Right-of-Way Widths for Planned Street Improvements

November 2021

Honolulu COMPLETE STREETS

City and County of Honolulu

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Prepared by The City and County of Honolulu, Department of Transportation Services in cooperation with the Oahu Metropolitan Planning Organization and the United States Department of Transportation.

CONTENTS

Terms

City and County of Honolulu (City)	A body politic and corporate created by the people of the island of Oahu with the power of local self-government with the power to serve and advance the general welfare, safety, and aspirations of its inhabitants in a sustainable manner and promote stewardship of natural resources for present and future generations.
Complete Streets	Streets that are designed to move people and improve safety, balancing the needs of all road users – pedestrians, bicyclists, transit riders, and motorists. Many of our streets were planned and designed to move vehicles quickly and efficiently, lacking pleasant sidewalks, safe crossings, low-stress bike lanes, comfortable bus stops, and quick bus services.
Complete Streets Program	The implementation of Complete Streets is a combined effort of the City's Departments of Design and Construction, Facility Maintenance, Parks and Recreation Division of Urban Forestry, Planning and Permitting, and Transportation Services.
Department of Transportation Services (DTS)	The City department that directs and performs program planning, operation and maintenance, minor traffic control improvements, management of parking facilities, and collection of charges for the City's multimodal transportation system.
Geographic Information Systems (GIS)	A computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. Geographic information systems can show many different kinds of data on one map.
Greenhouse Gas (GHG)	Gases that trap heat in the atmosphere and warm the planet. Transportation from burning fossil fuel for our cars, trucks, ships, trains, and planes is a leading source of greenhouse gas pollution.
Mode of Transportation	Ways by which people move from one place to another. Common modes of transportation are walking, biking, transit, and driving.

Key

Mode Split	Also referred to as mode share, the percentage of people traveling by each type (or mode) of transportation. Walking and biking make up about 11 percent of the Oahu's mode split.
OahuMPO Citizens Advisory Committee (CAC)	The Citizens Advisory Committee consists of non-governmental organizations and City and County of Honolulu neighborhood boards whereby public input can be solicited to advise the OahuMPO Policy Board. It is broadly based, include minorities and disadvantaged groups, reflected through the composition of its member organizations, and have an interest in and concern for the transportation planning process.
Oahu Metropolitan Planning Organization (OahuMPO)	A decision-making agency made up of state and county governments, operators of public transportation receiving federal funds, and the public at large that for the purpose of carrying out a continuing, cooperative, and comprehensive transportation planning process for Oahu.
Right-of-Way (ROW)	The amount of property available to provide public access for travel. It includes at least the land from the edge of one property to the edge of the property on the opposite side of the street. Within the right-of-way, space is allocated to various modes of transportation and facilities to support the safe and efficient movement of people and goods.
Single-Occupant Vehicle (SOV)	A privately operated vehicle that consumes 270 square feet of land for storage whose only occupant is a driver (2.6 square feet). The average car is parked 95 percent of the time and, otherwise, used for personal travel, daily commuting, and for running errands.

1.0 Introduction

Right-of-way is an incredibly valuable public asset. Within the right-of-way, street space supports different modes of transportation—automobiles and trucks, transit, walking, biking, and rolling—but when space is limited, how do we determine what goes where?

Miles of public roadway of Oahu

1,500

This length would stretch more than halfway from Honolulu to Samoa.

Acres of Space that equates the street right-of-way

9,600

If combined, this area would stretch across almost all of urban Honolulu.

Estimated Land Value

$44B

The estimated land value of the Oahu streets right-of-way

Because land on Oahu is limited, it is necessary to plan how right-of-way is used so that it efficiently and productively serves all members of the community. Right-of-way is also increasingly difficult to acquire, and in many cases procuring it may be infeasible or met with opposition. Rethinking and repurposing our current streets to serve varied community needs increases the versatility of the right-of-way we do have.

Safe, sustainable options for travel are critical to the movement of people and goods across the island, where residents live and work, visitors recreate, and businesses operate every day. Public streets are a critical infrastructure that must be maintained, managed, and planned to equitably serve the community into the future.

In addition to the increasing cost of right-of-way and growing mobility demands on our streets year after year, climate change and sea level rise are challenges that affect our transportation systems and travel options.

Hawaii has a statewide goal of carbon neutrality by the year 2045. Providing comfortable, attractive travel options involves street designs that encourage people to walk or roll, bike, or ride transit, thus decreasing reliance on single-occupant vehicles and reducing carbon emissions.

The unique topography of our island state makes certain roadways vulnerable to extreme weather events and sea level rise. On Oahu, communities along the perimeter of the island and in lower elevation coastal areas are especially susceptible to these impacts. Specific planning of the street system is necessary to preserve critical access lifelines for the community during these events.

The City and County of Honolulu (City) maintains and enforces planned street widening maps and companion regulations related to development, land use, and building permits. The Right of Way Widths for Planned Street Improvements defines priorities and guides implementation of future street improvements in alignment with Honolulu's Complete Streets ordinance. This document includes an assessment of current right-of-way widths, land use, and multimodal plans and initiates a method for prioritizing future improvements so that street conditions meet public health and safety standards for all users of the street system, regardless of mode.

The proposed Street Type assignments introduced in this document and used in right-of-way evaluation have evolved from the original Complete Streets types found in the Honolulu Complete Streets Design Manual (CCH 2016). They are based on the character, context, function, and long-term modal goals for all

streets on Oahu, ensuring our streets can continue to sustainably accommodate and balance the needs of all users. A set of digital maps reflecting this work is available as a resource for development review and permitting and implementation of future Honolulu Complete Streets projects.

1.1 Overview and Background

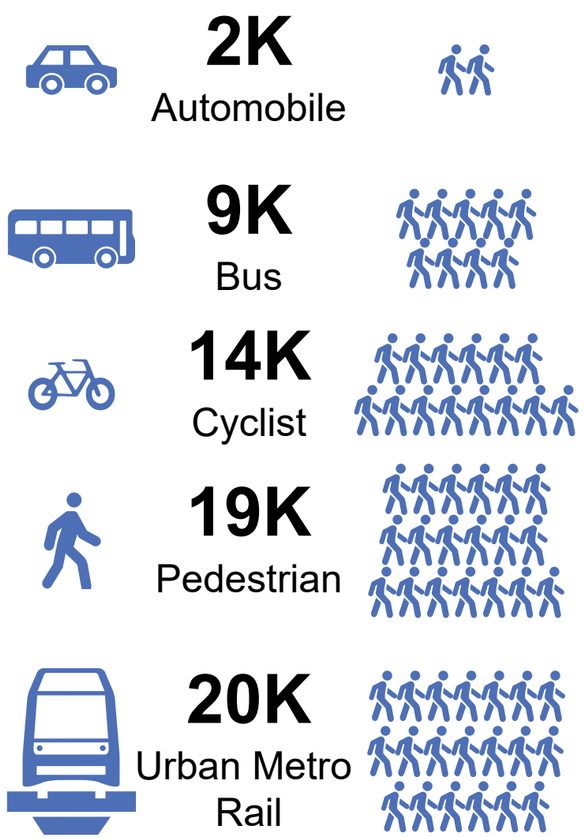
Right-of-way is the amount of property available to provide public access for travel. It includes at least the land from the edge of one property to the edge of the property on the opposite side of the street. Within the right-of-way, space is allocated to various modes of transportation and facilities to support the safe and efficient movement of people and goods.

> *"Our City streets represent a large portion of City land assets. It is imperative that we use these valuable corridors to their highest and greatest use, to implement Complete Streets which provide equitable access across all modes and for all abilities, including pedestrians, bicycles, cars, trucks, and buses" – Jon Nouchi, DTS Deputy Director*

Right-of-way for Complete Streets can include travel lanes for vehicles, sidewalks, bike lanes, and transit lanes. It can also include loading zones, shoulders and medians, stormwater management and retention facilities, landscaping, on-street parking, utilities, lighting, retaining walls, pedestrian amenities, street furniture, bus stops or shelters, bicycle storage, and other features to support mobility and connectivity for all modes.

There are approximately 1,500 miles of roadway that make up the transportation network that is open to the public. This does not include the H-1, H-2, and H-3 freeways and does not include any private roadways closed to the public. It does include all public streets on Oahu, and equates to approximately 9,600 acres of right-of way. The estimated land value of the Oahu streets right-of-way is approximately $44 billion.

Corridor Capacity by Mode



This graphic compares the people throughput per hour, by transportation mode, in the width of a typical traffic lane in the city.
Sources: H. Botma and H. Papendrecht. 1991. Traffic Operations of Bicycle Traffic. In Transportation Research Record 1320. TRB. Washington, D. C. National Research Council, and based on GTZ calculations (2009).

Limited space and resources and increased demand on services and facilities are common themes across the state. Careful management of Oahu's street assets is critical to ensuring they continue to serve the needs of all users in the future in the most effective and economical way possible. Actively maintaining and managing street assets allows the City to plan for and adjust to potential changes that influence where people choose to live, how people choose to travel, and the means by which goods are transported throughout the island.

1.2 Purpose and Objectives

As a city grows land use patterns change and the true cost of preferred transportation methods evolve. Across the country, public roadways are funded using a combination of federal, state, local, and private expenditures. In Hawaii and nationwide, nearly half of the total costs are borne by the general public through government expenditures plus other social and economic costs. A similar amount of the total costs are borne by private citizens through the private costs of owning, operating, and maintaining motor vehicles for transportation. These costs do not fully account for indirect costs such as air pollution or carbon emissions or the disproportionate effects of vehicular transportation on some communities (Ulupono 2021).

Of the total costs for the public streets borne by the general public, only a small amount is currently being funded by gasoline/fuel taxes and other user fees. This is about the same amount of the cost of building and maintaining roads that is generated from general taxes such as property, income, and sales taxes. Over time the proportion being funded through gasoline/fuel taxes is eroding because these tax rates are not being increased to keep up with inflation; vehicles are becoming more fuel-efficient; and the total amount of miles of vehicle transportation has not been growing (US PIRG 2015).

Therefore, public roadways are highly subsidized by the general public, and so-called "gasoline/fuel and user fees" are covering a shrinking share of costs. People who travel by walking, biking, and transit modes on the street system are paying much of the system costs through general taxes, while using a very small proportion of the right-of-way (US PIRG 2015).

It is essential that future plans be updated to accommodate and promote smart and efficient travel, and balance the cost of various modes more equitably. The City maintains and enforces planned street widening maps and companion regulations related to development, land use, and building permits. The purposes of the Right-of-Way Widths for Planned Street Improvements is to modernize existing policies regarding widening and improvement of streets islandwide, incorporate sustainability into improvement recommendations from various ongoing planning efforts, and implement Complete Streets principles systemwide.

Modernization –The planned right-of-way widths for our street network were established in the 1980s at a time when accommodating and moving vehicular traffic was the priority. Our system conditions, travel needs, funding levels, and priorities have changed over time. The improvements identified in the right-of-way rules are being updated to represent the desired local transportation network.

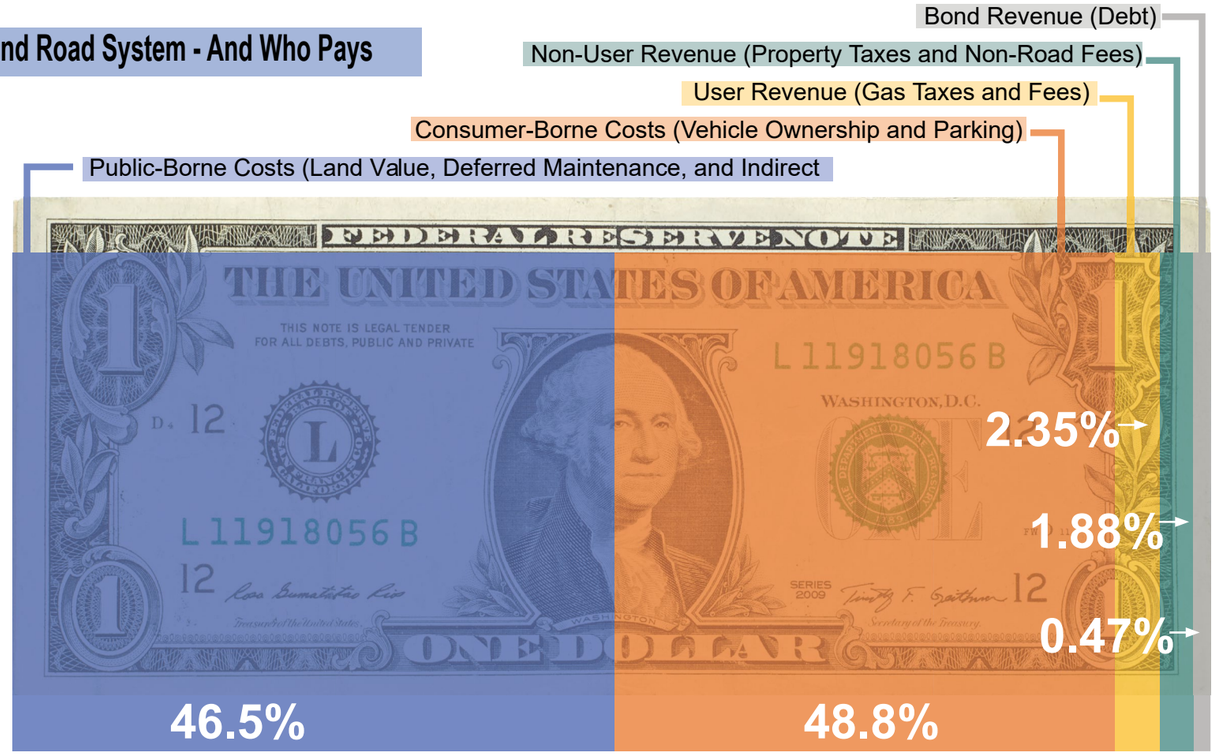
Sustainability – With increased competing uses for our limited street right-of-way, a comprehensive review of the City's existing policies regarding widening and improvement of existing streets islandwide must be performed to ensure our streets can continue to sustainably accommodate and balance the needs of all users.

Complete Streets – The principles of Complete Streets guide all transportation investments and decisions regarding operation and maintenance of the transportation system. The City's Complete Streets law (Ordinance 14-33) expresses Honolulu's commitment to planning, designing, operating, and maintaining Complete Streets.

This effort guides implementation of future improvements in alignment with Honolulu's Complete Streets ordinance.

The Costs of the Public Street and Road System - And Who Pays

Public roadways are funded through a combination of federal, state, local and private expenditures. This graphic shows the approximate percentage of costs of transportation based on data adapted from various sources (Ulupono 2021, US PIRG 2015).



