

## **4. PUBLIC FACILITIES AND INFRASTRUCTURE** **POLICIES AND PRINCIPLES**

The purpose of this chapter is to set forth policies and principles to guide planning and construction of proposed public and private public facility projects and infrastructure systems to carry out the vision for future development of Ewa, as described in Chapter 2.

Information on timing and phasing of both planned and proposed infrastructure and public facility projects available during plan preparation is also included. However, each project proposal is only identified and presented conceptually; not on a site specific basis. More detail on the specific need, route alignment, site boundaries, capacity and other specifications for each project, as applicable, will be prepared at the master planning stage which precedes approval of actual development.

As noted in Chapter 5, existing unilateral agreements, zoning and Urban Design Plans will continue to guide development in the area.

### **4.1 TRANSPORTATION SYSTEMS**

This section describes the existing conditions and plans and proposals for development of Ewa's roadways, transit system, and bikeways. (See the Public Facilities Map in Appendix A and the Roadway Network listing in Table 4.1.) The section concludes with general policies and planning principles to guide future transportation system development in Ewa.

Based on regional planning and transportation analysis done for the Development Plan Revision Program, planned and proposed roadway elements and other transportation system features which may be needed to meet the projected development in Ewa are identified.

#### **4.1.1 EXISTING ROADWAY NETWORK**

The major east-west arterials of the Ewa roadway system include:

- ! The H-1 Freeway which is the major arterial road connecting Ewa with the Primary Urban Center,
- ! Farrington Highway which, past Kapolei, is the major arterial connecting the Waianae Coast with Ewa, and, between Kapolei and Waipahu, is a secondary east-west route.

North-south roads distribute traffic onto and off of the east-west arterials at several locations. They include:

- ! Fort Weaver Road which links West Loch, Ewa Villages, Ewa by Gentry, and Ewa Beach with Farrington Highway and H-1,
- ! Kunia Road which connects to Central Oahu's Schofield Barracks and Wahiawa,
- ! Fort Barrette Road which runs south from Kapolei to the main entrance to Barbers Point Naval Air Station (BPNAS),
- ! Makakilo Drive which continues up the hillside from the Makakilo Interchange of the H-1 Freeway, providing the only access to Makakilo, and
- ! Kalaeloa Boulevard which provides access to Campbell Industrial Park and Barbers Point Harbor via the H-1's Palailai Interchange.

**TABLE 4.1: EWA ROADWAY NETWORK**

<p><b>Existing System</b></p> <p><u>Major East-West Arterials</u></p> <ul style="list-style-type: none"> <li>o H-1 Freeway</li> <li>o Farrington Highway</li> </ul> <p><u>North-South Distributors</u></p> <ul style="list-style-type: none"> <li>o Fort Weaver Road</li> <li>o Kunia Road</li> <li>o Fort Barrette Road</li> <li>o Makakilo Drive</li> <li>o Kalaeloa Boulevard</li> </ul>		
<p><b>Planned Extensions</b></p> <p><u>Existing Roads Improvements</u></p> <ul style="list-style-type: none"> <li>o Widen Farrington Hwy (4 lanes, Ft. Weaver to Kalaeloa)</li> <li>o Widen Ft. Barrette Road (4 lanes, H-1 to Kapolei Pkway)</li> <li>o Widen Ft. Weaver Road/Kunia Road (6 lanes, H-1 to Renton Road)</li> <li>o Widen Kalaeloa Boulevard/Extend Hanua Street to H-1</li> <li>o Widen Farrington Hwy (6 lanes, H-1 terminus to Nanakuli)</li> <li>o HOV median lane from Makakilo to Waiawa Interchange</li> </ul> <p><u>New Roads</u></p> <ul style="list-style-type: none"> <li>o Kapolei Parkway</li> <li>o North-South Road</li> </ul> <p><u>Interchange Improvements</u></p> <ul style="list-style-type: none"> <li>o Kunia Interchange</li> <li>o Makakilo Interchange</li> <li>o Palailai Interchange</li> </ul> <p><u>New Interchanges</u></p> <ul style="list-style-type: none"> <li>o Kapolei Interchange</li> <li>o North-South Road Interchange</li> <li>o Makaiwa Hills</li> </ul>	<p><b>ORTP #</b></p>	<p><b>ORTP Phasing</b></p>
<p><b>Additional Elements</b></p> <ul style="list-style-type: none"> <li>o Link Fort Barrette Rd. and Kalaeloa Regional Park (BPNAS)</li> <li>o Extend from North-South Rd. into Kalaeloa Regional Park</li> <li>o Develop additional north-south roads and a mauka frontage road near the City of Kapolei</li> <li>o Extend Geiger Road to link Fort Barrette Road and North-South Road</li> <li>o Link Campbell Industrial Park with Geiger Road</li> <li>o Develop an additional north-south road in East Kapolei</li> </ul>		
	<p>C2</p> <p>S10</p> <p>S20</p> <p>S21</p> <p>S31</p> <p>HOV-7</p> <p>C5</p> <p>S19</p> <p>S1</p> <p>S2</p> <p>S17</p> <p>S27</p> <p>S19</p> <p>S32</p>	<p>1995-2000</p> <p>1995-2000</p> <p>2001-2005</p> <p>2001-2005</p> <p>2006-2020</p> <p>2006-2020</p> <p>1995-2000</p> <p>2001-2005</p> <p>1995-2000</p> <p>1995-2000</p> <p>2001-2005</p> <p>1995-2000</p> <p>2001-2005</p> <p>2006-2020</p>
<p>SOURCE: Identification numbers and phasing from <b>2020 Oahu Regional Transportation Plan</b>, November 1995</p>		

According to the 2020 Oahu Regional Transportation Plan (November 1995), the existing transportation system in Ewa has sufficient capacity for current traffic volumes during peak hour traffic, but experiences congested conditions because of bottlenecks and lack of capacity on the corridor from Pearl City to Downtown Honolulu. Traffic volume on the H-1 at Waikele is projected to increase by over 60% by 2020, while traffic on the H-1 by Aiea is projected to increase by 10%.

As noted in Section 4.1.6, the substantial development of Secondary Urban Center jobs (from 17,000 jobs in 1990 to over 64,000 jobs by 2020) is projected to increase the number of Ewa residents who work in the area.

However, it is also projected that the number of commuters traveling to the PUC from Ewa and Central Oahu will still increase, although at a lower rate than would occur if development of the Secondary Urban Center was not supported.

