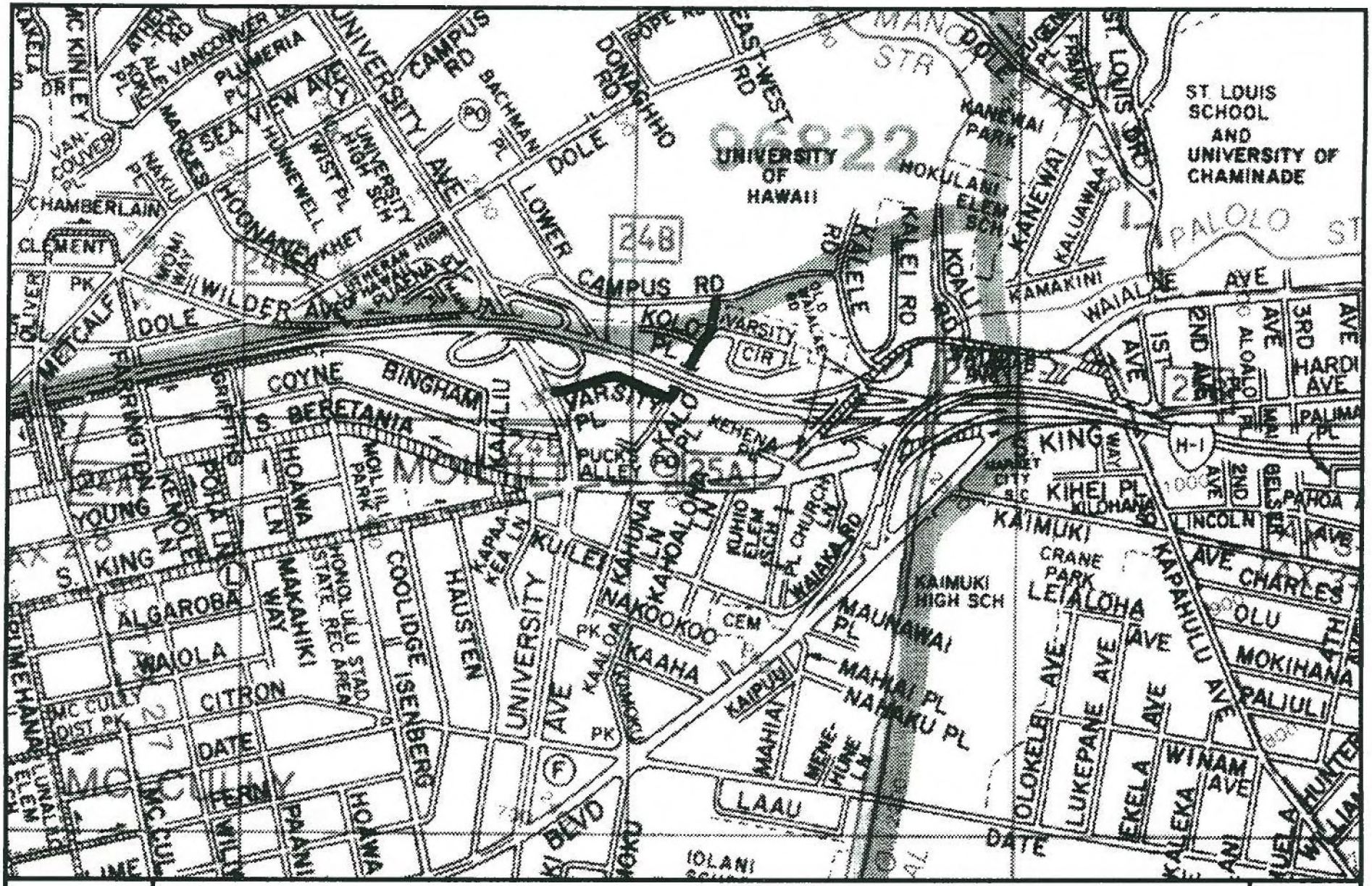
Extending an at-grade LRT alignment north of Varsity Place would create severe operational impacts at the University Avenue Interchange on H-1 Freeway if no modifications are implemented.

