

HONOLULU BICYCLE MASTER PLAN

DEPARTMENT OF TRANSPORTATION SERVICES
CITY & COUNTY OF HONOLULU
MAYOR JEREMY HARRIS

April 1999



HONOLULU BICYCLE MASTER PLAN

DEPARTMENT OF TRANSPORTATION SERVICES
CITY & COUNTY OF HONOLULU
MAYOR JEREMY HARRIS

Prepared By:
Helber Hastert & Fee, Planners
Bicycle Federation of America
Engineering Concepts, Inc.
David Cheever Marketing

April 1999

The preparation of this document was financed in part through a grant from the United States Department of Transportation, Federal Transit Administration. The United States Government assumes no liability for the contents or use thereof.

ACKNOWLEDGMENTS

City Council, City and County of Honolulu
Department of Transportation Services
Bicycle Advisory Committee
Hawaii Bicycling League

Individuals:

The Honorable Jeremy Harris, Mayor of the City &
County of Honolulu
Andy Mirikitani, City Council Transportation
Committee Chair
Cheryl Soon, Director of the Department of
Transportation Services
Joe Magaldi, Deputy Director of the Department of
Transportation Services
Chris Sayers, City and County of Honolulu Bicycle
Coordinator, Project Manager
Michael Medeiros, State Department of
Transportation Bicycle and Pedestrian Coordinator



MESSAGE FROM THE MAYOR

As a lifelong bicycling enthusiast, I am very pleased to present the *Honolulu Bicycle Master Plan*. This comprehensive plan sets forth the City's goals, objectives, and strategies to make Honolulu a truly bicycle-friendly city.

The document puts forth a bold vision of bicycling as an alternative mode of transportation as well as a fun recreational activity. To ensure broad-based community input, we incorporated the ideas and suggestions of bicyclists, concerned citizens, the business community, and the visitor industry. These vision groups wanted bicycles to be a significant part of the transportation mix.

On behalf of the citizens of the City and County of Honolulu, I want to thank all participants for their valuable assistance in developing this plan for the future.



JEREMY HARRIS, Mayor
City and County of Honolulu



Mayor Jeremy Harris speaks at a press conference on the importance of bicycles as a viable mode of transportation.

MESSAGE FROM COUNCILMEMBER

It has been very gratifying to work together with the Department of Transportation Services, Helber Hastert & Fee, the Hawaii Bicycling League, the Bicycle Federation of America, and O'ahu citizens, in making the *Honolulu Bicycle Master Plan* a reality. This visionary plan provides the blueprint for the 21st Century to make Honolulu a bicycle-friendly city and a world class bicycling destination. This plan is a product of extensive community visioning workshops with residents, and discussions and meetings with neighborhood boards in each community from Kāhala to Pearl City.

The law establishing the *Honolulu Bicycle Master Plan*, which I authored, was initiated to create a viable transportation alternative, a major recreational asset for residents and visitors, and an economic development initiative to promote bicycle tourism. Three major initiatives are created under the plan. The first calls for the construction of a *Lei of Parks* linking the city's regional parks and attractions from Diamond Head to Aloha Tower. The second provides a continuous bikeway from Kāhala to Pearl City serving over 450,000 residents in the primary urban center, and the third seeks to improve access to O'ahu colleges and universities.

I extend my special thanks to all those who participated in developing this plan for their invaluable assistance in creating a vision for the future of our island community.

Andy Mirikitani

ANDY MIRIKITANI, Transportation Committee Chair
Honolulu City Council



Councilmember Mirikitani confers with bicycle advocates.

Bynum, 1998

CONTENTS

1. PURPOSE & NEED6
 2. VISION, GOALS & OBJECTIVES 11
 3. RECOMMENDED PROJECTS 14
 4. PROJECTED COSTS 31
 5. IMPLEMENTING POLICIES & PROGRAMS 34
 6. BENCHMARKS 38
 REFERENCES 42

LIST OF MAPS

PROPOSED PROJECTS 13
 REGIONAL BIKE CORRIDOR CONCEPT 15
 LEI OF PARKS CONCEPT PLAN 17
 LEI OF PARKS MAP 19
 BIKE-FRIENDLY ROUTE NO. 1 MAP 21
 COLLEGE ACCESS MAP 25
 EXISTING BIKEWAYS C-2
 STATE BIKE PLAN RECOMMENDATIONS C-3

LIST OF TABLES

TABLE 1: LEI OF PARKS - PRIORITY ONE PARK LINKS SUMMARY 18
 TABLE 2: BIKE-FRIENDLY ROUTE NO. 1 SUMMARY 20
 TABLE 3: COLLEGE ACCESS PROJECT SUMMARY 24
 TABLE 4A: PRIORITY TWO PROJECTS 28
 TABLE 4B: LEI OF PARKS - PRIORITY TWO PARK LINKS SUMMARY 29
 TABLE 5: PRIORITY THREE PROJECTS 30
 TABLE 6: PROJECTED CONSTRUCTION COSTS 31

TABLE 7: GOALS, OBJECTIVES & BENCHMARKS 38
 TABLE A.1: LEI OF PARKS - PRIORITY ONE PARK LINKS A-4
 TABLE A.2: LEI OF PARKS - PRIORITY TWO PARK LINKS A-4
 TABLE A.3: BIKE-FRIENDLY ROUTE NO. 1 A-5
 TABLE A.4: COLLEGE ACCESS PROJECTS A-5
 TABLE A.5: PRIORITY 2 PROJECTS A-6
 TABLE A.6: PRIORITY 3 PROJECTS A-6
 TABLE B.1: MAKAI BIKE CORRIDOR PROJECTS B-2
 TABLE B.2: CENTRAL BIKE CORRIDOR PROJECTS B-3
 TABLE B.3: MAUKA BIKE CORRIDOR PROJECTS B-3
 TABLE B.4: MAUKA-MAKAI BIKE CORRIDOR PROJECTS B-4
 TABLE B.5: RECOMMENDED DESIGN TREATMENT B-7
 TABLE C.1: PROPOSED HAWAI'I BIKEWAY FACILITIES UNDER
 1994 BIKE PLAN C-1
 TABLE C.2: EXISTING BIKEWAYS IN THE PRIMARY URBAN CENTER C-1





PURPOSE & NEED

Honolulu already is a great city for bicycles — and it has the potential to be one of the best! Its physical beauty, mild year-round climate, relatively flat coastal plain, and compact form make Honolulu ideal for bicycle transportation. This *Honolulu Bicycle Master Plan* outlines a set of projects, policies, and programs to incorporate bicycles into the City's future transportation system.

Honolulu is at an important crossroads in its growth and development. It is faced with significant choices about its future. Will this City continue to grow and prosper, or will it follow the path of many Mainland cities facing decline and disinvestment? To prosper, the City must continue to attract O'ahu residents and visitors to live, work, and play. The present residential areas must remain vibrant.

One hallmark of a livable city is that its public spaces are actively used, that it has places to walk and ride, and that the outdoors can be enjoyed. Like many U.S. cities, Honolulu has matured as a city dominated by the automobile, to the detriment of alternative travel modes such as walking, bicycling, and transit. Increasingly, this auto-dependence is affecting the quality of life in our City.

While the auto provides an important means to move about the City, increasing congestion is making it difficult, time consuming, and expensive to use. Favorite destinations, such as beaches, parks, shopping centers, schools, and work places, are becoming harder to get to because of traffic congestion and limited parking. Our streets are designed more to accommodate the rapid flow of automobiles than for pedestrians and bicyclists. Traffic noise and the physical barriers imposed by our streets provide those not in autos a constant reminder of our auto-dependency.

Concern over automobiles speeding through neighborhood streets is a common agenda item at Neighborhood Board and community meetings. Excessive speeds and the danger imposed by these speeds, have fundamentally changed the way our children are permitted to enjoy their neighborhood streets. Many parents must prohibit their children from riding bicycles to school due to fears about safety on the streets.

The economics of owning an automobile are significant and consume an increasing portion of the family budget. The often times hidden environmental costs of our auto-dominated culture include total dependence on nonrenewable fossil fuels, the potential environmental damage of petroleum leaks into our streams, groundwater and coastal ar-

eas, and of course, the personal tragedy and public health costs associated with automobile accidents. The impact automobiles have on the quality of life within the City is important not only to residents, but also to visitors and the visitor industry, our economic mainstay.

As Honolulu looks to the 21st Century, we have to ask how to enhance the appealing qualities of our City for future generations. The *Honolulu Bicycle Master Plan* suggests that we should invest in sensible alternative transportation modes that are sustainable, that tread lightly on our natural environment, and which yield significant health benefits. There is, however, no single panacea. The investment strategy must be built on several, well-integrated legs including public transit, pedestrian and bicycle facilities, and the automobile. The strategy must also institutionalize the commitment, at all levels of government, to move toward the post-automobile era, where several viable alternative transportation modes are available to serve the mobility needs of our residents and visitors.

The *Honolulu Bicycle Master Plan* provides a strategy for the bicycle component of our future transportation system. It identifies an integrated network of on-road bike lanes and off-road shared-use paths that will link people with their favorite destinations. It also provides an array of important policy and program recommendations to institutionalize the commitment in all levels of government.

The potential is great for bicycles to become a significant transportation mode within urban Honolulu. Already, more than three times as many commuters use bicycles to get to work as the national average, despite a scarcity of well located bikeways and sufficient end-of-trip facilities (secure



Boulanger, 1998

Riding a bicycle is no longer just a recreational activity taken up by children. It has emerged as a viable mode of transportation for people of all ages for a variety of trip purposes.

bike lockers, showers, etc.). Since 1995, the Department of Transportation Services (DTS) has retrofitted all its buses with bike racks. Bike loadings on buses have increased dramatically from 526 per month in July 1995 to 10,370 in June 1998.

More can be done. West Coast cities, including Seattle and Portland, have been recognized for their successful bicycle transportation programs and boast even higher proportions of bicycle commuters — despite their wet climates and cold winters.

Bicycling is a very popular form of recreation for Honolulu residents. This is evidenced by the popular support of the

PURPOSE & NEED

Hawaii Bicycling League's annual "Century Ride," the island's third largest participative sporting event. Numerous triathlons and bicycle events appeal to a broad base of residents and a growing number of visitors.

A recent telephone survey determined that 23% of O'ahu residents had ridden a bicycle within the last month. Based on other jurisdictions' experiences, and in light of the popularity of bicycling already enjoyed here, investment in well planned facilities will significantly increase the use of bicycles as a means of transportation.

Formal bicycle planning in Hawai'i began, and has matured over the past two decades, as congestion on roadways increased and policy makers looked for alternate transportation modes. In 1977, the Hawai'i State Department of Transportation prepared *Bike Plan Hawai'i* for the State's roadway system. This plan was later updated in 1994. The

State and the Counties have used the plan to guide implementation of bicycle facilities, including bike racks, showers, bike lanes, routes and shared-use paths.

At present, the City is served by a series of ad hoc bikeways that are not linked systematically, although there are a few notable exceptions such as the Pearl Harbor Bike Path and the recently constructed Kalaniana'ole Highway Bikeway. What facilities exist generally suffer from infrequent maintenance. In 1994, City Council member Andy Mirikitani introduced Ordinance 94-39 to address this problem. The Ordinance directs that a bikeway system master plan be prepared and updated every five years. This ordinance was adopted by the Mayor and the City Council. The preparation of the *Honolulu Bicycle Master Plan* is a significant step towards making Honolulu a bicycle-friendly City.

The *Honolulu Bicycle Master Plan* provides recommendations for the development of a regional network of almost 100 miles of new bicycle routes, stretching from Kāhala to Pearl City. This 20-mile long urban corridor houses a residential population in excess of 450,000. Most of the recommended bikeways are within existing street rights-of-way, a choice necessitated by limited land area within the City and predicated on the legal right of bicycles to operate on public roadways. The recommended bikeways connect primary employment centers, and commercial and recreational destinations with urban Honolulu's major residential areas. The routes are direct and continuous, important characteristics of popular bikeways.

High-priority projects include construction of a "Lei of Parks," a network of primarily off-road paths linking the City's regional parks and attractions — from Diamond Head to Aloha



An attractive signing system should be created to highlight the Lei of Parks and to guide bicyclists riding along it.

Tower. The Lei provides residents and visitors the opportunity to move between beautiful parks in a comfortable, off-road setting. Waikiki, near the center of the Lei, will benefit by an exciting new recreational amenity for visitors.

Another high-priority project is a continuous bikeway across the City, providing a direct connection between Pearl City and Kāhala. This bikeway, referred to as "Bike-Friendly Route 1," will promote bicycle commuting in the City. A third high-priority project would improve bike-access to the City's colleges and universities. Many other projects are recommended that would ultimately result in an integrated network of bikeways that would give residents a viable transportation alternative to the automobile.



Tens of millions of dollars are spent every year to operate and maintain Honolulu's roadways, with a large share of the funds coming from the federal government through the federal gasoline tax. The recent reauthorization of the federal highways spending program (now called the Transportation Equity Act for the 21st century or "TEA21") ensures the eligibility of 80% federal matching funds to complement local funds for recommended bikeway projects.

If all of the projects in this master plan were built today, the projected costs to design and build the entire network are about \$77 million. In reality, however, the projects will be constructed over a 10-20 year period and much of the funding can come from normal budgets for roadway repair, maintenance, and improvement. A large portion of the project work involves State roads (about \$30 million). This work would need to be programmed and funded by the State Department of Transportation. Of the remaining \$47 million of potential City projects, a significant portion can be funded from regular line agency maintenance and capital improvement budgets, coinciding with other park and roadway improvements.

In addition to projects, the plan includes important recommendations to institutionalize bicycle transportation features in the routine working of all levels of government agencies and, in some instances, the private sector. An essential recommendation is that every street in the City should be designed and maintained to accommodate shared use by bicycles and motor vehicles. Finally, specific benchmarks are provided to measure progress in achieving the long-term vision for a bicycle-friendly Honolulu.

PURPOSE & NEED

The draft *Honolulu Bicycle Master Plan* was circulated to the 17 Neighborhood Boards within the study area, to relevant government agencies, and interested parties. Presentations were made to each Board to describe the recommendations.

The draft plan was well received. Several Boards had specific concerns. Examples of comments range from Nu'uuanu-Punchbowl's (Board #12) request for additional routes to Wai'ala'e-Kāhala's (Board #3) request for removal of proposed routes from the plan. All review comments were evaluated, and where appropriate, incorporated into this, the final *Honolulu Bicycle Master Plan*.

If Honolulu is to maintain its character and prestige as a great place to live and visit, we should commit the resources to transform our auto-centric transportation system into one that reinforces the qualities that make our City livable. Nothing less than a fundamental shift in emphasis from the automobile to alternative transportation modes is required to achieve this. The *Honolulu Bicycle Master Plan* is an important step in that process.

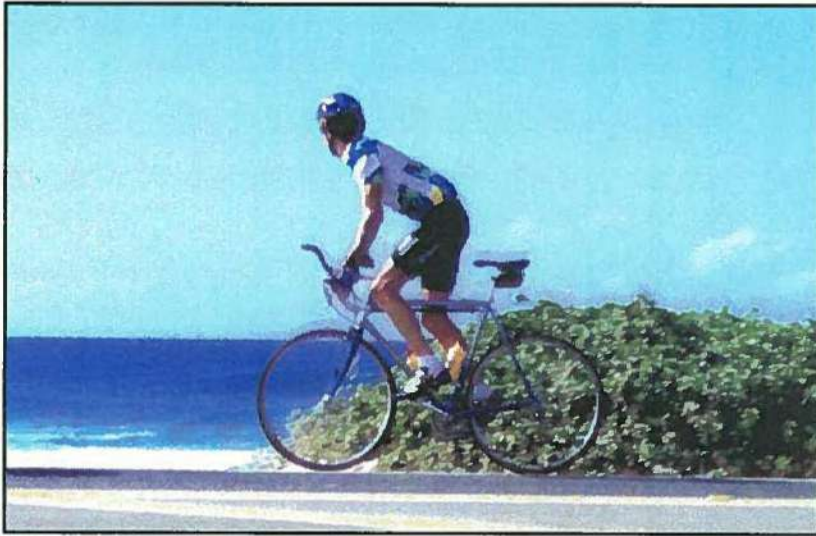
To fully realize Honolulu's potential as a great place for bicycles, the *Honolulu Bicycle Master Plan* must lead to physical changes in facilities measured in miles of bike lanes, yards of concrete, numbers of bike parking stalls, and the like. It must also change the way we currently consider bicycles within the City's overall transportation system. These changes, in turn, will lead to greater use of bicycles as alternatives to autos.

The design, financing, and implementation of the recommended system and the institutionalization of recom-



Boulenger, 1998

mended policies and programs are challenging efforts. Successful implementation of the *Honolulu Bicycle Master Plan* will require a dedicated staff, coupled with strong administrative, legislative, and community support over a sustained period. This is a challenge of yet another nature, but one entirely worth meeting.



VISION, GOALS & OBJECTIVES

Honolulu's twenty-year vision is:

Honolulu is a bicycle-friendly city where bicycling is a viable and popular travel choice for residents and visitors of all ages.

“Honolulu is a bicycle-friendly city...” *Bicycle-friendliness suggests a city where it is easy to ride a bicycle. Fear is not a factor when riding a bicycle in Honolulu because the roads are shared, bicycling is safe, and animosity between motorists and bicyclists does not exist.*

“where bicycling is a viable...” *Viable indicates a bicycle system that is easily accessible. The bicycle network in Honolulu is a comprehensive and continuous one, making it convenient to fulfill a range of transportation needs.*

“and popular...” *The word “popular” connotes social acceptance; not only is bicycling a viable choice, but lots of people are bicycling as well. It implies that people will use a bicycle for a variety of reasons: commuting, recreation, exercise, and other trip purposes.*

“travel choice...” *Bicycling is not the only way to get from one point to another. However, it is one of a variety of transportation modes that Honolulu offers.*

“for residents...” *A bicycle-friendly city makes it easier for residents to choose to ride a bicycle. It benefits the community by reducing congestion and pollution as well as increasing the safety on roadways.*

“and visitors...” *Bicycling not only benefits our residents, but it is a choice that tourists have as well. This part of the vision alludes to the possibilities that bicycling can contribute to further diversification in our tourist-based economy.*

“of all ages...” *This captures the essence of the plan where riding a bicycle is for everyone. Honolulu offers bikeways that are safe for a child to ride to school, an adult to commute to work, or an elderly person to ride to the post office.*

The vision statement supports a shift in transport emphasis from near total dominance by automobiles to formal encouragement of bicycle use. It demands that travel by bicycle be convenient and safe, with excellent bicycle facilities, and a comprehensive bicycle network.

VISION, GOALS & OBJECTIVES

Six themes were repeatedly identified in public workshops and incorporated into Honolulu's vision. These themes were used as a basis for the development of the goals and objectives:

- mode change;
- better facilities;
- access and convenience;
- improved safety;
- social acceptance; and
- economic development.

Based on these themes, three goals and eleven objectives were established to realize the vision for a bicycle-friendly Honolulu:

Goal #1: To increase the mode share of bicycle trips.

Objective #1.1: Increase the number of people who ride bicycles.

Objective #1.2: Provide and maintain a continuous bicycle network.

Objective #1.3: Provide and maintain bicycle support facilities (e.g. showers and bicycle racks).

