4. PUBLIC FACILITIES AND INFRASTRUCTURE POLICIES AND PRINCIPLES

This chapter sets forth policies and principles to guide the planning and construction of proposed public and private public facility projects and infrastructure systems to carry out the vision for the future development of Central Oahu, as described in Chapter 2.

Information on timing and phasing of both planned and proposed infrastructure and public facilities 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 detailed information 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.

Policies and principles are provided for the following public facilities and infrastructure systems:

4.1 TRANSPORTATION SYSTEMS

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

The planned and proposed roadway elements and other transportation system features which are listed as potentially being needed to meet the projected development in Central Oahu were identified through the regional planning and transportation analysis done for the *Sustainable* Communities Plan Revision Program, the revision of the Oahu Regional Transportation Plan, and the City's Oahu Trans 2K transportation planning process.

4.1.1 EXISTING ROADWAY NETWORK

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

- The H-1 Freeway which is the major arterial road connecting Central Oahu with the Primary Urban Center,

- Farrington Highway which functions as a secondary east-west route and as a commercial district street through Waipahu.

The three major north-south arterial highways include:

- The H-2 Freeway which extends from the H-1 Freeway at the Waiawa Interchange to Wahiawa,

- Kamehameha Highway which is the island's original major circle island route and serves as a parallel alternate route to the H-2 Freeway during peak periods and as a carrier for local traffic between Waipahu, Waikele, Waipio, Mililani, and Wahiawa, and

TABLE 4.1: CENTRAL OAHU ROADWAY NETWORK

Existing System		
Major East-West Arterials		
o H-1 Freeway		
o Farrington Highway		
Major North-South Arterials		
o H-2 Freeway		
o Kamehameha Highway		
o Kunia Road		
Planned Extensions	**ORTP 2020 #** *(ORTP 2025 #)*	**ORTP 2020 Phasing**
North-South Corridors		
o Widen Kunia Road (4 lanes, H-1 to Royal Kunia)	**S23a** *(C-10)*	1995-2000
o Widen HOV lane inbound connector and bridges through Waiawa Interchange to provide PM outbound HOV lane	**HOV-3**	2001-2005
o Widen Kunia Road (6 lanes, H-1 to Royal Kunia)	**S23b**	2001-2005
o Widen Kunia Road (4 lanes, Royal Kunia to Wahiawa)		
o Widen Kam. Hwy (4 lanes, Ka Uka Blvd to Lanikuhana Ave)	**S40**	2006-2020
o Village Park Connector	**S39** *(C-7)*	2006-2020
o Waipahu Depot Rd widening makai of Farrington Hwy	NA *(C-15)*	NA NA
East-West Corridors		
o Widen Waipahu Street from Kamehameha Highway to Paiwa Street and/or add turn lanes, bus pull-outs, etc.		
o Realign Farrington Hwy eastbound near Waipahu Depot Road	**C27** *(C-17)*	2001-2005
o Extend Waipahu Street eastward to Waihona Street	*(C-5)*	NA
Interchange Improvements	*(C-16)*	NA
o Waipio Interchange		
o Waiawa Interchange	**S6**	1995-2000
New Interchanges	**S18**	2001-2005
o Second Waipio Interchange	**S30**	2006-2020

KEY: NA (Not applicable, project proposed after 2020 ORTP completed)
SOURCE: ORTP 2020 identification numbers and phasing from **2020 Oahu Regional Transportation Plan**, November 1995. *(ORTP 2025 identification numbers from **Transportation for Oahu Plan TOP 2025**, April 6, 2001.)*

- Kunia Road which links Schofield Barracks and Wahiawa with Ewa.

According to the **2020 Oahu Regional Transportation Plan** (November 1995), the existing roadway system in Central Oahu has sufficient capacity for current 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 going from Central Oahu to the Primary Urban Center must transition through interchanges to get onto the H-1 Freeway. A major bottleneck occurs at the Waiawa Interchange where the H-2 Freeway joins the H-1 Freeway. Traffic volume on the H-2 at Kipapa is projected to increase by almost 40% by 2020, while traffic on the H-1 by Aiea is projected to increase by 10%.

The substantial development of jobs in Ewa and Central Oahu (from 52,000 jobs in 2000 to 110,000 jobs by 2025) is projected to increase the number of Central Oahu residents who work in Ewa or Central Oahu from existing levels.

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 the transportation analysis and need assessments done in preparing the **Plan** is provided on pp. 2-32 to 34 of the **Central Oahu Development Plan Report** (June 1995), the technical report prepared by the Plan consultant team.

The following two sections describe improvements needed to meet these existing and projected transportation needs.