The objectives of this effort are as follows:

- To undertake a comprehensive review and update of the entire island's planned street widening maps based on current land use plans, best practice planning models, and updated assumptions regarding modes of travel
- To help improve how the public streets rights-of-way can be allocated to various modes of transportation, resulting in a more efficient, sustainable, and equitable transportation system
- To ensure the implementation of the goals and requirements of the Complete Streets ordinance as it applies to existing streets and right-of-way
- To prepare for the future rail transit system and assist with implementation of the neighborhood transit-oriented development plans
- To increase safety, accessibility, mobility, and connectivity for motorized and non-motorized users
- To ensure an engagement process with key stakeholders, the public, and planning and engineering professionals

1.3 Process and Methodology

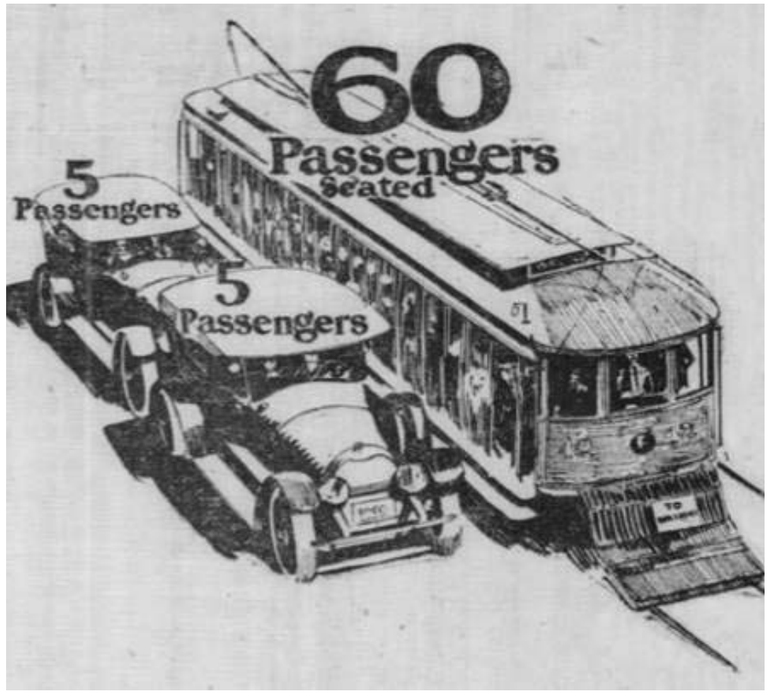
Developing the updated Right-of-Way Widths for Planned Street Improvements involved the review of existing information and future plans, technical analysis of digital data, and thoughtful categorization of streets based on modal priorities aligned with Complete Streets principles. To build upon previous planning work completed by the City and partner agencies, all relevant policies, regulations, requirements, and recommended modal investments were examined to identify the long-term goals and needs for street right-of-way. This review of previous work is described further in Chapter 2. Traffic volumes, future modal needs, and information about other physical street elements (such as the presence of sidewalks or bicycle lanes) were consolidated to create a comprehensive digital dataset.

This information was then compared to parcel information and roadway design data to assess the availability of right-of-way on a map-based platform for all streets. Recognizing that space is limited and Oahu's streets are valuable land assets, a decision-making process was developed to guide future allocation of rights-of-way to various transportation modes. This process is described in Chapter 3 and considers the character, context, and function of a street when different modes need to be prioritized on the different Street Types.

The City welcomed public and stakeholder reviews of the right-of-way analysis and Street Type assignments through online communication and interactive map-based activities. A summary of public and stakeholder involvement and the information received is summarized in Chapter 4.

Chapter 5 provides a summary of the work completed and analysis conclusions of the Right-of-Way Widths for Planned Street Improvements. It also includes a description of how the outcomes and results of this project can be used to inform the City's future Complete Streets planning efforts.

Historic Comparison of Modal Efficiency



Historic Comparison of Modal Efficiency, Source: Honolulu Rapid Transit Company, LTD. Circa 1920s. This graphic had been accompanied by text the said: "Large cities have discovered that mass transportation is the only solution of their traffic problems. Street area cannot be expanded as traffic increases without rebuilding the whole town, therefore available space must be used economically. Obviously it is not being used economically when only one person in a big automobile occupies as much space as 20 to 60 in a streetcar."

2.0 Overview of Relevant Plans and Policies

This chapter provides a summary of the relevant plans, policies, and regulations that influence the use and allocation of right-of-way on streets. The purpose of reviewing these documents was to identify the accomplishments and recommendations of previous planning efforts completed by the City and partner agencies, as well as to understand how right-of-way allocation can support the vision and goals of those plans.

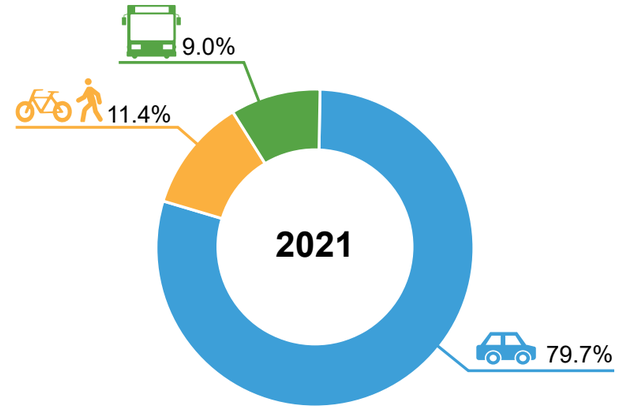
The Oahu Regional Transportation Plan is a long-term plan for transportation on the island. It highlights future transportation needs, identifies strategies to enhance the multimodal system, and aims to improve mobility and equity for Oahu's communities. Land use plans and localized development plans, such as those related to future transit-oriented development near rail stations, guide how and where growth might occur so that land uses are coordinated and complimentary. Without changes to land use or transportation options, mode split (the percentage of people using a particular transportation mode) is unlikely to change over time. Modifications to the right-of-way are needed to provide alternatives to single-occupancy vehicle travel and to meet climate change goals to reduce the amount of greenhouse gas emissions generated by transportation. With limited land on Oahu, developments are shifting to denser, more compact footprints, especially in urban Honolulu, to efficiently use this limited space. The Right-of-Way Widths for Planned Street Improvements supports the goals of these plans by helping to identify priorities and constraints for our limited right-of-way.

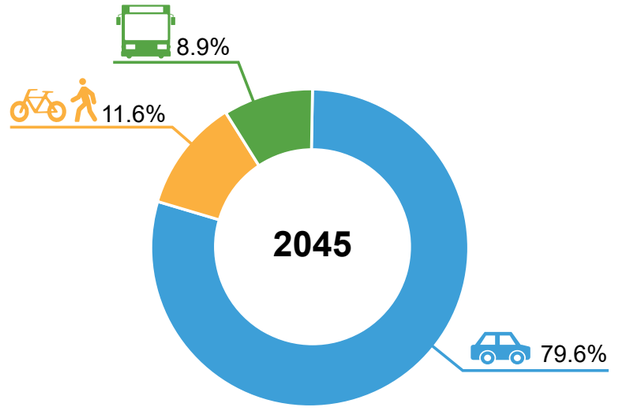
The documents summarized in this chapter are aligned with a consistent overall mission – to achieve an effective, sustainable, multimodal transportation system across the City by providing safe and convenient options for all users of the roadway, including pedestrians, bicyclists, motorists, persons with disabilities, users and operators of public transit, seniors, children, and movers of commercial goods.

2.1 Right-of-Way Width and Setback Rules

Right-of-Way widths and setback requirements govern how much street space is available for vehicles, bicycles, transit, and pedestrians. The Rules and Regulations of the Department of Transportation Services for the Establishment and Administration of Right-of-Way Widths and Setback Lines for Planned Street and Public Transit Improvements (CCH 1983) was a document developed by the City and County of Honolulu nearly four decades ago. These rules were created to implement the City's Development Plan requirement that the City

Existing and Projected Mode Split on Oahu





Mode Split is a common term used to identify the percentage of travel by mode of transportation, such as walking, bicycling, public transit, or in an automobile. Shown in this figure is the mode split for daily travel on Oahu today and in 2045. The vast majority of travel is by automobile at about 80%. The combined mode split for walking, bicycling, and transit is about 20%. Developing Complete Streets system-wide will enable improvements in the safety and efficiency for access to non-automobile modes of transportation. Source: Oahu Regional Transportation Plan, 2021.

establish and maintain future right-of-way widths and setback lines for planned street and transit improvements shown on the public facilities map and planned improvements to minor streets. The right-of-way widths and street setback lines were based on the Development Plan land uses for the respective areas, as well as standards set forth in the City's Subdivision Rules and Regulations.

These setback requirements were oriented toward supporting motor vehicular traffic. Modal priorities have changed since these rules were established.

2.2 Complete Streets Design Manual and Ordinance

The principles of Complete Streets now guide all transportation investments and decisions regarding operation and maintenance of the transportation system.

The Complete Streets Design Manual (CCH 2016) provides guidance on how to plan and design streets that comply with the City's Complete Streets Ordinance 12-15. It is used by City staff, design professionals, private developers, community groups, and others involved in the planning and design of Oahu's streets. The manual is applicable to all projects that impact the public right-of-way along streets, including the construction of new streets and improvements to existing streets. The manual is used by professionals as a resource in design to ultimately apply their own engineering judgment to each situation and context, to implement solutions that better accommodate all users.

Complete Streets principles should be applied to all street facilities based on the Street Types defined in the Complete Streets Design Manual (CCH 2016). The manual defines eight Street Types classifications based on their intended use and provides ideal street cross sections for each including details on potential components of the travel way. The types vary depending on their unique characteristics and function, and their emphasis on supporting certain levels of traffic at a desired speed or accommodating specific transportation modes. The Street Type classification of 'Street' defined in the manual has been divided into two categories – 'Street' and 'Residential Street' – to further differentiate their functions and preferred components.

The following nine Street Types are illustrated in the Right of Way Widths for Planned Street Improvements:

- **Boulevards** typically have higher traffic volumes, more travel lanes, moderate speed limits, and are located in urban areas. They should have sidewalks, bike lanes, or transit routes.
- **Avenues** usually have moderate to high traffic, low to moderate speed, and often connect urban centers with Boulevards. Avenues should have bike lanes.
- **Main Streets** are typically found in commercial sections of a town center. They are generally designed for people on foot, should have bike lanes, and could have on-street loading or parking.
- **Streets** generally carry moderate vehicle volumes at low speed in urban or suburban settings, should have sidewalks, and can connect residences with small retail areas.
- **Residential Streets** typically have two travel lanes and can be urban or suburban in character and typically allow on-street parking. They may have raised curbs, landscaping, sidewalks, or bike lanes (new Street Type name).
- **Malls** (Pedestrian or Transit) are dedicated streets where private automobiles are prohibited or heavily restricted. Pedestrian malls are typically adjacent to uses that cater to people on foot. Transit malls are for fixed transit routes, allow bicycles, and have multiple transit lines and stops.
- **Rural Roads** generally carry very little traffic and are low-speed facilities, allowing people on foot and people on bicycles to share the road.
- **Lanes and Alleys** often provide access to the backs of buildings and garages for deliveries and refuse collection. They are usually narrow and do not include sidewalks.
- **Scenic Byways** are listed on national or statewide historic registers and have unique features or significance that should be preserved to maintain the character of the road.

2.3 Transportation Plans

The Right-of-Way Widths for Planned Street Improvements evaluates existing public streets. This existing transportation network is being updated to support active transportation – walking, biking, and accessing transit – and should be planned and designed for safe and efficient mobility for all road users. Land use plans influenced and contributed to the integrated transit recommendations surrounding each of the rail stations. Relevant modal plans were reviewed for long-term goals and identified needs for right-of-way.

2.3.1 Oahu Bike Plan

The Oahu Bike Plan: 2019 Update (CCH 2019b) builds off of the foundation provided in the 2012 Oahu Bike Plan: A Bicycle Master Plan (CCH 2012). The vision and goals of the 2012 Bike Plan continue to provide the structure for the Bike Plan Update's proposed recommendations, but a critical new part of the Bike Plan Update is to incorporate "lower-stress" designs into Oahu's proposed bikeway network.

The focus of the 2019 Oahu Bike Plan Update is to identify specific projects, policies, and programs that will expand bicycle ridership and provide a network of safe, comfortable bikeways attractive to users of all ages and abilities.

Oahu currently has 211 miles of on- and off-road bikeway facilities, and this update calls for an additional 575 miles of bicycle facilities (including 325 miles of City facilities budgeted at about $147 million). Building out the planned bicycle network will require a significant investment.

The Bike Plan Update is consistent with the City's overall efforts related to Complete Streets and the commitment to making Oahu's roadways safe and accessible for all users of all ages and abilities. The Bike Plan Update is a key component of the City's multimodal transportation system, which will help guide decisions regarding future operations and capital improvements.

2.3.2 Oahu Pedestrian Plan

The Oahu Pedestrian Plan (CCH 2021a) is a long-term action plan to create vibrant, safe, and accessible streets to enable those of all ages and abilities to get around safely and comfortably by walking and rolling. The stated objective of the plan is to make the street network more walkable in support of healthy and livable communities. The plan identifies pedestrian improvement projects and programs and prioritizes those improvements to facilitate walking and multimodal travel consistent with the City's Complete Streets approach. The Draft Oahu Pedestrian Plan was released for public review in June 2021.

The Pedestrian Plan defines the priority steps needed to make Oahu a more walkable, livable, and healthy place. The process began with an inventory of existing conditions and prioritization of pedestrian improvements through technical analysis and community engagement. Preliminary inventories identified a deficiency of nearly 800 miles of missing sidewalks, with an estimated cost of more than $1.15 billion.

Walking is the oldest and most efficient, affordable, and environmentally friendly form of transportation. Walking and rolling helps build strong communities, is the primary way that neighbors get to know one another, and is an easy way to improve mental and physical health.

The Pedestrian Plan is a key component of the City's multimodal transportation system, which will help guide decisions regarding future operations and capital improvements.

2.3.3 Bus-Rail Integration Plans

Seven Bus-Rail Integration Plans were prepared for the Honolulu Rapid Transportation Project. Each plan provides information on bus access, as well as service characteristics of bus routes serving the rail stations. Plans were prepared for each station design group: West Oahu, Farrington Highway, Kamehameha Highway, Airport, Dillingham, and Kakaako, plus a separate plan for Ala Moana Center Station.

The plans provide guidance to the Department of Transportation Services in development of the multimodal transportation system, such as the delineation of on- and off-street bus facilities in each station area, and will help create an efficient, customer friendly, and integrated transit system.