Objective #1.4: Strive to make Honolulu one of the world's most bicycle-friendly cities.

Goal #2: To enhance cooperation between roadway users.

Objective #2.1: Increase the awareness of bicyclists, motorists, and pedestrians, of their rights and responsibilities.

Objective #2.2: Enforce the traffic code.

Goal #3: To encourage and promote bicycling as a safe, convenient, and pleasurable means of travel.

Objective #3.1: Provide a variety of bikeways.

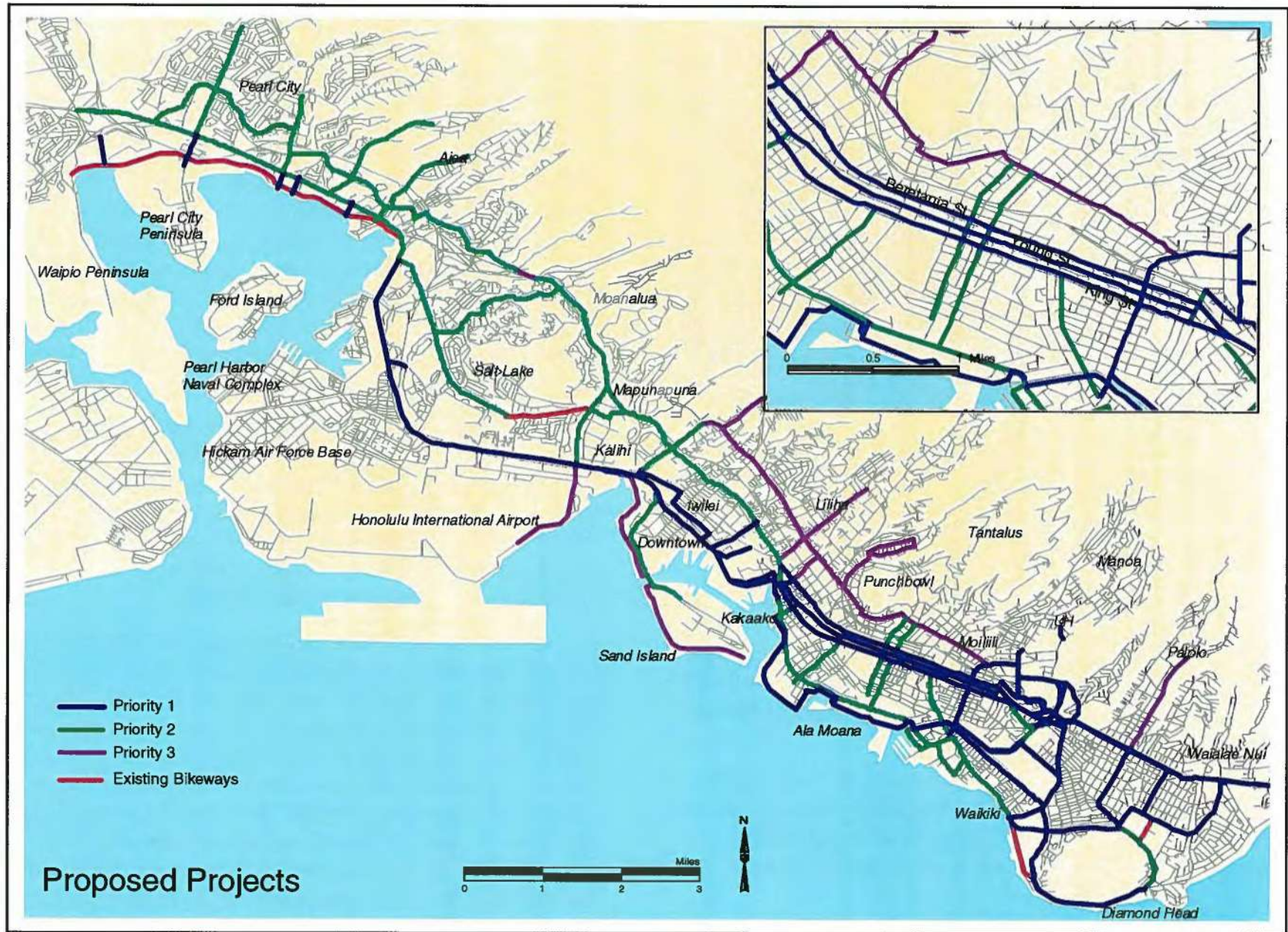
Objective #3.2: Prepare and implement a plan to promote bicycling.

Objective #3.3: Reduce the number of traffic crashes involving bicycles.

Objective #3.4: Reduce the number of bicycle thefts.

Objective #3.5: Increase the number of tourists who rent bicycles.

The projects, policies, and programs discussed in the *Honolulu Bicycle Master Plan* are based on these goals and objectives. The proposed projects map, on the facing page, highlights the projects which form the continuous bicycle network specified in Objective #1.2. The projects are discussed at length in Chapter 3, with estimated costs for the projects discussed in Chapter 4. Chapter 5 presents the policies and programs which will contribute to Honolulu becoming a bicycle-friendly city. Chapter 6 reviews benchmarks to measure the bicycle-friendliness of the City over time.





RECOMMENDED PROJECTS

Recommended projects emerged based on the following criteria:

1. identified in public workshops and charrette;
2. provide regional continuity and directness;
3. connect key links to the existing bikeway network;
4. support current and / or potential use patterns; and
5. complete bikeways identified in the regional bike corridor concept.

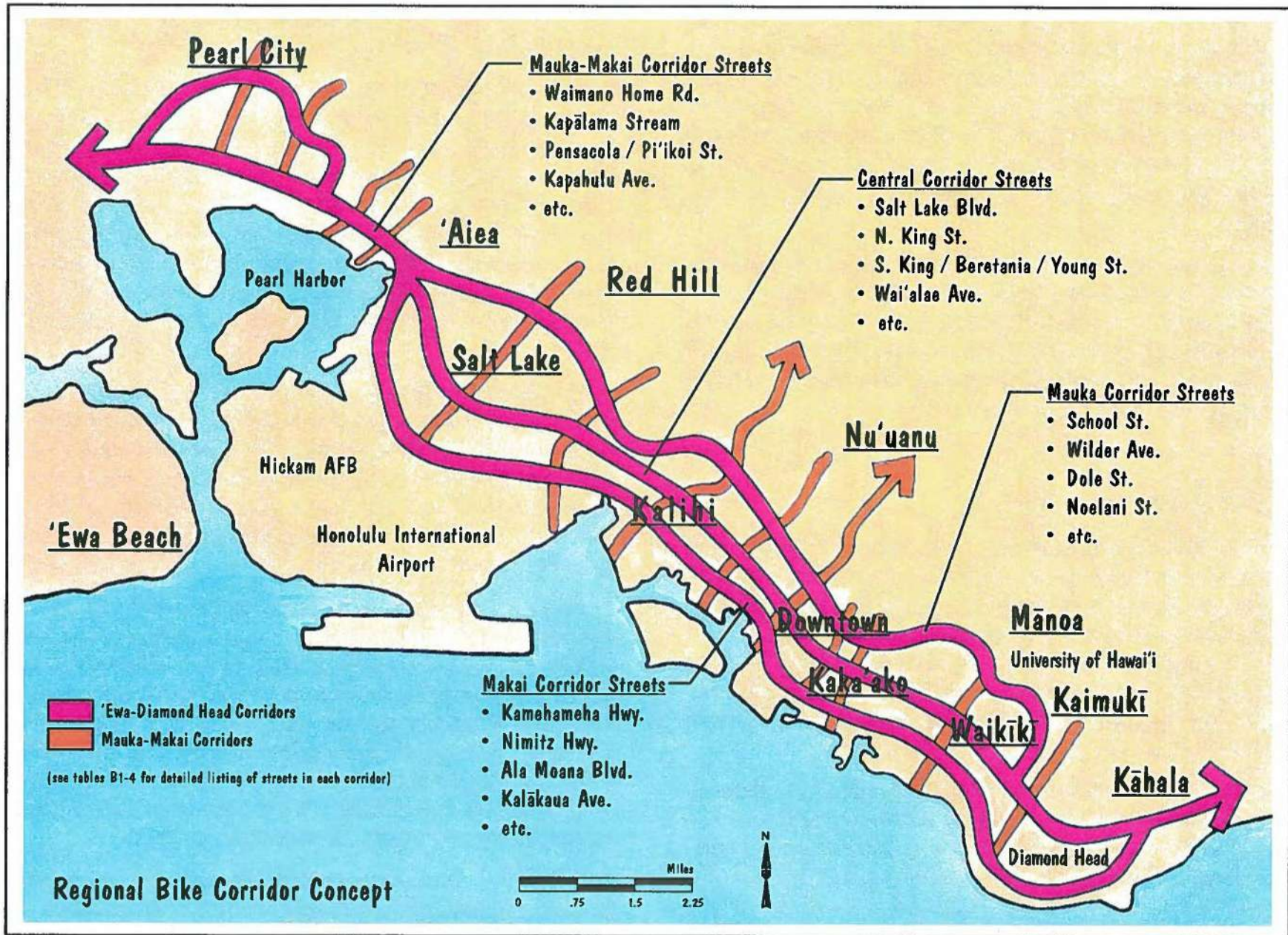
The regional bike corridor concept was a crucial factor in prioritizing projects. Section 3.1 discusses the concept and Section 3.2 describes how projects were prioritized. The remaining sections discuss the prioritized projects.

3.1 Regional Bike Corridor Concept

The regional bike corridor concept recognizes three major 'Ewa-Diamond Head bike corridors and a number of Mauka-Makai bike corridors as shown in the regional bike corridor concept map on the facing page. The grid created by the bike corridor is comprised of a makai corridor running along Honolulu's waterfront; a central corridor through the heart of the City; and a mauka corridor roughly tracing the lower slopes of the ridge communities. The Central and Makai Bike Corridors converge in the Capitol District / Downtown / Iwilei area, an area of high employment density. The 'Ewa-Diamond Head corridors are bisected at regular intervals by a series of Mauka-Makai Corridors.

The Makai Bike Corridor, running from Kalaniana'ole Highway in the east to Waipi'o Peninsula in the west, provides important commuter connections between Waikiki, Downtown, and the Airport. It provides key recreation links between the major parks and entertainment opportunities located along the corridor. It also provides the urban Honolulu leg of an around the island bikeway.

The Central Bike Corridor, beginning at Wai'alae Avenue in Kāhala and extending west to 'Aiea, has two distinct segments east and west of Downtown. To the east of Downtown, the corridor bisects the City's most dense residential areas including Kaimuki, McCully / Mō'ili'ili, and lower Makiki. It provides direct access to the major employment centers of Downtown, Iwilei, the King / Beretania and Kapi'olani business districts, and the University of Hawai'i Mānoa campus. To the west of Downtown, the Corridor bisects Kalihi and Salt Lake, terminating at Aloha Stadium.



RECOMMENDED PROJECTS

The Mauka Bike Corridor provides an east-west linkage above the H-1 Freeway across most of the study area. It is not continuous due to topographic and land ownership constraints found in areas such as Kaimukī Hill and Fort Shafter. Segments of the Corridor exceed five to ten percent slope, making some route segments difficult for novice riders, particularly along the bases of the many ridgetop communities.

Mauka-Makai bike corridors provide access from the inland residential areas in the valleys and atop the ridges, to the coastal employment and recreation areas. They are spaced at frequent intervals and utilize existing roadways as well as streams. (Appendix B provides more detail about the development of bike corridors.)

3.2 Prioritizing Projects

There are three priority levels: One, Two, and Three. Priority One recommendations focus on improving access to important elements of Honolulu: parks and waterfront areas; commercial and employment centers; and colleges and universities. Priority Two projects complete the Makai and Central Bike Corridors. Priority Three projects complete the Regional Bike Corridor concept's network of routes.

Priority One. The City is fortunate to have a number of existing bicycle facilities in place. Existing facilities can be linked with new facilities to create a continuous network. To increase the number of people who ride a bicycle, it is essential to have a variety of bikeways for different ride experience levels, ages, and competencies. The projects

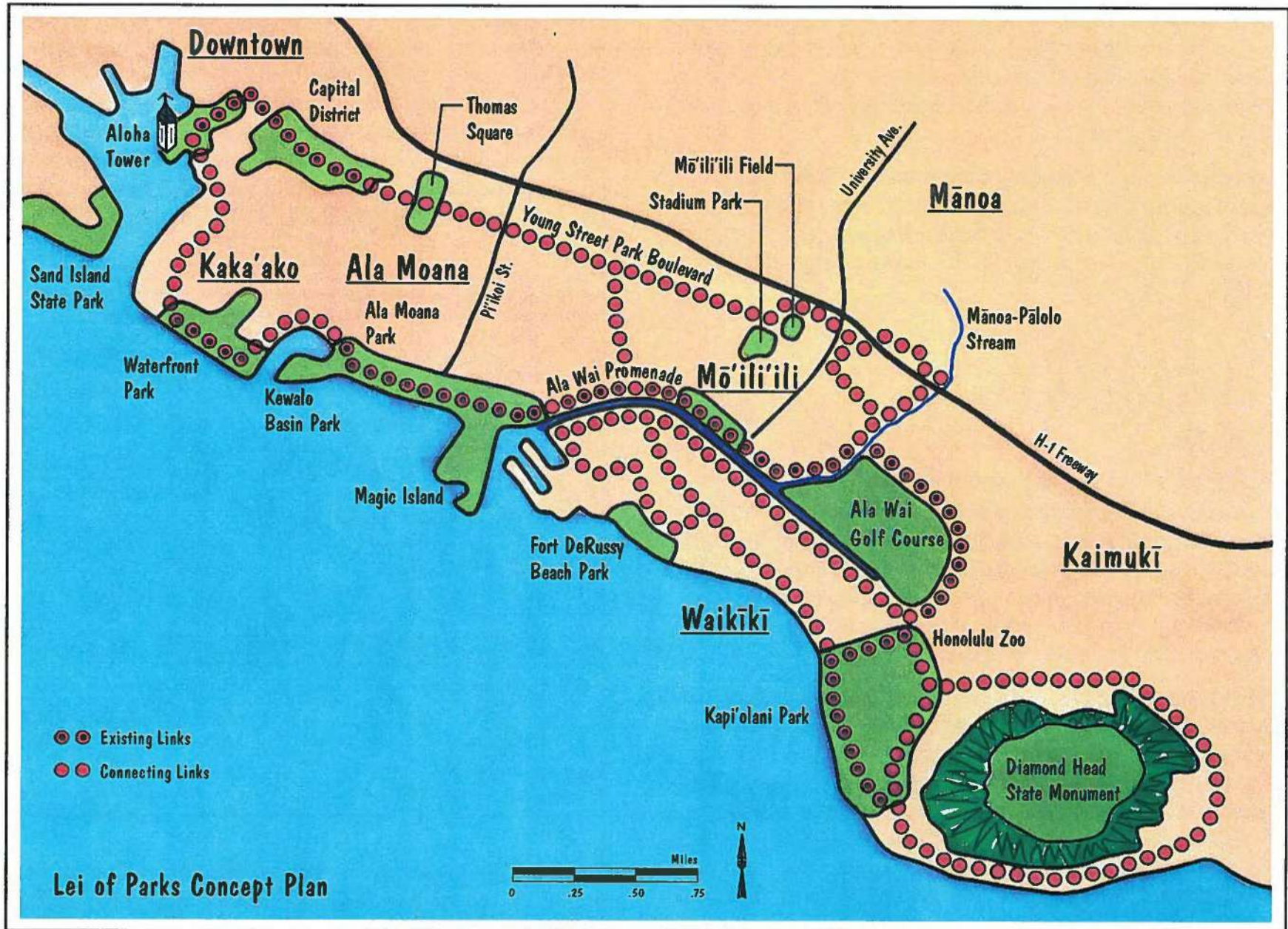
constitute almost 40 miles of new facilities with an estimated cost of about \$35 million.

The *Lei of Parks* is a system of paths and bike lanes linking regional and local parks in urban Honolulu. The paths will be attractive to many different types of users, including pedestrians, in-line skaters, joggers and bicyclists. The Lei of Parks is categorized as a multi-use facility for the family and beginning riders to enjoy a safe, scenic, and leisurely bicycle ride (or walk, skate or run) that is generally separated from automobile traffic. It provides access to many destinations and can be used as a commuter facility as well.

Bike-Friendly Route No. 1 is a continuous bicycle facility that provides a direct connection between Kāhala and Pearl City. Located primarily makai of the Lunalilo Freeway, this bikeway is tailored to experienced bicyclists. The intent of Bike-Friendly Route No. 1 is to give commuters and other bicyclists a direct and safer bikeway through which to traverse urban Honolulu.

College Access is a series of projects to improve bicycle access to universities and community colleges within Honolulu. A large number of bicycle trips are made by students commuting to post-secondary schools. As stated in *Selecting Roadway Design Treatments to Accommodate Bicycles*, "Schools — especially colleges and universities — and military bases can generate a disproportionately large share of bicycle trips. This is especially true for campuses where motor vehicle parking is limited."¹

Priority Two. These are projects that can be implemented following Priority One projects. Priority Two projects in-



RECOMMENDED PROJECTS

clude several links completing the Lei of Parks, completion of the Makai and Central Bike Corridors and additional Mauka-Makai Bike Corridor improvements. The projects constitute about 37 miles of new facilities with an estimated cost of \$34 million.

Priority Three. These projects include the balance of recommended projects through the completion of the Mauka and Mauka-Makai Bike Corridors. The projects constitute more than 15 miles of new facilities with an estimated cost of \$8.5 million.

3.3 Priority One Projects

Lei of Parks

The Lei of Parks gives beginning bicyclists, families, and those who are looking for a leisurely, scenic, and recreational ride the opportunity to ride from Diamond Head to Aloha Tower. It provides a bicycle-friendly linkage between the City's major regional parks and attractions including: Diamond Head, Kapi'olani Park, Ala Moana Park, Kaka'ako Waterfront Park, and Aloha Tower.

The path connections between many of the parks are expected to be used by the general community. In addition to bicyclists, the Lei of Parks will attract walkers, runners, skaters, and others interested in enjoying the city's magnificent parks and waterfront setting. Because of the broad variety of expected users, a 12-foot wide shared-use path is the recommended design treatment. In addition, shared-use path design should not interfere with existing recreational uses.

The Lei is segmented into two major components. The "Priority One Park Links" provide a continuous route through the major parks and attractions. The "Priority Two Park Links" complete the Lei of Parks, providing access to the University and Downtown through a return loop via Young St. and the State Capitol District. Table 1 summarizes the individual improvements comprising the Priority One Park Links of the Lei of Parks. (The Priority Two Park Links are listed in Table 4b.)