A summary of transportation analysis and need assessments done in preparing this document is provided on page 2-33 and 2-34 of the Ewa Development Plan Report, the technical report prepared by the consultant team for this project.

#### **4.1.2 PLANNED EXTENSIONS OF THE ROADWAY NETWORK**

Planning and development of major roadways is the shared responsibility of the State Department of Transportation and the City Department of Transportation Services. Planning and use of federal transportation funds is coordinated through the Oahu Metropolitan Planning Organization (OMPO), a joint City-State agency.

OMPO recently prepared the 2020 Oahu Regional Transportation Plan based on year 2020 traffic volumes projected to be generated by land uses approved under the previous Development Plan Special Provisions and Land Use Map. In addition, in Ewa, a consortium of landowners and developers prepared the Ewa Region Highway Transportation Master Plan (1992) as part of a process to determine what Ewa highway improvements will be needed, and how much of the costs each developer is to pay. Under existing Unilateral Agreements, Ewa developers and landowners have agreed to finance

their fair share of development of the roads. The Master Plan is being updated, along with a study of the North-South Road, and analysis of methods for financing these improvements.

Roads listed in the Ewa Region Highway Transportation Master Plan and the 2020 Oahu Regional Transportation Plan will be required by 2020 to properly serve the anticipated developments. (The Master Plan has not yet been approved by the State and the City.)

The two plans show major elements of the future Ewa roadway network. These major improvements include:

- ! Kapolei Parkway which is planned as a major east-west corridor, connecting the eastern parts of Ewa with the City of Kapolei and employment areas to the west,
- ! A new North-South Road which will link Kapolei Parkway with Farrington Highway and the H-1 Freeway and extend on mauka of the H-1 Freeway interchange to become part of Makakilo Drive,
- ! Improvements to existing H-1 Freeway interchanges at Palailai, Makakilo, and Kunia,
- ! New H-1 Freeway interchanges at Kapolei and Makaiwa Hills, and
- ! Extension of Hanua Street parallel to Kalaeloa Boulevard to enhance truck access between the H-1 Freeway and Campbell Industrial Park.

Recognition of these major improvements to future roadway networks for Ewa in no way implies Council approval of these projects. These projects will have to be approved through the CIP process or through the zoning process.

### 4.1.3 ADDITIONAL ELEMENTS OF THE ROADWAY NETWORK

The planned development of East Kapolei and the return of Barbers Point Naval Air Station to civilian use will open additional areas for use and increase transportation needs beyond the levels planned for in the 2020 Oahu Regional Transportation Plan.

Additional east-west and north-south roadways will be needed to enhance movement between the various parts of the Ewa region and to provide improved access to activity centers such as Ewa Marina and the Kalaeloa Regional Park (at BPNAS), including:

- ! An improved roadway link between Fort Barrette Road and the Kalaeloa Regional Park to provide access to the shoreline and the park for residents of the Kapolei-Makakilo area,
- ! Extension from the North-South Road south of Kapolei Parkway into the Kalaeloa Regional Park to provide a second access to the Park for residents of East Kapolei and staff and students of the UH-West Oahu campus,
- ! Development of an east-west collector roadway system which connects developments on both side of North-South Road in an efficient circulation pattern,
- ! Development of additional north-south roads and a mauka frontage road to improve circulation between the City of Kapolei and the freeway, Makakilo and Makaiwa Hills,
- ! Extension of Geiger Road to provide a direct link between Fort Barrette Road and the North-South Road,

- ! Development of a roadway linking the western part of Ewa Marina and a road within the eastern boundary of BPNAS which connects to Geiger Road,
- ! Development of an east-west roadway linking Campbell Industrial Park with Geiger Road, and
- ! Development of at least one additional north-south road between East Kapolei and Farrington Highway, east of the North-South Road.

The need for these roads has been established only at the conceptual stage, and further study, planning and approvals will be required to establish need, appropriate route, capacity, and other characteristics.

#### **4.1.4 TRANSIT**

With population growth, the City should increase transit service in Ewa, in order to enhance circulation among Ewa communities and between Ewa and the adjacent Waianae and Central Oahu areas, and to provide suitable service for peak-hour commuting.

##### **4.1.4.1 Bus Service**

Bus service is provided through the Department of Transportation Services, which currently contracts with Oahu Transit Services (OTS) for operation of TheBus. A second vendor operates the Handi-Van system. As of 1994, OTS operated a fleet of 495 buses, programmed for expansion to 525 buses. About 35 buses were assigned to TheBus's Ewa Service Area, which is identical to the Ewa Development Plan area.

In 1996, there are four bus routes serving Ewa throughout the entire day:

- ! Ewa Mill - Honolulu No. 48
- ! Ewa Beach - Honolulu/Ala Moana No. 49
- ! Makakilo - Honolulu/Ala Moana No. 50
- ! Makaha - Honolulu/Ala Moana No. 51

In addition, during peak hour commuting, there are five express bus routes:

- ! Ewa Beach Express No. 91
- ! Makakilo City Express No. 92
- ! City of Kapolei/Campbell Industrial Park Express No. 94
- ! Ewa Gentry Express No. 101
- ! Kapolei Express No. 102

The **Comprehensive Bus Facility and Equipment Requirements Study**, published in 1994 by the Honolulu Public Transit Authority, examined bus system expansion and financing needs for the period 1994 - 2006. Assuming future expansion of the fleet from 525 to 650 buses, the study showed an increase in buses assigned to the Ewa Service Area from 35 to 88, of which 45 are expected to be articulated (high-capacity) buses. The additional buses would be used to increase capacity and frequency of service, as well as to add new routes. As the fleet expands its service, public review and Council approval will be necessary.

OTS currently operates two "divisions" from bus maintenance facilities located in Kalihi-Palama and Halawa. With growth in service and in the bus fleet, a third division will be needed to serve west Oahu and will be located at a third maintenance facility at Manana in the Pearl City area.

The **Comprehensive Bus Facility and Equipment Requirements Study** also addresses the need for "transportation centers" and park-and-ride facilities, although it makes no recommendations on specific sites in the Ewa area. Transportation centers are bus

transfer points having a protected environment for waiting passengers, like that on the mauka side of Ala Moana Center. Park-and-rides are special parking lots where commuters can park their cars and continue their commute by bus.