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 prepared the **2020 Oahu Regional Transportation Plan** (November 1995) which provides a fiscally-constrained long-range transportation plan for Oahu to 2020. Analysis and recommendations in the **2020 Oahu Regional Transportation Plan** (**ORTP**) are 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. (The **2020 ORTP** is currently being updated and will be replaced by the **2025 ORTP**.)

The **2020 ORTP** includes a number of major improvements for Central Oahu including:

- Widening of Kamehameha Highway to four lanes between Ka Uka Boulevard and the Lanikuhana Avenue intersections;

- Widening of the existing High Occupancy Vehicle (HOV) lane inbound connector and bridges through the Waiawa Interchange to provide an outbound HOV lane in the afternoon peak hours;

- Widening of Kunia Road to 6 lanes from H-1 to Royal Kunia and to 4 lanes from Royal Kunia to Wahiawa;

- Improvement of Waipahu Street from Kamehameha Highway to Paiwa Street, either by widening and/or adding turn lanes, bus pull-out lanes, and other improvements at critical areas;

- Improvement to existing interchanges at Kunia, Mililani, Waipio, and Waiawa; and

- A new interchange at Waipio.

In addition, in 1999, the Waipahu Vision Team proposed establishing a connector road between Village Park and Waipahu using an existing cane haul road. The City Council approved funding for planning of the project in the Fiscal Year (FY) 2000 Capital Improvements Program (CIP) budget, and for planning, design, and construction in the FY 2001 CIP budget. The road was also placed on the Central Oahu Public Facilities Map by the Council in 2000. Negotiations to acquire the right-of-way are underway.

The OMPO Policy Committee, on March 19, 2001, also identified three new projects for inclusion for funding under the **2025 Oahu Regional Transportation Plan**:

- Widening of Waipahu Depot Road makai of Farrington Highway;
- Realignment of Farrington Highway eastbound near Waipahu Depot Road; and
- Extension of Waipahu Street eastward to Waihona Street.

(A number of projects previously listed in the **2020 ORTP** were not selected.)

4.1.3 TRANSIT

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

4.1.3.1 Bus Service

Bus service is provided through the Department of Transportation Services, which currently contracts with Oahu Transit Services (OTS) for operation of TheBus. OTS also operates the City's para-transit service, the Handi-Van.

Central Oahu falls mostly within the Central Oahu/North Shore Bus Service Area. Waipahu falls within the Pearl Harbor Bus Service Area. In 2001, about 50 buses were assigned to the Central Oahu/North Shore Service Area.

As of 2001, there were 11 regular service bus routes serving the Central Oahu *Sustainable* Communities Plan area:

- Route 40 Honolulu-Makaha, through Waipahu
- Route 42 Ewa Beach, through Waipahu
- Route 43 Honolulu/Ala Moana - Waipahu Street
- Route 52 Honolulu - Wahiawa - Circle Island
- Route 62 Honolulu - Wahiawa Heights
- Route 72 Schofield - Wahiawa - Whitmore (Circulator)
- Route 431 Ewa Mill/Villages - Waipahu (Circulator)
- Route 432 East-West Waipahu (Circulator)
- Route 433 Waikele (Circulator)
- Route 434 Village Park (Circulator)

In addition, there were 11 express bus routes operating during the peak commuting hours:

- Route A City Express (Waipahu-UH Manoa)
- Route 81 Waipahu
- Route 83 Wahiawa Town - (HANG) Armory
- Route 83A Mililani - Wahiawa
- Route 84 Mililani - Wahiawa Armory
- Route 84A Mililani (Meheula)
- Route 96 Waipio Gentry
- Route 97 Village Park
- Route 98 Wahiawa Park & Ride (Armory P&R) - Mililani Mauka P&R
- Route 103 Waikele
- Route 201 Honolulu - Waipahu - Ewa Beach
- Route 202 Honolulu - Upper Waipahu

The City is currently in the process of converting its linear bus system into a Hub-and-Spoke system, a combination of express, local and community circulator buses which meet at transit centers throughout the island. There has also been an increase in the number of buses assigned to the Central Oahu/North Shore Bus Service Area.

In its planning for the conversion to a hub-and-spoke system, the City is addressing the need for "transit centers" and park-and-ride facilities in Central Oahu.

- Transit centers are bus transfer points having a protected environment for waiting passengers, like that on the mauka side of Ala Moana Center. Through the Primary Corridor Transportation Project, a site on Hikimoe Street near the Civic Center in Waipahu has been developed as a transit center. In addition, the City is in the process of developing transit centers in Mililani and in Wahiawa.

- Park-and-rides are special parking lots where commuters access the transit network. There are three park-and-ride facilities in Central Oahu located at:
  - Royal Kunia,
  - Mililani Mauka, and
  - the Army National Guard Armory in Wahiawa.