Table 1: Lei of Parks - Priority One Park Links Summary

No.	Facility	Type	Length (miles)	Cost (\$1,000's)
LP 1	Aloha Tower to Waterfront Park	sup*	0.7	695
LP 2	Waterfront Park to Ala Moana Park	lane	0.3	80
LP 3	Ala Moana Park to Ala Wai Canal	sup	0.2	110
LP 4	Kalākaua Ave. Bridge	x-walk	200 ft.	310
LP 5	Kalākaua Ave. to McCully St.	sup	0.2	335
LP 6	McCully St. Bridge (over Ala Wai)	x-walk	200 ft.	310
LP 7	McCully St. to Date St.	sup	0.9	260
LP 8	Date St. (Lā'au-Kapahulu)	sup	0.6	235
LP 9	Pāki Ave. (Kapahulu-Monsarrat)	lane	0.3	545
LP 9a	Pāki Ave. (Monsarrat-Diamond Hd.)	lane	0.7	920
LP 10	Diamond Hd. Rd. (Ruger Pk-Poni Moi)	lane	1.4	3,755
LP 11	Ala Wai Blvd.	sup/lane	1.6	4,780
LP 13	Young St.	park blvd.**	1.6	6,700
Subtotal			8.5	\$19,035

*sup = shared-use path

**park boulevard: see Appendix B

The Lei spans 14.9 miles and includes 24 separate segments. Total costs for the Lei of Parks are estimated at \$22.8 million. The longest segments are the Young Street Park



RECOMMENDED PROJECTS

Boulevard (1.6 mi) and the Ala Wai Boulevard shared-use path and bike lane (1.6 mi). The shortest segments are new crosswalks at the Kalākaua Ave. and McCully St. bridges.

The **Priority One Park Links** extend 8.5 miles and include 13 separate segments. Total costs are estimated at \$19.0 million. These projects include segments joining Aloha Tower, Kaka'ako Makai Park, Kewalo Basin Park, Ala Moana Park, Ala Wai Canal, Kapi'olani Park, and Diamond Head.

The **Priority Two Park Links** are the balance of \$3.8 million. They include segments joining the Downtown Capitol District to Aloha Tower, new routes in the McCully / Mō'ili'ili area, and routes through Waikīkī joining Ala Moana Beach Park with Kapi'olani Park. They improve access to the Lei from Waikīkī and the Mānoa / Kaimukī area.

The **Young Street Park Boulevard** is an essential component of the Lei of Parks, providing an important east-west link for commuters and improving access to Downtown colleges, Kaimukī, and UH Mānoa. The Park Boulevard will establish a new design prototype for Honolulu. The design objective is to create a park-like atmosphere along the street through the introduction of landscape and hardscape elements to calm traffic. This, in turn, will create a pleasant pedestrian and bicycle environment while retaining access for local motor vehicle traffic. (For further discussion of Park Boulevards, also referred to as Bike Boulevards, see Appendix B, Section B-2, Design Treatments.)

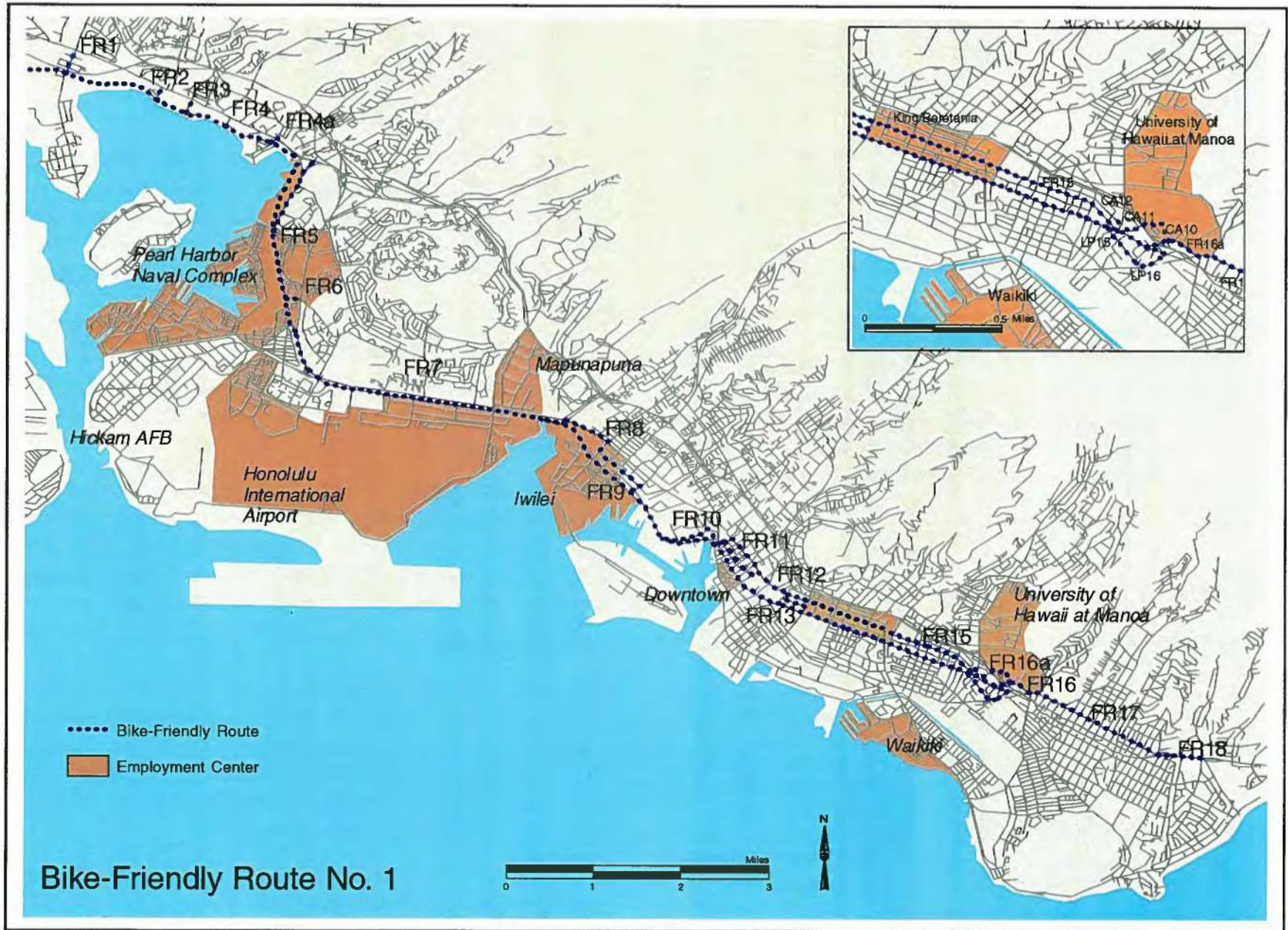
At Thomas Square, a shared-use path in or around the park should be constructed. The design of the path should be coordinated with the relevant civic and City organizations.

Bike-Friendly Route No. 1

Bike-Friendly Route No. 1 represents the first continuous bike route through the City, connecting the Kalaniana'ole Hwy. bike lanes near Kāhala with the Pearl Harbor Bike Path in 'Aiea. Table 2 summarizes the individual improvements comprising Bike-Friendly Route No. 1.

Table 2: Bike-Friendly Route No. 1 Summary

No.	Facility	Type	Length (miles)	Total Cost (\$1,000)
Pearl Harbor Bike Path Gateways:				
FR 1	a. Gateway @ Lehua Ave.	lane	0.1	\$65
FR 2	b. Gateway @ Blaisdell Park	sup	50 ft.	25
FR 3	c. Gateway @ Kanuku St.	sup	0.2	140
FR 4	d. Gateway @ Pearl Kai Center	sup	0.2	140
FR 4a	e. Gateway @ McGrew Point	sup	sign	10
FR 5	Kamehameha Hwy. (Vaikenburgh-Stadium)	lane	2.6	785
FR 6	Radford Dr. (Bougainville-Kam Hwy.)	lane	0.4	85
FR 7	Nimitz Hwy. (Viaduct)	lane	2.5	295
FR 8	Nimitz Hwy. (Waiakamilo Detour)	lane	0.8	130
FR 9	Nimitz Hwy. (Viaduct-Waiakamilo)	lane	1.1	950
FR 10	River St. (Nimitz-Beretania)	lane	0.1	85
FR 11	Hotel St. (River-Richards)	route	0.5	125
FR 12	Hotel St. (Alapa'i-Ward)	lane	0.2	235
FR 13	South King St.	lane	3.3	2,010
FR 15	Beretania St.	lane	3.3	2,010
FR 16	Old Wai'ala'e Rd. (Wai'ala'e-UH Quarry)	lane	0.3	125
FR 16a	Old Wai'ala'e Rd. Bridge (over H-1)	lane	0.1	40
FR 17	Wai'ala'e Ave. (Old Wai'ala'e-17th)	lane	1.5	450
FR 18	Wai'ala'e Ave. (17th-Kalaniana'ole)	lane	0.8	335
Subtotal			18.0	\$8,040

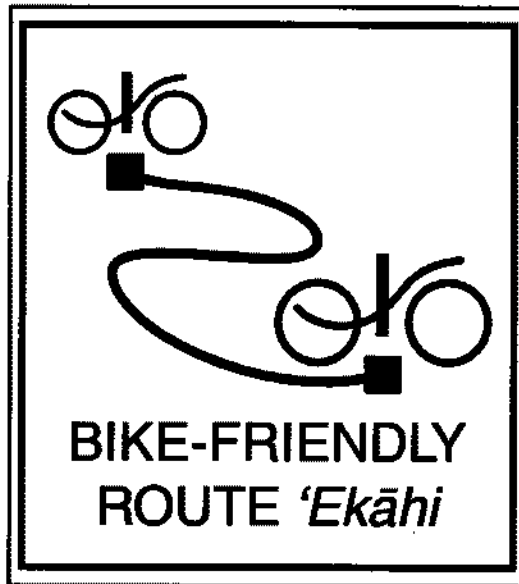


RECOMMENDED PROJECTS

The Bike-Friendly Route No. 1 project will complete major elements of the Central Bike Corridor from Kāhala to Downtown and major elements of the Makai Bike Corridor from the Pearl Harbor Bike Path to Downtown.

Bike-Friendly Route No. 1 serves the commuter cyclist and accommodates recreational and utilitarian trips. Bike lanes are the preferred design treatment for the route. Implementation of the route significantly improves the bike-accessibility of the City's major employment centers: Downtown, Pearl Harbor, and Waikīkī.

Bike-Friendly Route No. 1 includes 19 different road segments within the City. The longest facilities are the Beretania St. and S. King St. bikeways (3.3 mi.). The shortest facility is the shared-use path connecting the Pearl Harbor Bike Path to Kamehameha Hwy. at Neal Blaisdell Park (50 feet). Total costs are estimated at \$8.0 million. The highest cost



Similar to the Lei of Parks, an attractive signing system should be created to identify Bike-Friendly Routes. The naming convention for each of the Bike-Friendly Routes could be differentiated by the Hawaiian words for numbers. The signs would supplement the MUTCD signs required by the State DOT.

project is new bike lanes on Kamehameha Hwy., from Nimitz Hwy. to Salt Lake Blvd. Bike-Friendly Route No. 1 is comprised of several distinct segments described below.

Pearl Harbor Bike Path

Create gateways to the Pearl Harbor Bike Path through adding signage and landscaping at access points. Entrances and exits should be signed along Kamehameha Hwy. at Lehua Ave., Neal Blaisdell Park, Kanuku St., Pearl Kai Center, McGrew Point, and the Arizona Memorial Visitor Center.

Kamehameha Highway

Kamehameha Hwy: Add bike lanes to Kamehameha Hwy. through re-stripping the roadway between Nimitz Hwy. and Aloha Stadium.

Radford Dr: Stripe bike lanes between Bougainville Rd. and Kamehameha Hwy. Improve access to the Pearl Harbor Naval Complex at the Makalapa and Hālawā Gates, and the Arizona Memorial Visitor Center through striping advanced stop lanes for bicyclists at intersections.

Nimitz Highway

Designate an alternative route to Nimitz Hwy., between Waiakamilo Rd. and Middle St. where bike lanes now end. Direct cyclists to use Waiakamilo Rd., Kalani St., Pu'uhale Rd., and Dillingham Blvd. Add bike lanes along Nimitz Hwy. between Waiakamilo Rd. and Middle St. through road widening and / or reducing the median.

Add bike lanes under the Viaduct through re-stripping to connect to existing bike lane facilities.

Hotel Street

Add "Bike Route" signs between Richards St. and River St.

Remove on-street parking between Ward Ave. and Alapāi St. Re-stripe the roadway with bike lanes.

South King / Beretania Corridor

South King and Beretania Streets: Install "Share the Road" signs. Consider removing on-street parking on one side and re-stripe the roadways with bike lanes.

University Area

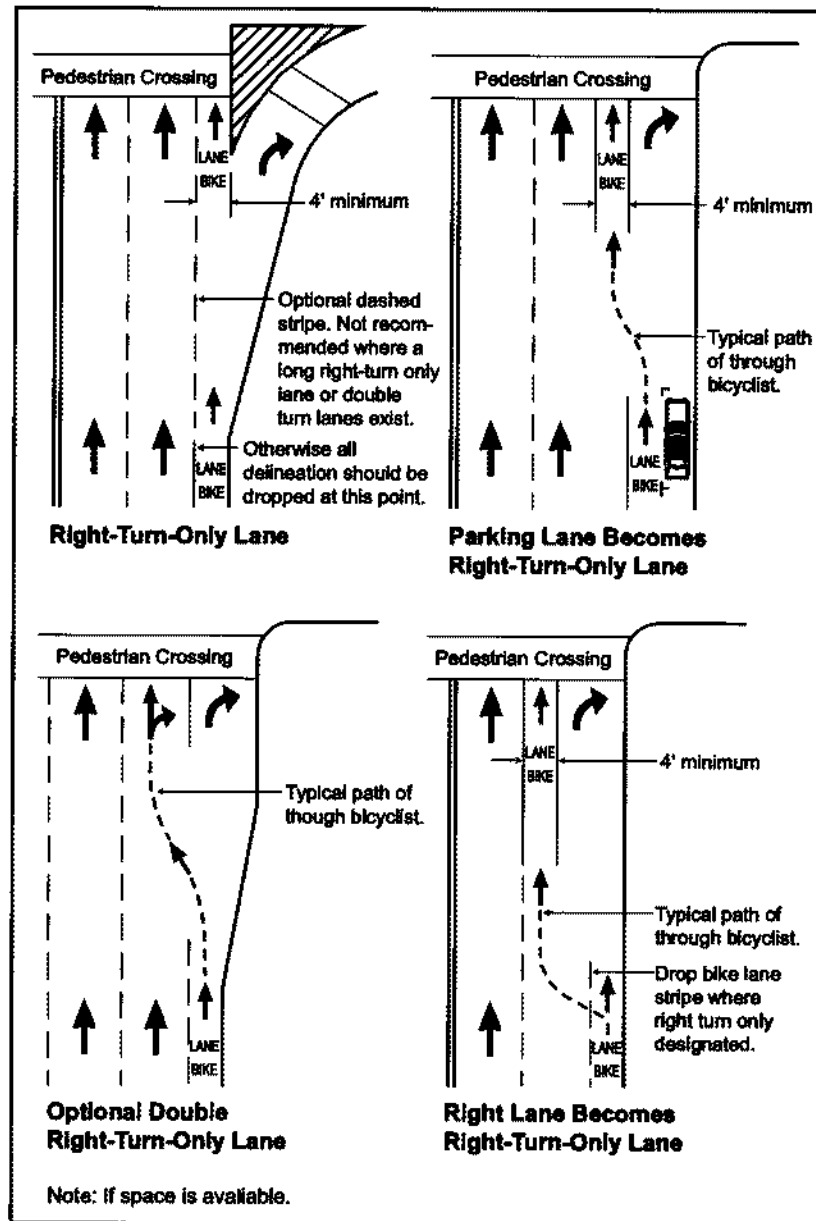
Old Wai'ala'e Rd. and South King St: Install "Share the Road," "Bikes Xing" and "Begin Right Turn Lane" signs. Retain "Yield to Bikes" signs. Consider removing one travel lane along Old Wai'ala'e Rd. and remove on-street parking on one side of South King St. Re-stripe the roads with bike lanes.

Kaimukī Corridor

Wai'ala'e Ave: Install "Share the Road" signs along Wai'ala'e Ave. through Kaimukī. Conduct a traffic study to analyze the effects of removing on-street parking and converting the two inside travel lanes to a two-way continuous left-turn lane, similar to Kūhiō Ave., to accommodate bike lanes. Re-stripe the road with bike lanes.

Kāhala Area

Wai'ala'e Ave: Connect the Kalaniana'ole Hwy. bike lanes to Wai'ala'e Ave., under the Lunalilo Freeway Viaduct through re-stripping the roadway with bike lanes.



Bicycle lanes approaching motor vehicle right-turn-only lanes

Hawaii DOT, 1997

RECOMMENDED PROJECTS

College Access Projects

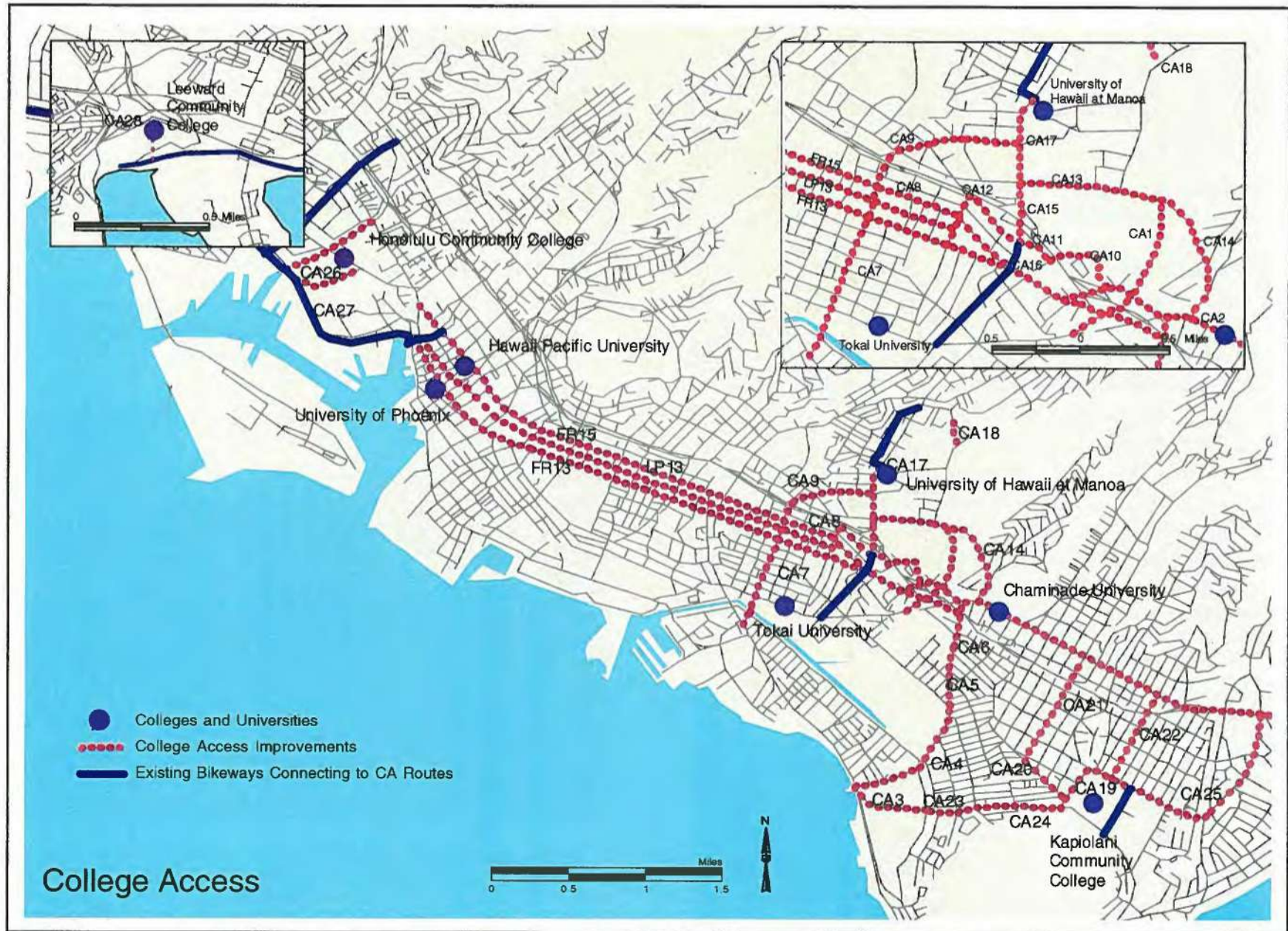
This set of projects is directed at improving access to university and college campuses within Honolulu. Studies have shown that colleges and universities generate a disproportionately large number of bicycle trips. Studies of bicycle ridership at UH Mānoa indicate 10%-17% of the students ride to campus versus 1.4% of the general population who commute to work in urban Honolulu.² Several factors, including lower cost, limited motor vehicle parking, and the general convenience of being able to ride right to class, contribute to the popularity of bike riding among post secondary students. Table 3 summarizes the projects that provide bicycle access to colleges and universities.