The Department of Transportation Services has currently identified and proposed for development two park-and-ride facilities in Ewa, one in the future civic center area of the City of Kapolei, and another further east, near the future North-South road/Kapolei Parkway intersection. Other sites are expected to be identified and proposed for development as new communities arise in areas that have not yet started to develop, especially if they are at key points along the future route of the proposed rapid transit system.

Policies, planning principles, and guidelines in this Development Plan support the establishment of transit service throughout Ewa and creation of linkages feeding into transit nodes along the future rapid transit corridor (See 4.1.4.2 below).

#### **4.1.4.2 Planned Rapid Transit Corridor**

As shown on the Public Facilities Map in Appendix A, a rapid transit corridor is planned to connect the City of Kapolei with Waipahu and onward to the Primary Urban Center. The corridor could provide for both an Ewa shuttle service, which could travel back and forth on the transit corridor between Ko Olina, the City of Kapolei, the UH West Oahu campus and Waipahu, and a commuter service, which could provide peak-hour express bus service to and from the Primary Urban Center. In peak-hour commuting, the corridor could carry express bus service, or even higher-speed dedicated transit service.

By connecting to the Primary Urban Center via Waipahu, the corridor could provide for a future high-speed connection between the Kapolei campus of the University of Hawaii at West Oahu and Leeward Community College, Honolulu Community College, and the University of Hawaii at Manoa.

The Ewa rapid transit corridor is planned to run from Waipahu along the Farrington Highway right-of-way, turning south at the North-South Road and west again in the Kapolei Parkway right-of-way to the City of Kapolei. The corridor could eventually extend to Barbers Point Harbor and a turn-around/ maintenance facility could be sited in the Kapolei Business Park.

Developments along the proposed transit corridor are being required to set aside appropriate sized right-of-way and under existing UAs, the land will be donated by Campbell Estate to the City at the time that a rapid transit system is developed for Ewa.

Land has been set aside for a rapid transit right-of-way in the median of Kapolei Parkway and in the North-South Road corridor. Campbell Estate has made a commitment to set aside additional land along Farrington Highway between the North-South Road and Fort Weaver Road. The Farrington Highway right-of-way through Waipahu has adequate land to accommodate rapid transit. (The right-of-way for an at-grade separated rapid transit system would be 28 feet while only eight feet would be required if the system were elevated.)

Land has been set aside in the City of Kapolei for a transit station/bus terminal/park-and-ride facility, and provisions should be made for transit stations/park-and-ride facilities at each of the transit nodes along the rapid transit corridor. (A 75 foot right-of-way would be required for each transit station.) In addition, 25 acres are being reserved for a future rapid transit maintenance yard.

High density residential and commercial development should be permitted within a one-quarter mile radius (15 minutes walking distance) around the transit station/park-and-ride facility site at the center of the transit node. The objective is to create a land use pattern that would allow residents to minimize use of the private automobile and encourage use of transit for longer trips and walking or biking for short trips.

#### **4.1.5 BIKEWAY SYSTEM**

The Kapolei Area Bikeway Plan, published by Campbell Estate in 1991, establishes a comprehensive bikeway network to serve the Ewa Plain. The network would include 56 miles of bikeway facilities, including bike paths (separated from the roadway), bike lanes (four- to six-foot lanes) and bike routes (shared curbside vehicle lane, with minimum 12-foot width).

The Kapolei Area Bikeway Plan (KABP) is part of the City of Kapolei Urban Design Plan, which was adopted by the City Council in 1995. The KABP covers all of Ewa except for military bases in the area. Elements of the KABP have been adopted by the State Department of Transportation as part of the State bikeway plan, Bike Plan Hawaii (1994). This Plan includes all the projects found either in the KABP or the State's Bike Plan Hawaii.

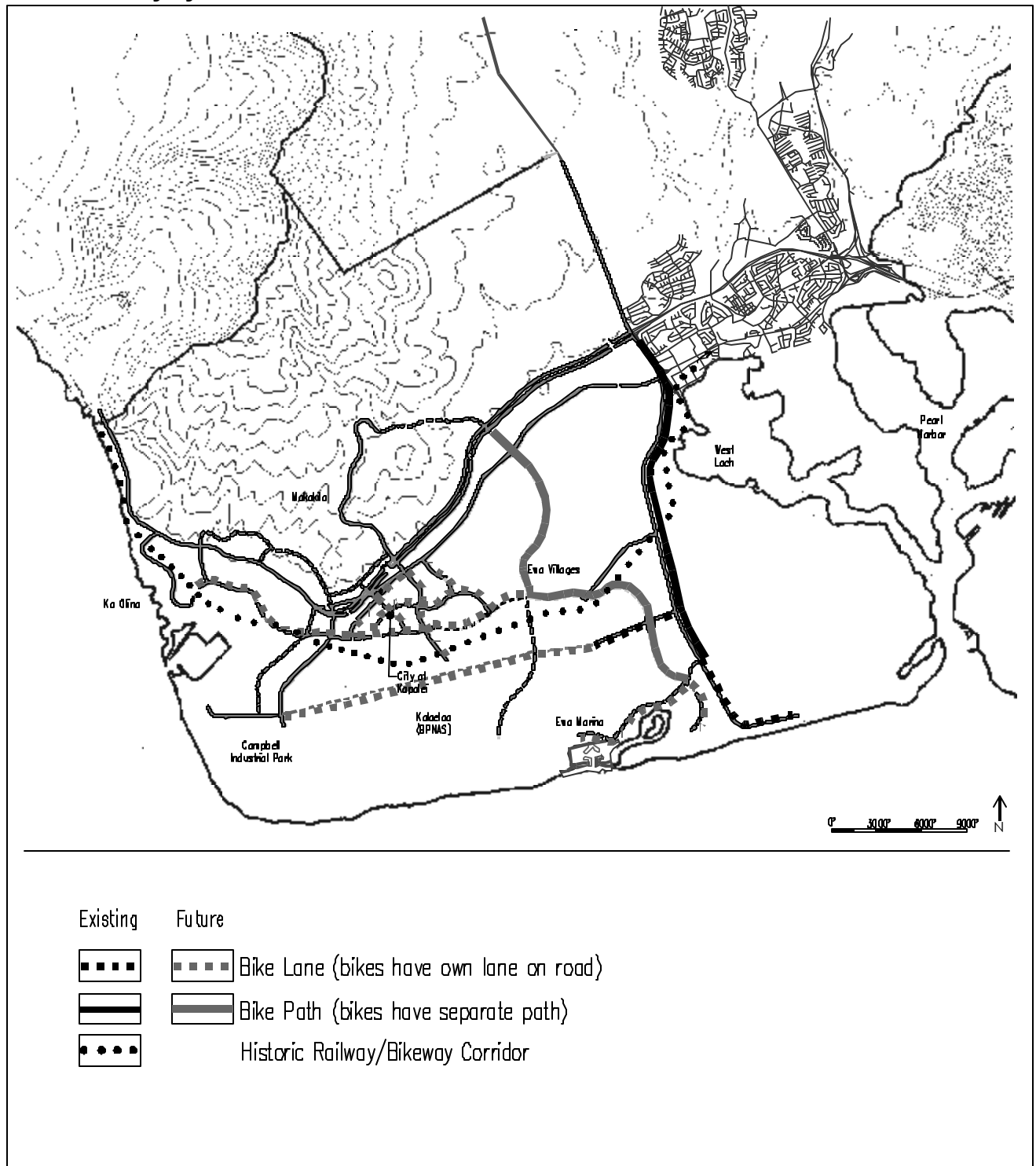
As shown in Exhibit 4.1, major bike paths should run along the OR&L right-of-way and Kapolei Parkway and along the North-South Road and Fort Weaver Road. Bikeways should be incorporated in other major roadways, and there should be an extensive network of bike lanes within the City of Kapolei and Kapolei Villages.