As part of the effort to develop bus-rail integration, the City has developed preliminary recommendations for a network of dedicated bus lanes along major bus operating corridors with higher transit ridership.

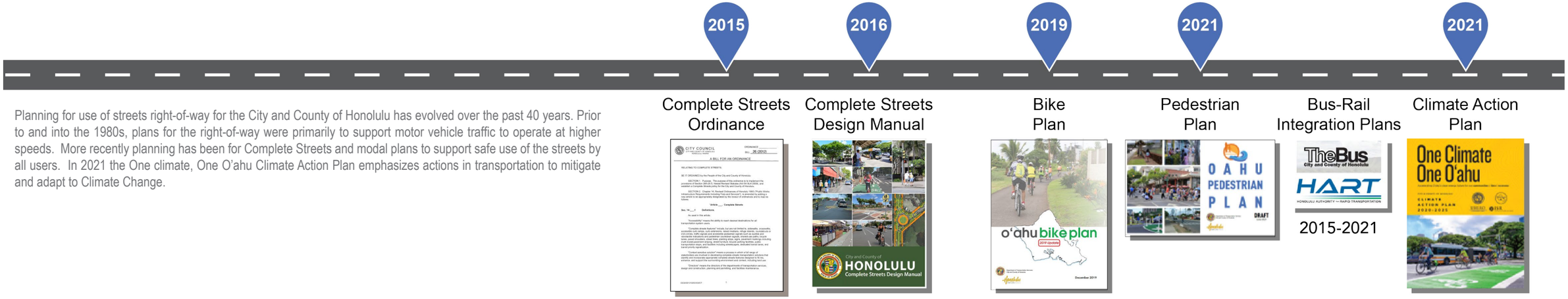
2.4 Environmental Initiatives

In 2021, the City published One Climate One Oahu, their Climate Action Plan (2020-2025) (CCH 2021b). The City recognizes the need for Hawaii, and the world, to dramatically reduce greenhouse gas emissions to avoid the most catastrophic effects of climate change. Taking bold actions to address climate change is urgently needed across the world stage. As required by Ordinance 20-47, the City must develop a Climate Action Plan to establish comprehensive milestones to transition Oahu to 100 percent renewable energy on the path to carbon neutrality by 2045. This is supportive of the state's goal of achieving net-negative greenhouse gas emissions no later than 2045.

This Climate Action Plan presents 9 climate strategies and 47 actions for the City to pursue in the next 5 years to substantially reduce greenhouse gas emissions from ground transportation, electricity, and waste sectors—a reduction of 45 percent by 2025 relative to 2015. Ground transportation alone (cars, motorcycles, off-road vehicles, trucks, buses, and other heavy-duty vehicles) is responsible for one-fifth of Oahu's total islandwide emissions, or approximately one-half of the total transportation emissions. Complete Streets are a means to enable safe and efficient transportation using modes that have lower greenhouse gas emissions.

An important environmental initiative for the use of public right-of-way is the incorporation of stormwater management features along with landscaping and street trees. The Complete Streets Design Manual (CCH 2016) includes "Chapter 9 Streetscape Ecosystem" that provides detailed discussion and City references to guidelines. Incorporating stormwater management, landscaping, and street trees within the right-of-way enhances quality of life of communities while also addressing potential environmental effects of the on-road transportation system.

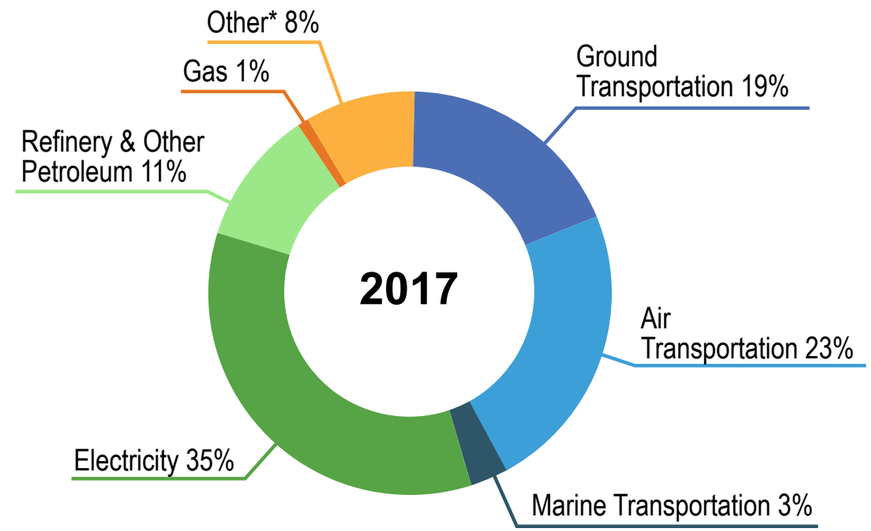
Planning for use of streets right-of-way for the City and County of Honolulu has evolved over the past 40 years. Prior to and into the 1980s, plans for the right-of-way were primarily to support motor vehicle traffic to operate at higher speeds. More recently planning has been for Complete Streets and modal plans to support safe use of the streets by all users. In 2021 the One climate, One O'ahu Climate Action Plan emphasizes actions in transportation to mitigate and adapt to Climate Change.



The large amount of paved, impervious surfaces in the right-of-way causes rapid runoff of stormwater and increased heat—something projected to worsen with climate change. The City has published the Storm Water Best Management Practices Guide for New and Redevelopment (DPP 2017) that includes new approaches for stormwater management. These approaches now include surface features for bioretention and biofiltration of stormwater known as “low-impact” or “green” infrastructure.

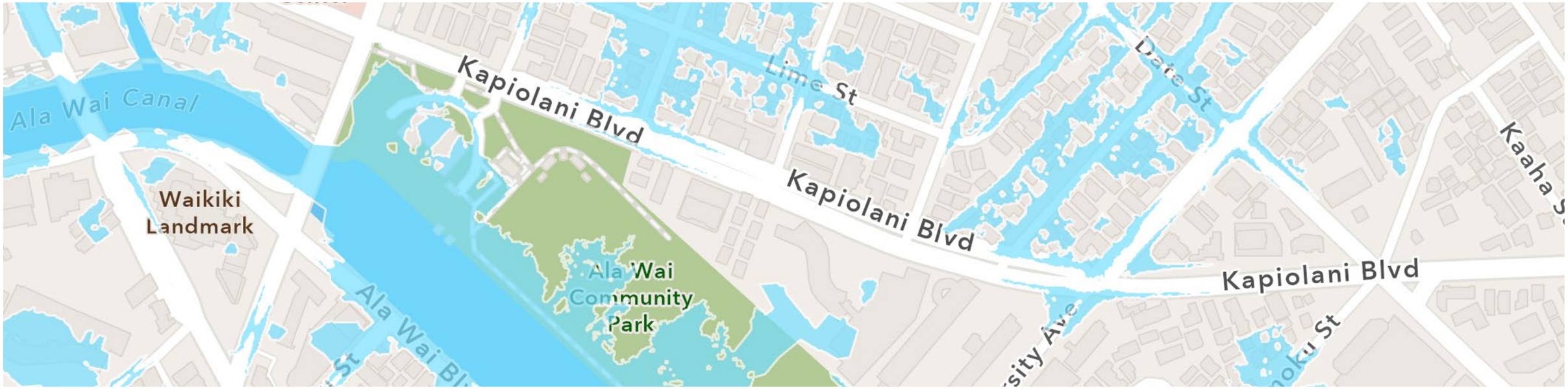
The Climate Adaptation: Design Principles for Urban Development (CCH 2020b) document describes a “resilient streetscape transition zone” between the street curb and buildings or structures that are raised above the street level to meet flood elevation requirements. This zone is intended to serve as a slope up from the street to the building, and could include amenities such as flood-resistant plantings, trees, or other streetscape elements that minimize offsite drainage and increase stormwater management. Part of this zone may lie within the public right-of-way.

Oahu’s Greenhouse Gas Emissions, by Sector (2017)



This graphic shows the greenhouse gas emissions from Oahu by source. Roughly one-fifth of Oahu’s greenhouse gases are generated by ground transportation. Other sources of greenhouse gas emissions account for 8 percent of Oahu's total and include agriculture and forestry land uses, wastewater treatment and solid waste disposal, and industrial processes and product use. Source: One Climate One Oahu, Climate Action Plan 2020-2025, City and County of Honolulu, published 2021.

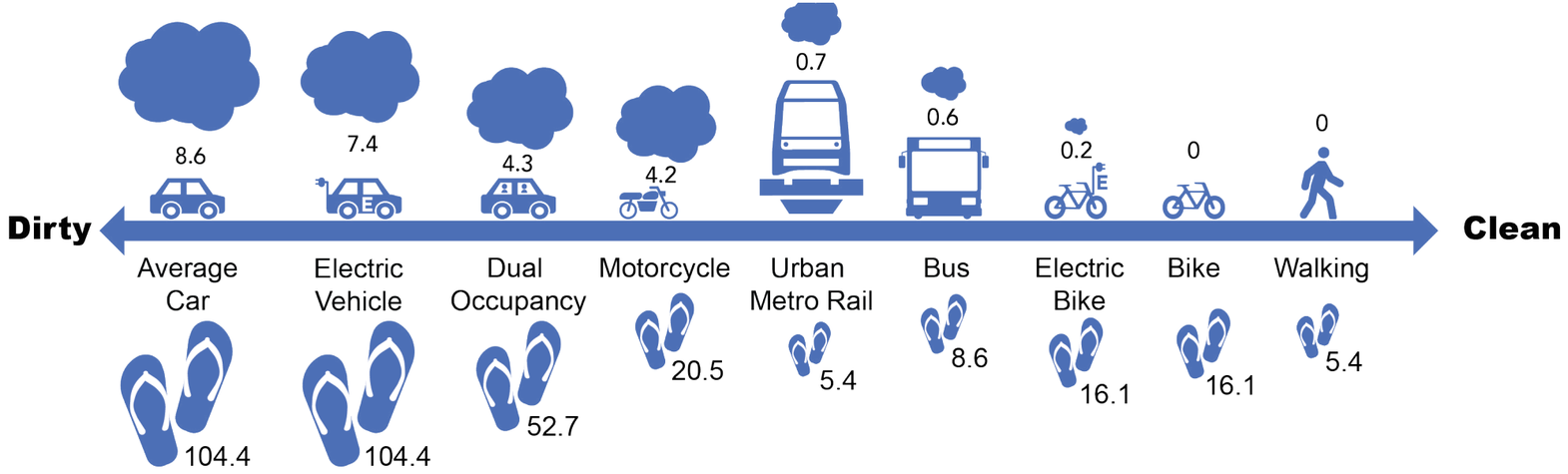
Potential Area Vulnerable to Sea Level Rise



This graphic shows areas in urban Honolulu that could potentially be vulnerable to the effects of climate change and sea level rise. Vulnerable areas include land that would be affected by a 3.2-foot rise in global sea levels by the year 2100 (CCMAC 2017).

Landscaping and street trees are essential parts of the urban forest and they contribute positively to the urban environment through local temperature moderation, stormwater collection, aesthetics, absorption of carbon, and the comfort and safety for people who live or travel along the street. Right-of-way space for landscaping and trees should be part of integrated planning and design for street corridors. The City's Urban Reforestation Master Plan (DUF 2006) and Urban Tree Plan (DUF/CCSR 2019) provide detailed guidelines for tree and plant selection and placement. The goal for adding trees along streets is to increase the total amount of tree canopy cover either covered by trees or shaded by vegetation. Landscaping and trees along streets will help to manage stormwater while providing shade and local cooling, further supporting and encouraging travel by foot and bicycle.

Relative Carbon Emissions and Space Requirements of Modes and Technologies for Transportation

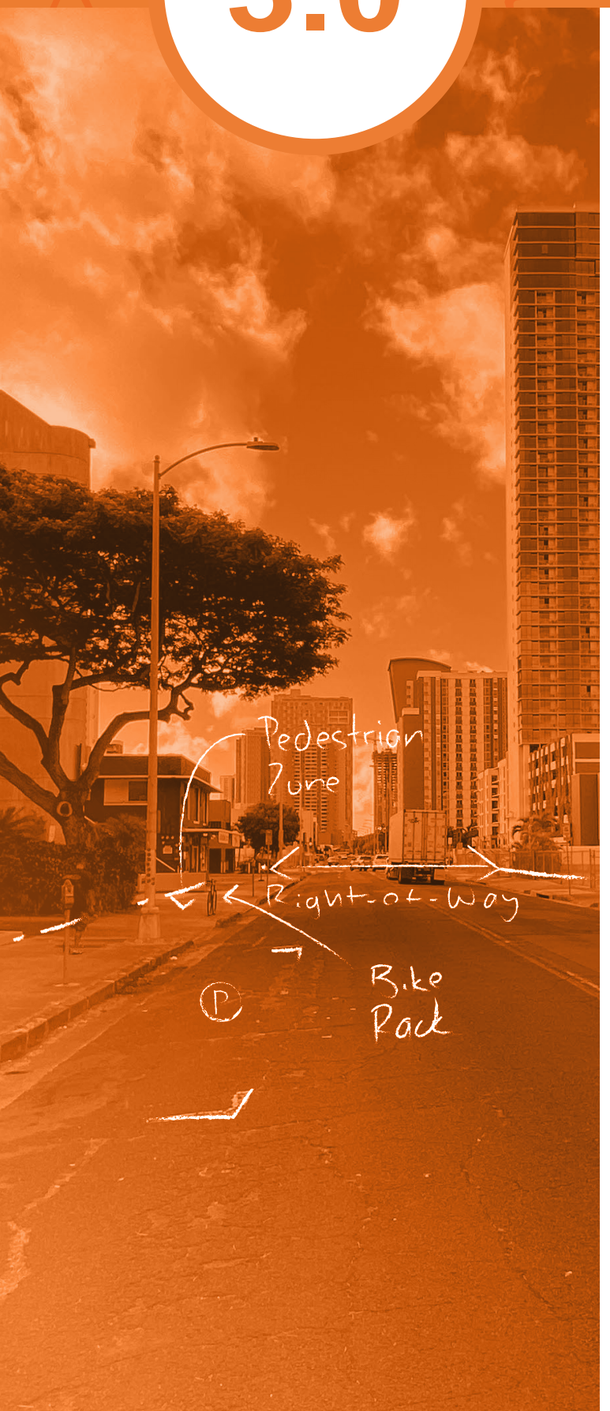


Ounces of CO_2 per person miles traveled

Space in ft^2 required per occupant

The amount of carbon-equivalent emissions for travel alone in a car with internal combustion engines is substantially higher than shared modes and by human-powered modes like bicycling or walking.
Source: Institute for Sensible Transport.