*"When I see an
adult on a bicycle,
I do not fear for
the future of the
human race"
H.G. Wells*

Table 3: College Access Project Summary

No.	Facility	Type	Length (miles)	Total Cost (\$1,000)
University of Hawai'i at Mānoa				
CA 1	Mānoa-Pālolo Strm. (Kapi'olani-Dole)	sup	0.4	\$725
CA 2	St. Louis Hts. Dr. (Wai'alaie -Dole)	lane	0.1	125
CA 3	Kapahulu Ave. (Kalākaua-Ala Wai)	lane	0.5	100
CA 4	Kapahulu Ave. (Ala Wai-Campbell)	lane	0.4	80
CA 5	Kapahulu Ave. (Campbell-Charles)	lane	0.5	170
CA 6	Kapahulu Ave. (Charles-Wai'alaie)	lane	0.4	140
CA 7	McCully St. (Ala Wai-Wilder)	lane	0.8	520
CA 8	McCully St. (Bridge over H-1)	lane	0.2	2,795
CA 9	Metcalf St. (Wilder-University)	lane	0.4	85
CA 10	University Lower Quarry (Old Wai'alaie-Varsity)	lane	0.3	50
CA 11	Varsity Pl. (Univ.-UH Lower Quarry)	route	0.1	50
CA 12	Coyne St. (University-Isenberg)	route	0.3	20
CA 13	Dole St. (University-EW Rd.)	lane	0.5	110
CA 14	Dole St. (EW Rd.-St. Louis)	lane	0.5	95
CA 15	University-Dole Intersection	int.		140
CA 16	University Ave. (Varsity Pl.-Dole (mauka dir. only))	lane	0.3	140
CA 17	University Ave. (Dole-Maile Way)	lane	0.4	130
CA 18	University Upper Fire Rd. (EW Rd.-Pāmoa)	sup	0.2	190
Subtotal			6.3	\$5,665
Kapi'olani Community College				
CA 19	Makapu'u Ave.	lane	0.3	\$35
CA 20	Alohea St.	lane	0.3	50
CA 21	10 th Ave. (Alohea-Wai'alaie)	route	0.6	65
CA 22	16 th Ave. (Wai'alaie -Kilauea)	route	0.6	65
CA 23	Monsarrat Ave. (Kalākaua-Pāki)	lane	0.4	70
CA 24	Monsarrat Ave. (Pāki-Makapu'u)	lane	0.8	455
CA 25	Kilauea Ave. (Wai'alaie -18th)	lane	1.6	280
Subtotal			4.6	\$1,020



RECOMMENDED PROJECTS

(Table 3, con't)

Honolulu Community College

CA 26 Kapālama Stream (Nimitz-N. King)	sup	0.6	1,375
CA 27 Alakawa St. (Nimitz-Dillingham)	lane	0.5	80
Subtotal		1.1	\$1,455

Leeward Community College

CA 28 Pearl Harbor Bike Path Connection	sup	0.2	\$140
---	-----	-----	-------

Subtotal of College Access Projects		12.2	\$8,280
--	--	-------------	----------------

College Access bicycle improvements include 12.2 miles of bikeways with the longest bikeway along Kilauea Ave. in Kāhala to improve access to Kapi'olani Community College (1.6 mi.). The shortest segment is a bike route along Varsity Pl. (600 ft.) improving access to the UH Mānoa Campus. Total costs are estimated at \$8.3 million, with the largest cost associated with a new shared-use path along Kapālama Stream to improve access to Honolulu Community College. College Access improvements are summarized below by major institution.

University of Hawai'i at Mānoa

St. Louis Dr. / Dole St. Intersection: Re-stripe intersection with holding areas for bicycles and bike lanes.

St. Louis Dr: Re-stripe the roadway between Wai'alaie Ave. and Dole St. with bike lanes. Improve intersection traffic signals to facilitate left turn from St. Louis Dr. to Dole St.

Dole St: Re-stripe the roadway between St. Louis Dr. and University Ave. with bike lanes through removal of one parking lane.

McCully St: Remove on-street parking and re-stripe the roadway to add bike lanes connecting Waikiki to the University. Road widening at some sections of McCully St. will be necessary. The McCully St. Bridge over the H-1 Fwy. should also be striped with bike lanes (see Appendix B for definition of different rider types).

Metcalf St: Reconstruct the lower portion of Metcalf St. at Wilder Ave. with bike lanes that do not interfere with the sidewalk.

University Ave: Complete the bike lanes from below H-1 up to Maile Way, including intersection improvements and bicycle holding areas at Dole St.



A multi-use path along the Mānoa-Pālolo Stream will provide access between Waikiki and the University of Hawai'i at Mānoa as part of the College Access and Lei of Parks projects. "Under most conditions, a recommended paved width for a two directional multi-use path is 3.6 m (12 ft)." (AASHTO, 1997)

Kapahulu Ave: Install “Share the Road” signs. Consider adding bike lanes through removing on-street parking, increasing the right-of-way and re-striping the roadway.

Mānoa-Pālolo Stream: Complete the shared-use path from Kapi’olani Blvd. to Dole St. along the Mānoa-Pālolo Stream. (The Date St. to Kapi’olani Blvd. segment is constructed under the “Lei of Parks” project.)

Upper Campus Fire Road: Construct a shared-use path connecting the Upper Campus to Pāmoa Rd.

King St. / Beretania St. / Young St. / Wai’alae Ave: See Bike-Friendly Route No. 1 improvements.

University Lower Campus: Add bike lanes on UH Lower Quarry Rd. through re-striping.

Varsity Pl. and Coyne St: Sign as bike routes to increase access to the University.

Kapi’olani Community College

Makapu’u Ave: Move centerline stripe to the center of the road and re-stripe roadway with bike lanes.

Alohea Ave. / Diamond Head Rd. / Monsarrat Ave: Complete bike lanes along segments of these streets.

10th and 16th Avenues: Sign as a bike routes.

Wai’alae Ave: See Bike-Friendly Route No. 1 improvements.

Downtown Campuses

Access to Hawaii Pacific University and the University of Phoenix are constructed under Bike-Friendly Route No. 1 which includes improvements to Hotel St., River St., King St., Beretania St., Young St., and Nimitz Hwy.

Honolulu Community College

Kapālama Stream: Construct a shared-use path.

Alakawa St: Re-stripe roadway with bike lanes.

Leeward Community College

Construct a shared-use path connection between Leeward Community College and the Pearl Harbor Bike Path.



A shared-use path connection should be constructed from the existing Pearl Harbor Bike Path to improve bicycle access to the Leeward Community College.

RECOMMENDED PROJECTS

3.4 Priority Two Projects

Priority Two projects continue to implement the vision of a continuous network of routes through the City. The total cost for all Priority Two projects is \$33.7 million to implement almost 38 miles of bike facilities. Improvements on Ala Moana Blvd. and Kamehameha Hwy. account for more than half of these costs at nearly \$23 million. Tables 4a and 4b summarize the Priority Two projects.

Lei of Parks (Priority Two Park Links)

A number of links within the Lei of Parks are Priority Two projects (see Table 4b). Priority Two Park Links span about 6 miles and include 11 separate segments. The Priority Two Park Links include segments joining the Downtown Capitol District to Aloha Tower, new routes in the McCully / Mō'ili'ili area, and routes through Waikīkī joining Ala Moana Beach Park with Kapi'olani Park. They improve access to the Lei from Waikīkī and the Mānoa / Kaimukī area.

Total costs for the Priority Two Park Links are estimated at \$3.8 million. The largest costs are associated with a shared-use path along the Mānoa-Pālolo Stream, between Date St. and Kapi'olani Blvd. This will connect to a shared-use path along the stream between Kapi'olani Blvd. and Dole St. (CA 1 constructed under "College Access" projects.)

Makai Bike Corridor

Within the Makai Bike Corridor, Priority Two projects focus on the completion of the Corridor with improvements on Ala Moana Blvd., Kalākaua Ave. and Kamehameha Hwy.

Table 4a: Priority Two Projects

No.	Facility	Type	Length (miles)	Total Cost (\$1,000)
LP	Lei of Parks - Priority Two Park Links	varies	6.4	3,820
	(see Table 4b for details)			
1	Waimano Hm. Rd. (Kam.-Komo Mai)	lane	1.2	305
2	Ka'ahumanu St. (Kam.-Komo Mai)	lane	1.0	95
3	Ka'ōnohi St. (Kam.-Laelua)	lane	1.5	100
4	Ka'amilo St. (Kulawai-Honomanū)	lane	1.5	130
4a	Honomanū St. (Moanalua-Kam.)	lane	0.1	500
5	Kamehameha Hwy. (H-2 to Stadium)	lane	3.8	13,005
6	Noelani St. (Ka'ahumanu-Waimano Hm.)	lane	1.2	125
7	Moanalua Rd. ('Aiea Hts.-Ka'ahumanu)	lane	1.5	295
8	'Aiea Hts. Dr. (Ulune-Moanalua)	lane	0.1	50
9	Ulune St. (Hālawa Valley Rd.-'Aiea Hts.)	lane	1.1	100
10	Āliamanu Dr. (Moanalua-Bougainville)	lane	1.0	80
11	Bougainville Dr. (Āliamanu-Radford)	lane	0.7	65
12	Pu'uloa Rd. (Nimitz-Moanalua)	lane	1.3	275
13	Kikowaena St. (Pūkōloa-Kaua)	lane	0.3	110
14	Āhua St. (Pūkōloa-Kikowaena)	lane	0.1	40
15	Pūkōloa St. (Āhua-Salt Lake Blvd.)	lane	0.3	110
16	Moanalua Gardens	sup	0.4	365
17	Moanalua Rd. (Moanalua Gdns-Icarus)	sup	0.9	1,420
18	Kaua St. (Middle-Moanalua Gardens)	lane	0.8	530
19	Middle St. (Nimitz-N. King)	lane	0.5	95
20	Middle St. (Bridge over H-1)	lane	250 ft.	10
21	Middle St. (Kaua-N. School)	lane	0.7	65
22	Salt Lake Blvd. (Kam Hwy.-Pu'uloa)	lane	3.5	365
23	Sand Island Bridge	lane	0.2	70
24	North King St. (Beretania-Middle)	lane	1.6	1,405
25	Ala Moana Blvd. (Nimitz-Kalākaua, ex. the portion b/t Holomoana & Kālia; see LP 21)	lane	2.7	9,535
26	Cooke St. (Ilalo-Hotel)	lane	0.8	130
27	Pensacola St. (Waimanu-Wilder)	route	1.0	235
28	Pi'ikoi St. (Ala Moana-Wilder)	route	1.2	245
Subtotal			37.4	\$33,675

Central Bike Corridor

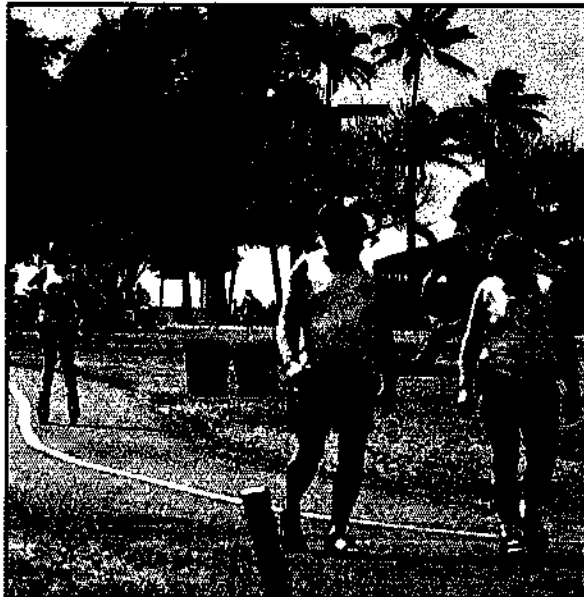
Priority Two projects include the completion of the Corridor with bike facilities on N. King St., Kaula St., and Salt Lake Blvd.

Mauka Bike Corridor

Within the Mauka Bike Corridor, Priority Two projects include the Moanalua shared-use path, and bike lanes on Ulune St., Moanalua Rd., and Noelani St.

Mauka-Makai Bike Corridors

Additional Mauka-Makai Corridor improvements include Waimano Home Rd., Ka'ahumanu St., Ka'ōnohi St., Ka'amilo St., Āliamanu Rd., Bougainville Dr., Pu'uloa Rd., Pensacola St., Pi'ikoi St., and Cooke St. as Priority Two projects.



Shared-use paths will attract walkers, runners and in-line skaters, as well as bicyclists.

Table 4b: List of Parks — Priority Two Park Links Summary

No.	Facility	Type	Length (miles)	Total Cost (\$1,000)
LP 12	Fort St. Mall	route	0.4	\$80
LP 14	Isenberg St. (Coyne-King)	lane	0.2	470
LP 15	Kuilei St.	lane	0.3	440
LP 16	Kapi'olani Blvd. (Kuilei-S. King)	lane	0.4	235
LP 17	Mānoa-Pālolo Stream (Date -Kapi'olani)	sup	0.4	725
LP 18	Diamond Head Rd. (Makapu'u-Ruger Pk)	lane	1.0	70
LP 20	Holomoana St. (Yacht Harbor)	lane	0.6	100
LP 21	Ala Moana Blvd. (Holomoana-Kālia)	lane	0.1	65
LP 22	Kālia Rd. (Ala Moana-Saratoga)	lane	0.4	630
LP 23	Saratoga Rd. (Kālia-Kalākaua)	lane	0.4	640
LP 24	Kalākaua Ave. (Beretania-Kapahulu)	lane	2.2	365
Subtotal			6.4	\$3,820

3.5 Priority Three Projects

Priority Three projects include the balance of the priority projects and are listed in Table 5 on the following page.

Mauka Corridor

Within the Mauka Bike Corridor, Priority Three projects include the construction of the N. School St., 'Iolani Ave., Alapa'i St., Spencer St., and Wilder Ave. bike lanes.

Also included is the completion of the Red Hill shared-use path connecting Moanalua Rd. from the top of Red Hill to Ulune St.

RECOMMENDED PROJECTS

Table 5: Priority Three Projects

No.	Facility	Type	Length (miles)	Total Cost (\$1,000)
1	Red Hill (Icarus Way-Ulune)	sup	0.8	\$1,295
2	Lagoon Dr.	lane	2.4	145
3	Sand Island SUP (Ke'ehi Lagoon to Sand Island)	sup	1.3	1,055
4	Liliha St. (N. King-Wyllie)	lane	1.4	365
5	Nu'uuanu Stream (Nimitz-Kuakini)	sup	0.8	1,530
6	Kamehameha IV Rd. (N. School-Likeiike Hwy.)	lane	0.7	110
7	North School St. ('Iolani-Middle)	lane	2.5	1,850
8	'Iolani Ave. (Alapa'i-N. School)	lane	0.4	350
9	Alapa'i St. ('Iolani-Spencer)	lane	0.2	40
10	Spencer St. (Alapa'i-Wilder)	lane	0.3	125
11	Wilder Ave. (Dole-Spencer)	lane	1.4	380
12	10th Ave. (Wai'ōma'o-Wai'āiae)	route	1.4	110
13	Lusitana St. ('Iolani-Pauoa)	route	0.4	405
14	Pauoa Rd. (Lusitana-Kapalu)	route	0.6	290
15	Kāneali'i Ave. (Lusitana-Kapalu)	route	0.6	290
16	Kapalu St. (Pauoa-Kāneali'i)	route	0.1	95
Subtotal			15.3	\$8,435

Mauka-Makai Corridors

Priority Three projects include construction of bike lanes along Lagoon Dr., Liliha St., Kamehameha IV Rd., and Liliha St., and a designated bike route with associated roadway improvements extending into Pauoa. The Sand Island and Nu'uuanu Stream shared-use paths, as well as the widening of the McCully St. Bridge to accommodate bicycles, are also Priority Three projects.

3.6 BikePlan 1994

The bikeways outlined in the *Honolulu Bicycle Master Plan* provide a network of bikeways throughout the City. These recommendations are intended to complement the recommendations made in the State DOT's *BikePlan 1994*. Appendix C provides a map of the recommended bikeways within the study area.

Endnotes

¹United States Department of Transportation, Federal Highways Administration. 1994. *The National Bicycling and Walking Study: Final Report*. Publication Number: FHWA-PD-94-023.

²Figures on ridership come from:

LeMaitre, MaryAnne. 1997. *Findings from: Survey of University of Hawai'i - Mānoa Bicyclists* (a Department of Urban and Regional Planning paper written for PLAN601).

Schnell, Thomas. Fall 1994. *Bicycle Transportation: A Plan B Area of Concentration Paper*. Department of Urban and Regional Planning, University of Hawai'i.

US Census Transportation Planning Package: Urban Element Special Tabulations of the 1990 Census Data. 1990. *Mode of transportation to work for workers 16+*.



PROJECTED COSTS

The projected costs are estimated at about \$77.5 million, consisting of \$47.1 million in City projects and \$30.4 million in State projects (Table 6). The overall costs represent less than one-percent of the total costs allocated to O’ahu surface transportation projects over the next 20 years.

The projected costs are preliminary, order-of-magnitude estimates prepared for budget purposes only. They include engineering and design, construction, inspection, and “soft” costs (survey, environmental documentation). Soft costs may add 20-40% to direct construction costs. Costs do not include right-of-way acquisition, which may be required in some areas. The intent of the *Honolulu Bicycle Master Plan* is to use the public rights-of-way to the extent practicable, in part to minimize right-of-way acquisition costs. Appendix A contains a breakout of the projected costs.