#### **4.1.6 GENERAL POLICIES**

The following general transportation systems policies support the vision for development of Ewa.

**Adequate Access and Services.** Before zoning approval is given for new residential and commercial development in Ewa, the Department of Transportation Services should either: (1) indicate that adequate transportation access and services can be provided with existing facilities and systems, or (2) recommend conditions that should be included as part of the zone change approval in order to assure adequacy.

**Exhibit 4.1  
Ewa Bikeway System**



**Transportation System Functions.** To support Ewa's role as the site for the Secondary Urban Center and a major growth area for new residential and employment development, its transportation system should:

- ! Provide adequate access between residences and jobs, shopping, and recreation centers in Ewa as development occurs;
- ! Provide improved access to and from adjacent areas, especially Central Oahu; and
- ! Provide adequate capacity for major peak-hour commuting to work in the Primary Urban Center. (Although the share of residents who will both live and work in Ewa is projected to increase from 17% to 44% by 2020, a majority of residents will still commute to jobs outside the region.)

**Improved Linkages.** Additional routes, as noted in Section 4.1.3 of this Plan, should be created between the various parts of the region, including to and across BPNAS after it is returned to civilian control.

**Reduction in Automobile Use.** Reliance on the private passenger vehicle should be reduced by:

- ! Provision of circulation systems with separated pedestrian and bicycle paths and convenient routes for public transit service,
- ! Use of more traditional "grid" patterns for street systems in new development areas to facilitate bus routes and encourage pedestrian travel,
- ! Provision of supporting facilities and amenities for pedestrian, bicycle, and public transit use. The use of bike trails, bicycle racks at commercial centers, bicycle storage facilities at employment centers as well as bus shelters at bus stops will be encouraged.

- ! Acquisition of a dedicated rapid transit right-of-way prior to development, and support for high-density and high-traffic land uses along the rapid-transit corridor, especially within a quarter-mile of centers of the transit nodes, subject to City Council approval of any system.

#### **4.1.7 PLANNING PRINCIPLES**

Because of its generally even, gradually sloping terrain, Ewa offers decided advantages for transportation.

- ! It provides an opportunity to create multiple linkages and routes between the various parts of the region. This advantage is enhanced by the planned closing of the Barbers Point Naval Air Station, which will return the area to civilian use and thereby allow for increased road linkages to and across former Naval Air Station lands.
- ! The terrain allows for relatively less expensive development of a dedicated transit right-of-way. The flat terrain also increases the feasibility of constructing a rapid transit system on that right-of-way.
- ! Both the terrain and the sunny, low rainfall climate enhance bicycling as an alternative form of transportation as well as for recreation. An improved environment for bicycling and walking also improves the potential for high transit ridership. (See the discussion of the Kapolei Area Bikeway Plan above in Sec. 4.1.5.)

Planning principles and guidelines addressing residential and commercial land uses, set forth in Chapter 3, Sections 3. 6 and 3. 7 above, provide substantial guidance toward enhancing pedestrian, bicycle and transit modes of transportation.

The following principles should guide the development of a multi-modal transportation system for Ewa:

- ! **Comprehensive Roadway Network.** The roadway system should be designed to provide multiple routes for travelling among the various residential communities and activity centers of Ewa, thereby lending variety to travel within the region and promoting communication among its communities. Network designs for communities should take on more of a grid pattern, increasing intersections between collector streets.

The design should also increase connections between parallel major collectors and arterials - e.g., between North-South Road and Fort Weaver Road - rather than relying primarily upon loop roads to feed the major roadways. Planning for East Kapolei and for the reuse of Barbers Point Naval Air Station are important opportunities for creating such connections.

- ! **Land Use Planning Anticipating Rapid Transit.** Key to the vision for Ewa is reservation of a rapid transit corridor prior to development and the planning of high-density and high-traffic land uses along the corridor. This strategy will contribute to the feasibility of developing a high-speed transit line and will result in a more mobile, less automobile-dependent community. Planning for all the communities along the proposed transit corridor on Farrington Highway, North-South Road, and Kapolei Parkway should reflect the desire to establish a rapid transit corridor with high density residential and commercial nodes located at regular intervals.

- ! **Transit-Oriented Community Street Systems.** Circulation systems within residential communities and commercial centers should emphasize connections between north-south and east-west streets and accessibility from residential streets to bus routes, parks, schools and commercial centers. Circulation systems should be designed to facilitate bicycle and pedestrian travel, to increase transit use, and to reduce dependence on automobile travel.

See Chapter 3, Sections 3.6 and 3.7, for more detailed planning principles and guidelines for circulation in residential communities and commercial centers.

- ! **Community-Level Street Standards.** Standards for public streets within residential communities and commercial centers should be revised to support and improve pedestrian and bicycle travel and on-street parking. While average motor vehicle speed may be reduced, safety and enjoyability for pedestrians and bicyclists would be increased, and greater efficiency in land use, reduced construction costs, and improved street function may occur.