The City's Primary Corridor Transportation Project, which began in 1998, is intended to address existing and future mobility constraints in Oahu's primary transportation corridor, which extends from the City of Kapolei in Ewa to the University of Hawaii-Manoa and Waikiki in the Primary Urban Center.

In November 2000, the Bus Rapid Transit (BRT) Alternative was selected by the City Council as the alternative to be used for the next phase of project development. The BRT system proposed would build upon the hub-and-spoke system and includes Regional and In-Town BRT elements.

The Regional BRT element includes a continuous Interstate H-1 BRT corridor from Kapolei to Middle Street comprised of zipper lanes and new express lanes to form an uninterrupted transitway. Special ramps may facilitate movement between the H-1 BRT Corridor and selected transit centers.

The In-Town BRT component would be a high capacity transit spine from Middle Street to the University of Hawaii-Manoa and Waikiki.

4.1.3.2 Planned Transit Corridor

As shown on the Public Facilities Map in Appendix A, a transit corridor is planned to connect Waipahu with the City of Kapolei to the west and with the Primary Urban Center to the east. Two transit nodes in Waipahu would be the centers of medium density residential and commercial development.

A transit node is more than a transit center. A transit node does have a transit center at its core where passengers can park their cars, and wait in protective shelters. The difference is that the node has shops, entertainment centers, restaurants, offices and residences within easy walking distance of the transit center. These "transit-oriented" land uses attract and supply passengers for the transit, and in turn, enjoy higher volume of customers because transit makes it easy to get to the node or to live in the area surrounding the transit center.

The corridor could support both a shuttle service connecting Waipahu, the UH West Oahu campus, the City of Kapolei, and Ko Olina and commuter service for peak-hour express service to and from the Primary Urban Center. In peak-hour commuting, the corridor could carry express bus service, or eventually, higher-speed dedicated transit service running on a separated route.

Through 2025, it is projected that transit service along the corridor will be provided by mass transit bus service running on roadways shared with other vehicles. However, sufficient right-of-way should be reserved for the establishment, when needed in the future, for either an elevated or a separated at-grade transit system. Such a system will require a 28 foot right of way along the route and a 75 foot right of way at transit station sites (at the transit nodes). The transit corridor runs along Farrington Highway in Waipahu where sufficient right-of-way and setback areas should be reserved to allow the possibility of eventually accommodating a separated transit system.

Medium density apartment and commercial mixed-use development should be permitted in Waipahu within one-quarter mile (15 minutes walking distance) from the transit station/park and ride facility sites at the two major transit nodes. (See more specific land use policy guidelines for Waipahu in Section 3.5 above.)

The objective is to create a land use pattern along the transit corridor and around the two nodes that would allow Waipahu residents to minimize use of the private automobile and encourage use of transit for longer trips and walking or biking for short trips.