3.0 Planned Right-of-Way Analyses



The current rules and regulations governing how City right-of-way is used were established in the 1980s. Much has changed since then; development has occurred, the population has increased, and travel options have expanded. This chapter describes the five primary steps taken to update the rules regarding right-of-way use, using data to reflect current modal priorities and local transportation network needs. This chapter also explains how streets were assigned Street Types based on Complete Streets principles.

3.1 Review Plans and Policies

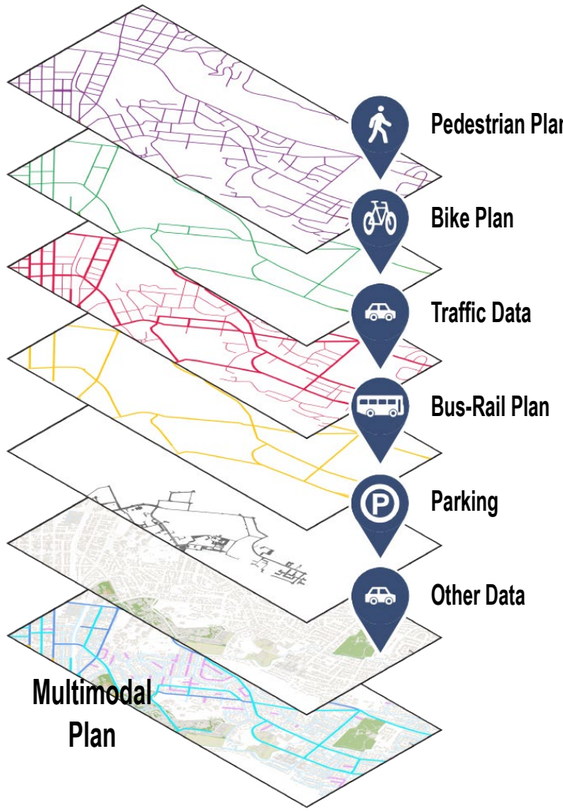
As described in Chapter 2, relevant plans, policies, and regulations related to the use and allocation of right-of-way on streets were reviewed. Information gathered from these previous planning efforts was used to establish an understanding of future recommendations for pedestrian and bicycle facilities, transit priority network improvements, and vehicular capacity enhancements.

Right-of-Way Widths for Planned Street Improvements Project Work Flow, Scope, and Products

Step 1. Review Current Plans	Step 2. Assess Right-of-Way Availability	Step 3. Assign Complete Street Types	Step 4. Identify Modal Needs and Conflicts	Step 5. Prioritize Modal Improvements
Complete Streets law (ROH14-33)	Digital parcel information	Complete Streets Design Manual	Digital maps of street features	Decision Tree priority analysis by Street Type and mode
Modal plans and recommendations	Roadway centerline and design data	Evaluate street character, context, function	Unconstrained street cross section vs. right-of-way widths	Corridor and feasibility studies
Policies, regulations, and requirements	Planned modal improvements	Public involvement and comments	Product: Location of competing modal needs and improvements	Public involvement and comments
Product: Understanding of long-term goals and right-of-way needs	Product: Digital maps of current and future street and modal features	Product: Proposed Street Type assignments for all City and County of Honolulu streets		Product: Data-supported street improvement recommendations by location and mode

Careful review of relevant plans and policies ensured that the Right-of-Way Widths for Planned Street Improvements is aligned with goals from other planning efforts, and will support the development of an effective, sustainable, multimodal transportation system.

Multimodal Plan Data Layers



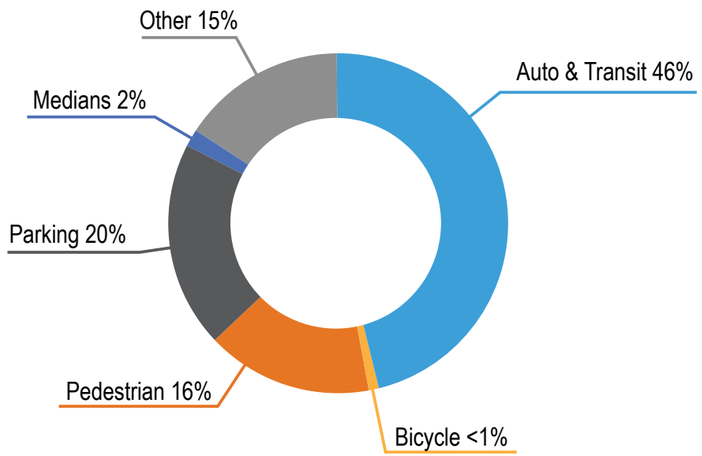
This project has assembled data on each mode of travel, along with right-of-way and other data so that information can be shared and analyzed.

3.2 Assess Available Right-of-Way

Understanding the current locations and availability of right-of-way is important for maintenance and management of public infrastructure. Assessing right-of-way is also critical for future planning.

Information about existing right-of-way widths and public street characteristics were gathered from the Rules and Regulations of the Department of Transportation Services for the Establishment and Administration of Right-of-Way Widths and Setback Lines for Planned Street and Public Transit Improvements (CCH 1983), a document that was created in the 1980s. This historical information was converted to digital and used in conjunction with Honolulu's existing digital parcel and street centerline datasets to estimate the average “parcel to parcel” width for all streets. Additional street information such as existing and forecasted traffic volumes, number of travel lanes, various sidewalk characteristics, posted speed limits, median land valuation, and urban or rural zoning designations were also added to the dataset. This created a comprehensive digital repository of current street system information and right-of-way widths on the transportation network.

Existing Right-of-Way Area (in Acres) by Type of Use



This graphic shows the distribution of public street acreage by transportation use. Auto and transit lanes account for nearly half of all street right-of-way. Other transportation uses may include on-street parking, medians, and landscaping.

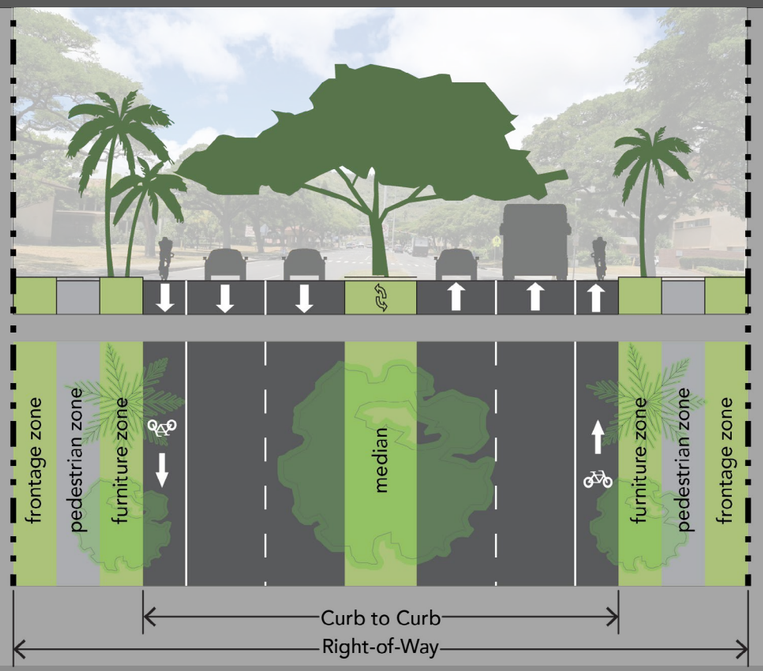
Certain elements within the rights-of-way, such as the presence and estimated width of roadway medians, were not readily available in existing inventories and could not be incorporated digitally into the dataset. In these cases, estimates for those elements were developed based upon other attributes or by using high resolution aerial imagery. The widths of existing street elements were summed to estimate a total cross section width for every street. This cross section width was then compared with the existing street right-of-way width and parcel dataset to identify how much of the existing right-of-way is already occupied (with vehicular travel lanes, bike lanes or sidewalks, for example) and how much space might be available for other uses (between the edge of the street elements and the right-of-way boundary).

Of the 9,600 acres of space on Oahu’s streets right-of-way:

- Nearly half of the right-of-way (roughly 4,400 acres) is occupied by travel lanes for automobiles and transit vehicles.
- Pedestrian zones and sidewalks make up about 16 percent (nearly 1,600 acres) of the total right-of-way.
- Dedicated bicycle facilities account for less than 1 percent (50 acres) of the total acreage.
- Space within the right-of-way is also reserved for other uses such as on-street parking, medians, and landscaping or may be unused or undeveloped under current conditions.

While the allocation of transportation modes and street elements within the right-of-way is important to future planning, the distribution of transportation facilities across the island’s communities is also necessary to provide an effective, accessible transportation system for all users. Title VI and Environmental Justice regulations protect against discrimination and aim to ensure that all communities are served equitably by transportation investments. Title VI and environmental justice communities are defined in the Title VI and Environmental Justice Program Implementation Plan (OahuMPO 2020).

Boulevard

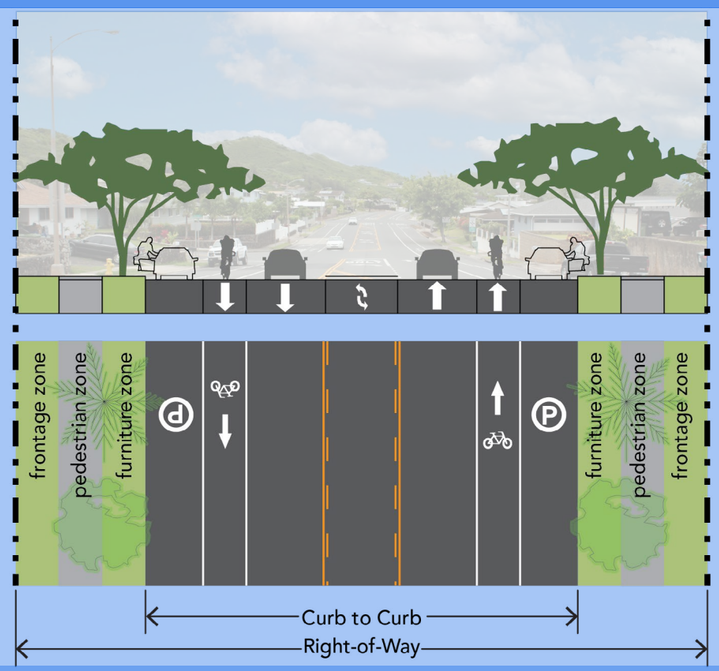


Typical Design Speed: 25-35 MPH | Loading Zones - N/A | Median - Maybe

Boulevards typically carry higher vehicle volumes at moderate speed in urban areas. They can have four or more travel lanes, and should have sidewalks and bike lanes. Boulevards usually have transit routes, and may be equipped with bus lanes or side access lanes buffering sidewalks and buildings.

Makakilo Drive

Avenue

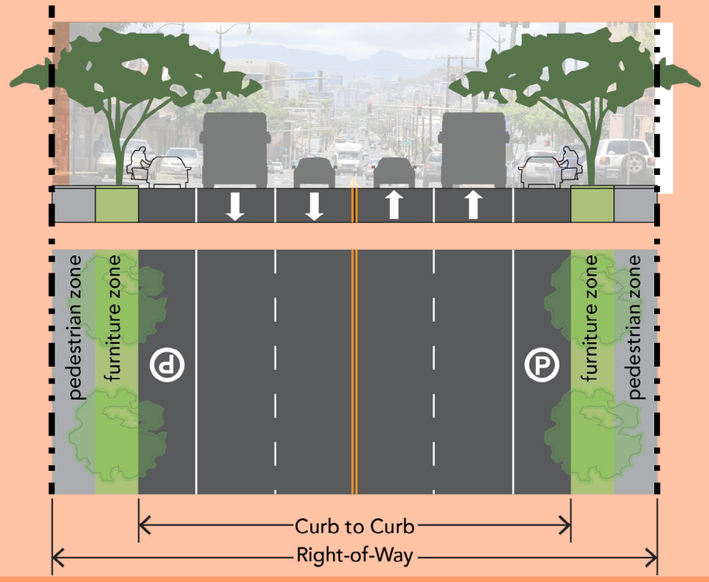


Typical Design Speed: 25-30 MPH | Median - Maybe

Avenues usually have moderate to high vehicle capacity with low to moderate speed, and typically connect urban centers with Boulevards. Avenues can have two to four travel lanes, should have bike lanes, and may have landscaped medians.

Keolu Drive

Main Street

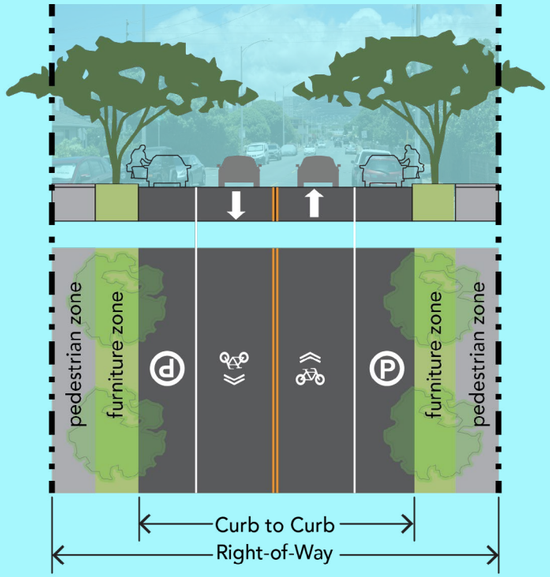


Typical Design Speed: 20 MPH | Median - Maybe

Main Streets are a subset of Avenues, with the special distinction in that they represent a commercial section of a town center. Main Streets generally have improved designs for people on foot and should have bike lanes.

Waialae Avenue

Street

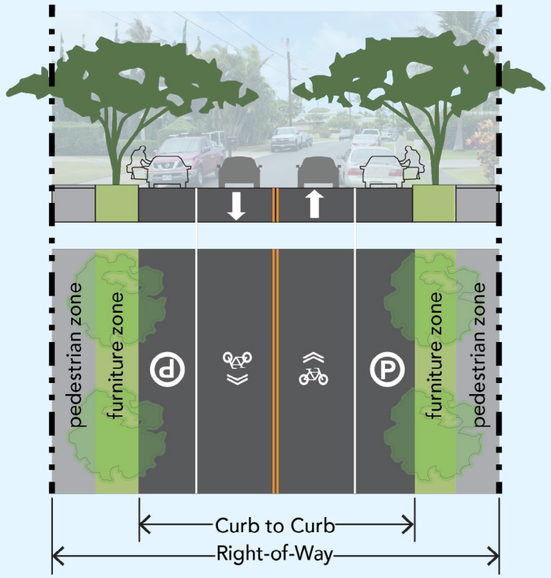


Typical Design Speed: 25 or Less MPH | Median - Maybe

Streets typically carry moderate vehicle volumes at low to moderate speed. They can have four or more travel lanes, and can be in urban or suburban settings. Streets usually connect residences with small retail, and can include sidewalks and on-street parking.