## 4.2 WATER ALLOCATION AND SYSTEM DEVELOPMENT

In 1987, the State enacted the State Water Code in order to protect, control, and regulate the use of the State's water resources for the benefits of its people. Under the Code, the City is responsible for preparing the water use and development plan for the City and County of Honolulu.

This plan, called the Oahu Water Management Plan (OWMP), is prepared by the Planning Department with the assistance of the State Commission on Water Resource Management and the Board of Water Supply, and approved by the City Council following extensive public review and comment. The OWMP was adopted by the State Commission

on Water Resources and the City Council in 1990. The Technical Reference Document (TRD) for the OWMP is currently being revised to update supporting data, analyses, and conclusions to reflect the closing of Oahu Sugar Company and Waialua Sugar Company and more recent data and analytical review. Future revisions to the document shall be submitted to the Council for its review and approval.

The Board of Water Supply evaluated the water development needs of the existing and new residential and commercial (including retail, office, resort, recreational, and industrial) development likely by 2020 as a result of implementation of the Development Plan.

The Board of Water Supply projects that an additional 35 million gallons per day (mgd) of potable (or drinkable) water will be needed in Ewa by 2020 to meet projected growth in residential and commercial demand. In addition, long term demand for nonpotable water for existing and new urban irrigation and other urban purposes is estimated to be approximately 26 mgd. Agricultural demand for non-potable water for the 3,000 acres of agricultural land in Ewa protected from development by this plan could be as much as 10 mgd (based on recent testimony before the State Commission on Water Resource Management). Meeting this demand will require reallocation of water within the island-wide system, as well as development of new sources.

As shown in Table 4.2, the Board of Water Supply has identified potential sources of potable and nonpotable water to meet the projected demand in Ewa through 2020. These sources will be pursued as part of the Board's development and operation of an integrated islandwide water system.

The water management strategy called for in the Oahu Water Management Plan is for on-going groundwater source development coupled with efforts to increase water use efficiency, water conservation, and continued development of alternative sources of water.

**TABLE 4.2: POTENTIAL SOURCES OF POTABLE AND  
NONPOTABLE WATER FOR EWA AND CENTRAL OAHU**

<b>POTABLE GROUNDWATER RESOURCES</b>	
<b>Ground Water Source</b>	<b>Estimated Source Yield (Million Gallons per Day)</b>
1. Waipahu Wells III	3.00
2. Ewa Shaft	15.00
3. Kunia Wells IV	2.00
4. Waiawa Wells (1)	9.00
5. Ekahanui Wells	2.00
6. Waipahu Wells IV	3.00
7. Kunia Wells III	3.00
8. Waipahu Wells II Addition	1.50
9. Mililani Wells IV	3.00
10. Kunia Wells II Addition	1.50
<b>Total Estimated Source Yield (2)</b>	<b>43.00</b>

<b>ALTERNATIVE WATER RESOURCES</b>		
<b>Source</b>	<b>Available Resource (Million Gallons Per Day)</b>	
	<b>Minimum Estimate</b>	<b>Maximum Estimate</b>
<b>Potable:</b>		
1. Ewa Desalinization Plant	10	25
<b>Nonpotable (3)</b>		
2. Nonpotable Caprock (4)	NA	NA
3. Surface Nonpotable Water	2	3
4. Wastewater Nonpotable Reuse	5	13
5. Waiahole Ditch	0	28
6. Pearl Harbor Springs Nonpotable	16	20
<b>Total Nonpotable</b>	<b>23</b>	<b>64</b>

**NOTES:**

NA Not Available

(1) Based on the Waiawa Water Master Plan.

(2) Source construction is contingent on the availability of sustainable yield.

(3) Nonpotable resources will be needed for agricultural and urban uses.

(4) Ewa Caprock aquifer sustainable yield is being reevaluated.

Pearl Harbor aquifer sustainable yield will decrease due to Oahu Sugar Company's close and requires reevaluation. Specific source capacities are only estimates. Allocations of groundwater and surface water sources require the approval of the State Commission on Water Resource Management.

Source: Board of Water Supply, 1996

#### **4.2.1 GENERAL POLICIES**

The following general policies should be followed in developing Ewa potable and nonpotable water systems to meet the projected demand.

**Adequacy of Water Supply.** Before zoning approval is given for new residential or commercial development in Ewa, the Board of Water Supply should either indicate that adequate potable and nonpotable water is available or recommend conditions that should be included as part of the zone change approval in order to assure adequacy.

**Dual Transmission Lines.** Where required, developments should have dual water lines to allow conservation of potable water and use of nonpotable water for irrigation and other appropriate uses. Such requirements shall be determined during review of project master plans for new developments and approval of zoning applications.

**Development and Allocation of Potable Water.** The State Commission on Water Resource Management has final authority in all matters regarding administration of the State Water Code. Under that authority, the Board of Water Supply should coordinate development of potable water sources and allocation of all potable water intended for urban use on Oahu. State and private well development projects could then be integrated into and made consistent with City water source development plans.

**Use of Nonpotable Water.** An adequate supply of nonpotable water should be developed for irrigation and other suitable uses on the Ewa Plain in order to conserve the supply of potable water and to take advantage of dual water systems constructed by Ewa developers.

The Pearl Harbor aquifer is the most cost effective and accessible water resource of potable quality, and it is needed to support the existing and future domestic potable water uses described in the development plans. To minimize the risk of impacts to our precious potable water sources, the use of reclaimed water (“reclaimed wastewater effluent”) and brackish waters as nonpotable irrigation sources in the coastal caprock area such as the Ewa Plain should be given high priority. Significant demand exists for nonpotable water for golf courses, landscape irrigation and industrial uses on the Ewa Plain. In addition to the compatibility of the source to the demand in the area, the infrastructure to distribute the reclaimed water in that area is being planned. Use of reclaimed water and brackish water should, therefore, focus on meeting demand in the Ewa Plain where there are no adverse consequences to the drinking water resources.

Experiences with increasing chloride, nitrate and pesticide contamination of groundwater indicate that activities on the surface of the land can have a detrimental effect on the quality of drinking water. Nonpotable water used above Pearl Harbor aquifer should be low in total dissolved solids to protect the quality of drinking water withdrawn from wells located down-gradient of the application.

