Introduction

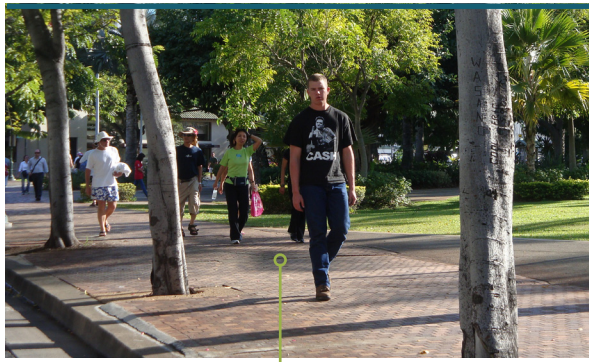
Many people walk in Hawaii—residents, tourists, students, children, people with disabilities, and older adults—and all need well designed pedestrian facilities.

INTRODUCTION

Why a Pedestrian Toolbox?

The Hawaiian Islands are home to more than 1.3 million people, and over 6 million more people visit the islands each year, drawn by the scenic beauty, tropical climate, and relaxed atmosphere. Because these residents and visitors walk to and from destinations each day for transportation, fitness, and recreation, they have an important need for safe, reliable, efficient, convenient, and attractive pedestrian facilities.

We are all pedestrians at some point each day, and for some of us, especially children, walking is our primary mode of transportation. Whether we walk several miles a day, use a wheelchair to get from our office to the bus stop, ride a skateboard through the park, or simply walk across the parking lot from our car to the grocery store entrance, all of us have a need for well-designed and properly functioning pedestrian facilities. Pedestrian facilities are essential to complete, healthy, and livable communities.



We are all pedestrians at some point each day.

As a companion document to the Statewide Pedestrian Master Plan, the Hawaii Pedestrian Toolbox presents best practices (national and international) for planning, design, and operation of pedestrian facilities based on a compilation of adopted guidance from around the world. The toolbox also provides guidance for education, enforcement, and encouragement to enhance pedestrian travel in Hawaii.

The toolbox directly supports the policy framework (vision, goals, and objectives) of the Statewide Pedestrian Master Plan and addresses many of the specific issues raised in the Areas of Concern analysis that was part of the process of developing the statewide plan. The toolbox is organized into subject matter sections that practitioners can quickly reference to find the guidance they need for their projects.

IN THIS SECTION

TOOLBOX USERS

PRIMARY:

- *Traffic, transportation, and civil engineers*
- *Planners (land use and transportation)*
- *Urban designers, landscape architects, and architects*
- *Other design professionals*
- *Site development and building permit review staff*
- *Developers*

SECONDARY:

- *School districts*
- *Neighborhood councils and planning committees*
- *Metropolitan planning organizations*
- *Central business district planning organizations and main street groups and businesses*
- *Officials and politicians*
- *Representatives from special campaigns and programs*
- *Law enforcement officers*
- *Pedestrian advocates*

Tailored to Hawaii's Characteristics and Context

The guidance in each toolbox section has been specifically tailored to the needs and characteristics of pedestrians in the Hawaiian Islands and the various contexts across the State of Hawaii, including local conditions found on each island. Planners and practitioners in Hawaii will be able to reference these best practices and adapt the guidance to fit their projects.

The intent is to provide a comprehensive document that can be applied under a wide variety of applications and diverse conditions in Hawaii. Implementation of this guidance will improve pedestrian accessibility, mobility, connectivity, and safety.

Who Will Use the Pedestrian Toolbox?

The design guidelines provided in the toolbox will assist staff from the Hawaii Department of Transportation (HDOT), counties, and cities, as well as private developers, planning and design professionals, and others, in planning, designing, constructing, and maintaining pedestrian facilities in a variety of settings, including urban, suburban, and rural communities throughout Hawaii.

Pedestrian access to the waterfront is an important need in many communities in Hawaii.

What is the Focus?

The focus of this toolbox is on **planning and design of pedestrian facilities**, but best practice recommendations and guidelines also are provided for operations, as well as for implementing effective education and promotion programs.

References and Other Resources

The technical information contained in this toolbox was compiled from numerous sources. In some cases, other documents or sources of information were researched and specifically adapted for the toolbox based on input from the advisory committees and other technical experts involved. Readers interested in additional information related to specific types of pedestrian facilities will find a list of relevant sources at the end of each toolbox section.

PURPOSE OF THE HAWAII PEDESTRIAN TOOLBOX

- *To promote best practices throughout the state and achieve a broader-scale, positive change in the pedestrian environment*
- *To provide consistency in pedestrian design guidance*
- *To provide comprehensive guidance in a number of pedestrian-related topics*

Supports Hawaii's "Complete Streets" Objectives

WHAT ARE PEDESTRIAN FACILITIES?

Sidewalks, walkways, paths, trails, intersection treatments, crosswalks, signing, signals, actuation, curb ramps, grade separated structures, and traffic calming are all examples of pedestrian facilities. Other features, treatments, and strategies to encourage and enhance pedestrian travel and maximize safety are also addressed in the toolbox.

How to Use this Toolbox

A highly visible, marked crosswalk in Honolulu

HOW TO USE THIS TOOLBOX

How Should the Information in the Toolbox Be Used?

This toolbox presents best practices for pedestrian planning, design, operation, and education. The information is provided to help practitioners implement projects and improvements to better serve pedestrians' needs throughout the State of Hawaii.

The information presented in this toolbox may not solve all problems associated with pedestrian travel, but it provides a "first step" in establishing a consistent set of statewide guidelines for pedestrian facilities. Information in the toolbox also can be used to help facilitate consensus on sometimes differing approaches to design.

Applying the Guidance with Flexibility

This toolbox provides a combination of standards and guidelines that allows for flexible and innovative approaches. The best practices need to be applied on a case-by-case basis and adapted to fit each project's conditions. Standards are required that either mandate or prohibit specific practices, while guidelines are more flexible. In all cases, the guidance in this toolbox must be applied in conjunction with other applicable local, regional, state, and federal requirements and guidelines. Refer to page H-2 and H-3 for more information.

The guidance in the toolbox applies to typical situations encountered during project planning, design, and development. Unique design problems sometimes require flexibility in design solutions.

Pedestrians are everywhere in Hawaii—in urban, suburban, rural, natural, and resort settings.

IN THIS SECTION

STANDARDS vs. GUIDELINES

The guidelines that are presented throughout the toolbox are the preferred design approaches to use in Hawaii. However, some design provisions are mandatory, some are strongly encouraged, and some are optional. Look for these language usages to understand the degree of flexibility in design:

- *Required: Look for the words "shall" or "shall not," and "must" or "must not." Also look for the words "is required" or "are required."*
- *Recommended: Look for the words "should" or "should not." The words "preferred," "encouraged," or "recommended" may also be used.*
- *Optional: Prescribed options or optional treatments use the words "may" or "may not."*

Relationship to Other Guidelines and Standards

Counties in Hawaii and the City and County of Honolulu may have other adopted standards and guidelines related to design of pedestrian facilities that may supersede the guidance in this toolbox. In that case, this toolbox can be used to complement the locally-adopted guidance. There may be useful information here that is not covered in as much detail elsewhere.

All pedestrian facilities must be planned, designed, and built in accordance with existing federal, state, and local standards as applicable. In some situations, the current standard may not be achievable due to geometric, environmental, or other constraints. In these situations, variances from the standard may be acceptable. However, a facility should not typically be built to less than the minimum standards described. Deviations from standards should be documented and justified through special studies. Deviations must be approved by the agencies that have jurisdiction over the project.