Campbell Street

Residential Street

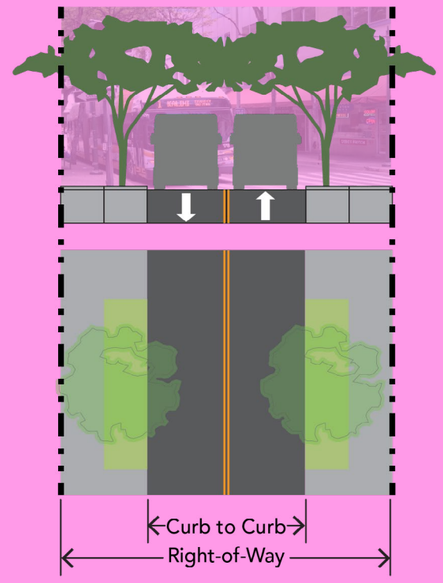


Typical Design Speed: 15 MPH | Median-No

A Residential Street is local, can be urban or suburban in character, and is suitable for all frontages and uses. Streets typically have two travel lanes, may have raised curbs, landscaping or on-street parking. Residential Streets usually have sidewalks or other separated ways to serve the needs of people on bicycles and people on foot.

Kakahiaka Street

Mall

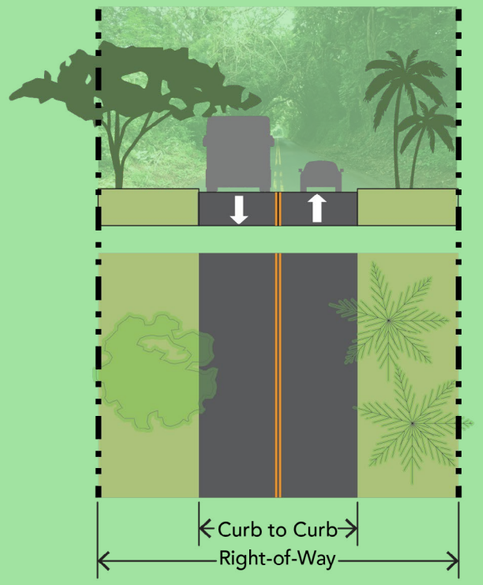


Typical Design Speed:N/A | Auto-N/A | Parking-N/A | Median-No

Malls are a type of Street where private automobiles are prohibited or heavily restricted. Transit Malls are dedicated primarily for buses or trains, and have multiple transit lines and stops. Pedestrian Malls have no motor vehicles and are typically adjacent to uses that cater to people on foot. Both types of malls may allow slow speed bicycle travel.

Fort Street (Pedestrian)

Rural Road

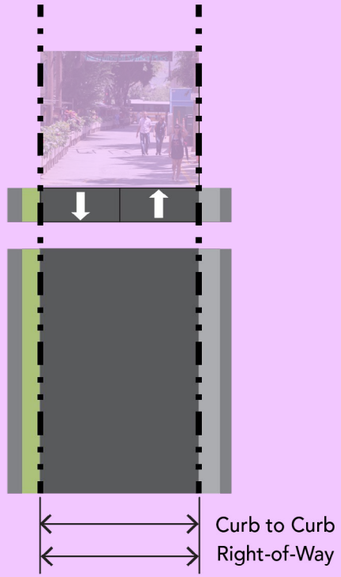


Typical Design Speed: 25-35 MPH | Loading Zones-N/A | Median-Maybe

Rural Roads generally carry very little traffic and are low speed facilities, allowing for people on foot and people on bicycles to share the road. Rural Roads are typically sparsely developed and connect developed areas with other Rural Roads.

Nuuanu Pali Drive

Lane/Alley

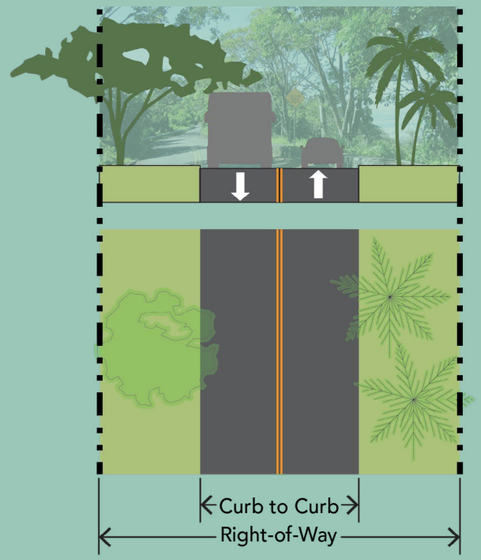


Typical Design Speed: 5-10 MPH | Transit - N/A | Median - No

A Lane or Alley is a narrow street, often without sidewalks. Lanes and alleys connect streets and can provide access to the backs of buildings and garages for deliveries and refuse collection.

Marin Lane

Scenic Byway



Typical Design Speed: N/A | Transit - N/A | Median - No

Certain roads have been designated historic and are listed on the United States Department of the Interior, National Park Service, National Register of Historic Places, and Hawaii Register of Historic Places. These roads typically have unique features or significance. The Scenic Byway designation is in addition to a street's typology and is intended to preserve the character of the road that contributes to its historic nature.

Tantalus Drive

About 1,540 acres (approximately 16.0 percent) of Oahu's rights-of-way are dedicated to transportation facilities located within environmental justice communities, including:

- Almost 900 acres of travel lanes
- Roughly 270 acres of pedestrian zones and sidewalks
- Nearly 10 acres of bicycle facilities

Many of Oahu's streets are susceptible to the effects of climate change and extreme weather events. Streets along the island's perimeter and lower level coastal area often serve as critical lifelines for communities and access for emergency services. Roughly 2 percent of the streets right-of-way is currently located within areas vulnerable to the effects of climate change and sea level rise. Vulnerable areas include land that would be affected by a 3.2-foot rise in global sea levels by the year 2100 (CCMAC 2017).

3.3 Assign Complete Streets Types

Before thinking about how any available street rights-of-way might be used in the future, Oahu's streets were categorized into Street Types. Based on Complete Streets principles and the Street Type definitions presented in Chapter 2, each street in Oahu's roughly 1,500-mile roadway network was assigned a type based on their character, context, and function, which are defined as follows:

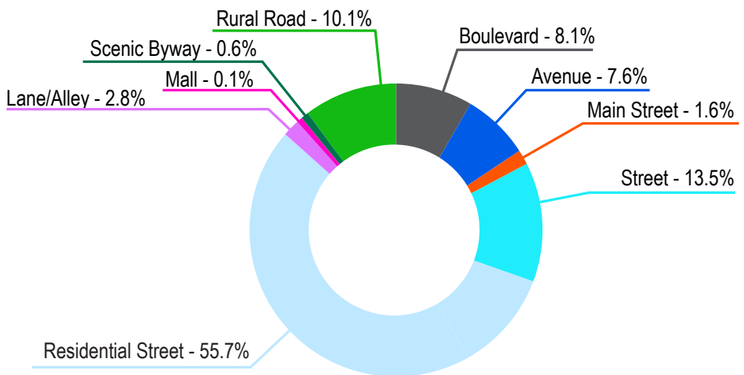
Character – What does the street look like? Does it have multiple lanes for traffic? Medians and landscaping? Sidewalks or bike lanes? The transportation network should provide different types of streets to offer route choices for all modes.

Context – Is the street located in a rural area? In the urban downtown core? Does it provide local, neighborhood access or regional connections? Streets should reflect the environment they are passing through.

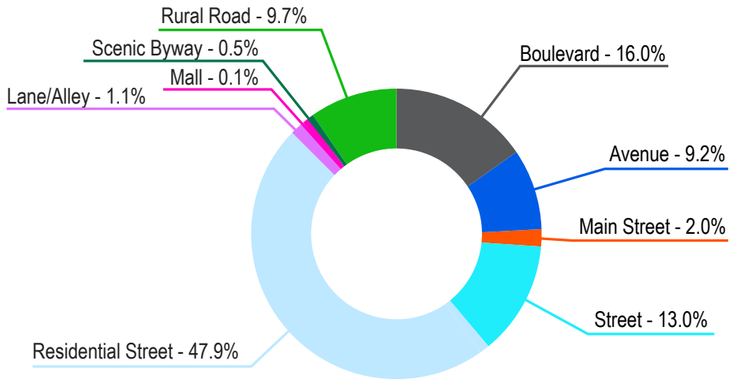
Function – Does the street have high traffic volumes? What is the posted speed limit? Do trucks often use the street? Is the street located near a school? Street designs should vary depending on the intended use and mobility of prioritized modes.

This assignment step was necessary not only to streamline planning efforts, but to make transparent future priorities on where modal facilities are implemented. Comprehensive Street Type assignments is an accomplishment that few other cities in the country have completed. While streets should appropriately accommodate everyone, different streets have different intended uses, and modal improvements should be aligned with those uses. For example, certain types of streets are more likely to have bicycle lanes and wide sidewalks, while others may have bus lanes or parking. Speed limits tend to be lower on streets that are focused on local access, while other streets may place more emphasis on moving traffic at higher speeds.

Percentage by Length (Miles)



Percentage by Area (Acres)



Each street in Oahu's roughly 1,500-mile roadway network was assigned a Street Type based on their character, context, and function. This graphic shows the distribution of Street Types by both length (in miles) and by area (in acres of right-of-way).

Street Type assignments were initially completed in the digital map dataset by applying a set of parameters to the street attribute information compiled in Subchapter 3.2. These parameters were aligned with street definitions outlined in the Complete Streets Design Manual (CCH 2016) and relevant guidance set forth by the National Association of City Transportation Officials. For instance, Rural Road assignments would be streets with attributes indicating they are located in rural areas, carry relatively low traffic volumes, and are in an area with agricultural land use. Boulevards would be identified in the digital map dataset as streets with attributes specifying urban areas, higher traffic volumes, or wider travel ways with transit routes.

The proposed Street Type assignments were confirmed during reviews with City stakeholders, and then reviewed by community members via an online, interactive map tool that allowed users to learn about the various Street Types and provide feedback. Visitors to the interactive map tool were asked whether appropriate Street Type assignments had been made and if certain streets should have been assigned one of the other listed Street Types. More details on the public and stakeholder engagement can be found in Chapter 4.

3.4 Identify Modal Needs and Conflicts

Long-term goals and future recommended projects from relevant modal plans (such as identified priority improvements from the Oahu Bike Plan, the Oahu Pedestrian Plan, or the Bus-Rail Integration Plans) were reviewed, and proposed plan improvements were added to the comprehensive dataset of existing roadway alignments and right-of-way widths. Because the majority of future planned improvements are conceptual in nature, the various street element widths were estimated. Future recommended project element widths were estimated based on their preferred facility widths as shown in the table on the next page. For example, future recommended bike lanes were assumed to have a width of at least 6 feet, exclusive of the gutter on lanes adjacent to a curb, based on bike lane design guidance found in the Oahu Bike Plan Bicycle Facility Design Toolkit (CCH 2019a).

The widths of all future planned street elements on a particular street were summed to estimate a total “unconstrained” street cross section width. This is referred to as the unconstrained width because it represents the total need for all modes, regardless of existing right-of-way constraints. This exercise was completed for every street, focusing on future planned improvement locations, and allowed an initial identification of locations where the existing right-of-way may be insufficient to accommodate future planned improvement projects.

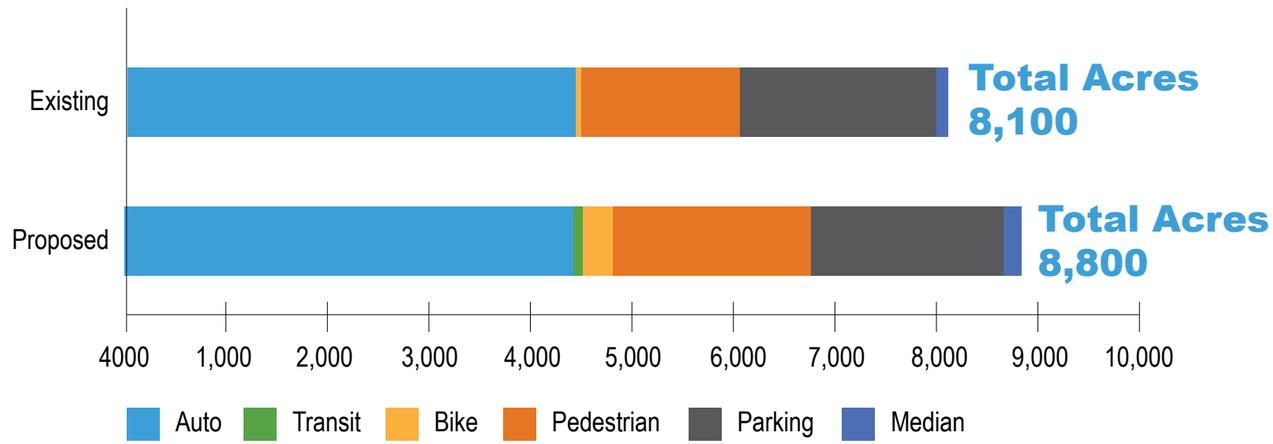
Implementing all recommended future planned improvement projects would increase the amount of space used by traffic lanes, pedestrian zones and sidewalks, bicycle facilities, and on-street parking combined by more than 8.5 percent, or about 700 acres, compared to existing conditions.

Planning Level Guidance for Street Element Widths

Typical Street Cross Section Element	Prefered Width	Minimum Width
Traffic Lane	9'-10'	9'
Bus Lane	11'-12'	11'
On-street Parallel Parking Lane	7'-8'	7'
Median (without Trees, Lighting)	6'	6'
Median (with Trees, Lighting)	10'-16'	10'
Shoulder Bikeway	6'-8'	4'
Bike Lane	5'-6'	5'
Buffered Bike Lane	7'	6.5'
Two-way Bikeway	12'-14'	10'
Pedestrian Zone	5'-6'	4'
Bus Stop Zone	8'	8'
Furniture, Amenity, Landscaped Zone	4'-5'	4'

This table presents the preferred and minimum street elements widths that should be used for conceptual planning of streets rights-of-way. Preferred widths vary by Street Type and are the desired widths to provide modal comfort. Minimum widths are absolute. Source: Complete Streets Design Manual (CCH 2016); additional input from Department of Transportation Services, City and County of Honolulu, 2021.

Existing and Proposed Right-of-Way Area (in Acres), by Type of Use



Future recommended transportation projects would add nearly 700 acres of improvements to Oahu's streets, including 200 acres of space for bicycle facilities and more than 400 acres of pedestrian zones, sidewalks, and shared use paths. There is not enough space to fit all of these improvements within the planned right-of-way.