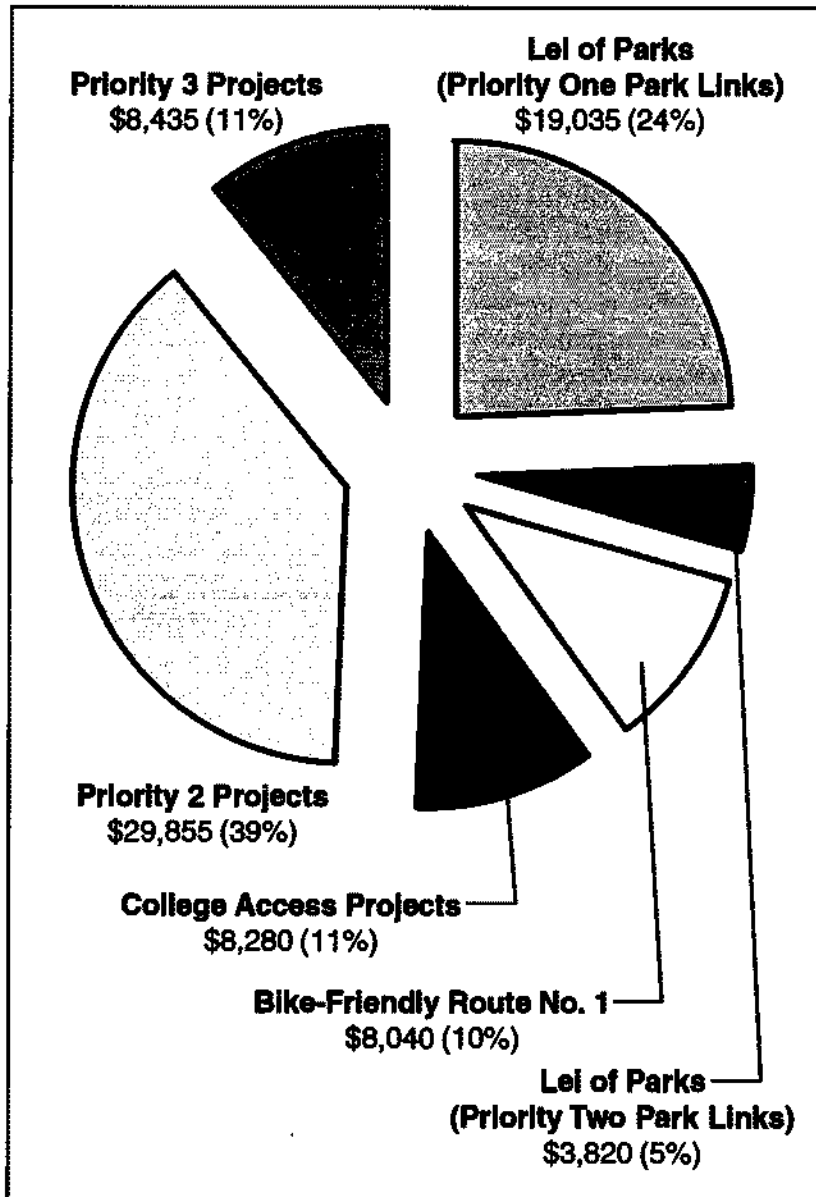
Table 6: Projected Construction Costs (\$mil)

Priority Group	City Portion	State Portion	Total Cost
Priority One Projects			
Lei of Parks (Priority One Park Links)	\$18.3	\$0.8	\$19.1
Bike-Friendly Route No. 1	5.6	2.4	8.0
College Access	5.1	3.2	8.3
Priority Two Projects			
Lei of Parks (Priority Two Park Links)	3.7	0.1	3.8
Other Projects	7.3	22.6	29.9
Priority Three Projects			
	7.1	1.3	8.4
Total Costs	\$47.1	\$30.4	\$77.5

Priority One projects are estimated at \$35.4 million, Priority Two projects at \$33.7 million, and Priority Three projects at \$8.4 million. One of the largest cost items involves bike lanes along Kamehameha Highway and Ala Moana Boulevard (both State facilities), programmed as part of the Priority Two projects.

The total cost for the proposed improvements needs to be viewed with great care. The \$77.5 million in projected infrastructure improvements is a high estimate. It assumes 1999 dollars, that projects are built on an individual, stand-alone basis, and that all project improvements are classified as “bicycling projects.” In reality, however, the projects will be constructed over an extended period (10-20 years). A number of the project recommendations are for State facilities (40% of the total or \$30.4 million) that will need to be prioritized and programmed under the State highways funding process. These projects include facilities on Nimitz and Kamehameha Highways, Ala Moana Blvd., Red Hill, within

PROJECTED COSTS



Allocation of Costs (1000's)

the Kaka'ako Makai Area, as well as university and community college campus access projects.

A number of projects, such as lane striping and intersection improvements, can be programmed as part of regular roadway repair, maintenance and improvement projects. Some projects, such as the Ala Wai Promenade widening and the Young Street Park Boulevard that have broad community benefits, could be justified for funding with community redevelopment funds. The remaining projects are eligible for 80% federal matching funds from the recently reauthorized federal transportation-spending program now called the Transportation Equity Act for the 21st century or "TEA21."

Strategies to bundle projects together, such as a series of interconnecting bikeways or perhaps entire mega-projects such as the Lei of Parks, will reduce projected costs by achieving economies of scale in the design / construction process. The "soft" costs discussed above are particularly responsive to economies of scale.

Creativity in identifying alternative funding sources and getting projects built will be required to realize the 10-20 year vision outlined in the *Honolulu Bicycle Master Plan*. The City's Bike Fund brings in about \$400,000 per year from bicycle registrations. About \$200,000 of this is used to fund the BikeEd program and the City's Bicycle Coordinator position. The remaining \$200,000 is available for bicycle-related projects. Leveraging the current Bike Fund with the 80% federal matching funds available through TEA21 would generate only about \$1.0 million per year.

Portions of the revenues generated from the gasoline tax could be designated to support bicycle projects and other

human-powered modes of transportation, in addition to roadway improvements for motor vehicles. For example, one-penny of the gasoline tax would generate an estimated \$3 million per year in revenues. Leveraged with 80% federal matching funds, this would generate \$15 million for bikeway projects per year.

Other potential sources of local matching funds include existing City budgets involved with community redevelopment actions, park improvement projects, and public works projects. The Lei of Parks project, which connects our major parks together, is a prime candidate to coordinate with park redevelopment improvement plans. Additional revenues can be raised through the implementation of Community Facilities Districts, tax increment financing districts, and traditional improvement district mechanisms. Developer funding may be appropriate for some segments. Small projects could be adopted by a community group or non-profit organization and funded through private charitable grants.





IMPLEMENTING POLICIES & PROGRAMS

Policy and program recommendations to promote the institutionalization of bicycling in Honolulu are presented below. The recommendations are based on lessons learned from other jurisdictions, and input received from public workshops and the November 1997 charrette. The policy and program recommendations are the principal means of institutionalizing the commitment for Honolulu to become a truly bicycle-friendly city.

5.1 Policies

1. Adopt major bicycle policy statements in the City's *General Plan* and *Primary Urban Center Development Plan* so that "every street and highway on which bi-

cycles are permitted to operate is a "bicycle street" and should be designed and maintained to accommodate shared use by bicycles and motor vehicles."

2. Create a roadway classification system in the *Primary Urban Center Development Plan* which designates bicycle priority streets separately from other modes.
3. Incorporate appropriate bicycle and pedestrian facilities into all new roads and roadway improvements including traffic control during construction.
4. City agencies involved in roadway design, should review and consider adopting the forthcoming revised State DOT *Uniform Design Manual* recommendations for bicycle facilities and the forthcoming 1999 *AASHTO Guide for the Development of Bicycle Facilities*.
5. Update City design manuals to be consistent with proposed State *Uniform Design Manual* and AASHTO changes.
6. Incorporate project recommendations from the *Honolulu Bicycle Master Plan* into the *O'ahu Regional Transportation Plan* and subsequent updates of the State's *Bike Plan Hawai'i*.
7. Incorporate recommendations of the *Honolulu Bicycle Master Plan* into other City plans as they are updated. These include the *General Plan*, *Development Plans*, and *Special Area Plans*.
8. Require bicycle facilities in the City's street setback improvement program.

9. Establish a bicycle parking requirement in the City's *Land Use Ordinance* to identify minimum short- and long-term bicycle parking requirements by land use type. Provide incentives for developers to provide secure short- and long-term bicycle storage facilities and showers.
10. Continue to work closely with the Neighborhood Boards, community associations, school organizations, and other community-based groups to establish and maintain bicycle and pedestrian-friendly neighborhoods.
11. Identify opportunities for bicycle projects to be incorporated into capital improvement and maintenance projects.
12. Use the benchmarks identified in Chapter 5 of the *Honolulu Bicycle Master Plan* to monitor progress toward project and program implementation.
13. DTS should prepare an annual progress report to be submitted to the Mayor, the Transportation Commission, the City Council, O'ahu Metropolitan Planning Organization (OMPO), and the Mayor's Advisory Committee on Bicycling.

5.2 Programs

1. Develop bikeway maintenance programs to:

- Repair potholes;
- Maintain shared-use-paths; and
- Replace non-bicycle-friendly storm grates in conjunction with routine maintenance.



Police on bicycles are excellent role models.

2. Improve the cleaning and sweeping of bikeways throughout the City.
3. Encourage volunteer groups to establish a program to monitor bicycle use patterns:
 - Conduct baseline counts on key recreation and commuter routes and update counts to track changes in use; and
 - Conduct counts before and after new projects to monitor use and effectiveness.
4. Continue and expand the bike parking facilities program through:
 - Bike rental lockers for long-term parking at major destinations including the Airport, Downtown, Park & Ride transit facilities, regional malls, universities and colleges;



Continue funding the BikeEd education program for all fourth graders on O'ahu.

- Bicycle rack installation program; and
- Designate bicycle parking areas with bicycle parking signs and pavement markings at parks, businesses, shopping, and commercial centers.

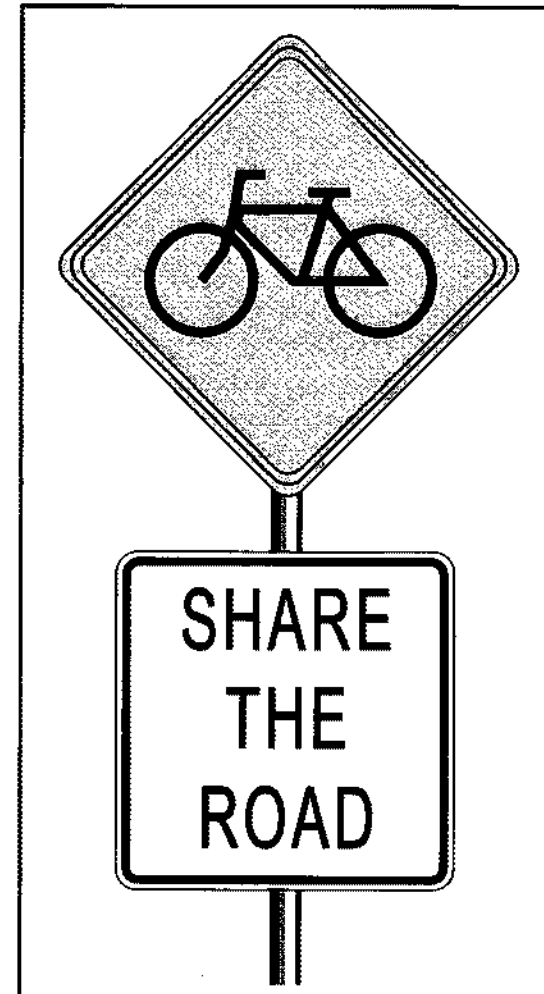
5. Establish a Downtown network of facilities to provide bike commuters with clothes storage, showers, and secure bike parking:
 - Encourage building owners and facility managers to provide covered, secure bicycle parking by offering tax incentives;
 - Encourage health centers and fitness clubs to offer membership packages for bicycle commuters; and
 - Encourage "Employer Promotion" programs.

6. Develop a bike point-of-sale and rental information package whereby an owner / renter of a bicycle receives an information package that includes the rules of the road, guidelines on how to share the road or path with other users, frequently asked questions, and an O'ahu bike map.
7. Motorist / Bicyclist / Child Education Programs:
 - Include questions regarding bicycles on driver's license tests;
 - Continue to fund the *BikeEd* education program for all fourth graders;
 - Promote adult bicycle education classes like "Effective Cycling;"
 - Promote sharing of roadway space between motorists and bicyclists through signing roadways with "Share the Road" signs;
 - Promote sharing of shared-use-path space; and
 - Create and air public service announcements.
8. Implement encouragement programs:
 - Continue the Mayor's "Sunday on Wheels" program;
 - Establish a "Bike to Work Week" with program incentives that support bicycling and alternative transportation modes; and
 - Include bicycles in the City motor pool.
9. Establish a neighborhood traffic calming program to make neighborhoods more pedestrian / bike-friendly:
 - Educate Neighborhood Board members, developers, and public and private sector designers and engineers of traffic calming initiatives;

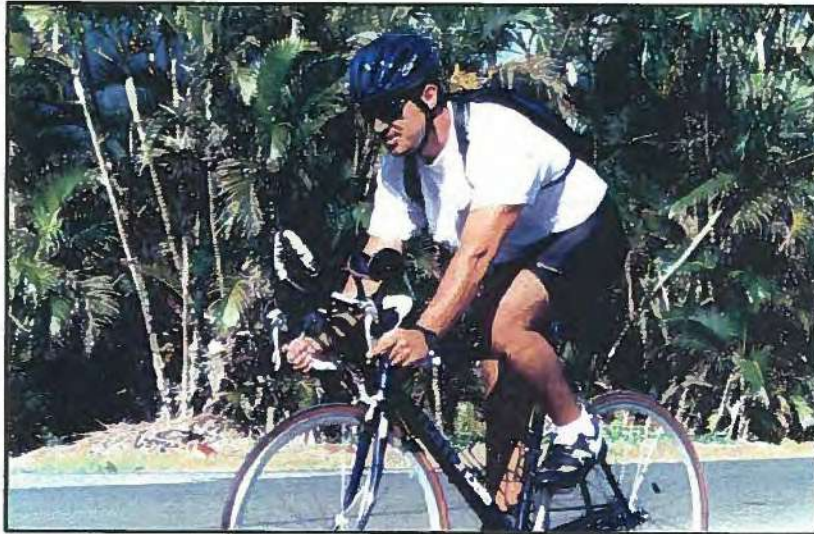
- Add "Share-the-Road" signs to neighborhood streets;
 - Slow traffic on neighborhood streets thereby improving pedestrian and bicycle safety and access; and
 - Create bicycle-safe zones around elementary, middle, and high schools through physical improvements and coordination with school, community-based groups, and the Honolulu Police Department.
10. Improve bike accessibility to, and integration with, transit facilities:
- Provide long term, secure, covered parking at park & ride facilities, airports, universities and community colleges, and other destinations;
 - Add signage and publicize the fact that bicycles are allowed on "public transit vehicles only" lanes; and
 - Identify points where bikeways and key bus routes intersect. Add bike routes to bus maps and create bike maps that include bus routes.
11. Promote Hawai'i as a bicycle-friendly place for tourists:
- Create and provide information for tourists including maps, guides, and rules of the road. Distribute this information to bike shops, hotels, youth hostels, and bed and breakfast accommodations;
 - Encourage hotels and other visitor accommodations to provide and / or expand bike parking and storage for visitors; and
 - Promote Honolulu as a bicycle-friendly city by the Hawai'i Visitors and Convention Bureau.

12. Implement enforcement programs to enforce the laws of the road as they apply to motorists and bicyclists:
- Implement an enforcement program for dangerous behavior on the road by all road users; and
 - Create a positive reinforcement program for good behavior.

John Forester, noted bicycle expert, writes, "Cyclists fare best when they act and are treated as drivers of vehicles." Soon to be adopted by the MUTCD, the "Share the Road" signage shown here reinforces this message.



Hawaii Department of Transportation, 1987



BENCHMARKS

To measure the success of meeting the goals and objectives outlined in Chapter 2, benchmarks have been developed. Benchmarks are used to indicate progress in reaching an ultimate vision. They specify a time frame in which achievement should be attained. They are crucial in recognizing and defining priorities, as well as in measuring the achievement of goals and objectives to realize the vision of a bicycle-friendly Honolulu. The plan established three goals and eleven objectives. The benchmarks are organized by objective. Each of the objectives previously described is accompanied by a specific benchmark(s) to realize the established objective.

Table 7: Goals, Objectives & Benchmarks

<i>Goals</i>	<i>Objectives</i>
<p>Goal #1 <i>To increase the mode share of bicycle trips.</i></p>	<p>Objective 1.1: Increase the number of people who ride bicycles.</p>
	<p>Objective 1.2: Provide and maintain a continuous bicycle network.</p>
	<p>Objective 1.3: Provide and maintain bicycle support facilities.</p>
	<p>Objective 1.4: Strive to make Honolulu one of the world's most bicycle-friendly cities.</p>

1 Year Benchmark	5 Year Benchmark	10 Year Benchmark	20 Year Benchmark
<p>"Bike to Work Day" Encourage volunteer groups to conduct baseline inventory of bike traffic counts at screen-lines along corridors. Invite bike clubs and community organizations to participate in updating the counts.</p>	<p>"Bike to Work Week" Central Corridor bike trips increase by 50% over 1999 levels. Commute mode share doubles from 1.4% of commuter trips to 2.8%.*</p>	<p>Annual "Bike to Work Week." Central Corridor bike trips increase by 100% over 1999 levels. Commute mode share doubles from 2.8% of all trips to 5%.*</p>	<p>Commute mode share doubles from 5% of commuter trips to 10%.* *Share refers to specific areas within the City which have relatively high bike usage such as UH Mānoa and Downtown.</p>
<p>Identify sufficient sources of funds to design & construct desired bicycling facilities. Designate staff responsible for identifying funds and establish schedules and deadlines.</p>	<p>Complete the Priority One project recommendations.</p>	<p>Complete the Priority Two project recommendations.</p>	<p>Complete the Priority Three project recommendations.</p>
<p>Initiate an outreach program to educate employers on the benefits of commuter cycling. Request employers provide incentives in lieu of paid automobile parking such as memberships in local athletic and gym-type facilities offering lockers and showers.</p>	<p>Adopt an amendment to the Land Use Ordinance, indicating the type and number of required bicycle parking facilities. Bike parking available in major commercial and employment centers (for example: Downtown, regional malls, colleges, and universities).</p>	<p>Long-term bike parking (lockers) available at all educational institutions, the airport, and transit centers. Convenient showers and changing facilities available to all commuting cyclists needing such accommodations.</p>	<p>Showers and changing facilities available in all employment centers.</p>
<p>Sponsor a statewide bicycle facilities design workshop.</p>	<p>Host a national bicycle / pedestrian conference. Achieve listing in <i>Bicycling Magazine's</i> Top 10 Bicycle-Friendly Cities.</p>		

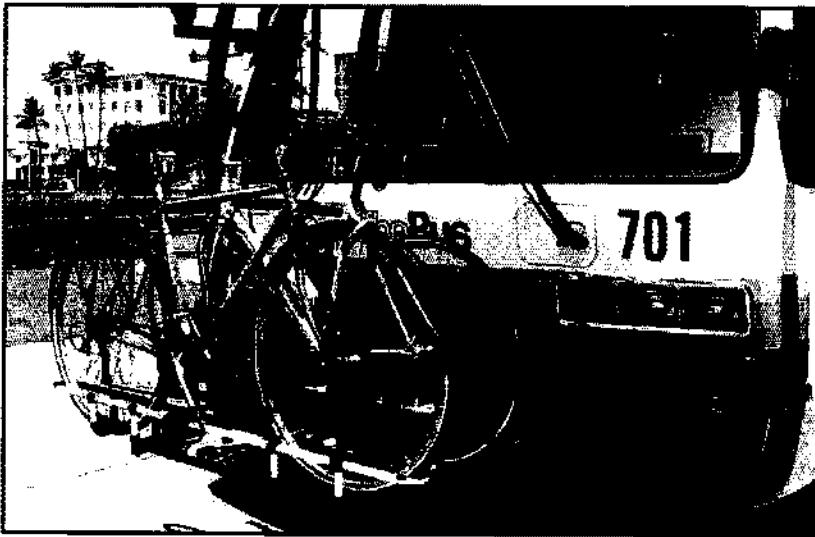
BENCHMARKS

Table 7 (con't.): Goals, Objectives & Benchmarks

Goals	Objectives	1 Year Benchmark
Goal #2 To enhance cooperation between roadway users.	Objective 2.1: Increase the awareness of bicyclists, motorists, and pedestrians, of their rights and responsibilities.	100% of all 4 th graders receive bicycle education through BikeEd.
	Objective 2.2: Enforce the traffic code.	Broadcast two new public service announcements (PSA's) reminding motorists and bicyclists to obey the rules of the road.
Goal #3 To encourage and promote bicycling as a safe, convenient, and pleasurable means of travel.	Objective 3.1: Provide a variety of bikeways.	Identify sufficient sources of funds to design and construct desired bicycle facilities.
	Objective 3.2: Prepare and implement a plan to promote bicycling.	Broadcast two new PSA's illustrating the health benefits and convenience of bicycle riding. Establish an interagency coordinating group (e.g. DTS, DOT, DOE, & DOH) to leverage existing public information resources and to present consistent messages about the virtues of bicycling. Provide news organizations with updates of bicycle improvements and events. Maintain and enhance the <i>Honolulu Bicycle Master Plan</i> web site as a central repository of bicycle plan information as well as other bicycling information. Prepare and distribute "bicycle maintenance improvement request forms" to bike shops, satellite city halls, etc.
	Objective 3.3: Reduce the number of traffic crashes involving bicycles.	Number of all bicycle related major crashes held at the 1997* level of 3.3% of all major vehicle crashes within the City & County of Honolulu. *Latest published data
	Objective 3.4: Reduce the number of bicycle thefts.	Locate bicycle parking facilities in high visibility areas. Bicycle thefts are reduced by 10% over 1999 levels.
	Objective 3.5: Increase the number of visitors who rent bicycles.	Obtain baseline information on number of visitor rentals. A visitor-friendly map of Honolulu bicycle routes and popular destinations is made available to each hotel guest. Hawaii Visitors and Convention Bureau (HVCB) and hotels promote bicycle tours and rentals.