THIS TOOLBOX IS JUST ONE OF MANY SOURCES OF GUIDANCE

Be sure to check with local, regional, state, and/or federal jurisdictions responsible for or involved in your specific project to confirm requirements.

Reference documents that guide state and local design in Hawaii include:

- ***Standard Details for Public Works Construction, Revised September 2000***
- ***Standard Plans, HDOT Highways Division, 2008***
- ***Hawaii Standard Specifications for Road and Bridge Construction, 2005***
- ***Standard Uniform Design Standards for Streets and Highways, 1980***

Interpreting Guidance on Dimensions in the Toolbox

Guidance on dimensions in the toolbox is often presented in terms of “desirable,” “minimum,” or "maximum" dimensions. These recommendations should be applied with professional judgment to achieve the best solutions that are specifically tailored to the circumstances encountered. For example, if a sidewalk receives a high amount of use, the project designer or local design reviewer may elect to apply the “desirable” dimension over the “minimum” for the sidewalk width.

Where Can You Find the Information You Need in the Toolbox?

Pedestrians in Hawaii

This introductory section provides information about pedestrian use and statistics throughout the State of Hawaii.

General Characteristics and Needs of Pedestrians

This introductory section provides information about the characteristics and needs of pedestrians in general, as well as those of various types of pedestrians. Understanding these characteristics and needs will help guide planning, design, operation, and education decisions.

Pedestrian Toolbox/Toolbox Sections

The toolbox provides recommendations under eleven topics organized into sections. A directory of these toolbox sections is provided on the first page of the toolbox for easy reference. Toolbox Section 1—Thinking about Pedestrians from the Start—Creating Pedestrian-Friendly Communities provides a general overview of planning and design considerations related to pedestrians and creating pedestrian-friendly communities. The other toolbox sections provide more specific design guidance related to a number of key topics that will be helpful to practitioners.

Other Resources

Relevant sources of information and references are listed at the end of each toolbox section.

Glossary

A glossary is also provided after the toolbox. Terms and acronyms related to pedestrian facilities addressed in the toolbox are defined and described.

OTHER DOCUMENTS TO REVIEW

FOR PLANNING, DESIGN, AND OPERATION OF PEDESTRIAN FACILITIES

- ***Local design standards, zoning codes and development codes, including city and county standard plans and provisions***
- ***Hawaii DOT policies, standard plans and provisions, specifications for road and bridge construction, and uniform design standards for streets and highways***
- ***Americans with Disabilities Act (ADA) Federal Requirements***
- ***Manual on Uniform Traffic Control Devices (MUTCD), Federal Highway Administration, USDOT***
- ***Guide for the Planning, Design and Operation of Pedestrian Facilities, American Association of State Highway and Transportation Officials, AASHTO***
- ***Guide for the Development of Bicycle Facilities, AASHTO***
- ***A Policy on Geometric Design of Highways and Streets (the Green Book), AASHTO***
- ***A Guide for Achieving Flexibility in Highway Design, AASHTO***
- ***International Building Code (IBC), International Conference of Building Officials Uniform Code, and locally adopted building codes***

Note: This is only a partial list and does not include all available resources. Refer to the end of each toolbox section for other relevant publications.

Even small towns and villages need well designed pedestrian facilities.

There are many attractive walking routes in Hawaii.

Index

The index at the end of this document provides an alphabetical listing of subject headings and words to help you quickly find information about specific topics.

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Images and Graphics

Sources and references for images and graphics are noted throughout this document. Sources are typically not cited for photographs and illustrations provided, adapted, and/or created by the author of the toolbox and other direct contributors to its development.

LOOK FOR THE BOXES

Important and helpful information and checklists are highlighted in graphic boxes like this one throughout the toolbox

LIVE LINKS TO WEBSITES

Live links (hyperlinks) to websites, accessible to people viewing the content electronically, are located throughout the toolbox. These hyperlinks, active at the time of publication, are shown in bold, purple, italicized text. Readers can click on each hyperlink and follow instructions to access the website. For example:

State of Hawaii Department of Transportation

English to Metric Conversion Chart

Dimensions are shown in English units throughout the document with metric equivalents following in parentheses. An English-to-metric conversion chart is provided below for easy reference purposes.

INCHES	MULTIPLY BY	EQUALS NO.	UNIT
1	25.4	25.4	millimeters
2	25.4	50.8	millimeters
3	25.4	76.2	millimeters
4	25.4	101.6	millimeters
5	25.4	127.0	millimeters
6	25.4	152.4	millimeters
7	25.4	177.8	millimeters
8	25.4	203.2	millimeters
9	25.4	228.6	millimeters
10	25.4	254.0	millimeters

FEET	MULTIPLY BY	EQUALS NO.	UNIT
1	0.305	0.305	meters
2	0.305	0.610	meters
3	0.305	0.915	meters
4	0.305	1.220	meters
5	0.305	1.525	meters
6	0.305	1.830	meters
7	0.305	2.135	meters
8	0.305	2.440	meters
9	0.305	2.745	meters
10	0.305	3.050	meters

MPH	MULTIPLY BY	EQUALS NO.	UNIT
10	1.61	16.1	Kilometers/hour
20	1.61	32.2	Kilometers/hour
30	1.61	48.3	Kilometers/hour
40	1.61	64.4	Kilometers/hour
50	1.61	80.5	Kilometers/hour

MILES	MULTIPLY BY	EQUALS NO.	UNIT
1	1.61	1.61	kilometers
2	1.61	3.22	kilometers
3	1.61	4.83	kilometers
4	1.61	6.44	kilometers
5	1.61	8.05	kilometers
6	1.61	9.66	kilometers
7	1.61	11.27	kilometers
8	1.61	12.88	kilometers
9	1.61	14.49	kilometers
10	1.61	16.10	kilometers

Honolulu sidewalks are filled with pedestrians on a daily basis.

Visitors, who often don't rent vehicles, frequently rely on walking as a primary mode of transportation.

Pedestrians in Hawaii

Pedestrians in Hawaii have a wide diversity of needs.

PEDESTRIANS IN HAWAII

This introductory section to the Hawaii Pedestrian Toolbox highlights statistical information and important considerations related to pedestrians in the Hawaiian Islands. Understanding the needs of pedestrians and factors that affect pedestrian travel is important when designing pedestrian facilities and developing pedestrian programs.

Pedestrians Defined

Merriam-Webster defines the term "pedestrian" as: going on foot; and: of, relating to, or designed for walking (e.g. *pedestrian* traffic or a *pedestrian* mall).

The Hawaii Revised Statute (291C-1) defines a "Pedestrian" as:

> *"any person afoot, in a wheelchair, or in a vehicle propelled by a person afoot."*

a "Sidewalk" as:

> *"that portion of a street between the curb lines, or the lateral lines of a roadway, and the adjacent property lines, intended for use by pedestrians."*

and a "Safety Zone" as:

> *"the area or space officially set apart within a roadway for the exclusive use of pedestrians and which is protected or is so marked or indicated by adequate signs as to be plainly visible at all times while set apart as a safety zone."*

According to state statute, a pedestrian may include anyone who is either walking or using an electronic or human-propelled personal assistive mobility device (self balancing, two-wheeled device designed to transport one person with a maximum speed of 12.5 mph). This includes people in wheelchairs and personal wheeled devices, as well as children riding on small bicycles, scooters, and skateboards.

Throughout the toolbox, when the terms "pedestrian activity," "walking," or "walkability" are used, they are meant to relate to any pedestrians, whether on foot or using a wheelchair or other personal wheeled device.