4.1.4 BIKEWAYS

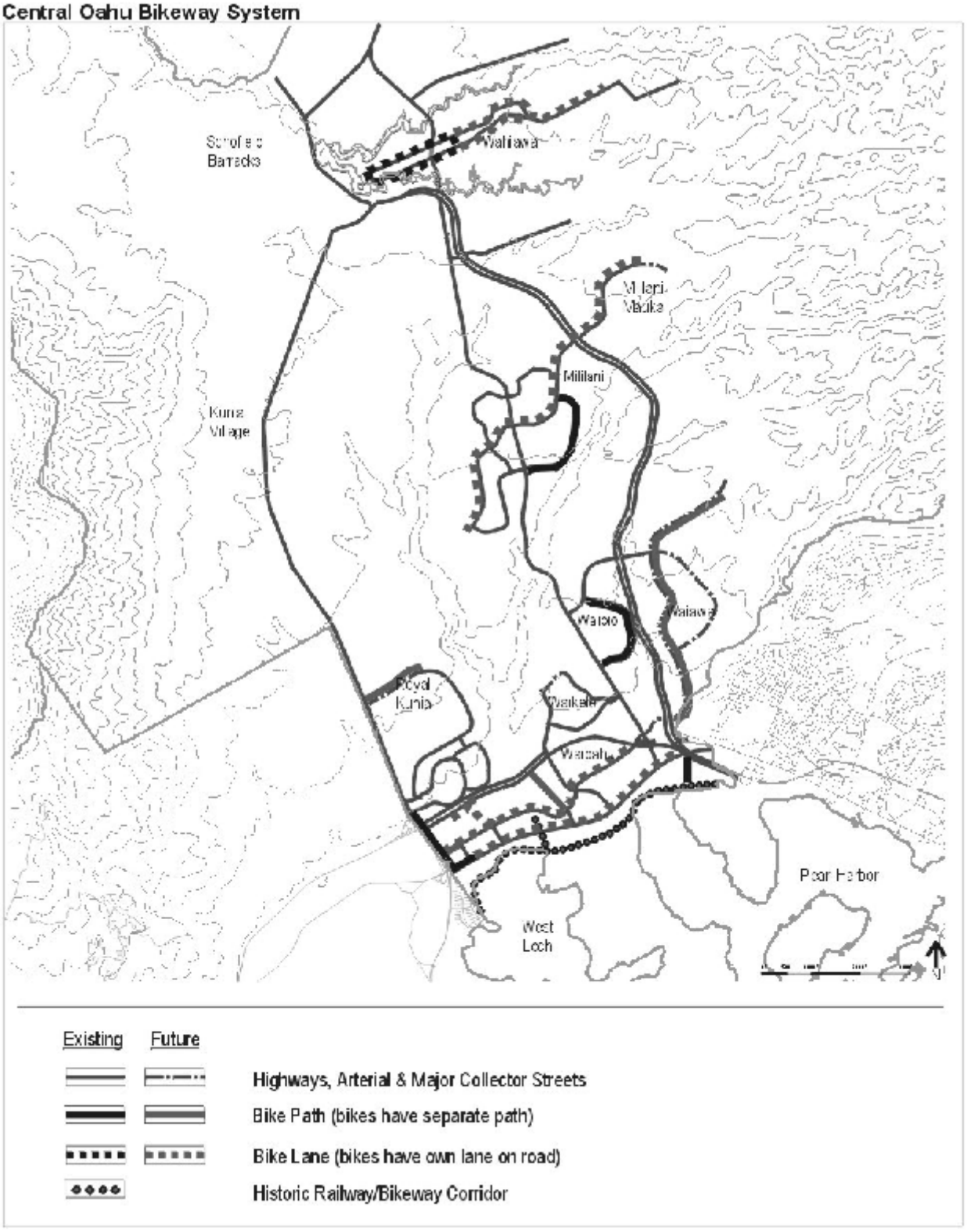
The proposed bikeway system for Central Oahu shown in Exhibit 4.1 generally incorporates facilities recommended in **Bike Plan Hawaii** (the State Bikeway Plan) and the **Waipahu Town Plan**.

The Exhibit shows existing and planned routes for two types of bicycle facilities: **bike paths** which are separated from the roadway and **bike lanes** which are four- to six-foot lanes exclusively for bike use included in the roadway.

Bike Paths. As part of the Pearl Harbor Historic Trail, a major bike path should run east-west along the OR&L right-of-way (with branch routes to the Waipahu Cultural Garden and Leeward Community College). Use of the OR&L right-of-way is to be shared with restored historic train operations (see Sec. 3.4.3.1). Other major bike paths, to run north-south, should include Kunia Road between Farrington and H-1 Freeway, Managers Drive/Mokuola Street, Waipio Uka Street, and Lanikuhana Avenue between Kamehameha Highway and Meheula Parkway.

Bike Lanes. Bike lanes should be provided on Waipahu Street, the Village Park connector between Village Park and Waipahu, Hikimoe Street, Waipahu Depot Road, Meheula Parkway, Kilani Avenue, and California Avenue. In addition, Kamehameha Highway, Kunia Road north of H-1, and Wilikina Drive should be designated as bike routes with a curbside vehicle lane of minimum 12-foot width allowing shared use by bikes and automobiles.

Exhibit 4.1
Central Oahu Bikeway System



4.1.5 GENERAL POLICIES

The following general transportation system policies support the vision for development of Central Oahu.

Adequate Access and Services. Before zoning approvals are given for new residential and commercial development in Central Oahu, the Department of Transportation Services and State Department of Transportation should:

- Report if adequate transportation access and services can be provided with existing facilities and systems; and

- If adequate capacity can not be provided by existing facilities, recommend conditions that should be included as part of the zone change approval in order to assure adequacy, including the timing of any necessary improvements.

Transportation System Functions. Central Oahu's transportation system should:

- Provide adequate access between jobs, shopping, and recreation centers in Central Oahu;

- Provide improved access to and from adjacent areas, especially the employment centers of the Secondary Urban Center in Ewa, and

- Provide adequate capacity for peak-hour commuting to work in the Primary Urban Center. (Although the share of residents who will be able to live in Central Oahu and work either in Ewa or Central Oahu is projected to increase by 2025, a majority will continue to commute to jobs outside Ewa and Central Oahu.)

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;

- Design of street systems in new development areas with layouts to facilitate bus routes and encourage pedestrian travel;

- Provision of supporting facilities and amenities for pedestrian, bicycle, and public transit use (Bicycle racks at commercial centers, bicycle storage facilities at employment centers, and bus shelters at bus stops will be encouraged);

- Preservation of existing right-of-way and establishment of setback areas sufficient to permit future development of a dedicated transit right-of-way on Farrington Highway; and

- Support for medium-density and high-traffic land uses along the Farrington Highway transit corridor, especially within a quarter-mile of the transit nodes.