**Use of Waiahole Ditch Water.** A sufficient amount of water is needed to meet the diversified agricultural needs for Ewa and Central Oahu along with high quality recharge of the Pearl Harbor aquifer. A number of potential sources are identified in Table 4.2, including: caprock, surface water, spring waters, Waiahole Ditch Water and wastewater effluent. The amount of water available and the potential use of each of these sources varies according to location. The State Commission on Water Resource Management should consider all sources of water in making allocations.

**Water Reclamation.** The City will reclaim and distribute wastewater effluent, provided that paying customers can be found for the nonpotable water. No additional costs will be borne by sewer users to subsidize private users of recycled effluent.

Under the City's agreement through a Consent Decree with the U.S. Environmental Protection Agency and the State Department of Health, the City plans to reclaim and use up to 10 mgd of Oahu's wastewater by 2001.

Construction of the secondary treatment unit at the Honouliuli Wastewater Treatment Plant has been completed. The facility is capable of providing 13 million gallons per day (mgd) of undisinfected secondary treated reclaimed water (R-3 quality).

In Fiscal Year 1997-98, the City plans to build a pilot project at Honouliuli to study the potential for aquifer recharge with disinfected secondary treated reclaimed water (R-2 quality) and to evaluate the resulting water quality impacts within the lower Ewa plain region. The R-3 secondary treatment facility at Honouliuli will be upgraded to an R-2 facility when the pilot project is ready to begin. The pilot project will have a capacity of 5 to 6 mgd.

If the pilot project indicates the water quality of the Ewa caprock aquifer can be improved with effluent recharge with no detrimental impacts to near shore waters, the pilot project will be expanded to provide 13 mgd of recharge, providing that customers can be found to pay for the capital costs of the distribution system and the cost of operating and maintaining the facility and distribution system.

**Integrated Resource Management.** Management of all potable and nonpotable water sources, including ground water, stream water, storm water, and effluent reuse should be integrated through amendments to the Oahu Water Management Plan and future Integrated Resource Management plans which will require Council approval and adequate public review, following City development of plans and adoption of an appropriate management process.

## **4.3 WASTEWATER TREATMENT**

The Department of Environmental Services estimates treatment/disposal capacity at the Honouliuli Wastewater Treatment Plant will need to be increased from existing capacity for primary treatment of 38 million gallons per day (mgd) to almost 51 mgd by 2020 to meet projected population and economic growth in Ewa and Central Oahu resulting from implementation of the revised Development Plans. In addition, the capacity of specific sewer lines and pump stations will need to be increased.

### **4.3.1 GENERAL POLICIES**

All wastewater produced by new developments in Ewa should be connected to a regional or municipal sewer service system.

Where feasible, effluent should be treated and used as a source of nonpotable water for irrigation and other uses below the Underground Injection Control line of the State Department of Health and the "No-Pass" Line of the Board of Water Supply. As noted above, the Department of Environmental Services has made a commitment to the U.S. Environmental Protection Agency and the State Department of Health to reclaim and use up to 10 million gallons a day (mgd) of wastewater islandwide by 2001.

Wastewater treatment plants should generally be located in areas shown as planned for industrial use and away from residential areas shown on the Urban Land Use Map in Appendix A. Existing treatment plants are shown on the Urban Land Use Map and the Public Facilities Map in Appendix A. A City review and approval process, such as the Plan Review Use process, which provides adequate public notice and input, complete technical analysis of the project, and approval by the City Council, shall be required for any major new private wastewater treatment plant. Other system elements, such as pump stations and mains, should not require such comprehensive review and policy approval.

## **4.4 ELECTRICAL POWER DEVELOPMENT**

The Hawaiian Electric Company forecasts that increased demand and the proposed retirement of the Honolulu Power Plant from service will create a need for additional island-wide power generation capacity by 2020. Potential sites in Ewa for additional generating units include Campbell Industrial Park and Kahe Point.

#### **4.4.1 GENERAL POLICIES**

Major system improvements -- such as development of a new power generating plant and/or major new transmission lines -- should be analyzed and approved based on islandwide studies and siting evaluations. Strong consideration should be given to placing any new transmission lines underground.

Electrical power plants should generally be located in areas shown as planned for Industrial use and away from Residential areas shown on the Urban Land Use Map in Appendix A. Existing power plants are shown on the Urban Land Use Map and Public Facilities Map in Appendix A. Any proposed major new electrical power plant or proposals for a new above-ground or underground transmission corridor carrying voltages of 138kV or greater shall be considered through a City review and approval process, such as the Plan Review Use process, which provides public review, complete analysis, and approval from the Department of Land Utilization and the City Council.

Other system elements, such as sub-stations and transmission lines, are not shown on the Map and should be reviewed and approved administratively.

#### **4.5 SOLID WASTE HANDLING AND DISPOSAL**

Two major solid waste handling and disposal facilities are located in Ewa. The H-Power plant at Campbell Industrial Park is operating at maximum capacity, receiving over 600,000 tons of solid waste each year. The Waimanalo Gulch Sanitary Landfill, located between the proposed Makaiwa Hills residential development and Kahe Valley, is the major active waste disposal site on Oahu. It will run out of capacity within ten to twenty five years.

The Solid Waste Integrated Management (SWIM) Plan prepared by the Department of Public Works and adopted by the City Council in 1995 identified existing landfills which could be expanded and potential sites for developing new landfills to provide new capacity. The Waimanalo Gulch was identified as having potential for expansion. Ewa sites for new landfills identified in the Plan included the mauka part of Kahe Valley, a site within the West Loch Magazine Blast Zone, and a site in East Kapolei.

#### **4.5.1 GENERAL POLICIES**

The East Kapolei site identified in the SWIM Plan should not be developed as a landfill. It is in an area planned for residential use and is adjacent to the University of Hawaii West Oahu campus.

Siting and/or expansion of sanitary landfills should be analyzed and approved based on islandwide studies and siting evaluations.

#### **4.6 DRAINAGE SYSTEMS**

Low-lying parts of the Ewa Plain are subject to flooding during intense rainstorms. Flood control has typically been provided for urbanized areas through the development of concrete-lined channels to convey stormwaters to the ocean.

Discharge of floodwaters to the ocean, however, is a major source of non-point source pollution of nearshore waters, negatively affecting coral growth, fish populations and use of the shoreline for swimming, surfing, and other types of ocean recreation.

The federal government has initiated a major program to reduce non-point-source pollution, mandating response by the State and the counties. The City requires retention/detention facilities adequate for a two-year frequency/24-hour duration storm to be provided on site, but the required capacity is only for the amount of stormwater generated on site. In many watersheds, however, undeveloped mountain areas generate

a disproportionately large share of the total stormflow, and no party is responsible for mitigating the environmental impact.