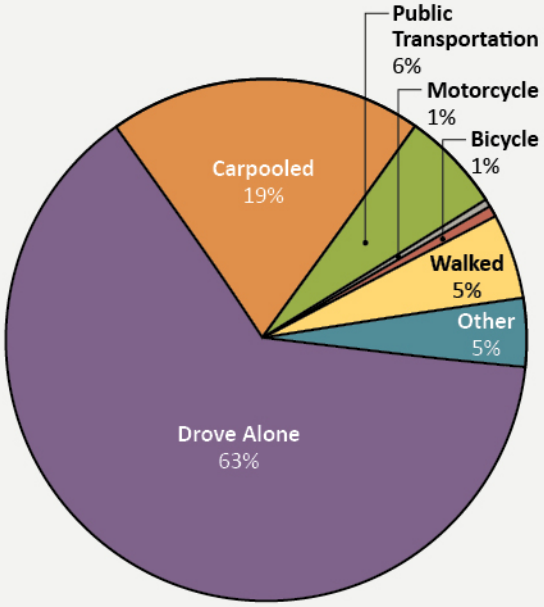
IN THIS SECTION

Levels of Pedestrian Activity in Hawaii

According to the 2000 Census, only about 6 percent in Hawaii either walked (4.4 percent) or bicycled (1.6 percent) to work, while 82 percent drove to work alone or carpooled. (Refer to Exhibit P.1.) According to the 2010 Benchmarking Report, published by the Alliance for Biking and Walking and based on the 2009 National Household Travel Survey (NHTS), 8.2 percent of all trips to work (commute trips) in Hawaii were by made by bicycling or walking, compared to the national level of 9.6 percent. The report also indicates that Hawaii ranks sixth overall in the nation for the number of people who walk to work.

The 2010 Benchmarking Report estimates that 7 percent of all trips in Hawaii are on foot. However, it is unclear if this statistic represents purely the resident population or also includes the visitor population (nearly seven times greater than the resident population). Given the influx of visitors, mild climate, and other factors, the number of all trips made by walking in Hawaii is likely to be above the national average. In fact, results from a 2007 household survey on Oahu indictate that 14.2 percent of all trips by residents and visitors were made by biking or walking. This compares with a national average of 12 percent for biking and walking trips as a percentage of total trips.

EXHIBIT P.1 Means of Transportation to Work



Source: Statewide Pedestrian Master Plan, HDOT, with data from the 2000 Census

According to the 2009 NHTS, there are an estimated 42 billion walking trips nationwide every year. To put this statistic in perspective, Americans take a total of about 388 billion annual trips with walking trips making up roughly 10.9 percent of all trips. Because every trip begins and ends as a pedestrian trip—whether walking to a bus stop or across a parking lot to the car—we are all pedestrians at some point each day.

Exhibit P.2 summarizes how Hawaii compares to other states in the nation in various categories related to pedestrian and bicycle activity.

About 5 percent of pedestrians in Hawaii walk to work, according to the 2000 Census.

Important Factors that Affect the Need for Pedestrian Facilities

There are many factors that affect pedestrian activity and the need for pedestrian facilities. These factors will continue to influence how people travel in Hawaii in the coming years.

Population Growth and Tourism

Hawaii's population grew from about 1.1 million in 1995 to 1.36 million in 2010. The population is projected to grow to 1.72 million by 2020. This rise in population will bring greater pressures on natural resources related to human impacts and increasing demand on Hawaii's transportation system.

Tourism is Hawaii's foremost industry and leading employer. In 2010, more than 7 million visitors came to the Hawaiian Islands, and the visitor population is growing throughout the state. This influx of visitors also places an extensive, increasing demand on the state's transportation system.

Providing a variety of transportation options, including pedestrian, bicycle, and transit facilities, will help Hawaii serve this growing demand while also minimizing impacts to the environment and sensitive resources in the islands.

Diversity

Pedestrians in Hawaii are diverse—they come from many countries and cultures and speak and read a variety of languages. They include people of all ages, young and old, and people of

EXHIBIT P.2 Pedestrian and Bicycle Statistics for the State of Hawaii

	AVERAGE IN HAWAII	AVERAGE OF ALL STATES NATIONWIDE	
Percent of All Trips to Work by Pedestrians and Bicyclists[2]	8.2%[1]	9.6%	↓
Percent of Federal Transportation Dollars Spent on Ped/Bike	1.23%	1.58%	↓
Percent of Federal Safety Dollars Spent on Ped/Bike[2]	5.7%	0.6%	↑
Percent of Safe Routes to School Funding Obligated	17%	40%	↓
Percent of all Traffic Fatalities that are Pedestrians or Bicyclists	20.34%	13.56%	↓
Percent of Youth Ages 10-17 Who are Obese or Overweight[2]	28.5%	34.6%	↑
State Ped/Bike Staff (in FTEs)[2]	1.5	4.9	↓
Complete Streets Policy	Yes	26 States	↑
Share the Road Safety Campaign[2]	Yes	33 States	↑

Source: Alliance for Biking and Walking, 2012 Benchmarking Report
[1]Source: 2009 Household Interview Travel Survey in Hawaii / 2010 Benchmarking Report
[2]Source: 2010 Benchmarking Report

LEGEND

↓ Lower than or Worse than National Average

↑ Higher than or Better than National Average–Exceeding Benchmark

Walkability is an important ingredient of livable communities.

Pedestrians stroll through Chinatown on Oahu, Hawaii.

varying physical stature and capability. A higher proportion of older adults live in Hawaii compared to other states, largely because many retirees are drawn to the mild climate and attractive environment. Some pedestrians have mobility and sight impairments and other disabilities. (Refer to the special needs of younger and older pedestrians and pedestrians with disabilities described in the "General Characteristics and Needs of Pedestrians" section. See also Toolbox Section 3—Accessibility.)

People of all income levels live in Hawaii, and the incidence of poverty in some communities affects peoples' capability to buy and maintain vehicles. Throughout the islands there are various households with no access to vehicles and residents who rely on walking as their main transportation mode. In addition, most visitors who come to Hawaii choose not to rent a car and have limited access to personal vehicles. Many walk to and from their destinations, along with riding available transit systems and taking part in local tour programs.

Considering the diversity of pedestrians in Hawaii is important when planning and designing facilities to accommodate their needs.

The Health Crisis

America is facing a national health crisis of epidemic proportions. Physical inactivity combined with unhealthy eating has, in just a few generations, made us a nation of overweight and out-of-shape people. The incidence of overweight or obese adults increased steadily from 47 percent in 1976 to 68 percent in 2007. The prevalence of overweight children and adolescents more than tripled during that same 30-year span, with 19.6 percent of children aged 6-11 and 18.1 percent of adolescents aged 12-19 identified as obese. (Source: *Increasing Physical Activity through Community Design*, National Center for Bicycling and Walking, 2010)

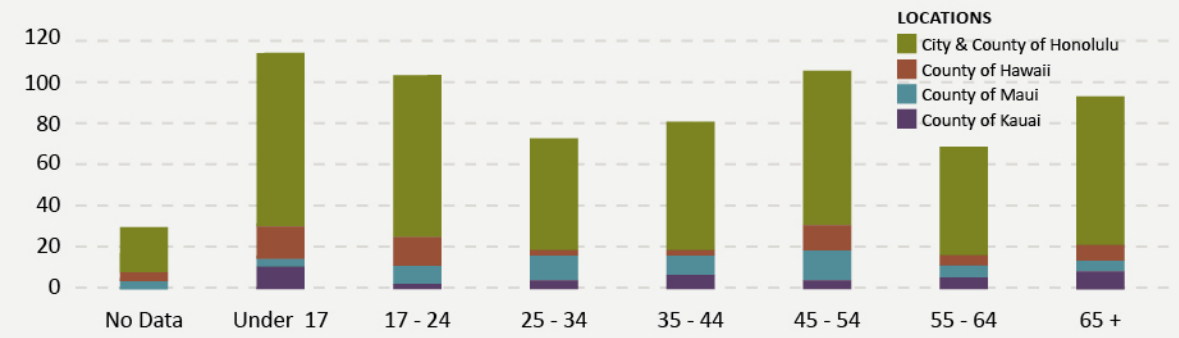
Diseases and health risks related to obesity, including diabetes, heart diseases, hypertension, and stress, are also increasing at alarming rates. About 60 percent of overweight children between the ages of 5 and 10 already demonstrate risk factors associated with disease such as elevated blood levels and insulin levels. These factors can lead to chronic diseases later in life. The direct economic cost of obesity in the US was estimated to be between $80 and $90 billion in 2008.