Transportation Development Priorities. Projected demand for peak-hour transportation in Central Oahu should be met by:

- Increased use of transit; and

- Transportation demand management through:

  - HOV facilities,
  - Park-and-ride facilities, and
  - Other programs which encourage reduced use of the private automobile.

Relying on adding private automobile commuting capacity to meet the projected growth in demand from Oahu's Leeward areas would be prohibitively expensive and have undesirable results. To increase commuting capacity from Central Oahu to Honolulu would require widening or double-decking the freeways in the Aiea/Pearl City area. Even if this extra capacity was added in the Aiea/Pearl City area, destructive, divisive, and expensive street widening would have to be done in Central Honolulu to create sufficient capacity to absorb the extra cars that the expanded freeways could bring to the central city.

4.1.6 PLANNING PRINCIPLES

The topography of Central Oahu is characterized by plateaus, divided by gulches. Major arterials run north-south, generally parallel to the major gulches - Waikele and Kipapa.

Disadvantages. Central Oahu's topography has a number of disadvantages for transportation system development:

- The gulches, because of their depth and width, represent a barrier to east-west roadway connections.

- Since both the H-2 Freeway and Kamehameha Highway have to cross Kipapa Gulch and other smaller gulches, widening of those arterials would involve major costs.

- The topography also makes Central Oahu a costly long-range prospect for rapid transit. In addition to the gulch crossings, the steep incline from Waipahu to Mililani may limit available technology.

- Traffic going from Central Oahu to the Primary Urban Center - where the major peak-hour demand occurs - must transition through interchanges to get onto the H-1 Freeway. A major bottleneck occurs at the Waiawa Interchange, where the major Central Oahu arterial, the H-2 Freeway, joins the H-1 Freeway.

Principles. Planning principles and guidelines addressing residential and commercial land uses, which are set forth in Chapter 3 (Sections 3.8 and 3.9), provide substantial guidance toward enhancing pedestrian, bicycle and transit modes of transportation.

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

- **Increased Arterial Capacity for Transit.** Increases in arterial lanes should be oriented to HOV and mass transit. Exclusive lanes and park-and-ride facilities should be developed to improve transit speed and to provide enhanced incentive for commuters to opt for mass transit or HOV use.

- **Land Use Anticipating Dedicated Transit Lanes on Farrington Highway.** Land use planning for Waipahu should emphasize and strengthen Farrington Highway's role as a transit corridor by:

  - Reserving adequate right-of-way and establishing setbacks to allow for establishment of a separate transit right-of-way; and
  - Encouraging intensive residential and commercial uses around the two transit nodes and along the transit corridor.

  Express bus service, feeder buses, and park-and-ride facilities should be used to link other Central Oahu communities to any future rapid transit system and to reinforce the development of the transit nodes.

- **Transit-Oriented Community Street Systems.** Circulation systems within residential communities and commercial centers should emphasize accessibility from residences 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 3.8 and 3.9, for more detailed planning principles and design 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 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 Department of Planning and Permitting 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 most recent revision of the **Technical Reference Document** for the OWMP (December 1998) includes updated supporting data, analyses, and conclusions which reflect the closing of Oahu Sugar Company and Waialua Sugar Company and the most recent data and analytical review. Future revisions to the OWMP 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 2025 as a result of implementation of the new Ewa Development Plan and the proposed Central Oahu *Sustainable* Communities Plan.

The Board of Water Supply projects that an additional 17 million gallons per day (mgd) of **potable** (or drinkable) water will be needed in Ewa and Central Oahu by 2025 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 13,500 acres of agricultural land in Ewa and Central Oahu protected from development by this plan and the new **Ewa Development Plan** is estimated to be 38 mgd. Meeting this

demand will require reallocation of water within the island-wide system, as well as development of new sources.

As shown below 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 and Central Oahu through 2025. These sources will be pursued as part of the Board's development and operation of an integrated island wide 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.

4.2.1 GENERAL POLICIES

The following general policies should be followed in developing Central Oahu potable and non-potable water systems to meet the projected demand.

Adequacy of Water Supply. Before zoning approval is given for new residential or commercial developments in Central Oahu, 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.

Watershed Protection. Central Oahu watersheds are important to the recharge of the Pearl Harbor Aquifer, one of Oahu's most important sources of potable water. As a result, the watershed should be protected to maintain an adequate supply of good quality water and to retain sufficient acreage to ensure infiltration into groundwater aquifers.