- Pedestrian zone and sidewalk improvements account for a little more than 400 acres of planned right-of-way. Implementation of these planned improvements would increase the existing pedestrian network by roughly 25 percent.
- Nearly 200 acres of planned right-of-way for bicycle facilities would increase the dedicated bicycle network by more than 400 percent compared to existing conditions.

While these improvements would bring many benefits, not all of the future recommended street projects would be able to fit within the existing and planned right-of-way. If all future street projects were implemented, approximately 700 miles of the total 1,500 miles of streets would not be able to accommodate those improvements. Nearly half of all streets would either require right-of-way acquisition or adjustments to existing facilities to allow enough space for these planned improvements.

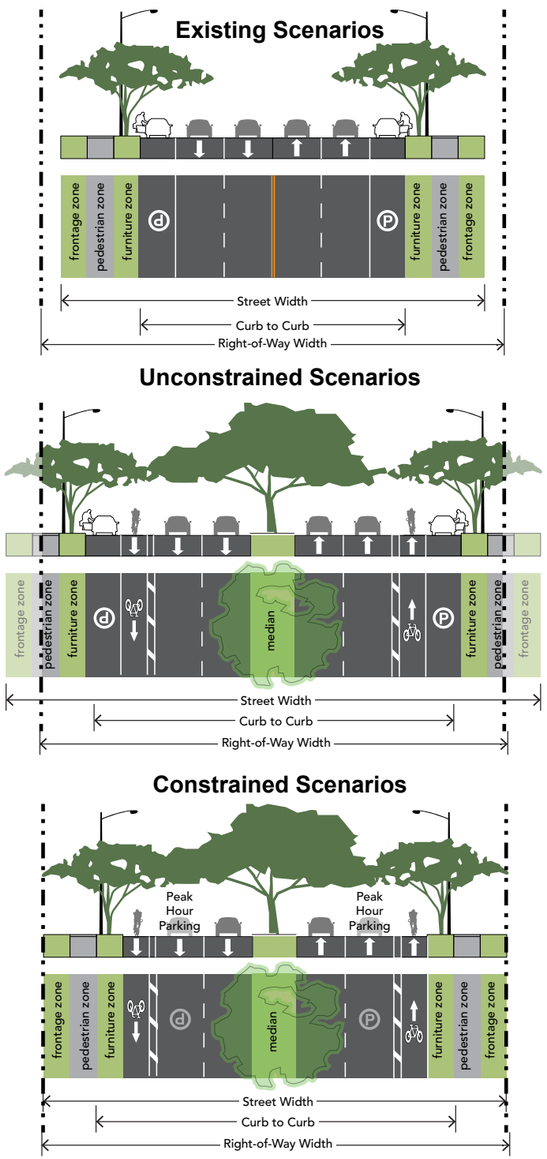
3.5 Priorities by Mode of Transportation

Recognizing that street space is limited and acquiring right-of-way is not always feasible or preferred, it was necessary to develop a process to guide how any future available right-of-way could be allocated to various modes of transportation, while also meeting the goals and requirements of the Complete Streets ordinance. As shown in Subchapter 3.4, it is highly unlikely that all of the planned or recommended future improvements will fit within the existing right-of-way. How do we decide which planned improvements get implemented?

First, a modal priority rating was identified for each mode depending upon the Street Type as shown in the nine cross section examples in Subchapter 3.3. These ratings ranged from high priority, to medium priority, to low priority. Competing modes that were not identified as priorities were de-emphasized, dedicated space was reduced, and those modes would not be considered further for inclusion on the street.

Next, to evaluate priorities by mode of transportation, an analysis of three right-of-way scenarios was conducted. The three scenarios were Existing, Unconstrained, and Constrained. Example illustrations of street cross sections are shown in this chapter for the three scenarios.

Example Cross Sections for Three Scenarios



As shown in the Unconstrained scenario cross section, all of the future recommended street improvements may not fit within the planned right-of-way. The Constrained scenario cross section shows an example of how limited right-of-way can be used more efficiently through prioritization of transportation uses.

- The **Existing scenario** included the existing space dedicated to infrastructure for automobile traffic, bikes, pedestrians, and on-street parking.
- The **Unconstrained scenario** included the existing infrastructure and added widths for all planned modal improvements for Oahu's streets without limitations of the right-of-way.
- The **Constrained scenario** evaluated how much of the multimodal planned infrastructure would fit within the planned right-of-way and prioritized modes to try to fit improvements within the planned right-of-way.

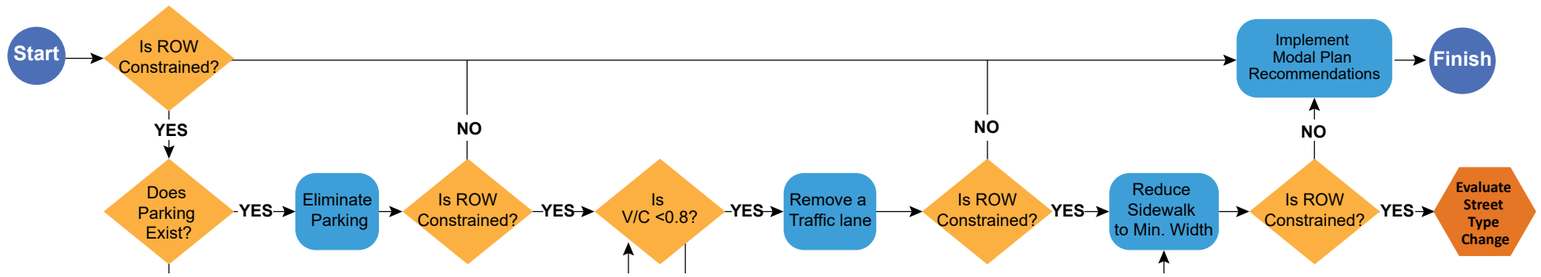
In the Constrained scenario, if competing modes were prioritized similarly high on the street, a "decision-tree" logic step was applied. This logic was designed into the comprehensive dataset for each Street Type, based on modal priorities by the Street Type (example for Avenue is shown in this chapter), and provided stronger restrictions on how to select improvement projects so that they would fit within the right-of-way. Strategies to ensure improvement projects could fit within the right-of-way included repurposing on-street parking lanes, reducing pedestrian zones to their minimum widths, or eliminating a general purpose traffic lane if vehicular volumes allowed for acceptable operations. If all decision-tree logic could not result in all planned improvements fitting within the right-of-way, a modification to the assigned Street Type may be considered. Decision-tree logic code used in the Constrained scenario analyses is available at DTS-Complete-Streets in GitHub, a software collaboration website, and alternative logic could be proposed.

Prioritizing modes by Street Type using the "decision-tree" logic resulted in **nearly 1,300 miles of streets being able to accommodate planned improvement projects.** This is an increase from the 800 miles of street that could accommodate improvement projects in the "Unconstrained" scenario. This constraint is a result of repurposing existing right-of-way or reducing or removing existing street elements. Space for on-street parking was noticeably reduced based on the "decision-tree" logic that prioritizes active transportation modes within the right-of-way. Summary bar chart of the results of allocations for right-of-way by mode are shown.Roughly 1,000 acres of existing right-of-way used for on-street parking was repurposed or removed to allow for other uses, including the following:

- Approximately 65 acres of right-of-way for dedicated transit lanes (that could be shared with right-turning vehicles or business access)
- Roughly 370 acres for pedestrian zones (including shared use paths) and sidewalk space
- Almost 200 acres of right-of-way for bicycle facilities

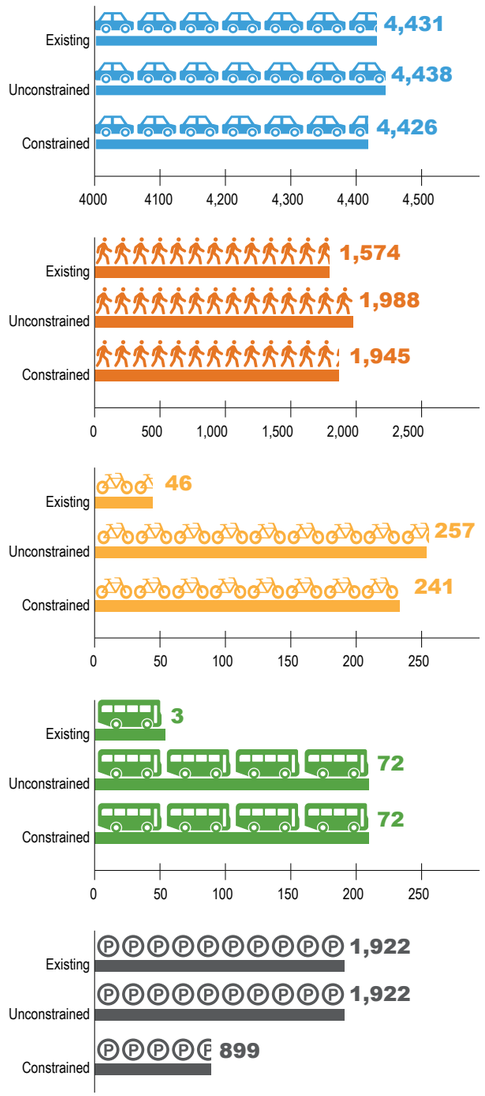
Even after prioritizing modes by Street Type using "decision-tree"

Modal Priority Decision Tree for Street Type - Avenue



Shown are each of the decision steps analyzed for the Street Type 'Avenue' to evaluate planned use of right-of-way. Separate decision trees, with varying parameters, were applied for each of the different Street Types. Per greenbelt.org, the volume to capacity ratio (V/C) is "a measurement of the operating capacity of a roadway or intersection where the number of vehicles passing through is divided by the number of vehicles that could theoretically pass through when at capacity. If vehicles (v) divided by capacity (c) is less than one the facility has additional capacity. If (v)/(c) is greater than one it is likely that the peak hour will elongate into a peak period."

Right-of-Way for Transportation Uses (in Acres) by Scenario



This graphic shows the amount of right-of-way allocated to transportation uses (automobile, pedestrian, bicycle, transit, and parking) in each of the scenarios analyzed. Using "decision-tree" logic to prioritize active transportation modes and efficiently fit improvements within the street right-of-way, the Constrained scenario would result in more dedicated transit lanes, pedestrian spaces, and bicycle facilities than currently exist.

logic, an estimated 200 miles of streets would still be lacking enough right-of-way to fit all prioritized improvements. Detailed studies should be conducted at the time of project-level planning and design to confirm right-of-way needs.

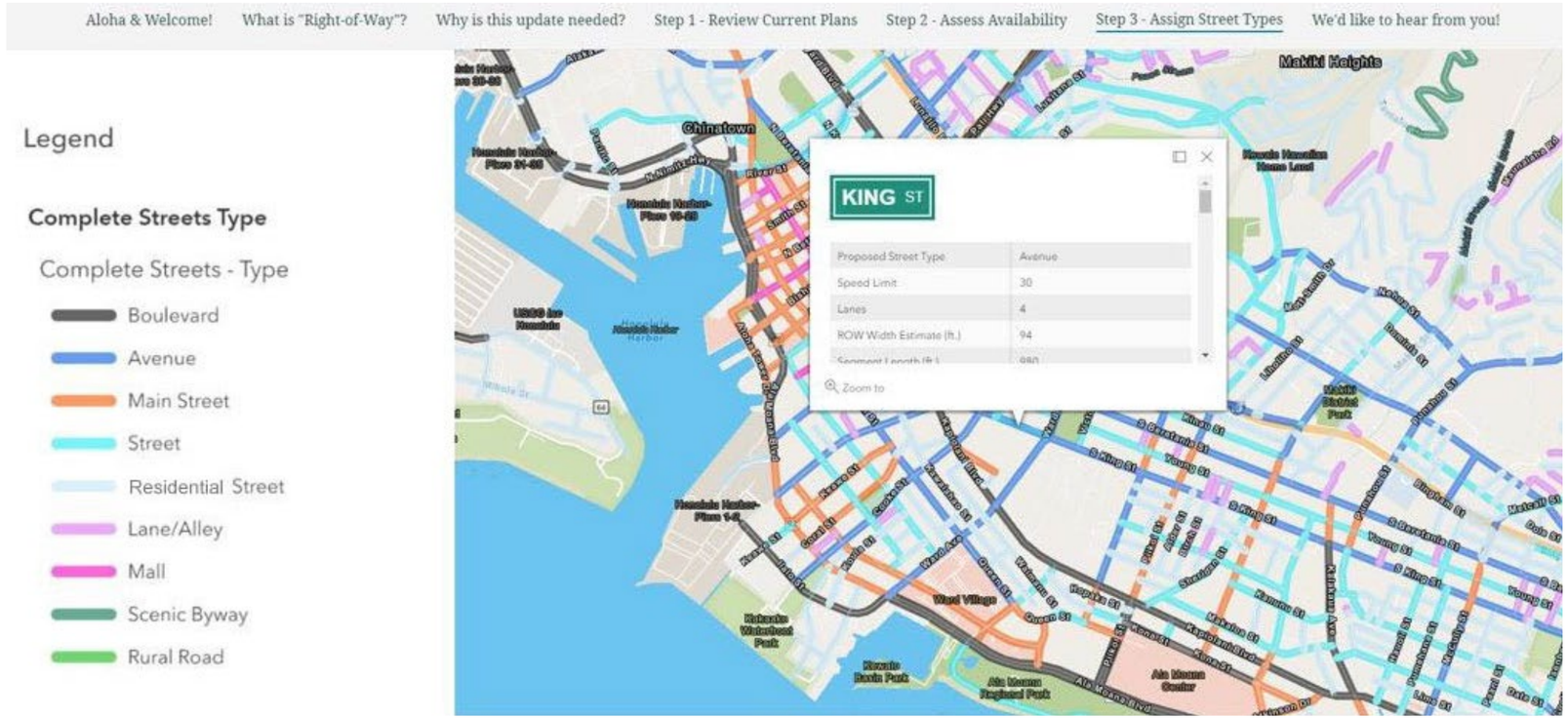
After prioritization, approximately 1,560 acres of transportation investments would be located within environmental justice communities. These improvements would consist of the following:

- Roughly 10 additional acres of transit lanes
- Almost 100 acres of pedestrian zones and sidewalks
- More than 40 acres of bicycle facilities

While 130 acres of on-street parking may be repurposed or removed to provide these additional improvements, the overall increase in multimodal transportation street assets within environmental justice communities is roughly 1 to 2 percent greater than existing conditions.