G. VARSITY PLACE ACCESS CORRIDOR

Varsity Place corridor runs east-west between University Avenue and Kalo Place as shown in Figure 26. Along with Kalo Place, it provides an alternative path into the University of Hawaii - Manoa area. Varsity Place has apartments on the south side and the H-1 Freeway on the north side.

TABLE 51
PHYSICAL CHARACTERISTICS
VARSITY PLACE ACCESS CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	East-west
Functional Classification	(No official classification)
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	1
Existence of Median Turn Lanes	No
Edge Treatment	Improved with curb and gutter
Sidewalks	Yes
Vertical alignment	Flat grades
Horizontal alignment	Straight
On-street parking	Yes – on the freeway side of the street
Right-of-way width	
Flowline-to-flowline width	
Landscaping presence	Mature trees



PB 100 YEARS

VARSITY PLACE / KALO PLACE ACCESS CORRIDOR

Figure **26**

TABLE 52

LRT IMPACTS

VARSITY PLACE ACCESS CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	LRT would have shared space with vehicular traffic
Median turn lanes affected	
Parking impacts	LRT would eliminate street parking
Operational traffic impacts	Impacts to University/Varsity Place intersection.
Structural impacts	No apparent impacts.
Clearance impacts	No apparent impacts.
Turning radius impacts	Tight turning radius from Varsity Place onto Kalo Place
Other impacts	

An at-grade LRT alignment would probably need to share the roadway with vehicles in this segment due to the narrow width of Varsity Place. The turn onto Kalo Place is very tight for an LRT vehicle.

H. KALO PLACE ACCESS CORRIDOR

The Kalo Place access corridor runs north-south between Varsity Place and the University of Hawaii as shown in Figure 26. The road passes through residential and commercial areas. This corridor, along with the Varsity Place corridor provides alternative access into the University of Hawaii - Manoa area.

TABLE 53

PHYSICAL CHARACTERISTICS
KALO PLACE ACCESS CORRIDOR

PHYSICAL CHARACTERISTICS	DESCRIPTION
Roadway Orientation	North-south
Functional Classification	(No official classification)
One-way or Two-way	Two-way
Number of Through Lanes in Each Direction	1
Existence of Median Turn Lanes	No
Edge Treatment	Improved with curb and gutter in residential area
Sidewalks	Yes – through residential area
Vertical alignment	Flat grades
Horizontal alignment	Relatively straight
On-street parking	Yes
Right-of-way width	
Flowline-to-flowline width	
Landscaping presence	N/A

TABLE 54

LRT IMPACTS
KALO PLACE ACCESS CORRIDOR

LRT IMPACTS	DESCRIPTION
Number of through lanes eliminated	0- LRT to share roadway
Median turn lanes affected	N/A
Parking impacts	LRT through the residential area would require removal of street parking and shared space with vehicular traffic
Operational traffic impacts	
Structural impacts	
Clearance impacts	Insufficient vertical clearance where H-1 Freeway crosses over Kalo Place
Turning radius impacts	
Other impacts	Commercial area would require ROW acquisition

I. SUMMARY

The Beretania Street corridor is the most constrained corridor due to the narrow segment located between University Avenue and Artesian Street.

South King Street and Kapiolani Boulevard are both workable corridors although operational impacts at intersections could be more severe on Kapiolani Boulevard. Kapiolani Boulevard would have median left-turn lanes eliminated whereas South King Street would not. There are also contra-flow lane operations on Kapiolani Boulevard during the peak periods that could be disrupted by an at-grade LRT alignment. However, because left turns are not generally allowed on Kapiolani Boulevard, location of an at-grade LRT down the center of the roadway is not as disruptive as it is on other two-way, arterial roadways.

Hotel Street is a good transit path through Downtown, especially since it is already designated as a transit mall.