Overall, residents of Hawaii are generally healthier than those from other states. (For example, 14 percent of students are reported as obese compared to higher levels nationwide.) However, inactivity, obesity and related health risks are still a growing problem in Hawaii. Native Hawaiians have more than twice the rate of diabetes and are 5.7 times more likely to die from diabetes than Caucasians living in Hawaii. Millions of visitors with obesity, diabetes, and other health problems come to Hawaii each year from throughout the nation and abroad. Encouraging people to walk and providing pedestrian facilities to accommodate their needs can increase physical activity and improve public health.

Safety

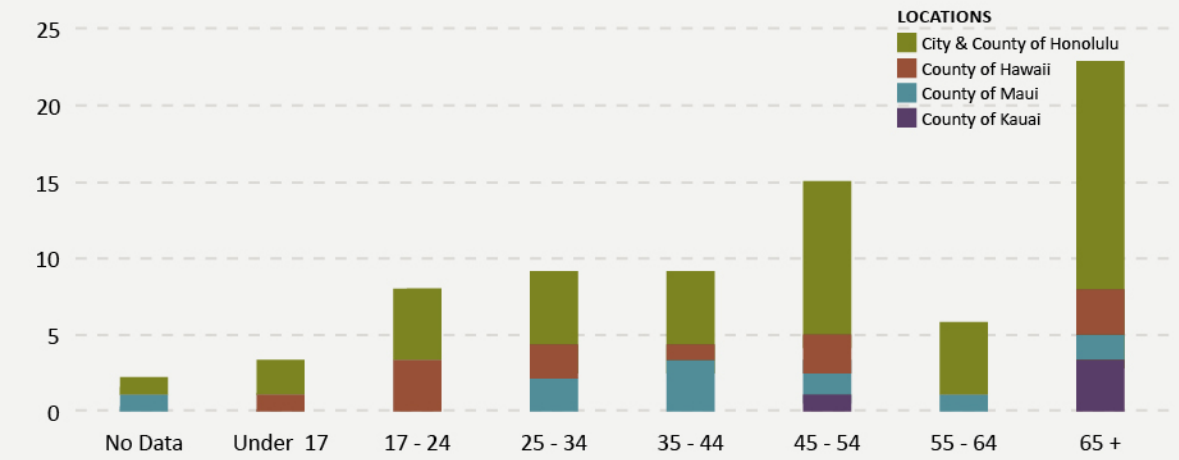
Even though pedestrian activity is estimated to occur in higher levels in Hawaii compared to other states, Hawaii ranks 30th for pedestrian safety (2010 Benchmarking Report). Approximately 21 percent of all traffic fatalities are pedestrians, 6 percent of which are under the age of 16, and 18 percent are over the age of 60. According to the Statewide Pedestrian Master Plan, another source of data, the Hawaii

EXHIBIT P.3 ***Age of Pedestrians Involved in Accidents on State Highways, Statewide, 2004-2008***



Source: HDOT

EXHIBIT P.4 ***Age of Pedestrians Involved in Fatal Accidents on State Highways, Statewide, 2004-2008***

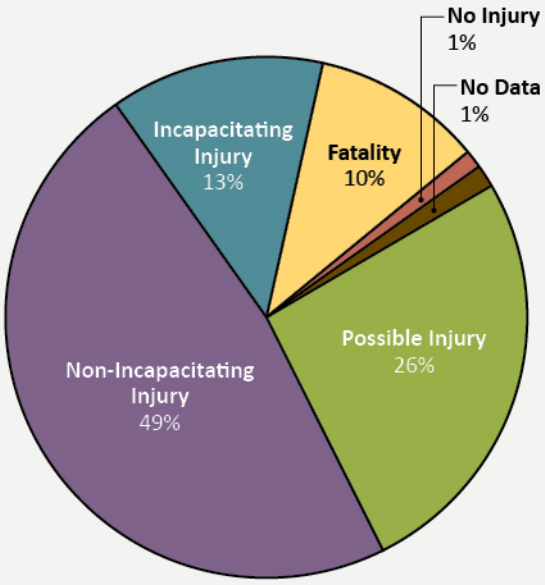


Source: HDOT

Farmers Market at Fort Street Mall, Downtown Honolulu, Hawaii

Pedestrians window shop along Waialae Avenue in Kaimuki, Honolulu, Hawaii.

EXHIBIT P.5 Severity of Pedestrian Accidents on State Highways, Statewide, 2004-2008



Source: Statewide Pedestrian Master Plan, HDOT, with data from the 2000 Census

Strategic Highway Safety Plan 2007-2012, shows that between 2001 and 2005, Hawaii had the fifth highest pedestrian fatality rate nationwide. Among the elderly, Hawaii leads the nation with a rate of 40.2 deaths per 100,000 people 65 years and older, nearly three times higher than that for the rest of the US. A total of 150 pedestrians were killed in Hawaii over the 2001-2005 period, accounting for 22 percent of all traffic fatalities. Another 540 pedestrians are involved in major traffic crashes each year. Senior pedestrians have the highest rates of fatality. The highest rates for non-fatal pedestrian injuries occurred among the 5 to 19 year age range, with especially high rates among 10 to 14 year olds. Exhibit P.3 depicts the ages of pedestrians involved in accidents on state highways during the period of 2004-2008, while Exhibit P.4 shows the age of pedestrians involved in fatal crashes. Exhibit P.5 depicts the severity of crashes involving pedestrians statewide in Hawaii.

Improving pedestrian facilities and broadening awareness of pedestrians' needs across Hawaii should result in less crashes involving pedestrians and improved pedestrian safety overall.

Dependence on Fossil Fuels

Hawaii is the most oil-dependent of all 50 states and relies on imported petroleum for 90 percent of its primary energy. Most of this oil is from foreign nations. Hawaii's residents pay among the nation's highest prices for fuel and electricity. This dependency is increasing. (Source: *Indicators of Environmental Health*, State of Hawaii Department of Health, February 2010)

Encouraging more pedestrian activity and providing pedestrian facilities to accommodate this activity will help to reduce the state's reliance on fossil fuels.

Greenhouse Gas Emissions and Climate Change

Increasing greenhouse gas emissions and the effects of climate change have the potential to severely impact Hawaii's economy, public health, natural resources and environment. In 2007, a state law was passed (Act 234) committing the state to reduce its greenhouse gas emissions, caused mostly by fossil fuel-based electricity generation and transportation uses.

If more people walk and use other forms of transportation besides motor vehicles for their trips in Hawaii, less greenhouse gas emissions will occur, reducing the potential effects of climate change.

Livability

People are demanding a return to more livable communities and neighborhoods across America. Walkability is an important ingredient of livable places. Clean air and water and access to nature and healthy foods also contribute to livability. Providing sidewalks, paths, crossing treatments, and other pedestrian facilities can greatly enhance the walkability and livability of Hawaii's communities and neighborhoods.