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

POTABLE GROUNDWATER RESOURCES

Ground Water Source	Estimated Source Yield (Million Gallons per Day)
1. Waipahu Wells III	3.00
2. Ewa Shaft	15.00
4. Waiawa Wells (1)	N.A.
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
Total Estimated Source Yield (2)	32.00

ALTERNATIVE WATER RESOURCES

Source	Available Resource (Million Gallons per Day)	
	Minimum Estimate	Maximum Estimate
Potable:		
1. Kalaeloa Desalination Plant	5	15
Nonpotable (3)		
2. Nonpotable Caprock (4)	NA	NA
3. Surface Nonpotable Water	2	3
4. Wastewater Nonpotable Reuse (5)	10	26
5. Waiahole Ditch	0	28
6. Pearl Harbor Springs Nonpotable	14	20
Total Nonpotable	26	77

NOTES:

NA Not Available

(1) Estimate not available until revised Waiawa Water Master Plan reviewed and approved.

(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.

(5) BWS currently has contracts for 12 mgd of recycled water from Honouliuli WRF and for 2 mgd from Wahiawa WWTP which will be used for direct irrigation.

Pearl Harbor aquifer sustainable yield has decreased by 19 mgd due to the reduction in agricultural recharge. 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, 2001

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 in Central Oahu in order to conserve the supply of potable water.

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 from the Honouliuli Water Recycling Facility will focus on meeting the nonpotable water demand in the Ewa Plain.

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.

Agricultural Water Sources. 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 wastewater effluent and distribute non-potable water, provided that customers can be found for this source of nonpotable water, and that no threat is posed to the quality of the potable water aquifer.

Under the City's agreement through a Consent Decree with the U.S. Environmental Protection Agency and the State Department of Health (DOH) for Honouliuli Wastewater Treatment Plant (WTP), the City is reclaiming and using 10 mgd of Oahu's wastewater.

As part of a Consent Decree with the State DOH for the Wahiawa WTP, the City has upgraded the Wahiawa WTP to provide tertiary treatment of wastewater to allow unrestricted usage of the effluent for irrigation and application purposes. This reclaimed water is discharged into Lake Wilson as has been done for over 50 years. The effluent is indirectly used for irrigation when water from Lake Wilson is applied to croplands.

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. Policies in those plans will be adopted only after adequate public review and Council approval, following City development of plans and adoption of an appropriate management process.

4.3 WASTEWATER TREATMENT

The Department of Design and Construction estimates treatment/disposal capacity at the Honouliuli Wastewater Treatment Plant (WTP) will need to be increased from existing capacity for primary treatment of 38 million gallons per day (mgd) to 51 mgd by 2025 to meet projected population and economic growth in Ewa and Central Oahu resulting from implementation of the revised Plans. In addition, the capacity of specific sewer lines and pump stations will need to be increased.

The City's Wahiawa WTP is operating under a Consent Decree from the State Department of Health. Under the Consent Decree, the City has agreed to upgrade the WTP to tertiary treatment and deepen the outfall in order to continue discharging to Wahiawa Reservoir (Lake Wilson). The plant now treats approximately 2.0 mgd domestic wastewater collected from Wahiawa Town, Whitmore Village, and the Navy Naval Computer and Telecommunications Area Master Station communities.

The City has upgraded the Wahiawa WTP to produce tertiary treated effluent. This highly treated water is discharged into Wahiawa Reservoir (Lake Wilson) through a new 24-inch outfall at a depth of approximately 40 feet below the water level.

The City is also considering reactivating and upgrading the Mililani WTP (which is currently out of operation) to provide tertiary treated effluent for irrigation purposes at Royal Kunia, Waiola, and Waiawa.

4.3.1 GENERAL POLICIES

All wastewater produced by new developments in Central Oahu 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 (UIC) line of the State Department of Health and the "No-Pass" Line of the Board of Water Supply. Above the UIC line and "No-Pass" line, use of tertiary treated effluent (R-1 Quality) for irrigation purposes may be appropriate if approved by the Department of Health and Board of Water Supply. As noted above, the City is meeting its 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 island wide 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 Public Facilities Map in Appendix A.

A City review and approval process which provides adequate public notice and input should be used for any major new private wastewater treatment plant. Other system elements, such as pump stations and mains, should not require such comprehensive review and approval.

4.4 ELECTRICAL POWER DEVELOPMENT

The Hawaiian Electric Company (HECO) expects that increased electrical demand may create a need for additional power generation capacity before 2025. Overall economic development, the associated increase in electrical demand, the effectiveness of energy conservation and efficiency programs, and the development of new energy-related technologies will all play a role in determining how soon additional generation capacity will be required. One potential site for additional generating units identified by HECO is the Waipio Peninsula. The site is owned by the U.S. Navy which would have to agree to such a use for the site.