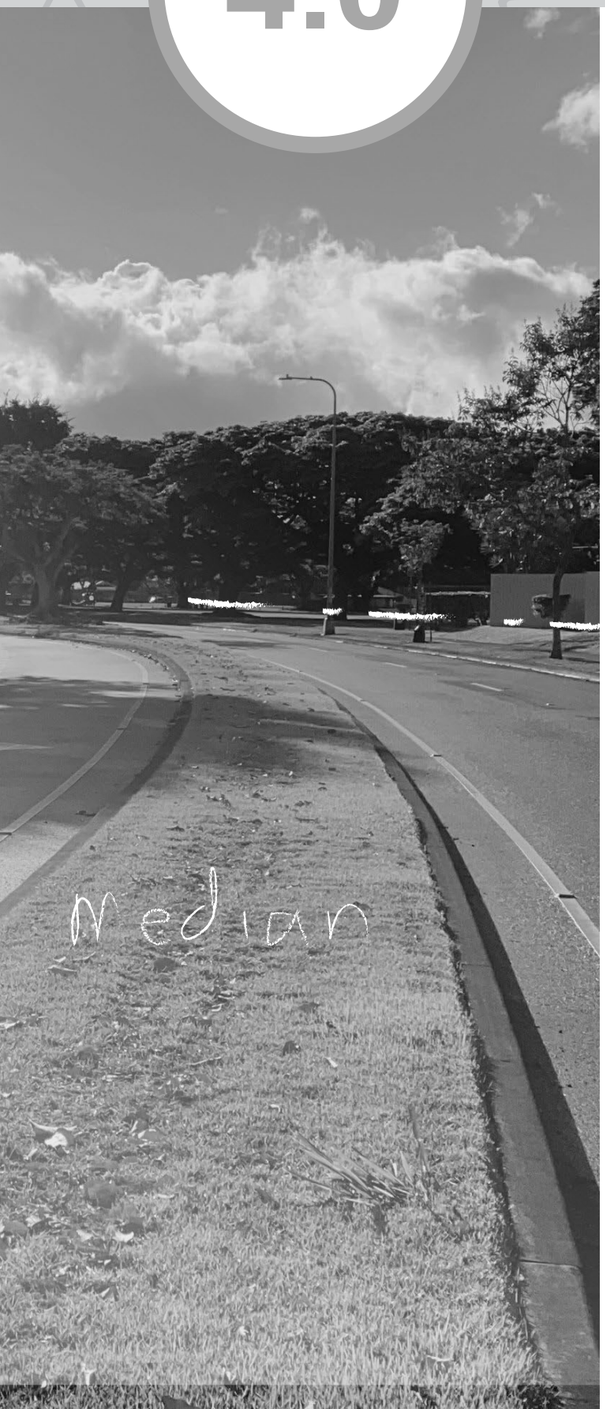
About 2 percent of prioritized modal investment acres would be located within an area vulnerable to the effects of climate change and sea level rise. This value is unchanged from existing condition, and supports efforts to increase transportation resiliency by investing in improvements that are less likely to be affected by future sea level rise.

Interactive Digital Mapping Interface



The digital mapping system developed on this project can allow access to data about each street segment. Shown in this graphic is an example of interaction with the map to view a "pop-up box" that displays data unique to the street selected. Displayed data includes information such as traffic volumes, transportation plan recommendations, posted speed limits, right-of-way widths, and Street Type.

4.0 Public and Stakeholder Engagement



The Right-of-Way Widths for Planned Street Improvements included public outreach and stakeholder engagement. The purpose and goals of the Public Outreach Plan were as follows:

- Inform people of the project (residents, Oahu Metropolitan Planning Organization committee members, relevant City staff, and other stakeholders)
- Present an overlay of existing modal plans compiled to date in online digital maps
- Seek input on draft Street Type assignments to the Oahu street network
- Confirm the need to update outdated right-of-way maps (established in the 1980s) to accommodate current modal priorities
- Provide concepts on how priorities for use of right-of-way for the street system can be established

Stakeholders included groups and key individuals internal to the City, as well as external partner agencies and the general public.

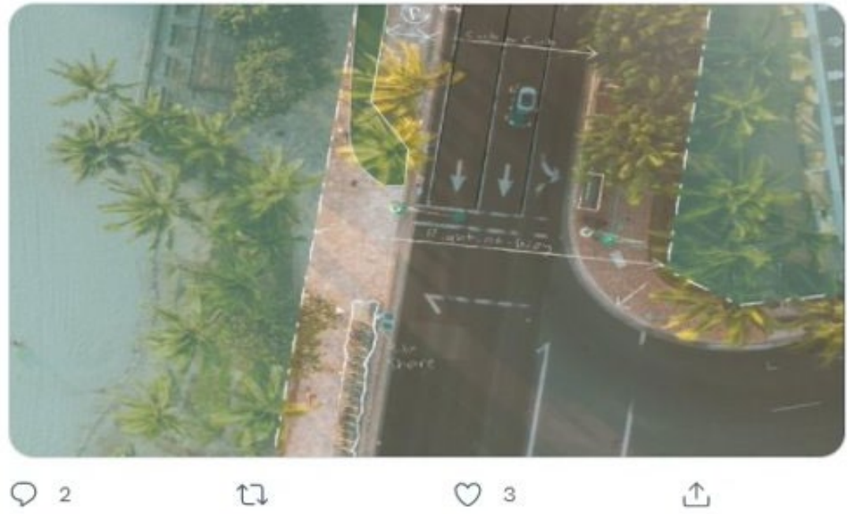
4.1 Internal Stakeholder Engagement Process

The City Complete Streets Core Team was the primary formal interface and sounding board for internal City feedback and direction. Interested Complete Streets Team members were invited to the regular Friday Strategic Plan group meetings at the following key milestones:

- While the methodologies for analyses of the Complete Streets digital map system was being developed
- While the webpage Story Map was being drafted, to provide an overall update and prepare them for upcoming activity
- When the Street Type and modal priority assignments were available for review
- During the public comment period
- After draft replies to public comment had been addressed

Throughout the process, the entire Complete Streets Team was updated periodically at their regular meeting by a City representative. Other specific stakeholders from Departments of Transportation Services, Planning and Permitting, and Design and Construction were briefed upon request or as appropriate. Input from internal stakeholders was very important to the development of the recommendations and final product because this effort may influence or guide the work of other departments.

Twitter Announcement



Shown in the figure is an image of the project Story Map and twitter announcement. The public was provided multiple ways to view and make comments on draft project content including using a cell phone to see and comment on Street Type assignments. the majority of public input was regarding proposed changes to the initial Street Type assignments. Other comments were regarding the need to consider Climate Change in right-of-way planning.

Mahalo to key individual project stakeholders who participated in and contributed to the development of the Right-of-Way Widths for Planned Street Improvements. These stakeholders include the following:

Department of Transportation Services

J. Roger Morton, Director

Jon Nouchi, Deputy Director

Patrick Preusser, Director of Rapid Transit

Kelly Akasaki, Traffic and Mode Safety Branch Chief

Daniel Alexander, Complete Streets Planner

Craig Chung, Interim Chief of Transportation Engineering

Chris Clark, Chief Planner, Transportation Performance and Development Division

Renee Espiau, Complete Streets Administrator

Ty Fukumitsu, Chief of Transportation Technology

Eileen Mark, Chief of Transportation Mobility

Mike Motoki, Regional Planning Branch Chief

Meredith Soniat, Infrastructure Planner

Paula Youngling, Assistant Chief Planner, Transportation Performance and Development Division

Department of Design and Construction

Alex Kozlov, Director

Haku Milles, Deputy Director

Scott Shigeoka, Chief of Land and Survey Acquisition

Department of Facility Maintenance

Roger Babcock, Jr., Director

Tyler Sugihara, Chief Road Maintenance

Department of Information Technology

Walter Kuong, Data Processing Program Manager

Department of Planning and Permitting

Dean Uchida, Director

Kamakaokalani Andrade, Traffic Engineer

Sherwin Aquino, Geographic Information Systems Analyst

Katia Balassiano, Chief Planner, Land Use Permits Division

Jim Hayden, Geographic Information Systems Analyst

Franz Kraintz, Community Planner

Ken Schmidt, Geographic Information Systems Administrator

Lance Watanabe, Traffic Review Branch Chief

Weston Wataru, Site Development Division Administrator

Dina Wong, Chief Planner, Planning Division

Andrew Yamaguchi, Planner, Development Plans and Zone Change Branch

Oahu Metropolitan Planning Organization

Nicole Smith, Planning Program Manager

4.2 External Stakeholder Engagement Process

The public was invited to review the project and provide comments via a webpage Story Map hosted and managed on the City Complete Streets website (https://www.honolulu.gov/completestreets/guidance). The webpage Story Map was launched on September 1, 2021, and was active throughout the month of September to share information on the project and to collect feedback on proposed Street Types.

A virtual briefing to the Oahu Metropolitan Planning Organization Citizens Advisory Committee members was made during the early part of the public comment period (on September 1, 2021) to provide overview and receive feedback. Community feedback was also solicited using a City press release and social media posts.

4.3 Website for Public Review and Input

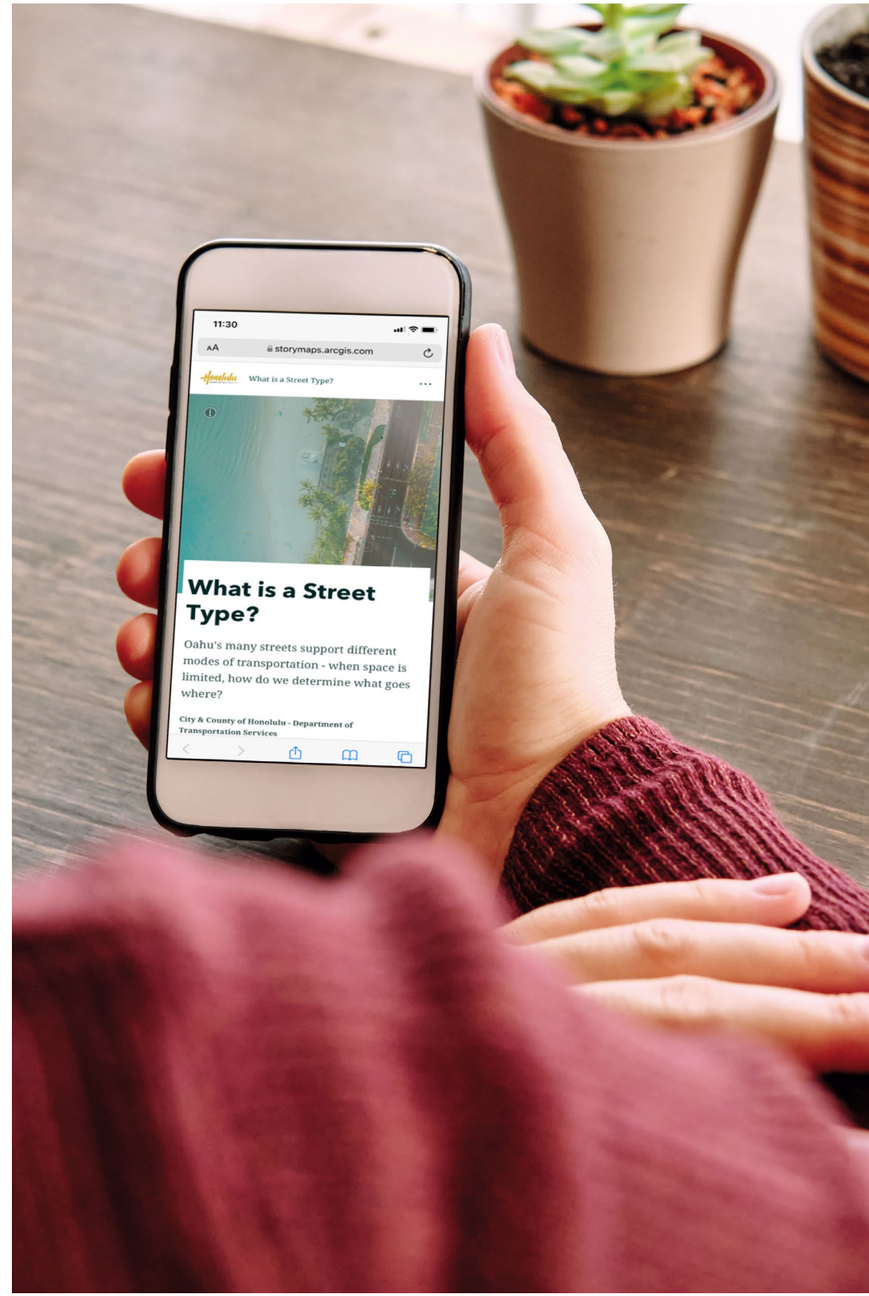
Public access to the project webpage Story Map through the City's Complete Streets website was the primary platform for public engagement. The interactive webpage included various features and content to enhance public understanding of issues surrounding the limited right-of-way, such as:

- A PDF of the presentation from the Citizens Advisory Committee briefing, provided for reference
- An explanation of Complete Streets Street Types
- Attractive design with color coding and index for Street Type assignments
- Interactive Story Map web interface to facilitate feedback and comments
- A video presentation describing to the public how to view and use the interactive Story Map
- Definition of terms such as "Street Type" and "modal priority" for ease of understanding
- Discussion of how the City's modal priorities are influenced by modal plans (Oahu Bicycle Plan, new Pedestrian Plan, bus-rail integration, Complete Streets ordinance, and others)
- Emphasis that City's right-of-way is constrained and that not all modes can be accommodated on every street
- Interactive digital map showing modal priorities
- Composite digital maps for each of the proposed priorities from the modal plans (pedestrian, bike, bus, parking, and the Oahu Metropolitan Planning Organization 2040 Oahu Regional Transportation Plan traffic lane widenings)
- Ability to provide feedback (using dropdown menu for defined Street Types, defined modal priority, and open comment) directly on map, via comments, or via email

A summary of public input received through the public-facing Story Map online is described below. A survey was imbedded within the Story Map to enable public input on preliminary Street Type assignments, along with other general input regarding the project. The online Story Map had approximately 2,000 page views by interested parties.

The input received is illustrated in the diagram on the next page. A total of 70 comments were received; 46 of those commenters provided contact email addresses and/or phone numbers. Most (61) were input directly through the Story Map web survey, while another 7 were sent through email, and 2 by phone calls. Of the total public inputs, 36 commented on the proposed Street Type assignment shown in the Story Map either confirming the proposed assignment or suggesting an alternate Street Type assignment. In addition to comments about the proposed Street Type assignments, 65 written comments were received. Several commenters provided suggestions for improvements to the Story Map, the online survey, and accessibility to the digital mapping information.