Fort Street Mall, Honolulu, Oahu


ONE WAY

General Characteristics and Needs of Pedestrians

People choose to walk for a wide variety of reasons—exercise, recreation, errands, and to get to and from work, school, transit and shopping.

GENERAL CHARACTERISTICS AND NEEDS OF PEDESTRIANS

Understanding Pedestrian Characteristics and Needs

In order to successfully design pedestrian facilities, we must recognize that pedestrian needs are diverse and wide-ranging. Our design approach must be flexible to meet the diversity of their needs.

One common obstacle in design of pedestrian facilities is assuming that one standard can be applied to fit an "average" population. For example, the speed that pedestrians travel can vary greatly, yet pedestrian signals are often timed for average walking speeds of 3 to 4 mph. Children, older adults, and people with certain disabilities typically travel at much slower walking speeds.

This section summarizes the characteristics and needs of pedestrians in general, as well as those of various types of pedestrians.

Characteristics of Pedestrian Travel

Why do People Walk?

Pedestrians travel for a wide variety of reasons. In Hawaii and throughout the United States, pedestrian travel has gained recognition as an important form of transportation. People choose to walk for a wide variety of reasons—for exercise, fitness, and health, to complete personal errands, for recreational purposes, to get to and from work, school, transit and shopping, for environmental benefits and to reduce their carbon footprint, and for many other reasons. The levels of walking related to each purpose vary widely depending on the setting and nearby land uses. Exhibit G.1 lists some of the various types of trips people make as pedestrians.

Various Settings

Different areas in Hawaii experience different levels of pedestrian travel. In certain urban areas, the level of walking is higher. In Honolulu, for example, approximately 7 percent of commute trips are walking trips, compared with

IN THIS SECTION

IMPORTANT NEEDS OF PEDESTRIANS

- *Directness and convenience of the route – it takes them where they need to go (minimizing the time it takes and distance traveled)*
- *Accessible facilities*
- *Safe, secure streets and walking areas*
- *Context sensitive planning and design– nearby places to walk and a transportation network designed for walkability*
- *Visibility and lighting (for day time and night time walking)*
- *Comfort and shelter*
- *Attractive and clean environment*
- *Access to transit*
- *Interesting things to look at while walking and social interaction*
- *Enhanced recreational experience—walking provides access to while also preserving waterfronts and environmental, scenic, historic, and cultural resources*

EXHIBIT G.1 Typical Types of Pedestrian Trips (Why People Walk)

To and from work and school
Social visits and events
Appointments
Health and excercise
Errands and deliveries
Recreation
Extra curricular activities
Combined (recreational walking while shopping)
Multimodal trips (walking to a bus stop)
Walking the dog

Pedestrians along Alii Drive in Kona, Hawaii

the overall estimate of 4.4 percent statewide. The higher rate of walking in urban areas is generally attributed to the higher populations of the cities, as well as the more complete and continuous pedestrian networks and facilities. Exhibit G.2 lists some reasons urban areas typically tend to receive high pedestrian use.

Pedestrian travel is higher in urban areas, but pedestrians are often found in suburban and rural areas, particularly in Hawaii. There is a common misconception that people who live in the suburbs do not walk. Research indicates that this is not the case, particularly in suburban areas that provide an interconnected and continuous system of well-designed pedestrian facilities. University of Washington professor, Dr. Anne Vernez-Moudon's research paper, *Effects of Site Design on Pedestrian Travel in Mixed-Use, Medium Density Environments* found that relatively high numbers of people walk in suburban centers, where adequate pedestrian facilities are provided.

It is also important to recognize that people living in suburban and rural areas travel as pedestrians for different purposes than those

EXHIBIT G.2 Why Urban Areas Receive High Pedestrian Use

Higher density of residences, businesses, and other places
High concentration of origin and destination points
Pedestrian networks and facilities are generally more complete and continuous
More available pedestrian facilities
Traffic congestion
Shopping and services are more accessible
Average trip distances are shorter
Parking too costly or unavailable
Transit service is more readily available

Every trip begins and ends as a pedestrian trip, and particularly in urban areas people are willing to walk more for their daily travel needs.

living in urban areas. Suburban and rural pedestrian trips are often associated with walking to schools or school bus stops, transit bus stops, or for recreation and leisure purposes. Fewer people tend to walk for running errands, shopping, and travelling to community services (although these are common reasons for walking in small town centers and village core areas).

Types of Pedestrian Facilities

According to the *National Survey of Pedestrian and Bicyclist Attitudes and Behaviors*, the majority of pedestrian trips (nationwide) occur either on sidewalks or on paved roads without shoulders. The national survey identified the following types of facilities along with percentages of pedestrians using each.

Sidewalks	45.1 %
Paved roads (no shoulders)	24.8 %
Shoulders of paved roads	8.4 %
Unpaved roads	8.0 %
Paths/trails	5.8 %
Grass or fields	4.9 %
Other	3.0 %

Source: National Survey of Pedestrian and Bicyclist Attitudes and Behaviors

Pedestrian Trip Lengths

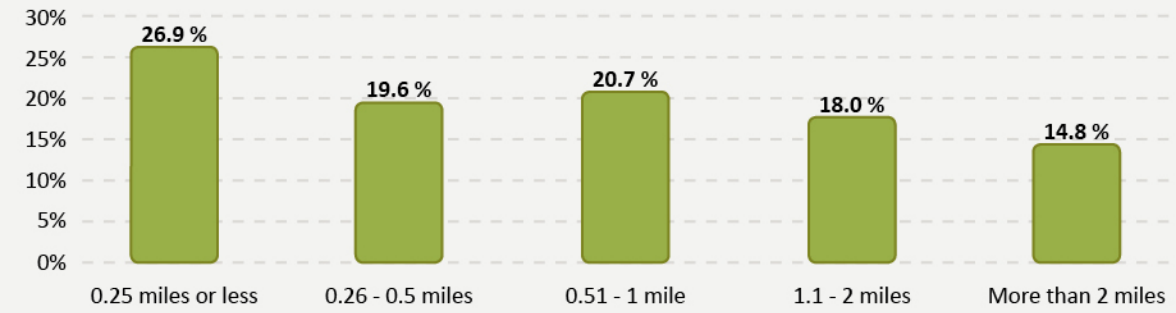
The distances pedestrians are willing to travel can vary greatly depending on the setting, nearby land uses, climate and weather conditions, topography, comfort and attractiveness of the route, the purpose of their trip, the time of day, and other factors. Most people will walk longer distances for recreational purposes, but prefer to walk shorter distances when they are commuting or are in a hurry, such as from the bus stop to their office.

According to the *National Survey of Pedestrian and Bicyclist Attitudes and Behaviors*, about 27 percent of walking trips nationwide are less than ¼ mile and about 15 percent are more than 2 miles, with the average length of walking trip being 1.2 miles. Exhibit G.3 depicts the results of the national survey, showing the percent of trip lengths on the most recent day walked of the respondents.

Guidelines for acceptable walking distances are listed below.

- Traditionally, planners strive to locate community facilities, transit stations/hubs,

EXHIBIT G.3 *Percent of Trip Lengths on Most Recent Day Walked*



Source: National Survey of Pedestrian and Bicyclist Attitudes and Behaviors

PEDESTRIAN TRIP FACTS (NATIONWIDE)

- ***Pedestrian trips account for 39 percent of all trips less than one mile, ranking second only to private motor vehicle trips***
- ***73 percent of all pedestrian trips are less than one-half mile***
- ***One out of five trips is work related***

Source:
National Survey of Pedestrian and Bicyclist Attitudes and Behaviors

and other popular pedestrian destinations no more than ¼ from the origin of most pedestrian travel.