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 island wide studies and siting evaluations. Strong consideration should be given to placing any new transmission lines underground where possible under criteria specified in State law.

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. Any proposed major new electrical power plant should be considered through a City review and approval process which provides public notification and opportunity to comment and public agency analysis of impacts and mitigations.

4.5 SOLID WASTE HANDLING AND DISPOSAL

There are no landfills in Central Oahu because of concerns about the potential impacts on Oahu's water supply. The entire *Sustainable* Communities Plan area, with the exception of a small area bordering Pearl Harbor, is considered one of Oahu's most important groundwater recharge areas.

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. No potential sites in Central Oahu were identified.

While the City is augmenting the number and scope of its waste diversion programs, most of Central Oahu's solid waste will continue to receive final treatment and disposal either through incineration at the H-POWER plant or disposal at landfills in other areas. The Waipahu Incinerator was closed in 1995.

4.5.1 GENERAL POLICIES

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

Siting of landfills above the UIC line and the "No Pass" line should be approved only if recommended for approval by the Department of Health and the Board of Water Supply.

A City review and approval process which provides adequate public notice and input, complete technical analysis of the project, and approval by the City Council, should be used for any new or major modification of private landfills, incinerators, garbage-to-energy plants, refuse convenience centers, or other major solid waste handling or disposal facility.

4.6 DRAINAGE SYSTEMS

Central Oahu can be divided into two areas for assessing drainage needs: the uplands mauka of the H-1 Freeway and the lowlands makai of the freeway.

The urban developments sited on high plateaus in the Central Oahu uplands benefit from the natural flood protection provided by the deep gulches which drain storm waters and filter some pollutants. Historically, flooding problems in the uplands have only occurred in the portion of Waiakakalaua Gulch which has been developed with houses and apartments.

Flooding has been more prevalent in the Central Oahu lowlands, particularly in Waipahu around Waikele Stream and in Waiawa around the lower reaches of Waiawa Stream where flood plain and wetland areas have been developed.

The discharge of drainage to Pearl Harbor has caused serious siltation problems and has aggravated water pollution which was already a significant problem due to shipyard uses. Siltation causes navigation problems in the harbor and forces the Navy to dredge at frequent intervals.

The City, in response to a federal government mandate, has initiated a major program to reduce non-point-source pollution. The City has established new rules for its storm drainage standards. These rules, which were adopted in 2000, include provisions for storm water quality and retention.

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 drainage ways 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 Central Oahu drainage systems include:

- **Retention and Detention**. Public and private agencies should employ methods of retaining or detaining storm water as the preferred strategy for management of non-point source pollutants in 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 pedestrian and bicycles.

- **Preservation of Gulches as Natural Drainage ways**. The major natural gulches which are listed in Table 2.1 should be retained as flood plains and open space resources. Further development of residential, commercial, or industrial uses within the gulches should be avoided, and grading or other disturbance of gulch walls, other than what is necessary to clear the gulch of debris or other floodway obstructions or to construct and maintain drainage, access, and utility facilities, should not be allowed.

- **Preservation of Flood Plain Capacity Around Pearl Harbor**. Urban development should be restricted in the lowlands around Pearl Harbor if it reduces flood plain capacity or allows increased siltation and pollution of Pearl Harbor.

- **Restrictions on Stream Channelization**. Streams should not be channelized, and existing flood plains should be left intact except where absolutely necessary to protect existing urban development from flooding.

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/or with multi-track scheduling.

As shown in Table 4.3, based on expected development, the DOE projects a need for seven new elementary schools, three new intermediate schools, and two new high schools in Central Oahu by 2025.

The conceptual locations for one new intermediate school and one new high school 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. Sites have been reserved for the five of the seven elementary schools. The minimum site size recommended by the DOE for elementary schools is 12 acres, for intermediate schools is 18 acres, and for high schools is 50 acres.

4.7.1 GENERAL POLICIES

Project Review and Approval Assessment. As new residential developments are reviewed as part of the project application review and approval process, the State Department of Education should report to the Department of Planning and Permitting whether the DOE will be able to provide adequate school facilities, either at existing schools or at new school sites so that needs from the proposed development can be met.

Fair Share Provisions. Developers should pay their fair share of all costs needed to provide adequate school facilities for the children living in their developments.

TABLE 4.3: PLANNED SCHOOLS IN THE CENTRAL OAHU *SUSTAINABLE* COMMUNITIES PLAN AREA

School	Site Reserved	Opening Date
Elementary Schools		
Mililani Mauka II	X	2001-2003
Royal Kunia	X	2003-2005
Waiawa	X	N.D.
Waiawa II	X	N.D.
Waiawa III	X	N.D.
Koa Ridge		N.D.
Koa Ridge II		N.D.
Intermediate/High School		
Waiawa Intermediate	X	N.D.
Site Undetermined Intermediate		N.D.
Site Undetermined Intermediate		N.D.
Waiawa/Koa Ridge High School		N.D.
Site Undetermined High School		N.D.