5 Year Benchmark	10 Year Benchmark	20 Year Benchmark
<p><i>Effective Cycling</i> classes are held regularly to train adult riders on how to ride in an urban setting. Annual City-wide events promoting cycling activities.</p>		
<p>Violation relating to bicycle / pedestrian offenses held constant at 1999 levels.</p>	<p>Violations relating to bicycle / pedestrian offenses reduced 10% over 1999 levels.</p>	<p>Violations relating to bicycle / pedestrian offenses reduced 20% over 1999 levels.</p>
<p>Complete the Priority One project recommendations.</p>	<p>Complete the Priority Two project recommendations.</p>	<p>Complete the Priority Three project recommendations.</p>
<p>Implement improved maintenance procedures such that maintenance requests decrease by 15% from the first year levels and average response times are less than 48 hours.</p>		
<p>Number of major bicycle crashes reduced to 2.75% of all major vehicle crashes.</p>	<p>Number of major bicycle crashes reduced to 2.5% of all major vehicle crashes.</p>	<p>Number of major bicycle crashes reduced to 2% of all major vehicle crashes.</p>
<p>See 5 year benchmark 1.3. Bicycle thefts are reduced by 50% over 1999 levels.</p>		
<p>100% increase in the number of visitor rentals over 1999 levels. HVCB promotes Honolulu as a Bicycle-Friendly City, publicizing recent listing in <i>Bicycling Magazine's</i> Top 10 Bicycle Friendly Cities.</p>	<p>200% increase in the number of visitor rentals over 1999 levels.</p>	

REFERENCES



REFERENCES

The *Honolulu Bicycle Master Plan* project, policy, and program recommendations are based on broad community input as well as on bicycle planning and policy documents from the U.S. and other jurisdictions. National, state, and county roadway design and construction standards were relied upon for recommendations of various roadway improvements. The following list of references are documents that have been referred to within the text of this document.

American Association of State Highway and Transportation Officials. August 1991. *Guide for the Development of Bicycle Facilities*.

American Association of State Highway and Transportation Officials. April 1997. *Guide for the Development of Bicycle Facilities (Draft)*.

American Planning Association. 1995. *Bicycle Facility Planning*. Report Number 459.

City of Portland. May 1996. *Bicycle Master Plan*.

Forester, John. 1993. *Effective Cycling, 6th edition*. MIT Press: Cambridge, Massachusetts.

Hawai'i Department of Transportation. 1997. *Hawai'i Statewide Uniform Design Manual for Streets and Highways — Draft*. Section 16.

Hawai'i Department of Transportation. 1994. *BikePlan Hawai'i*.

International In-line Skating Association. 1997. *Guidelines for Establishing In-line Skate Trails in Parks and Recreational Areas*. IISA: Kensington, Maryland.

LeMaitre, MaryAnne. 1997. *Findings from: Survey of University of Hawai'i - Mānoa Bicyclists* (a Department of Urban and Regional Planning paper written for PLAN601).

McGurn, James. 1987. *On Your Bicycle: An Illustrated History of Cycling*. John Murray Publishers Ltd.: London.

O'ahu Metropolitan Planning Organization. 1995. *O'ahu Regional Transportation Plan*.

Oak Ridge National Laboratory. November 1993. *1990 NPTS Databook, Volume I*.

Oregon Department of Transportation. June 14, 1995. *Oregon Bicycle and Pedestrian Plan*.

Schnell, Thomas. Fall 1994. *Bicycle Transportation: A Plan B Area of Concentration Paper*. Department of Urban and Regional Planning, University of Hawai'i.

Transportation Alternatives. 1993. *Bicycle Blueprint*. Transportation Alternatives: New York.

United States Department of Transportation, Federal Highways Administration. January 1994. *Selecting Roadway Design Treatments to Accommodate Bicycles*. Publication Number: FHWA-RD-92-073.

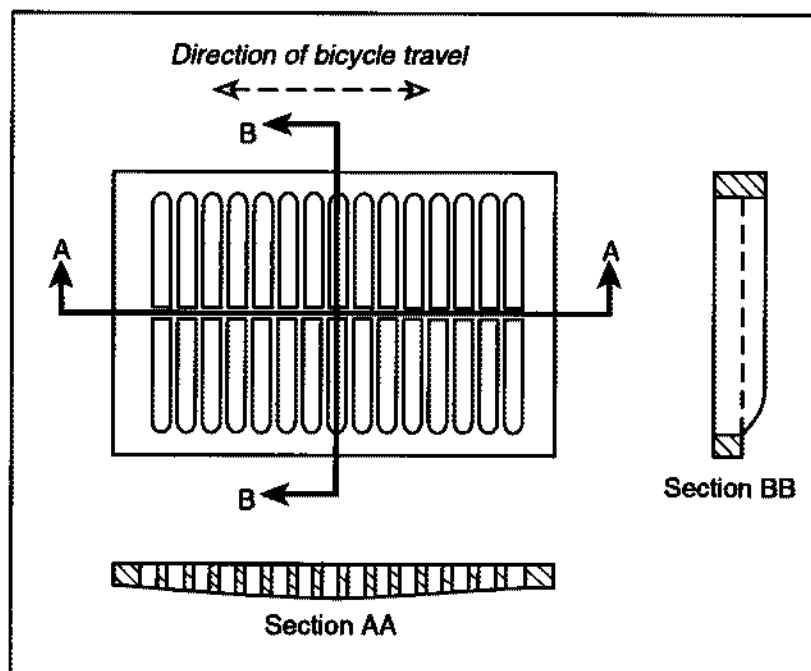
United States Department of Transportation, Federal Highways Administration. 1994. *The National Bicycling and Walking Study: Final Report*. Publication Number: FHWA-PD-94-023.

University of North Carolina, Highway Safety Research Center. October 1994. *A Compendium of Available*

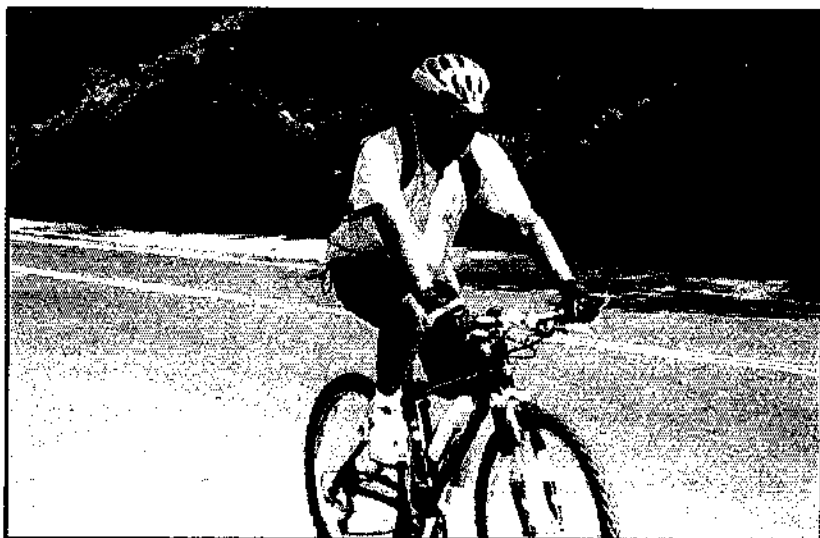
Bicycle and Pedestrian Trip Generation Data in the United States. Prepared for the Federal Highway Administration.

U.S. Census Transportation Planning Package: Urban Element Special Tabulations of the 1990 Census Data. 1990. *Mode of transportation to work for workers 16+*.

Ward Research, Inc. November 1997. *Telephone Survey of O'ahu Residents Regarding Bicycling Usage*.



Example of bicycle-safe drainage grate.



LIST OF APPENDICES

**APPENDIX A:
ESTIMATED COSTS**

**APPENDIX B:
DESIGN CONCEPTS & STANDARDS**

**APPENDIX C:
HONOLULU BIKEWAYS**



ESTIMATED COSTS

This appendix provides a breakdown of total costs for each of the projects described in Chapter 3.

A.1 Methodology for Estimating Costs

Each construction project is unique and actual costs will vary according to the specific project. This section outlines the method used to estimate total project costs, based on a preliminary construction cost estimate. More precise estimates should be developed after preliminary engineering has been completed.

Three types of costs comprise the total project cost. These are:

- design and engineering costs;
- construction costs; and
- inspection costs.

Design and engineering costs are often considered “soft” costs. These costs include monies to cover environmental documentation, such as permit applications and environmental assessments, site surveys, design, and engineering of the proposed facility. Experience has shown that some of these costs may be reduced by grouping projects together. For the purposes of this report and unless otherwise indicated, the following assumptions have been made:

- Environmental Documentation (assessments and permits): 10-15% of construction costs; 15% for projects less than \$250,000; 10% for projects greater than \$250,000.
- Design and Engineering: 10-15% of construction costs; 15% for projects less than \$1 million; 10% for projects greater than \$1 million.

Construction costs are those costs incurred for the construction of the facility. These costs include, but are not limited to, pavement markings, signage, and in some cases, roadway widening. Construction cost estimates are preliminary, order-of-magnitude estimates for budget purposes only, and include a 25% contingency factor.

During construction, inspection of the construction site is required to ensure that the new facility meets the roadway design standards for each jurisdiction. For federally funded projects, a federally certified inspector is required to inspect

the project during construction.

- Construction Engineering (Inspection costs): 10-15% of construction costs; 15% for projects less than \$1 million; 10% for projects greater than \$1 million.
- Supervision Costs: 40% of Construction Engineering (Inspection) costs.

Costs do not include right-of way acquisition which may be required in some areas.

Examples:

Scenario I: Construction cost less than \$250,000

Example: LP 2 - Waterfont Park to Ala Moana Park

Cost Description	Formula	Est. Cost
A Construction:		\$ 50,000
B Environmental Documentation:	(15% * A)	7,500
C Design and Engineering:	(15% * A)	7,500
D Inspection:	(15% * A)	7,500
E Supervision:	(40% * D)	3,000
Total cost of project	(A+B+C+D+E)	\$75,500

Scenario II: Construction cost between \$250,000 and \$1,000,000

Example: CA 7 - McCully Street Bike Lanes (Ala Wai to Wilder)

Cost Description	Formula	Est. Cost
A Construction:		\$355,000
B Environmental Documentation:	(10% * A)	35,500
C Design and Engineering:	(15% * A)	53,300
D Inspection:	(15% * A)	53,300
E Supervision:	(40% * D)	21,300
Total cost of project	(A+B+C+D+E)	\$518,400

Scenario III: Construction cost greater than \$1,000,000

Example: LP 13 - Young Street Park Boulevard

Cost Description	Formula	Est. Cost
A Construction:		\$5,000,000
B Environmental Documentation:	(10% * A)	500,000
C Design and Engineering:	(10% * A)	500,000
D Inspection:	(10% * A)	500,000
E Supervision:	(40% * D)	200,000
Total cost of project	(A+B+C+D+E)	\$6,700,000



APPENDIX A

A.2 Cost Summary Tables

The tables below provide a break out of the costs for each project. The *total* project cost, rounded to the nearest \$5,000.00, for each project are also reported in Chapter 2 and summarized in Chapter 3 of this report. (Due to this rounding factor, costs in these tables will be slightly less.)

Table A.1: Lei of Parks - Priority One Park Links (\$1,000)

Routes	Engin., Env. & Design	Cons- truction	Inspect. & Operation	Total Project Cost
LP 1 Aloha Tower to Waterfront Park	\$118.8	\$475.0	\$99.8	\$693.6
LP 2 Waterfront Park to Ala Moana Park	15.0	50.0	10.5	75.5
LP 3 Ala Moana Park to Ala Wai Canal	21.0	70.0	14.7	105.7
LP 4 Kalākaua Ave. Bridge	61.5	205.0	43.1	309.6
LP 5 Kalākaua Ave. to McCully St.	66.0	220.0	46.2	332.2
LP 6 McCully St. Bridge (over Ala Wai)	61.5	205.0	43.1	309.6
LP 7 McCully St. to Date St.	51.0	170.0	35.7	256.7
LP 8 Date St. (Lā'au-Kapahulu)	46.5	155.0	32.6	234.1
LP 9 Pāki Ave. (Kapahulu-Monsarrat)	92.5	370.0	77.7	540.2
LP 9a Pāki Ave. (Monsarrat-Diamond Head Rd.)	157.5	630.0	132.3	919.8
LP 10 Diamond Head Rd. (Ponimō'i-Ruger Pk.)	280.0	2,800.0	392.0	3,472.0
LP 11 Ala Wai Blvd.	713.0	3,565.0	499.1	4,777.1
LP 13 Young St.	1,000.0	5,000.0	700.0	6,700.0
Subtotal				\$18,726.1

Table A.2: Lei of Parks - Priority Two Park Links (\$1,000)

Routes	Engin., Env. & Design	Cons- truction	Inspect. & Operation	Total Project Cost
LP 12 Fort St. Mall	\$15.0	\$50.0	\$10.5	\$75.5
LP 14 Isenberg St. (Coyn-King)	80.0	320.0	67.2	467.2
LP 15 Kuilei St.	75.0	300.0	63.0	438.0
LP 16 Kapi'olani Blvd. (Kuilei-S. King)	46.5	155.0	32.6	234.1
LP 17 Mānoa-Pālolo Stream (Date-Kapi'olani)	123.8	495.0	104.0	722.8
LP 18 Diamond Head Rd. (Makapu'u-Ruger Pk.)	13.5	45.0	9.5	68.0
LP 20 Holomoana St. (Yacht Harbor)	19.5	65.0	13.7	98.2
LP 21 Ala Moana Blvd. (Holomoana-Kālia)	12.0	40.0	8.4	60.4
LP 22 Kālia Rd. (Ala Moana-Saratoga)	107.5	430.0	90.3	627.8
LP 23 Saratoga Rd. (Kālia-Kalākaua)	108.8	435.0	91.4	635.2
LP 24 Kalākaua Ave. (Beretania-Kapahulu)	62.5	250.0	52.5	365.0
Subtotal				\$3,792.2



Table A.3: Bike-Friendly Route No. 1 (\$1,000)

Routes	Engin., Enw., & Design	Cons- truction	Inspect. & Operation	Total Project Cost
FR 1 Pearl Harbor Bike Path Gateway (● Lehua Ave.)	\$12.0	\$40.0	\$8.4	\$60.4
FR 2 Pearl Harbor Bike Path Gateway (● Blaisdell Park)	4.5	15.0	3.2	22.7
FR 3 Pearl Harbor Bike Path Gateway (● Kanuku St.)	27.0	90.0	18.9	135.9
FR 4 Pearl Harbor Bike Path Gateway (● Pearl Kai Center)	27.0	90.0	18.9	135.9
FR 4a Pearl Harbor Bike Path Gateway (● McGrew Point)	1.5	5.0	1.1	7.6
FR 5 Kamehameha Hwy. (Valkenburgh-Aloha Stadium)	133.8	535.0	112.4	781.2
FR 6 Radford Dr. (Bougainville-Kamehameha)	16.5	55.0	11.6	83.1
FR 7 Nimitz Hwy. (H-1 Viaduct)	58.5	195.0	41.0	294.5
FR 8 Nimitz Hwy. (Waiakamilo Detour)	25.5	85.0	17.9	128.4
FR 9 Nimitz Hwy. (H-1 Viaduct to Waiakamilo)	162.5	650.0	136.5	949.0
FR 10 River St. (Nimitz-Beretania)	16.5	55.0	11.6	83.1
FR 11 Hotel St. (River-Richards)	24.0	80.0	16.8	120.8
FR 12 Hotel St. (Alapa'i-Ward)	46.5	155.0	32.6	234.1
FR 13 South King St.	300.0	1,500.0	210.0	2,010.0
FR 15 Beretania St.	300.0	1,500.0	210.0	2,010.0
FR 16 Old Wai'ala'e Rd. (Wai'ala'e to UH Quarry)	24.0	80.0	16.8	120.8
FR 16a Old Wai'ala'e Rd. Bridge (over H-1)	7.5	25.0	5.3	37.8
FR 17 Wai'ala'e Ave. (Old Wai'ala'e-17th)	76.3	305.0	64.1	445.4
FR 18 Wai'ala'e Ave. (17th-Kalaniana'ole)	66.0	220.0	46.2	332.2
Subtotal				\$7,992.9

Table A.4: College Access Projects (\$1,000)