- Site designers typically use 300 feet as the maximum distance from parking and site pedestrian circulation to building entrances. Street crossings are typically most effective when located approximately 400 to 600 feet apart in areas heavily used by pedestrians.
- *A Guide to Land Use and Public Transportation* states that pedestrians can be expected to travel about 1,000 feet to and from a bus stop or about 750 feet for mobility impaired. People will walk further to high capacity transit and rail stations—about ⅓ to ½ mile.

Planners and urban designers generally use a rule of thumb of ¼ mile walking distance to and from pedestrian destinations and origins such as shopping areas, community centers, and transit hubs, with a ½ mile walking distance as the general catchment area for community and neighborhood walkability. Refer to Toolbox Section 1—Thinking about Pedestrians from the Start for more information.

It is important to note that in Hawaii, where the climate is mild much of the year and the environment is scenic and attractive, people may be more inclined to walk than in other settings across the nation. But this will be largely dependent upon the completeness and continuousness of the pedestrian network and the level of facilities available for pedestrian use.

Overcoming Impediments to Pedestrian Travel

Research has confirmed a variety of common reasons that contribute to low levels of pedestrian travel. The box on the next page lists some of the most common reasons cited by pedestrians.

COMMON REASONS FOR LOW LEVELS OF PEDESTRIAN TRAVEL

- *Poor facilities; lack of sidewalks/walkways*
- *Failure to provide a contiguous system of pedestrian facilities*
- *Concerns for personal safety*
- *Failure to provide facilities to and from popular origins and destinations*
- *Inclement weather*
- *Poor lighting*
- *Lack of separated facilities*

Source: Measures to Overcome Impediments to Bicycling and Walking, Research Report

Measures to Overcome Impediments to Bicycling and Walking, a case study completed by the Federal Highway Administration in 1993, as part of the *National Bicycling and Walking Study,* cited three primary categories of reasons for not walking:

- Facility deficiencies
- Information or knowledge deficiencies
- Motivational deficiencies

Facility deficiencies include lack of adequate facilities and connectivity. Information or knowledge deficiencies are a result of people not knowing about the level of walking opportunities available to them. Motivational deficiencies have to do with attitudes and behaviors—people not walking because distances between origins and destinations are too long, walking is not convenient, the weather is poor, or they feel uncomfortable or unprotected as pedestrians. In many cases information/knowledge and motivational deficiencies would decrease as a result of improvements to pedestrian facilities and expanding the pedestrian network.

The Need for Improved Pedestrian Facilities

Public opinion surveys have shown that people have a desire to walk and would increase their amount of pedestrian travel if better facilities were available. For example, a national survey conducted by the Harris Poll showed that 59 percent of respondents said they would be willing to walk outdoors or walk more often if there were safe designated paths or walkways. Another survey of 900 students in sixth through twelfth grades in public and private schools (Youth Link Transportation Survey) found that:

- Approximately 75 percent of the students would consider walking or bicycling to school as an alternative transportation mode.
- There are several factors that would cause students to be more likely to walk to school, including safer crossings (25 percent), better lighting (29.7 percent), better sidewalks (36.5 percent), and people to walk with (44.9 percent).

Many other studies conducted at the national, state, regional, and municipal levels across the US have found similar results.

ASK THE FOLLOWING

- *Are there origins and destinations within acceptable pedestrian travel distances that will generate trips?*
  - *Schools and parks*
  - *Shopping areas*
  - *Medical facilities*
  - *Community and recreational centers*
  - *Transit/park-and-ride*
  - *Social services*
  - *Housing*
- *Does the existing street or roadway provide pedestrian facilities?*
- *What is the setting (urban, residential, rural)?*
- *Are there high traffic volumes and speeds that could affect pedestrian use?*
- *Can pedestrians cross without travelling more than 400 to 600 feet (120 to 180 meters) to an intersection or another crossing point?*
- *Are transit or school bus stops located along the roadway with safe access and crossing?*
- *Is there an opportunity to complete a contiguous system by filling in existing gaps?*
- *Are there barriers to pedestrian travel that can be removed or opened (dead-end routes, blocked passages)?*

Forecasting Pedestrian Use

At times, pedestrian facility improvements and expansions are not supported because existing use levels are low. As discussed above, there are several studies that have shown that when facilities are added and improved within a community, more people will walk. Pedestrian travel forecasting methods (discussed in more detail in Toolbox Section 1) may provide a quantitative approach to determining the demand for pedestrian facilities, but this approach shouldn't replace a common sense thought process to determine the necessity for facilities.

The sidebar on the left lists questions that should be asked when considering what types of pedestrian facilities should be developed under various circumstances.

Understanding the Severity of and Reasons for Crashes Involving Pedestrians

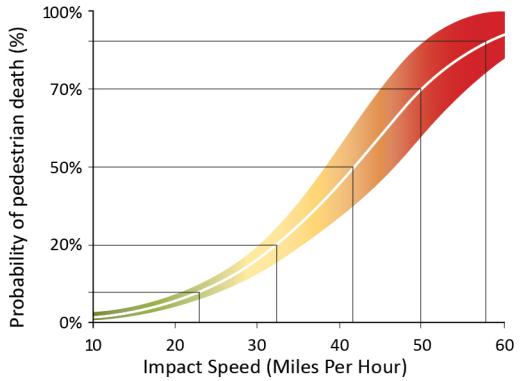
Analysis of pedestrian/motor vehicle crash statistics can help in developing engineering, education, and enforcement solutions.

Most reported pedestrian injuries are a result of crashes with motor vehicles. Vehicle speed is a significant factor in causing fatalities as a result of pedestrian collisions. The faster a motorist drives, the more likely injuries to a person on foot will result in death. The charts in Exhibits G.4 and G.5 illustrate the probability of a pedestrian's death in correlation to the speed of a vehicle involved.

As shown, when crashes occur with the vehicle travelling at a speed of 40 mph, many more pedestrians (85 percent) are killed compared to the number of deaths (45 percent) at a vehicle speed of 30 mph. Only 5 percent of crashes result in pedestrian deaths with vehicle speeds 20 mph. The ability to stop in time for crossing pedestrians significantly decreases as vehicle speed increases, as shown in Exhibit G.6. The higher the speed of travel, the more time required for the driver to stop their vehicle.

Another common reason for pedestrian/automobile collisions is driver inattention or distraction. Pedestrians' failure to use safe behavior when walking and crossing also causes crashes.

EXHIBIT G.4 ***Impact Speed and a Pedestrian's Risk of Injury or Death***
(AAA Foundation for Traffic Safety, September 2011)

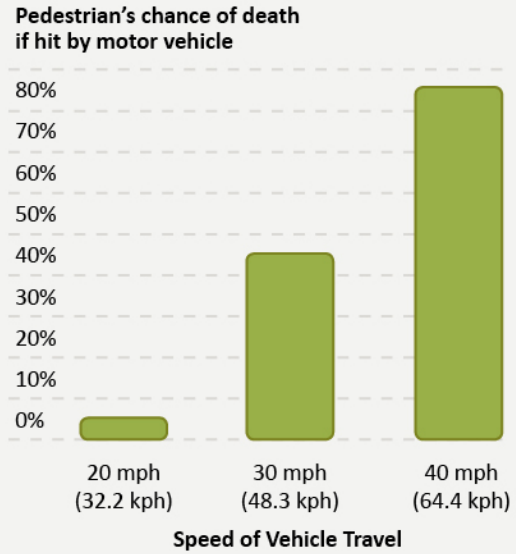


In Hawaii, there is a high incidence of crashes involving pedestrians and motor vehicles at intersections and crossings. A wide variety of conditions are thought to contribute to these incidents making it difficult to identify specific causes, but the state and local jurisdictions are taking strong action to improve safety at intersections and crossings.