Concrete-lined drainage channels have other negative environmental impacts, including disruption of lateral shoreline access, beach erosion downdrift of channel mouths, and visual blight.

**Drainage improvements** are planned for:

- ! A major new system to drain Makaiwa Hills, Kapolei Business Park, and the industrial areas closest to the Barbers Point Deep Draft Harbor;
- ! Expansion of the channel at the western edge of BPNAS to provide additional capacity for the City of Kapolei;
- ! A system to drain the West Loch Drainage Basin, serving Ewa by Gentry and development in East Kapolei; and
- ! A system to drain the Kaloι Gulch Drainage Basin.

The **Makaiwa Hills system** will have detention basins mauka of the H-1 Freeway and a 120-foot-wide concrete-lined channel to convey stormwaters to an ocean outlet just south of Barbers Point Harbor. It is being constructed by Campbell Estate. The Estate is also funding the expansion of the existing channel on the western boundary of the Barbers Point Naval Air Station.

Drainage improvements in the West Loch Drainage Basin must be constructed to handle stormwater runoff from existing and proposed projects located in the basin. These projects include the City's West Loch residential project, Phase I of the Ewa by Gentry residential project, and the proposed East Kapolei master-planned community project.

The drainage plans for Phase I of the Ewa by Gentry East project call for a grass-lined drainage channel running immediately east of the project's boundary. The channel would

terminate at a detention basin that will be immediately makai of the Honouliuli National Wildlife Refuge. During heavy rainstorms, stormwater runoff exceeding the capacity of the detention basin would be directed around the wildlife refuge for discharge into Pearl Harbor's West Loch.

The **Kaloi Gulch Drainage Basin** is one of the larger drainage basins in the region. It encompasses an area of approximately 7,140 acres, and has a peak design flow of approximately 11,500 cfs (cubic feet per second). Historically, the drainage pattern in this basin has flowed from the Waianae mountain range above Makakilo through the Kaloi Gulch toward the ocean terminating on Haseko's Ewa Marina property. Floodwaters typically spread out in sheet flows through the sugar cane fields below Farrington Highway.

Drainage flow through the Kaloi Gulch basin, however, has been constrained by the elevation of the OR&L right-of-way which forms a man-made barrier that impedes stormwater runoff. Because of this constraint, stormwater flows have been forced into a narrow drainage culvert between Tenney and Varona Villages in the Ewa Villages. During periods of heavy rainstorms, this has caused flooding in the Tenney and Varona Villages area.

The Ewa Villages and Ewa by Gentry projects are handling drainage within their projects through the development of golf courses. The golf courses provide detention and retention of storm waters and will adequately meet the Department of Public Works' drainage and environmental requirements for stormwater runoff.

Other proposed urban development projects in the basin, including the University of Hawaii West Oahu and the Ewa Marina project have not yet received City approval for their drainage master plans.

The drainage system serving the **Villages of Kapolei**, which consists of golf course retention and disposal of stormwater into injection wells and a large ditch near the Barbers Point Naval Air Station boundary, may need to be augmented in the future.

A proposal is being considered by the Barbers Point Redevelopment Commission which would create a drainage system through the Barbers Point Naval Air Station lands for waters from both the Villages of Kapolei and Kaloi Gulch drainage basins.

See Exhibit 4.2 for the location of Ewa Drainage Basins.

#### **4.6.1 GENERAL POLICIES**

Drainage system design should emphasize control and minimization of non-point source pollution and the retention and/or detention of storm water on-site and in appropriate open space and wetland areas.

Storm water should be viewed as a potential irregular source of water for recharge of the aquifer which should be retained for absorption rather than quickly moved to coastal waters.

Natural and man-made vegetated drainageways and retention basins should be the preferred solution to drainage problems wherever they could promote water recharge, help control non-point source pollutants, and provide passive recreation benefits.

#### **4.6.2 PLANNING PRINCIPLES**

Principles to guide the development of Ewa drainage systems include:

- !** **Retention and Detention.** Public and private agencies should employ methods of retaining or detaining storm water for gradual release into the ground as the preferred strategy for management of storm water. Where feasible, any open space, including parking lots, landscaped areas, mini and community parks, and public and private golf courses should be used to detain or infiltrate storm water flows to reduce their volume and runoff rates and the amounts of sediments and pollutants transported.



- ! **Relation to the Regional Open Space Network.** To the extent possible, the developers should integrate planned improvements to the drainage system into the regional open space network by emphasizing the use of retention basins, creation of passive recreational areas, and recreational access for pedestrians and bicycles.

Natural gulches on the slopes of the Waianae Range foothills which are within the Urban Growth Boundary should be preserved as part of the open space network.

The following principles apply specifically to development within the Kaloι Gulch drainage basin.

- ! **Key Role of Ewa Marina.** The City supports timely development of the Ewa Marina as a key element needed to mitigate drainage impacts in the Kaloι Gulch watershed during major storms. The marina's role as a storm water storage and detention basin has been acknowledged and included in previously approved environmental impact statements and land use approvals for projects in the Kaloι Gulch watershed.
- ! **Relation to the Ewa Village Master Plan and Other Previously Approved Developments in the Basin.** Solutions to handling drainage problems on lands above Ewa Villages must be compatible with the drainage design of the Ewa Villages Master Plan and other developments in the Kaloι Gulch drainage basin which have already been approved. The Ewa Villages drainage design assumes that runoff will not exceed existing levels received from sugar cane fields north of the golf course, will enter the Ewa Villages golf course water retention areas through a number of dispersed channels, and will not be at velocities which would scour out the golf course water retention areas.

## **4.7 SCHOOL FACILITIES**

Statewide, the State Department of Education (DOE) faces an enormous shortfall in funding to meet projected needs for new classrooms. As a result, the DOE is asking for developer "fair- share" contributions, exploring alternative school financing options such as lease/purchase agreements, and seeking to increase the number of schools operating year-round and with multi-tracking or double shifts.

As shown in Table 4.3, the DOE has projected a need by 2020 for nine new elementary schools, two new intermediate schools, and at least one new high school in Ewa. An additional high school will be needed after 2020. (Needs estimates could change if estimates of housing production and density or schools operations policies and funding are revised.)