Routes	Engin., Enw., & Design	Cons- truction	Inspect. & Operation	Total Project Cost
CA 1 Mānoa-Pālolo Stream (Kapi'olani-Dole)	\$123.8	\$495.0	\$104.0	\$722.8
CA 2 St. Louis Hts. Dr. (Wai'ala'e -Dole)	24.0	80.0	16.8	120.8
CA 3 Kapahulu Ave. (Kalākaua-Ala Wai)	19.5	65.0	13.7	98.2
CA 4 Kapahulu Ave. (Ala Wai-Campbell)	15.0	50.0	10.5	75.5
CA 5 Kapahulu Ave. (Campbell-Charles)	33.0	110.0	23.1	166.1
CA 6 Kapahulu Ave. (Charles-Wai'ala'e)	27.0	90.0	18.9	135.9
CA 7 McCully St. (Ala Wai-Wilder)	88.8	355.0	74.6	518.4
CA 8 McCully St. (Bridge over H-1)	417.0	2,085.0	291.9	2,793.9
CA 9 Metcalf St. (Wilder-University)	16.5	55.0	11.6	83.1
CA 10 University Lower Quarry (Old Wai'ala'e-Varsity)	9.0	30.0	6.3	45.3
CA 11 Varsity Pt. (Univ.-UH Lower Quarry)	9.0	30.0	6.3	45.3
CA 12 Coyne St. (University-Isenberg)	3.0	10.0	2.1	15.1
CA 13 Dole St. (University-EW Rd.)	21.0	70.0	14.7	105.7
CA 14 Dole St. (EW Rd.-St. Louis)	18.0	60.0	12.6	90.6
CA 15 University-Dole Intersection Improvements	27.0	90.0	18.9	135.9
CA 16 University Ave. (Varsity Pt.-Dole) (mauka direction only)	27.0	90.0	18.9	135.9
CA 17 University Ave. (Dole-Maile Way)	25.5	85.0	17.9	128.4
CA 18 University Upper Fire Rd. (EW Rd.-Pāmoa)	37.5	125.0	26.3	188.8
CA 19 Makapu'u Ave.	6.0	20.0	4.2	30.2
CA 20 Aloha St.	9.0	30.0	6.3	45.3
CA 21 10 th Ave. (Aloha-Wai'ala'e)	12.0	40.0	8.4	60.4
CA 22 16 th Ave. (Wai'ala'e-Kīlauea)	12.0	40.0	8.4	60.4
CA 23 Monsarrat Ave. (Kalākaua-Pāki)	13.5	45.0	9.5	68.0
CA 24 Monsarrat Ave. (Pāki-Makapu'u)	77.5	310.0	65.1	452.6
CA 25 Kīlauea Ave. (Wai'ala'e-18th)	55.5	185.0	38.9	279.4
CA 26 Kapālama Stream (Nimitz-N. King)	205.0	1,025.0	143.5	1,373.5
CA 27 Alakawa St. (Nimitz-Dillingham)	15.0	50.0	10.5	75.5
CA 28 Pearl Harbor Bike Path LLC Connection	27.0	90.0	18.9	135.9
Subtotal				\$8,186.9

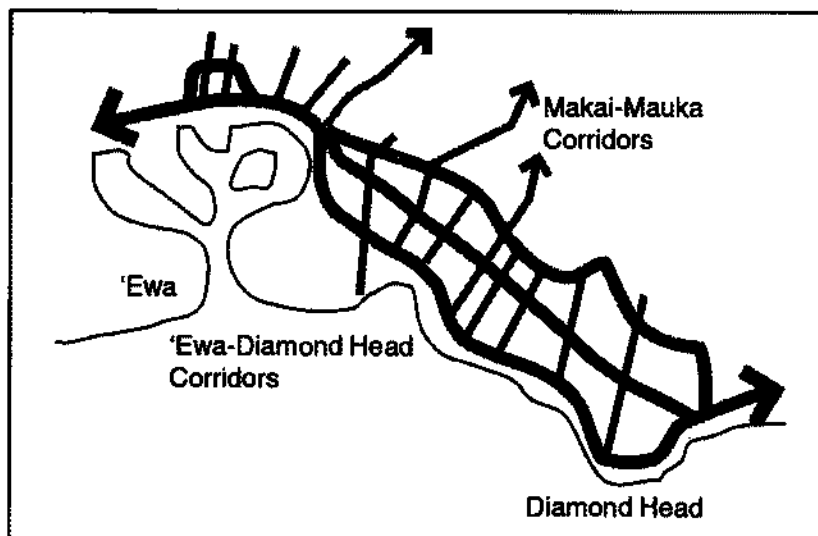
APPENDIX A

Table A.5: Priority 2 Projects (\$1,000)

	Routes	Engin., Env., & Design	Cons- truction	Inspect. & Operation	Total Project Cost
1	Waimano Home Rd. (Kam Hwy.-Komo Mai)	\$60.0	\$200.0	\$42.0	\$302.0
2	Ka'ahumanu St. (Kamehameha-Komo Mai)	18.0	60.0	12.6	90.6
3	Ka'onohi St. (Kamehameha-Laelua)	19.5	65.0	13.7	98.2
4	Ka'amilo St. (Kulawai-Honomanu)	25.5	85.0	17.9	128.4
4a	Honomanu St. (Moanalua-Kam.)	85.0	340.0	71.4	496.4
5	Kamehameha Hwy. (H-2 to Aloha Stadium)	1,941.0	9,705.0	1,358.7	13,004.7
6	Noelani St. (Ka'ahumanu-Waimano Home)	24.0	80.0	16.8	120.8
7	Moanalua Rd. ('Aiea Hts.-Ka'ahumanu)	58.5	195.0	41.0	294.5
8	'Aiea Hts. Dr. (Ulune-Moanalua)	9.0	30.0	6.3	45.3
9	Ulune St. (Halawa Valley Rd.-'Aiea Hts.)	19.5	65.0	13.7	98.2
10	Aliamanu Dr. (Moanalua-Bougainville)	15.0	50.0	10.5	75.5
11	Bougainville (Aliamanu-Radford)	12.0	40.0	8.4	60.4
12	Pu'uloa Rd. (Nimitz-Moanalua)	54.0	180.0	37.8	271.8
13	Kikowaena St. (Pukoloa-Kaua)	21.0	70.0	14.7	105.7
14	Ahua St. (Pukoloa-Kikowaena)	7.5	25.0	5.3	37.8
15	Pukoloa (Ahua-Salt Lake Blvd.)	21.0	70.0	14.7	105.7
16	Moanalua Gardens	62.5	250.0	52.5	365.0
17	Moanalua Rd. (Moanalua Gardens-Icarus)	242.5	970.0	203.7	1,416.2
18	Kaua St. (Middle-Moanalua Gardens)	90.0	360.0	75.6	525.6
19	Middle St. (Nimitz-N. King)	18.0	60.0	12.6	90.6
20	Middle St. (Bridge over H-1)	1.5	5.0	1.1	7.6
21	Middle St. (Kaua-N. School)	12.0	40.0	8.4	60.4
22	Salt Lake Blvd. (Kamehameha Hwy.-Pu'uloa)	72.0	240.0	50.4	362.4
23	Sand Island Bridge	13.5	45.0	9.5	68.0
24	North King St. (Beretania-Middle)	209.0	1,045.0	146.3	1,400.3
25	Ala Moana Blvd. (Nimitz-Kalākaua)	1,423.0	7,115.0	996.1	9,534.1
26	Cooke St. (Ilalo-Hotel)	25.5	85.0	17.9	128.4
27	Pensacola St. (Waimanu-Wilder)	46.5	155.0	32.6	234.1
28	Pi'ikoi St. (Ala Moana-Wilder)	48.0	160.0	33.6	241.6
	Subtotal				\$29,770
	Lei of Parks, Priority Two Park Links (Table A.2)				\$3,792
	Subtotal				\$33,562

Table A.6: Priority 3 Projects (\$1,000)

	Routes	Engin., Env., & Design	Cons- truction	Inspect. & Operation	Total Project Cost
1	Red Hill (Icarus Way-Ulune)	\$221.3	\$895.0	\$185.9	\$1,292.2
2	Lagoon Dr.	28.5	95.0	20.0	143.5
3	Sand Island SUP (Ke'ehi Lagoon to Sand Island)	180.0	720.0	151.2	1,051.2
4	Liliha St. (N. King-Wyllie)	62.5	250.0	52.5	365.0
5	Nu'uuanu Stream (Nimitz-Kuakini)	228.0	1,140.0	159.6	1,527.6
6	Kamehameha IV Rd. (N. School-Likelike Hwy.)	21.0	70.0	14.7	105.7
7	North School St. ('Iolani-Middle)	276.0	1,380.0	193.2	1,849.2
8	'Iolani Ave. (Alapa'i-N. School)	69.0	230.0	48.3	347.3
9	Alapa'i St. ('Iolani-Spencer)	7.5	25.0	5.3	37.8
10	Spencer St. (Alapa'i-Wilder)	24.0	80.0	16.8	120.8
11	Wilder Ave. (Dole-Spencer)	65.0	260.0	54.6	379.6
12	10th Ave. (Wa'oma'o-Wai'alaie)	21.0	70.0	14.7	105.7
13	Lusitana St. ('Iolani-Pauoa)	68.8	275.0	57.8	401.5
14	Pauoa Rd. (Lusitana-Kapalu)	57.0	190.0	39.9	286.9
15	Kāneali'i Ave. (Lusitana to Kapalu)	57.0	190.0	39.9	286.9
16	Kapalu St. (Pauoa-Kāneali'i)	18.0	60.0	12.6	90.6
	Subtotal				\$8,391.5



DESIGN CONCEPTS & STANDARDS

Bicycle transportation planning is an emerging field of transportation planning. The American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA) have prepared general guidance in the overall methods and approaches used in designing bicycle transportation systems and this guidance has been incorporated into the *Honolulu Bicycle Master Plan*.

B.1 Regional Bicycle Corridor Concept

The regional bicycle corridor concept provides the structure within which the system of bicycle routes is established. In defining the network of bicycle corridors, the *location* of

corridors and the *spacing* of these corridors, with respect to each other, have a significant influence upon the usefulness of a bike route system. Major *origins and destinations* of potential bicycle trips must be identified to ensure routes are available to meet cyclist's needs. *Public input* in identifying corridors and routes is critical to understanding user needs and desires. Finally, the corridor network has to be *connected* to the island-wide system to facilitate intra-regional travel.

Bicycle network planning begins with the understanding that people on bikes want to go to the same places as people in cars. Therefore, the City's existing street network provides an excellent framework for identifying the major travel corridors. The City's major 'Ewa-Diamond Head arterial streets are spaced about a mile apart on average. The major Mauka-Makai streets are also spaced about a mile apart. The close spacing of the City's major streets means that most residents of the City reside within several bicycle-minutes of a major street.

Based on public input, analysis of existing travel patterns, and the location of major employment and recreation centers, two major travel corridor types are recognized: 'Ewa-Diamond Head Corridors (Makai, Central and Mauka Corridors), and Mauka-Makai Corridors. The 'Ewa-Diamond Head Corridors include the City's principal arterial streets such as King St., Beretania St., Ala Moana Blvd., and Nimitz Hwy. which carry the highest volume of bicycle traffic.

The Mauka-Makai Corridors provide local access to the major 'Ewa-Diamond Head Corridors, as well as major access to several of the universities and colleges within the planning area, such as UH Mānoa and Honolulu Commu-

APPENDIX B

nity College. The Mauka-Makai Corridors also include the Kapālama, Nu'uānu, and Mānoa-Pālolo Stream corridors.

The objective and concept is to develop bike routes within each of the major travel corridors. The following tables summarize recommended projects by major corridor.

The Makai Bike Corridor includes 26.6 miles of projects which will provide a continuous route across the City near the water. The facilities include at least one continuous bike lane, and at several locations, a choice of bike lanes and shared-use path facilities. The Makai Bike Corridor could become the urban leg of an around-the-island bike corridor.



Table B.1: Makai Bike Corridor Projects

Proj. No.	Facility	Type	Length (miles)	Total Cost (1,000's)	
2	25	Ala Moana Blvd. (Nimitz-Kalākaua)	lane	2.7	\$9,535
LP	3	Ala Moana Park to Ala Wai Canal	sup	0.2	110
LP	21	Ala Moana Blvd. (Holomoana-Kālia)	lane	0.1	65
LP	11	Ala Wai Blvd.	sup/lane	1.6	4,780
LP	1	Aloha Tower to Waterfront Park	sup	0.7	695
LP	8	Date St. (Lā'au-Kapahulu)	sup	0.8	235
LP	18	Diamond Head Rd. (Makapu'u-Ruger Pk)	lane	1.0	70
LP	10	Diamond Head Rd. (Ruger Pk-Ponimō'i)	lane	1.4	3,755
LP	20	Holomoana St. (Ala Wai Yacht Harbor)	lane	0.8	100
LP	4	Kalākaua Ave. Bridge	x-walk	200 ft.	310
LP	24	Kalākaua Ave. (Beretania-Kapahulu)	lane	2.2	365
LP	5	Kalākaua Ave. to McCully St.	sup	0.2	335
LP	22	Kālia Rd. (Ala Moana-Saratoga)	lane	0.4	630
2	5	Kam. Hwy. (H-2-Stadium)	lane	3.8	13,005
FR	5	Kam. Hwy. (Vaikōnburgh-Aloha Stadium)	lane	2.6	785
CA	25	Kilauea Ave. (Wai'ālae-18th)	lane	1.6	280
LP	6	McCully St. Bridge (over the Ala Wai)	x-walk	200 ft.	310
LP	7	McCully St. to Date St.	sup	0.9	260
FR	7	Nimitz Hwy. (H-1 Viaduct)	lane	2.5	295
FR	8	Nimitz Hwy. (Waiakamilo Detour)	lane	0.8	130
FR	9	Nimitz Hwy. (H-1 Viaduct to Waiakamilo)	lane	1.1	950
LP	9	Pāki Ave. (Kapahulu-Monsarrat)	lane	0.3	545
LP	9a	Pāki Ave. (Monsarrat-Diamond Head Rd.)	lane	0.7	920
CA	29	Pearl Harbor Bike Path to LCC	sup	0.2	140
LP	2	Waterfront Park to Ala Moana Park	lane	0.3	80
Subtotal				26.6	\$38,685

Central Bike Corridor projects (18.4 miles) cut right through the center of the City, extending from Kāhala to Pearl Harbor. Facilities are all bike lanes with the exception of the Young Street Park Boulevard (a redesigned street).

Table B.2: Central Bike Corridor Projects

Proj. No.	Facility	Type	Length (miles)	Total Cost (1,000's)
2 14	'Ahua St. (Pūkōloa-Kikowaena)	lane	0.1	\$40
FR 15	Beretania St.	lane	3.3	2,010
CA 12	Coyne St. (University-Isenberg)	route	0.3	20
FR 12	Hotel St. (Alapa'i-Ward)	lane	0.2	235
FR 11	Hotel St. (River-Richards)	route	0.5	125
2 13	Kikowaena St. (Pūkōloa-Kaua)	lane	0.3	110
LP 15	Kuilei St.	lane	0.3	440
2 24	North King St. (Beretania-Middle)	lane	1.6	1,405
FR 16	Old Wai'ālae Rd. (Wai'ālae to UH Quarry)	lane	0.3	125
FR 16a	Old Wai'ālae Rd. Bridge (over H-1)	lane	0.1	40
2 15	Pūkōloa ('Ahua-Salt Lake Blvd.)	lane	0.3	110
2 22	Salt Lake Blvd. (Kam. Hwy.-Pu'uloa)	lane	3.5	365
FR 13	South King St.	lane	3.3	2,010
CA 10	Univ. Lower Quarry (Old Wai'ālae-Varsity)	lane	0.3	50
CA 11	Varsity Pl. (Univ.-UH Lower Quarry)	route	0.1	50
FR 18	Wai'ālae Ave. (17th-Kalaniana'ole)	lane	0.8	335
FR 17	Wai'ālae Ave. (Old Wai'ālae-17th)	lane	1.5	450
LP 13	Young St.	park blvd.	1.6	6,700
Subtotal			18.4	\$14,620

Mauka Bike Corridor projects (12.5 miles) extend from Dole Street by the UH Mānoa Campus, up and over Red Hill, and up along Moanalua and Noelani Streets in the 'Aiea / Pearl City area. The segment up and over Red Hill is a multi-use path. The rest of the facilities are bike lanes.

Table B.3: Mauka Bike Corridor Projects

Proj. No.	Facility	Type	Length (miles)	Total Cost (1,000's)
3 9	Alapa'i St. ('Iolani-Spencer)	lane	0.2	\$40
CA 14	Dole St. (EW Rd.-St. Louis)	lane	0.5	95
CA 13	Dole St. (University-EW Rd.)	lane	0.5	110
3 8	'Iolani Ave. (Alapa'i-N. School)	lane	0.4	350
2 18	Kaua St. (Middle-Moanalua Gardens)	lane	0.8	530
2 16	Moanalua Gardens	sup	0.4	365
2 7	Moanalua Rd. ('Aiea Hts.-Ka'ahumanu)	lane	1.5	295
2 17	Moanalua Rd. (Moanalua Gdns-Icarus)	sup	0.9	1,420
2 6	Noelani St. (Ka'ahumanu-Walmano Home)	lane	1.2	125
3 7	North School St. ('Iolani-Middle)	lane	2.5	1,850
3 1	Red Hill (Icarus Way-Ulune)	sup	0.8	1,295
3 10	Spencer St. (Alapa'i-Wilder)	lane	0.3	125
2 9	Ulune St. (Hālawala Valfey Rd.-'Aiea Hts.)	lane	1.1	100
3 11	Wilder Ave. (Dole-Spencer)	lane	1.4	380
Subtotal			12.5	\$7,080

APPENDIX B

Mauka-Makai Bike Corridor projects (34.0 miles) constitute the largest number of road segments. Most are relatively short segments, indicative of the narrow coastal plain upon which the City is built. The three canal multi-use paths (Kapālama, Nu‘uanu, and Mānoa-Pālolo) represent some of the longer segments. Gateway improvements to the Pearl Harbor Bike Path represent some of the smaller segments.