The State of Hawaii has adopted specific crosswalk laws for motorists and pedestrians. (Hawaii Revised Statutes 291C-72). The statutes clarify motorists' and pedestrians' responsibilities related to crosswalk use and impose the issuance of fines to those who fail to comply with the requirements.

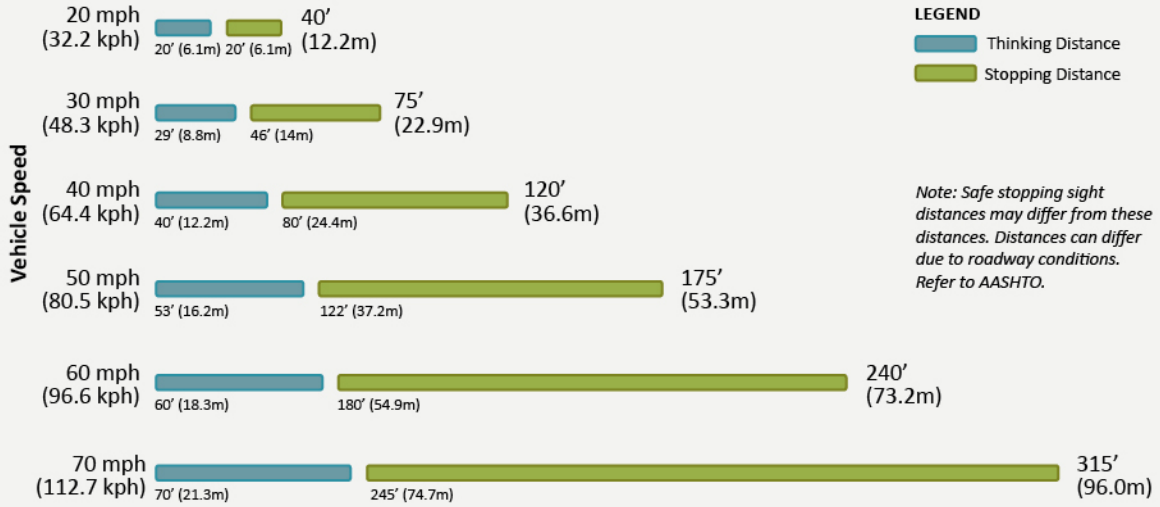
The Honolulu Police Department (HPD) provides pedestrian education, distributing information and talking to pedestrians near intersections. Refer to Toolbox Section 10—Effective Pedestrian Programs for more information.

EXHIBIT G.5 ***Fatalities Based on Speed of Vehicle***



Source: Walk Tall: A Citizen's Guide to Walkable Communities

EXHIBIT G.6 ***Thinking and Stopping Distances Related to Speed of Travel***



Source: Walk Tall: A Citizen's Guide to Walkable Communities; Killing Speed and Saving Lives

In Hawaii, most pedestrian crashes occur in the more urbanized areas. However, a number of crashes involving pedestrians occurred in rural areas, such as along the coasts of the islands of Oahu and Kauai, where pedestrians cross the road to visit parks and beaches. Pedestrian fatalities also follow this trend. Exhibit G.7 lists some of the most common causes of crashes involving pedestrians in Hawaii and nationwide.

By improving pedestrian facilities and implementing pedestrian projects, it is hoped that pedestrian safety will improve and more people in Hawaii will switch their means of transportation to walking for various types of trips. This is one of the important purposes for implementing the Hawaii Pedestrian Toolbox and the Statewide Pedestrian Master Plan.

Pedestrians' Spatial Needs

It is important for designers of pedestrian facilities to consider the basic spatial needs of pedestrians. Exhibit G.8 illustrates approximate human dimensions when walking.

For two people walking side-by-side or passing each other while travelling in opposite directions, the average space taken up is 4 feet 8 inches. This is why a 5-foot sidewalk is not considered to be wide enough for two people to comfortably pass each other. (Shy distance also is needed adjacent to the curb or roadway edge.)

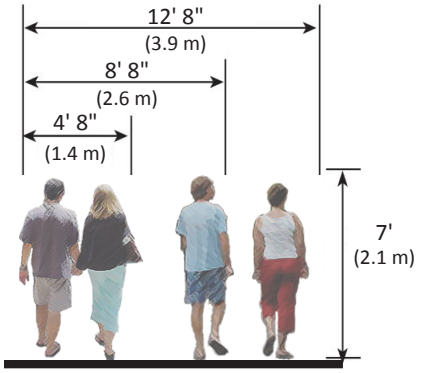
As discussed earlier in this section, pedestrians walk at an average speed of 3 to 4 mph (with children, older adults, and people with disabilities often walking at slower rates). Walking rates slow when pedestrian volumes increase and square footage per person decreases. Exhibit G.9 illustrates how average flow volumes decrease on walkways with increasing degrees of pedestrian density.

A spatial bubble is the preferred distance of unobstructed forward vision while walking under various circumstances. Exhibit G.10 illustrates the spatial bubbles that are comfortable for the average pedestrian while attending a public event, shopping, walking under normal conditions, and walking for pleasure. This information is helpful to the designer for use in calculating how much forward clear space is necessary to maintain a reasonable degree of comfort for pedestrians.

EXHIBIT G.7 Common Characteristics of Crashes Involving Pedestrians

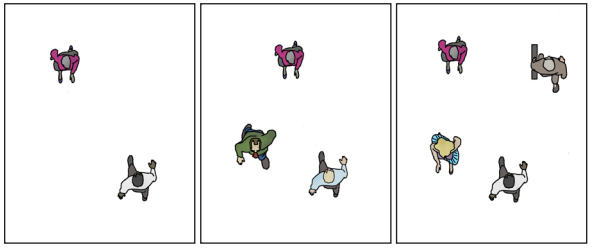
Driver inattention
Struck by a vehicle while crossing at an intersection (approximately 50 percent of all crashes nationwide)
Struck by vehicle while crossing mid-block (approximately 33 percent of all crashes nationwide)
Struck from behind while walking along the roadway in the same direction of traffic, particularly in rural areas *(Note: Hawaii Revised Statute 291C-76 (b) states: Where sidewalks are not provided, any pedestrian walking along and upon a highway shall, when practicable, walk only on the left side of the roadway or its shoulder facing traffic which may approach from the opposite direction.)*
Motorists exceeding safe speed (contributes to most pedestrian deaths)
Pedestrians darting out into the street at mid-block (a common type of pedestrian crash involving children)
Vehicles backing up (difficult to see children and others walking behind)
Crashes in urban areas (80 percent of all crashes nationwide)

EXHIBIT G.8 Human Dimension When Walking
(Adapted from Time-Saver Standards for Landscape Architecture)

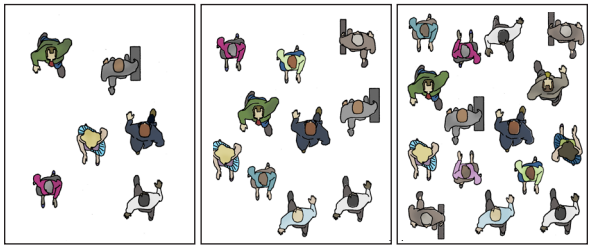


Sidewalks that are minimum six feet in width allow two pedestrians to walk comfortably side-by-side.