Conceptual locations of two new intermediate schools and two new high schools are shown on the Public Facilities Map in Appendix A. Elementary schools are not mapped because their sites are of community rather than regional concern and should be determined as part of a master planning and design process. Sites have been reserved for two of the elementary schools, one intermediate school, and one high school. (Minimum site size for elementary schools is eight acres, for intermediate schools is 18 acres, and for high schools is 50 acres.)

### **4.7.1 GENERAL POLICIES**

The State Department of Education should review and recommend on the adequacy of school facilities, either at existing schools or at new school sites to be made available when the development is completed.

Developers should pay their fair share of all costs needed to insure provision of adequate school facilities for the children living in their developments.

**TABLE 4.3: PLANNED SCHOOLS IN THE EWA DEVELOPMENT PLAN AREA**

School	Site Reserved	Opening Date
<b>Elementary Schools</b>		
Kapolei <sup>1</sup>	X	1994
Ewa Gentry	X	1996
Ewa Marina <sup>2</sup>		2000-2003
Makaiwa Hills or Ko Olina <sup>2</sup>		2003-2015
East Kapolei <sup>2</sup>		2003-2015
East Kapolei II <sup>2</sup>		2003-2015
Kaloi I (State Land Bank) <sup>2</sup>		N.D.
Kaloi II <sup>2</sup>		N.D.
Kaloi III <sup>2</sup>		N.D.
Kaloi IV <sup>2</sup>		N.D.
Site undetermined		N.D.
<b>Intermediate/High School</b>		
Kapolei Intermediate	X	1999 <sup>3</sup>
East Kapolei Intermediate <sup>2</sup>		N.D.
Kapolei High <sup>2</sup>	X	2000 <sup>3</sup>
East Kapolei High <sup>2</sup>		N.D.

**NOTES:**

- <sup>1</sup> First Increment completed.
- <sup>2</sup> No legislative appropriation as of 1995.
- <sup>3</sup> Pending future appropriations.
- N.D. Not Determined.

## 4.7.2 PLANNING PRINCIPLES

The following principles should be followed in planning and operating schools in Ewa:

- ! **Schools as Community Centers.** Because of the difficult financial problems for all sectors, new communities are likely to have fewer churches, private social halls, and recreation facilities. As a result, schools may have to assume important functions as cultural and recreational centers and as meeting facilities. The State DOE should design school facilities to facilitate community use during non-school hours and weekends.
  
- ! **Co-location with Parks.** Elementary and intermediate schools should be co-located with neighborhood or community parks, and designs of facilities should be coordinated by the State DOE and the Department of Parks and Recreation when needless duplication of parking and of athletic, recreation, and meeting facilities can be avoided.
  
- ! **Shared Facilities.** The Department of Parks and Recreation should coordinate the development and use of athletic facilities such as swimming pools and gymnasiums with the DOE where such facilities would maximize use and reduce duplication of function.
  
- ! **Fair Share Contribution.** The City will support the State Department of Education's request for fair share contributions from developers of residential projects to insure that adequate school facilities are in place at existing and new schools to meet the needs of residents.

## 4.8 PUBLIC SAFETY FACILITIES

Table 4.4 provides a listing of existing and planned fire and police stations in the Ewa Development Plan area.

**TABLE 4.4: EXISTING AND PLANNED FIRE AND POLICE STATIONS  
IN THE EWA DEVELOPMENT PLAN AREA**

<b>Facilities</b>	<b>Site</b>	<b>Service Area</b>	<b>Service Date</b>
<b>Fire Stations</b>			
Ewa Beach <sup>1</sup>	Ewa Beach	Ewa by Gentry, Ewa Marina, Ewa Beach, Iroquois Point	Existing
Makakilo	Makakilo	Makakilo, Ko Olina, Villages of Kapolei	Existing
Kapolei	Kapolei	Campbell Industrial Park, City of Kapolei, Kapolei Business Park	1995
Ewa Beach <sup>2</sup>	Fort Weaver Road	Ewa by Gentry, Ewa Marina, Ewa Beach, Iroquois Point	2000
Ewa Villages	Tenney Village	West Loch, Ewa Villages, East Kapolei	N.D.
Ko Olina	Ko Olina	Ko Olina Resort	N.D.
Makaiwa Hills	Makaiwa Hills	Makaiwa Hills	N.D.
<b>Police Stations</b>			
Ewa Plains Regional Station	City of Kapolei	Ewa Region	1997
Substations	Ewa Villages	East Ewa Region	N.D.
	Ko Olina	West Ewa Region	N.D.

**NOTES:**

<sup>1</sup> To be replaced with new station on Fort Weaver Road.

<sup>2</sup> New.

N.D. Not Determined.

To meet projected population and economic growth by 2020, the Fire Department estimates Ewa will need four new fire stations.

Because police operate primarily in the field and do not have a need for outlying stations, only a new regional station is projected by the Police Department to be needed to serve the 2020 population of 125,000. It is planned to be built in the City of Kapolei on donated land.

#### **4.8.1 GENERAL POLICIES**

Adequate staffing and facilities are needed to ensure public safety. New development should be approved only if staffing and facilities will be adequate to provide fire and police protection when development is completed.

### **4.9 OTHER COMMUNITY FACILITIES**

Other existing and proposed community facilities shown on the Urban Land Use Map in Appendix A include hospitals, colleges, correctional facilities, and cemeteries. Key facilities include the planned University of Hawaii West Oahu campus and St. Francis West Hospital.

Location of new community facilities should comply with the following principles:

- !** **Colleges and Hospitals.** Colleges and hospitals should generally be located in urban areas near transit nodes, commercial centers, or high-density residential areas.
  
- !** **Correctional Facilities.** Correctional facilities should generally be located on industrial or agricultural lands. (However, a youth detention facility can be located within the City of Kapolei as part of a relocated Family Court.) If such a facility is proposed for lands not planned for industrial or agricultural

use, a City review and approval process which provides public review, complete analysis, and policy approval should be used.

- ! **Other Major Facilities.** Major public, quasi-public or private facilities or utilities which provide essential community services but which could have a major adverse impact on surrounding land uses should be considered through a City review and approval process, such as the Plan Review Use process, which provides public notification, review by appropriate agencies, opportunities for public comment, and approval by the City Council.

#### **4.10 ADDED OR CHANGED PUBLIC FACILITIES**

Public facilities other than those listed in this plan shall be identified on the Public Infrastructure Map.