NOTES:

N.D. Not Determined.

SOURCE:

State Department of Education, March 2001

4.7.2 PLANNING PRINCIPLES

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

- **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 Design and Construction when needless duplication of parking and of athletic, recreation, and meeting facilities can be avoided.

- **Shared Facilities**. The Department of Design and Construction 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 through its zoning powers the State Department of Education's requests for fair share contributions from developers of residential projects so that the DOE can provide adequate school facilities to meet the needs of residents.

4.8 PUBLIC SAFETY FACILITIES

Table 4.4 provides a listing of existing and planned fire stations, police stations, and emergency medical services facilities and response units in the Central Oahu *Sustainable* Communities Plan area.

To meet projected population and economic growth by 2025, the Fire Department recently built two stations.

Because police operate primarily in the field and do not have a need for outlying stations, the Police Department plans no new regional stations in Central Oahu. Land has been donated for a sub-station at Waikele, but construction of the sub-station is not expected in the near future.

The expected population growth and development of new communities and community facilities in Central Oahu will result in a need for additional emergency medical service facilities and response units. The specific needs will depend on the size, demographics, and location of the future population. The State Department of Health has identified a need for three new stand-alone emergency medical services facilities in Central Oahu by 2010.

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 and emergency medical services when development is completed.

4.9 OTHER COMMUNITY FACILITIES

Other existing community facilities shown on the Urban Land Use Map in Appendix A include hospitals, colleges, correctional facilities, and cemeteries. Key facilities include Leeward Community College, Wahiawa Hospital, and the Waiawa Correctional Facility. A medical park is proposed for a portion of Koa Ridge nearest the new Central Oahu Regional Park.

TABLE 4.4: EXISTING AND PLANNED PUBLIC SAFETY FACILITIES IN THE CENTRAL OAHU *SUSTAINABLE* COMMUNITIES PLAN AREA

Facilities	Site	Service Area	Service Date
Fire Stations			
Wahiawa	Wahiawa	Wahiawa, Schofield, Wheeler, Whitmore Village	Existing
Mililani	Mililani	Mililani, Leilehua, Waikakalaua	Existing
Mililani Mauka	Mililani Mauka	Mililani Mauka, Waikakalaua	Existing
Waikele	Waikele	Waikele, Waipio-Gentry, Waipahu	Existing
Waipahu	Waipahu	Waipahu, Royal Kunia, Waikele, Ewa Villages, West Loch, Crestview, Waipio-Gentry	Existing
Police Stations			
Wahiawa District Station	Wahiawa	Wahiawa, Schofield, Wheeler, Whitmore Village, Leilehua, and Waikakalaua	Existing
Pearl City District Station	Pearl City	Waipahu, Royal Kunia, Waikele, Crestview, Waipio-Gentry	Existing
Waikele Substation	Waikele	Waikele	N.D.
Emergency Medical Services Facilities			
Wahiawa	@ Wahiawa General Hospital	Wahiawa, Schofield, Wheeler, Whitmore Village	Existing
	Stand-alone facility		2005
Mililani Mauka	co-locate @ Mililani Mauka Fire Station	Mililani, Mililani Mauka, Leilehua, Waikakalaua	2003
Waikele	Stand-alone facility	Waikele	2008
Waipio	Provide four RRUs		2002
Waipahu	@ Waipahu Fire Station	Waipahu, Royal Kunia, Waikele, Ewa Villages, West Loch, Crestview, Waipio-Gentry	Existing
	Stand-alone facility		2006

NOTES:

N.D. Not Determined.

RRU Rapid Response Unit (Does not transport patients but is used by an emergency medical technician to reach an emergency site and provide advanced life support treatment.)

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.

  A medical park can be located near the Central Oahu Regional Park on Koa Ridge Makai . Uses at the Medical Park could include:

  - A diagnostic-treatment center;
  - A physician's office building;
  - A sports medicine and research center;
  - A birthing center;
  - An acute-care facility;
  - An Alzheimer's center;
  - A hospice;
  - A center for alternative medicine;
  - An adolescent mental health facility;
  - A dental clinic;
  - A rehabilitation and wellness center;
  - A geriatric center;
  - A cardiac center; and
  - Other medical and health services.

  Building heights and densities allowed at the park should be comparable to those allowed at Mililani Technology Park.

- **Correctional Facilities**. Correctional facilities should generally be located on lands planned for industrial and agricultural use. 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 project analysis, and City Council approval should be used.

- **Approval of 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 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.