EXHIBIT G.9 Spatial Needs for Pedestrians
(Adapted from Time-Saver Standards for Landscape Architecture)



FV:	7 pfm	10 pfm	15 pfm
AS:	3 mph	2.8 mph	2.6 mph
O:	36 sf/p	25 sf/p	15 sf/p



FV:	20 pfm	25 pfm	> 25 pfm
AS:	2.3 mph	1.5 mph	0-1.25 mph
O:	10 sf/p	5 sf/p	< 5 sf/p

LEGEND

FV	flow volume
AS	average speed
O	occupancy
sf/p	square feet per person
pfm	pedestrian per foot width of walkway per minute

Older Adults as Pedestrians

Older adults have unique characteristics and special needs as pedestrians. As populations age, transit accessibility and safe walking routes become more important. Research shows that people over 60 walk more, yet in some cases may have impaired mobility.

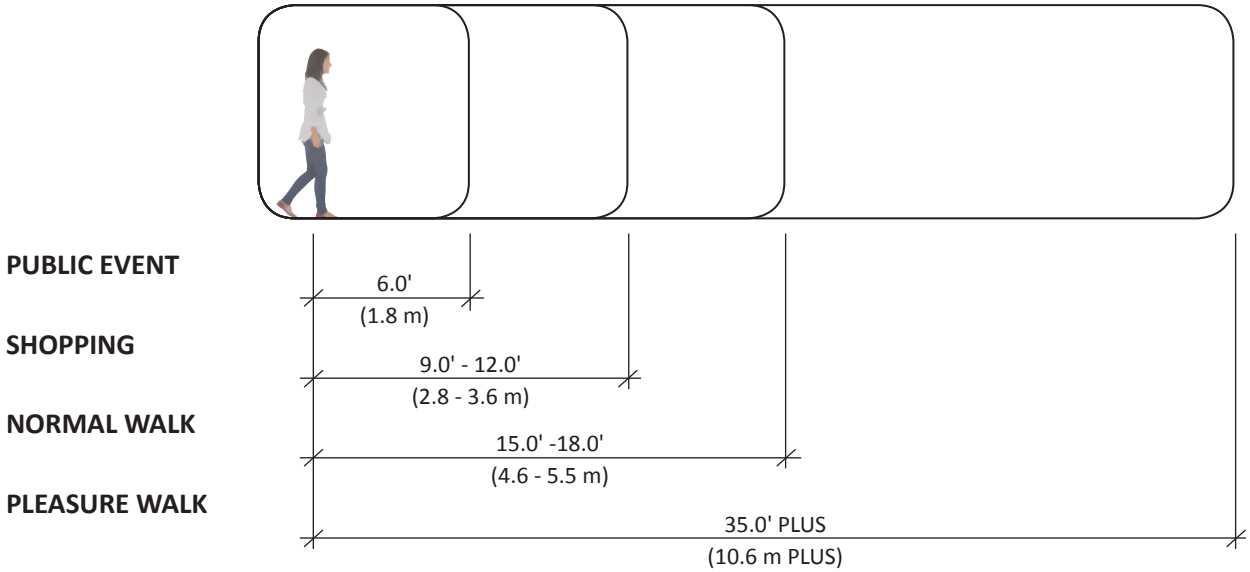
In Hawaii 13.3 percent of the population is represented by older adults (also referred to as elderly—people over 65 years). There are many locations in the islands where there are much higher levels of older adults, particularly in retirement communities and resorts (as high as 60 percent in some areas).

Older adults are more likely to be severely injured or killed when involved in a crash with a motor vehicle. Nationwide, people over age 65 represent approximately 13 percent of the population; yet account for 23 percent of all pedestrian deaths during that same year (*Walk Alert, National Pedestrian Safety Program Guide*). Another national statistic cites that pedestrians over 65 are two to four times more likely to die when involved in a pedestrian-motor vehicle collision. Older adults are particularly

Many older pedestrians rely on walking and transit as their primary modes of transportation.

The mild climate and the spectacular scenery of the Hawaiian Islands attracts more pedestrian activity than many other states.

EXHIBIT G.10 Spatial Bubbles *(Adapted from Time-Saver Standards for Landscape Architecture)*



more vulnerable while crossing the street, since they need more time to cross. Exhibit G.11 lists some typical elements that can aid older adult pedestrians in their travel.

Younger Pedestrians

Younger pedestrians (under 17 years old) are also important to consider because they do not drive (or if newly licensed, typically drive less than adults). Young pedestrians most often rely on safe walking routes to school and in some cases good pedestrian access to transit. The Hawaii statewide average for the population under 17 is 22.9 percent, with higher levels in this age group in various locations throughout the state (such as the central and western part of Oahu, with 20 to 60 percent under 17 years old).

Very young pedestrians also have particular needs. They tend to get distracted more easily and may wander into or dart out into traffic unexpectedly. Teens may have a false sense of security and safety in their quest to gain more independence.

COMMON CHARACTERISTICS BY AGE GROUP

AGE 0 TO 4	• *Learning to walk* • *Requiring constant parental supervision* • *Developing peripheral vision, depth perception*
AGE 5 TO 12	• *Increasing independence, but still requiring supervision* • *Poor depth perception* • *Susceptible to "dart out"/ intersection dash*
AGE 13 TO 18	• *Sense of invulnerability* • *Intersection dash*
AGE 19 TO 40	• *Active, fully aware of traffic environment*
AGE 41 TO 65	• *Slowing of reflexes*
AGE 65+	• *Street crossing difficulty* • *Poor vision* • *Difficulty hearing vehicles approaching from behind* • *High fatality rate*

EXHIBIT G.11 Aids to Older Pedestrians

Reduced roadway crossing distances (bulb-outs and curb extensions)
Signals within 60 feet of viewing distance; easy-to-read signs
Refuge areas in roadway crossings
Traffic calming
Shelter and shade
Handrails
Smooth surfaces and unobstructed travel ways
Signal timing at lower than average walking speed

Design is only one aspect that can help in improving safety for younger pedestrians. Besides adult supervision, which is always important, educational programs geared toward increasing a child's awareness of traffic and safety measures are an important tool to increasing their safety as pedestrians. In addition to adult supervision and effective education programs, good design of the places children walk most, such as school zones and school walking routes, neighborhood streets, and parks, can significantly help to improve their safety.

Refer to Toolbox Section 8—Children and School Zones for more information.

People with Disabilities

People with disabilities, including those using special walking aids or wheelchairs, need carefully designed facilities that eliminate barriers.

The needs of pedestrians with disabilities can vary widely depending on the type of disability and level of impairment. Elements that are helpful to people with disabilities are listed in Exhibit G.12.

It is important to understand the characteristics of all pedestrian age groups in order to fully address their needs in design.

EXHIBIT G.12 Aids to Pedestrians with Disabilities

- Curb cuts and ramps
- Tactile warnings
- Easy-to-reach activation buttons
- Audible warnings and message systems
- Raised and Braille letters for communication
- Signal timing at lower than average walking speed
- Maximum grade of 1:20 and cross slope of 1:50 (ramps can be 1:12)
- Roadway crossings and refuges
- Reduced roadway crossing distances (bulb-outs and curb extensions)
- Traffic calming
- Handrails
- Smooth surfaces and unobstructed travel ways

Space requirements for pedestrians with disabilities vary considerably depending upon their physical abilities and the assistive devices they use. Spaces designed to accommodate wheelchair users are generally considered to be functional and advantageous for most people. Exhibit G.13 illustrates the spatial dimensions of a wheelchair user, a person on crutches, and a sight-impaired person. This exhibit illustrates why a minimum six-foot-wide space is needed for two wheelchair users to pass. For additional information related to designing facilities for people with disabilities, refer to Toolbox Section 3—Accessibility.

EXHIBIT G.13 Spatial Dimensions for People with Disabilities *(Source: Accessibility for All)*