Table B.4: Mauka-Makai Bike Corridor Projects

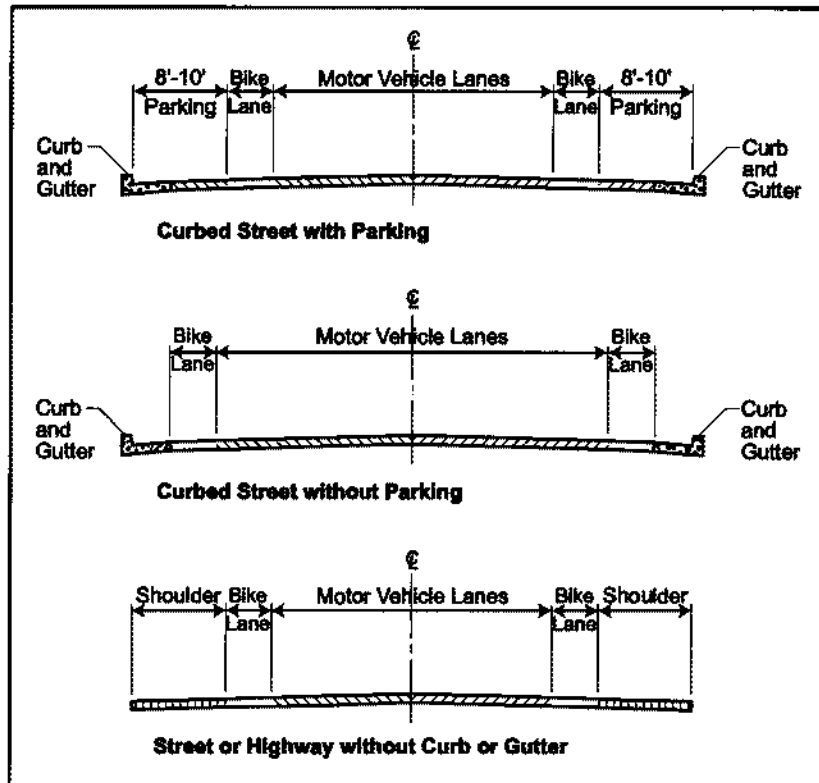
Proj. No.	Facility	Type	Length (miles)	Total Cost (1,000's)
CA 21	10th Ave. (Aloha-Wai'alaē)	route	0.6	\$ 65
3 12	10th Ave. (Wai'ōma'o-Wai'alaē)	route	1.4	110
CA 22	16th Ave. (Wai'alaē-Kīlauea)	route	0.6	65
2 8	'Aiea Hts. Dr. (Ulune-Moanalua)	lane	0.1	50
CA 28	Alakawa St. (Nimitz-Dillingham)	lane	0.5	80
2 10	Āliamanu Dr. (Moanalua-Bougainville)	lane	1.0	80
CA 20	Aloha St.	lane	0.3	50
2 11	Bougainville (Āliamanu-Radford)	lane	0.7	65
2 26	Cooke St. (Ilalo-Hotel)	lane	0.8	130
LP 12	Fort St. Mall	route	0.4	80
2 4a	Honomanū St. (Moanualua-Kam)	lane	0.1	500
LP 14	Isenberg St. (Coyle-King)	lane	0.2	470
2 3	Ka'ōnohi St. (Kamehameha-Laekua)	lane	1.5	100
2 2	Ka'ahumanu St. (Kam.-Komo Mai)	lane	1.0	95
2 4	Ka'aniho St. (Kulawai-Honomanū)	lane	1.5	130
3 6	Kam. IV Rd. (N. School-Likelike)	lane	0.7	110
3 15	Kāneali'i (Lusitana-Kapalu)	route	0.6	290
CA 27	Kapālama Stream (Nimitz-N. King)	sup	0.6	1,375
CA 4	Kapahulu Ave. (Ala Wai-Campbell)	lane	0.4	80
CA 5	Kapahulu Ave. (Campbell-Charles)	lane	0.5	170
CA 6	Kapahulu Ave. (Charles-Wai'alaē)	lane	0.4	140
CA 3	Kapahulu Ave. (Kalākaua-Ala Wai)	lane	0.5	100
3 16	Kapalu (Pauoa-Kāneali'i)	route	0.1	95
LP 16	Kapi'olani Blvd. (Kuilei-S. King)	lane	0.4	235
3 2	Lagoon Dr.	lane	2.4	145
3 4	Liliha St. (N. King-Wyllie)	lane	1.4	365

3 13	Lusitana St. (Iolani-Pauoa)	route	0.4	405
CA 19	Makapu'u Ave.	lane	0.3	35
LP 17	Mānoa-Pālolo Stream (Ala Wai-Kapi'olani)	sup	0.4	725
CA 1	Mānoa-Pālolo Stream (Kapi'olani-Dole)	sup	0.4	725
CA 7	McCully St. (Ala Wai-Wilder)	lane	0.8	520
CA 8	McCully St. (Bridge over H-1)	lane	0.2	2,795
CA 9	Metcalf St. (Wilder-University)	lane	0.4	85
2 20	Middle St. (Bridge over H-1)	lane	200 ft.	10
2 21	Middle St. (Kaua-N. School)	lane	0.7	65
2 19	Middle St. (Nimitz-N. King)	lane	0.5	95
CA 23	Monsarrat Ave. (Kalākaua-Pāki)	lane	0.4	70
CA 24	Monsarrat Ave. (Pāki-Makapu'u)	lane	0.8	455
3 5	Nu'uanu Stream (Nimitz-Kuakini)	sup	0.8	1,530
3 14	Pauoa Rd. (Lusitana-Kapalu)	route	0.6	290
<i>Pearl Harbor Bike Path Gateways:</i>				
FR 2	⊙ Blaisdell Park	sup	50 ft.	25
FR 3	⊙ Kanuku St.	sup	0.2	140
FR 1	⊙ Lehua Ave.	lane	0.1	65
FR 4	⊙ Pearl Kai Center	sup	0.2	140
FR 5	⊙ McGrew Point	sign		10
2 27	Pensacola St. (Waimanu-Wilder)	route	1.0	235
2 28	Pi'ikoi St. (Ala Moana-Wilder)	route	1.2	245
2 12	Pu'ukoa Rd. (Nimitz-Moanalua)	lane	1.3	275
FR 6	Radford Dr. (Bougainville-Kamehameha)	lane	0.4	85
FR 10	River St. (Nimitz-Beretania)	lane	0.1	85
2 23	Sand Island Bridge	lane	0.2	70
3 3	Sand Island SUP (Ke'ehi Lagoon to Sand Island)	sup	1.3	1,055
LP 23	Saratoga Rd. (Kālia-Kalākaua)	lane	0.4	640
CA 2	St. Louis Hts. Dr. (Wai'alaē-Dole)	lane	0.1	125
CA 17	Univ. Ave. (Dole-Maile Way)	lane	0.4	130
CA 16	Univ. Ave. (Varsity-Dole (mauka dir.))	lane	0.3	140
CA 18	Univ. Upper Fire Rd. (EW Rd.-Pāmoa)	sup	0.2	190
CA 15	Univ.-Dole Intersection Improvements	int.		140
2 1	Waimano Home Rd. (Kam.-Komo Mai)	lane	1.2	305
Subtotal			34.0	\$17,080

B.2 Design Treatments

There are several basic types of bikeway facilities. These include **bike lanes**, **bike routes**, and **bike paths**. The first two are on-road facilities and the last is off-road.

Bike lanes typically occupy the outside / curb lane of the street, and are identified by a continuous white stripe placed 4-6 feet from the gutter pan or parking lane. Bike routes are posted along streets with **wide curb lanes** or **shared lanes** where there is less traffic.



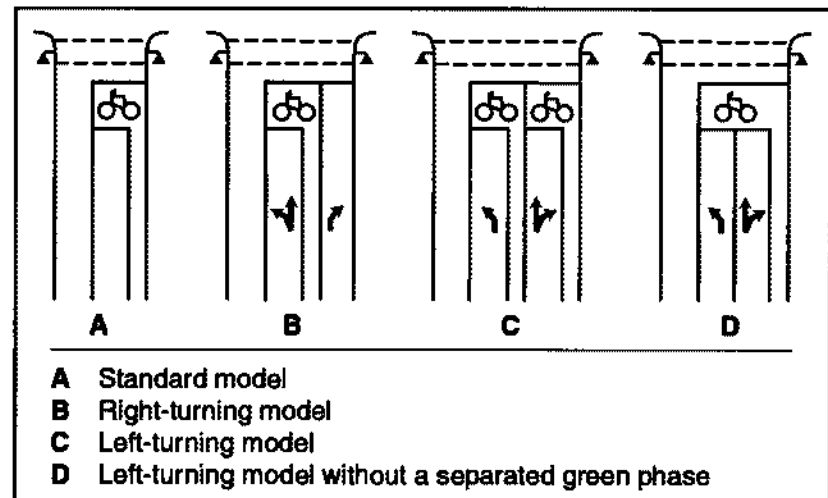
Typical Bicycle Lane Cross Section

AASHTO, 1991

In areas where bike lanes are the preferred treatment but right-of-way and roadway widths are insufficient, a **bike logo stencil** can be placed on the curb lane pavement at regular intervals. This treatment provides slightly better protection for the bicyclist than no treatment at all because it alerts the motorist that the lane should be shared with bicycles.

At intersections, it is sometimes difficult for a motorists and bicyclists alike to know where they should be waiting until a traffic signal changes from red to green. **Advanced stop lanes** for bicyclists can be painted refuge islands that define space for bicyclists to queue.

Bike paths are now called **shared-use paths** in recognition of the many joggers, walkers, and in-line skaters using them. They are typically removed from the road right-of-way entirely, located adjacent to the roadway or within parks and other scenic areas.



Advanced Stop Lanes

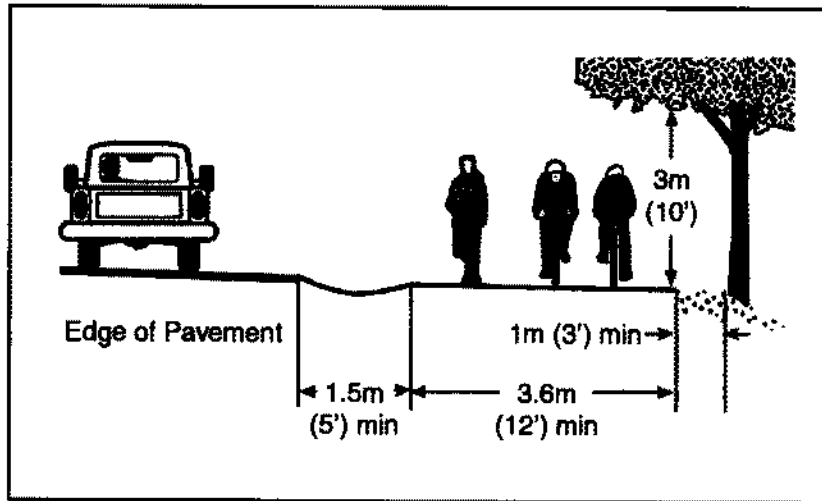
Hawaii DOT, 1997

APPENDIX B

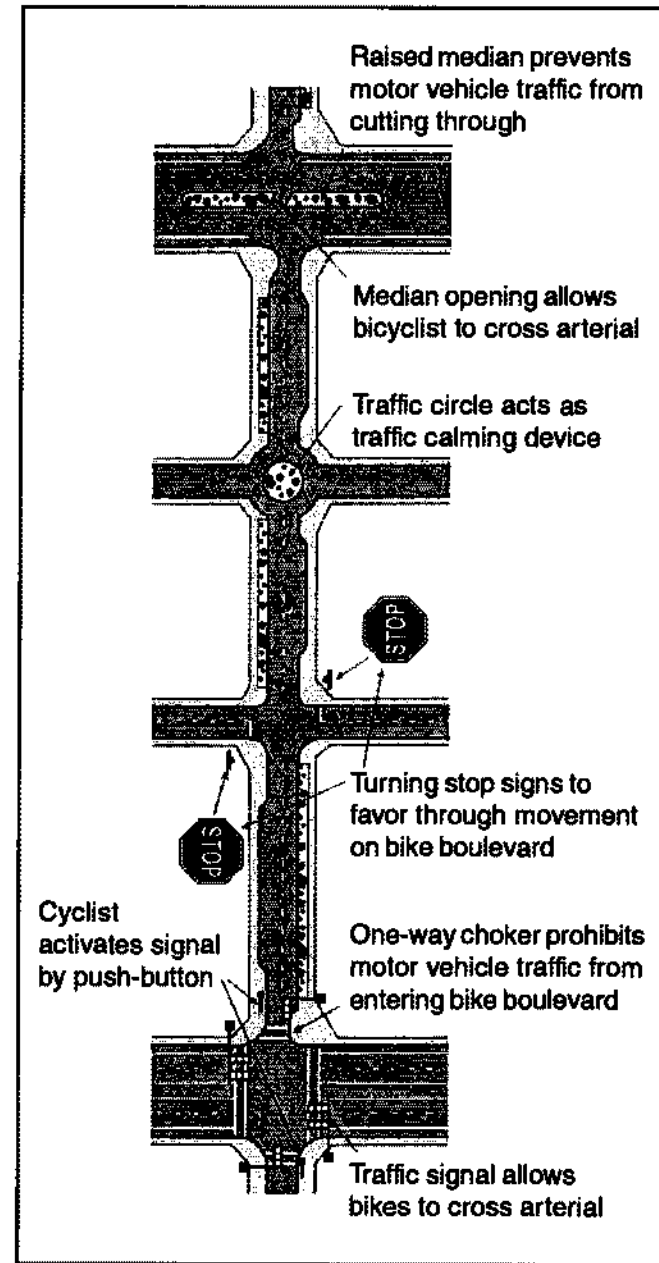
In Honolulu, as with many developed urban areas, the streets are the only means of providing continuous travelways for bicycles. Shared-use paths can provide local access and recreation, but there is simply not enough available land to create an extensive system of off-road facilities.

The **bicycle boulevard** or **park boulevard** is a refinement of the shared lane concept where the operation of a local street is modified to function as a through street for bicycles while maintaining local access for motor vehicles. Typical bike / park boulevard design treatments include cyclist-activated traffic signals, traffic circles to calm traffic, medians in the cross streets for refuge, and other physical improvements to reduce motor vehicle "shortcutting."

FHWA has adopted a method to identify the type of bicycle facility indicated in a specific situation. HDOT is adapting



Shared-use path



Park / Bicycle Boulevard typical plan

the method for use in Hawai'i. Key parameters considered in determining the appropriate treatment include the volume and average speed of motor vehicle traffic along a proposed bicycle route, mix of traffic, presence or absence of on-street parking, land use, and the available space in the right-of-way. Streets with little traffic or slow-moving traffic, such as on many of our local residential streets, are already bicycle-friendly; the major concern in our neighborhoods is enforcement of motor vehicle speeds.

AASHTO and FHWA recognize three groups of cyclists in the design process:

- A - advanced cyclists;
- B - basic cyclists; and
- C - children cyclists.

Recommended roadway design treatments and widths should be based on the Group B/C riders. The minimum design treatment should be based on the Group A riders. An example of the difference between design recommendations is shown in Table B.5, representing a fairly typical condition along Honolulu streets.

The example takes a street with an average daily traffic volume (ADT) between 3,000 and 10,000 vehicles per travel lane and posted speeds of 25 MPH and 35 MPH, a condition which characterizes most of the arterial and collector streets in urban Honolulu. This range of ADT is generally considered as representing "medium" traffic volume.

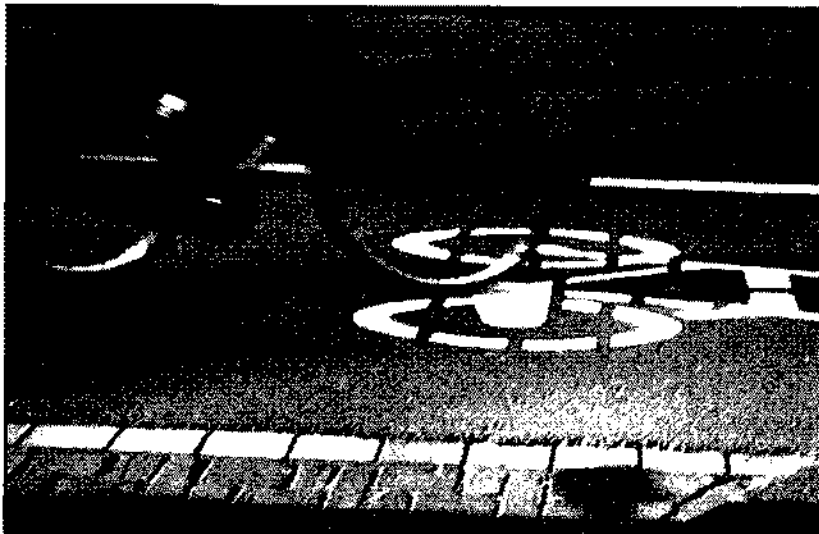
Table B.5: Recommended Design Treatment*

<u>Design Group</u>	<u>Posted Speed Limit**</u>	
	25 MPH	35 MPH
A	14' Wide Curb Lane	4' Bike Lane
B/C	5' Bike Lane	6' Bike Lane

Assumes average daily traffic (ADT) = 3,000-10,000 vehicles per lane
 * No on-street parking condition; add extra foot if parking is permitted, up to a maximum of 6 feet.
 ** Assumes average speed is 10 MPH > posted speed.

The recommended roadway treatment for the 25 MPH street is a 5-foot wide bike lane to accommodate the B/C rider group. The minimum treatment is a 14-foot wide curb lane to accommodate the A rider group.

Note that as vehicle speed increases, so does the level of treatment required. For example, the B/C bike lane increases from 5 to 6 feet wide as the posted speed increases from 25 MPH to 35 MPH.



Boulanger, 1986

HONOLULU BIKEWAYS

This appendix provides a summary of the number of bikeway miles that were proposed *Bike Plan Hawai'i* (1994) as well as a list of existing bikeways in the study area.

Table C.1: Proposed Hawai'i Bikeway Facilities under 1994 Bike Plan

	Paths (miles)	Lanes (miles)	Routes (miles)	Proposed Facilities (miles)
*PUC	2.7	50.5	10.5	63.7
C&C Honolulu	23.9	108.8	160.6	293.1
State of Hawai'i	85.8	141.6	1,081.2	1,308.6

*The Primary Urban Center (PUC) is an area extending from Kāhala to Pearl City.
Source: Hawai'i Department of Transportation. 1994. *Bike Plan Hawai'i*.

Table C.2: Existing Bikeways In the Primary Urban Center (1998)

Description of Location and Section	Route (miles)
18 TH Avenue (Int. Diamond Hd. Rd. to Kilauea Ave.)	0.4
Dole Street (Int. Univ. Ave. to St. Louis Dr.)	1.1
Hotel Street (Int. Alapa'i St. to vicinity Ward Ave.)	0.2
McCully Street (Int. Kapi'olani Blvd. to Oliver Lane to Wilder Ave.)	0.8
O'ahu Avenue (Maile Way to University Ave.)	0.5
Young Street (Int. Isenberg St. to Victoria St.)	1.6
Subtotal	4.6
	Lane (miles)
Kalākaua Avenue (Kapahulu Avenue to Pāki Ave.)	0.8
Maile Way (Int. University Ave. to O'ahu Ave.)	0.1
Metcalf Street (Junct. Wilder Ave. to Univ. Ave.)	0.3
Nimitz Highway (Aloha Tower to Waiakamilo Rd.)	1.8
Salt Lake Boulevard (Pu'uloa Rd. to Āiāmanu Elementary & Intermediate School)	0.7
Sand Island Access Road (Vicinity Alahao Pl. to Sand Island State Recreation Area)	2.3
University Avenue (Int. Kapi'olani Blvd. to Dole St.)	0.8
Waiakamilo Road (Int. Nimitz Hwy. to Houghtalling St.)	0.9
Subtotal	7.7
	Path (miles)
Date Street Bike Path (Int. Kapahulu Ave. to canal)	0.6
McCully Bikeway Promenade (Date St. to McCully St.)	0.9
Kapahulu Avenue (Int. Kalākaua Ave. to Pāki Ave.)	0.4
Kapahulu Avenue (Int. Pāki Ave. to Date Street)	0.4
Middle Street Bike Path (Int. Kamehameha/Nimitz Hwy. to North King St.)	0.5
Nimitz Highway (Vicinity Pu'uloa Rd. to vicinity Valkenburgh Street)	2.9
Pāki Avenue (Int. Poni Mol Rd. to Kapahulu Ave.)	0.9
Pearl Harbor Bike Path	5.9
Subtotal	12.5
Total Existing Bikeways	24.8

Source: DTS, City and County of Honolulu. 1998.