Of the written comments, 59 described issues and concerns regarding the need for sidewalks, bike lanes, parking, and safety improvements or speed control measures on specific streets. Most all of the written comments expressed support for more Complete Streets and multimodal improvements. There were some comments showing concern for a potential effect of implementing modal elements or widening if a higher level of Street Type was assigned. Related to those comments were concerns that adding modal elements or widenings would potentially displace existing trees. Others noted that the Street Type assignments cannot by themselves determine what should be done to each street; that context and compatibility and local environment should be considered before designs for improvements are developed. Some

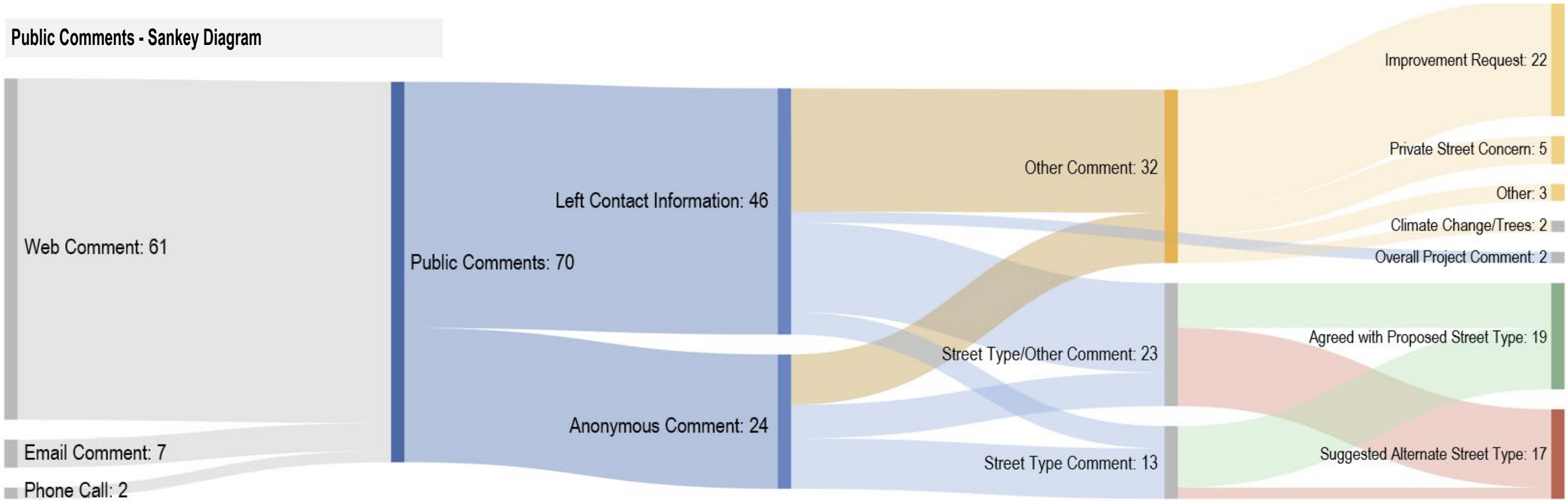


comments expressed concerns that more shade trees were needed for aesthetic or environmental reasons.

Street Type assignments may evolve over time as development occurs and the context of the streets may change. Modal improvements may occur with influences from public comments and on-the-ground studies that evaluate specific locations or corridors to ensure the investment benefits and serves people efficiently.

All of the comments were logged into a database and shared with this project team and other staff at the City. Each comment was reviewed by location and with regard to potential changes to this project or to other traffic and modal plan projects. Specific actions were taken to make the project web content and report more accessible. The City has acknowledged and responded to comments from the public when contact information was provided.

Public Comments - Sankey Diagram



The public was invited to review this project and provide feedback via an interactive Story Map website, which was viewed approximately 2,000 times throughout the month of September 2021. Feedback was also accepted by phone or email. Some comments expressed concerns that more shade trees are needed and existing trees should remain. Several comments described issues and concerns regarding the need for sidewalks, bike lanes, parking, and safety improvements or speed control measures on specific streets. Nearly all of the comments expressed support for more Complete Streets and multimodal improvements.

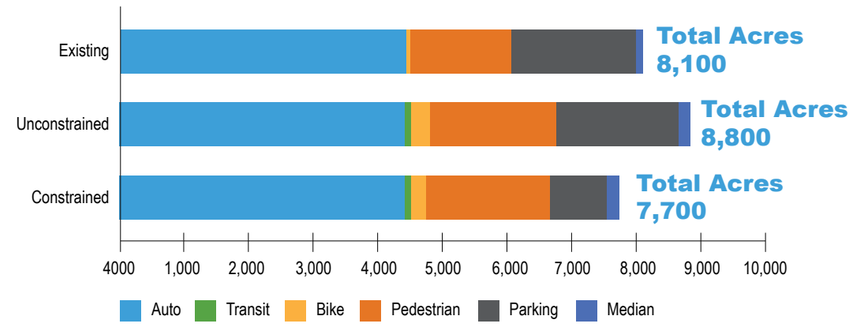
5.0 Conclusions and Next Steps

The Right-of-Way Widths for Planned Street Improvements is a step forward to assure that we plan for and use this limited asset efficiently. Oahu's streets each support different modes of transportation—automobiles and trucks, transit, walking, biking, and rolling—but with limited space, this effort will enable the City to establish the use of limited right-of-way. This chapter includes a summary of conclusions, strategies for accommodating planned improvements within Oahu streets right-of-way, and potential next steps.

5.1 Summary of Conclusions

This document has noted the gradual needs for change in how the streets and right-of-way are planned. Right-of-way planning has been ongoing for more than 50 years on Oahu. Early planning was oriented mostly to movement of motor vehicle traffic. The City has initiated Complete Streets and modal plans that emphasize the need to revisit the use of right-of-way. The movement of people has been shown to be much more efficient for pedestrian, bike, and transit facilities than for movement of automobile traffic in the same amount of space. The existing daily travel on Oahu is 80 percent by automobile and year 2045 forecasts are not expected to change without changes in land use and transportation investments. The public and City are becoming more concerned about the effects of climate change and one-fifth of Oahu's greenhouse gases are generated by ground transportation. Greenhouse gas emissions per person are significantly lower for pedestrian, bike, and transit modes compared to automobile travel. The public input received in the project surveys demonstrated strong support for Complete Streets.

Right-of-Way Area (in Acres) for Transportation Uses, by Scenario



There is not enough space within the street right-of-way to accommodate all of the future planned or recommended transportation improvement projects. To more efficiently use the street right-of-way, "decision-tree" logic was developed to prioritize transportation modes for each Street Type and strategies such as reducing facilities to their minimum widths were implemented. The Constrained scenario optimizes right-of-way use and could add 195 acres of bicycle facilities and 370 acres of pedestrian zones, sidewalks, and shared use paths to the existing transportation network.

Much of the work on this project involved modernizing the City's right-of-way planning process by gathering datasets for all modes of transportation and integrating that data into digital mapping so that more Complete Streets can be developed. Safe and sustainable options for travel are critical to the movement of people and goods across the island, where residents live and work, visitors recreate, and businesses operate every day. Public streets are a precious asset that must be maintained, managed, and planned for so that they can best serve all members of the community. There are approximately 1,500 miles of streets on Oahu, covering more than 9,600 acres of land, and valued at approximately $44 billion in current dollars. Considering all users when planning future improvements will enable the public to manage the use of this asset more productively.

Existing street data on traffic volumes, speed limits, and classification have now been combined with data from the Pedestrian, Bike, and Bus-Rail Plans in a single mapping system. Another significant achievement of this work has been to use the guidance from the Complete Streets Design Manual (City 2016) to assign Street Types to the entire street network—an accomplishment that few other cities in the country have completed. The Street Type assignments enable preliminary assessment of modal priorities in the network for more efficient use of right-of-way. This information will now be available to the public and referenced through the City website.

5.2 Strategies for Accommodating Improvements

The initial assessment for the use of right-of-way that has been conducted compared three scenarios for implementing improvements to support multimodal transportation. The new digital mapping system enabled a high-level evaluation of recent modal plans and other existing streets elements if they were implemented on the 1,500 miles of streets on Oahu. This assessment developed three scenarios for comparison as follows:

1. The Existing scenario included the existing space dedicated to infrastructure for automobile traffic, bikes, pedestrians, and on-street parking.
2. The Unconstrained scenario included the existing infrastructure and added widths for all planned modal improvements for Oahu's streets without limitations of the right-of-way.
3. The Constrained scenario evaluated how much of the multimodal planned infrastructure would fit within the planned right-of-way and prioritized modes to try to fit improvements within the planned right-of-way.

The results of these comparisons are shown in the bar graph shown on this page. The analyses of the Unconstrained scenario, which includes existing streets plus all planned improvements, indicated that there will need to be a plan for how to

use right-of-way more efficiently. Initial analyses show that there would be more than 700 miles of streets with planned improvements outside of the existing or planned right-of-way. Widening of streets right-of-way through land acquisition to support development of improvements would be very expensive. Also, in many cases this could be infeasible due to public concerns or potential environmental effects. This furthers the need to optimize the use of the right-of-way using tools like the digital mapping system developed in this project.

Understanding the limitations of available right-of-way, an assessment was made for prioritizing use in each street segment within the planned right-of-way under the Constrained scenario. Modal priorities were identified for each Street Type, ranging from high, to medium, to low. Decision-tree logic was developed for each Street Type to evaluate how to reduce the widths of features depending upon modal priorities. After applying priority logic, a preliminary estimate of about 200 miles of streets would be lacking enough right-of-way to fit all prioritized improvements.

While this is progress over the Unconstrained scenario, the City should continue to look for opportunities to meet the planned demand for access in the modal plans as multimodal street corridor planning and design is conducted. The initial analyses using the digital mapping tool to evaluate the Constrained scenario was a high-level application of decision-tree logic by Street Type on how to fit modal elements into the right-of-way for the entire network. Detailed street corridor planning should consider local context and public input, and make design adjustments and trade-offs to establish site-specific street corridor plans.

When conducting those corridor planning and designs, evaluation of options for implementing nondedicated modal solutions may be used to avoid needing additional right-of-way. Some of those options are as follows:

- **Parallel Corridors.** When modal plans cannot fit in the primary street right-of-way, even when reduced in width or comfort level, then parallel street routes can be considered. The digital mapping tool can be used to consider options to serve the modal priorities using parallel streets in the roadway network. The character of the streets along with modal plans for the street system can be considered in the planning process. Prime examples for this can be to move planned dedicated bike lanes or dedicated bus lanes to an adjacent street.
- **Quick Build Projects.** Quick Build solutions seek to address modal improvement needs through lower cost, and repurposing of streets with striping, painting, and delineators. Using a Quick Build approach can help meet the combined modal needs, reduce the extent of new infrastructure, and speed the delivery of the improvements. This approach can and has been applied to respond to rapid shifts in travel needs during the pandemic, for example providing expanded sidewalk or bike space for distancing, pedestrian-only streets, outdoor eating space on sidewalks, and on-street parking lanes.
- **Shared, Managed Spaces.** In many locations along street corridors, sufficient width may be available to fit planned modal improvements. However, in portions of, or in much of other

Existing Scenario

There are approximately

1,500 MILES

of streets on Oahu.

Unconstrained Scenario

Street right-of-way is limited. If all future recommended street improvement projects were implemented,

700 MILES

of streets would not be able to accommodate these improvements.

Constrained Scenario

After prioritization of transportation modes by Street Type...

1,300 MILES

of streets would be able to fit future planned improvements

65 ACRES

acres of right-of-way would be dedicated to transit lanes

200 ACRES

of right-of-way would be reserved for bicycle facilities

370 ACRES

of pedestrian zones, shared use paths, and sidewalk space would be added

Planned, prioritized improvements within the right-of-way would increase

the exisiting pedestrian network by

24%

the existing bicycle network by

400%

corridors, space must be shared between modes. Shared solutions can then be considered when conducting corridor planning and design projects. One example is combining pedestrian and bicycle use through a shared use path. Another is a dedicated bus lane that is signed and striped to allow traffic to use the lane for right turns into and out of driveways and cross streets.

- **Time-of-Day, Peak Hour, and Managed Parking.** Due to limited space within the right-of-way, another option is to share space by time of day. Much of the street system currently allows on-street parking. If these spaces are needed for bus lanes or for traffic lanes, an evaluation can be made to see if modal or traffic needs can be met during only peak hours when congestion levels are most significant. This approach can help mitigate the potential reduction of on-street parking adjacent to residences and commercial businesses.

5.3 Next Steps

Moving forward, the Right-of-Way Widths for Planned Street Improvements will be used to inform and guide decisions. Four primary ways the results and findings of this document will be used are summarized below.

1. **Informing the Development Permitting Process.** The City maintains and enforces planned street widening maps and companion regulations related to development, land use, and building permits. The Right-of-Way Widths for Planned Street Improvements project has created the streets and right-of-way information for City staff to readily share data on existing conditions and planned improvements for each street in the network. The project defines priorities and guides implementation of future street improvements in alignment with Honolulu's Complete Streets ordinance. The digital mapping system provides an assessment of current right-of-way widths, land use and multimodal plans, Complete Street Types, and initiates a method for prioritizing future improvements so that street conditions meet public health and safety standards for all users of the street system, regardless of mode. This will allow the City to collaborate for more effective transportation improvements to support development projects, such as those that may include streetscape transition zones between the street curb and buildings that are raised to meet flood elevation requirements. These types of projects will require close coordination between the City and developers because the transition zone could include designs to improve stormwater management and may be partially located within public right-of-way. The Transportation Impact Assessment Guide (CCH 2020a) provides performance targets for each mode by Street Type as summarized in the table shown on this page. Performance targets for modal comfort vary by Street Type. For example, on boulevards and parkways where traffic speeds are higher, automobile traffic and transit services are expected to perform at a higher level while bicycle facilities and parking may be de-emphasized. On avenues and streets where traffic speeds tend to be lower, streets may be designed to prioritize the comfort and experience of more people walking and biking over high volumes of automobile traffic or frequent transit service. The Right-of-Way Widths for Planned Street Improvements project identifies Street Types for all streets on Oahu. The performance of various transportation modes should be evaluated on all streets adjacent to development proposals, and efforts should be made so that all modes meet their performance targets.
2. **Informing future Complete Streets Projects.** The digital mapping system enables City staff to identify priority corridors for investment. Prior to this project, much of the modal planning could not easily consider availability of right-of-way in the evaluation of specific modal improvements. Now this digital system provides ready access to information on existing elements and future plans for each mode that can be seen on one screen all together or individually. Also, an initial assessment of right-of-way availability can be made, along with indications of locations where modal priority decisions will be necessary. Also, for street project planning, data on existing traffic volumes and speeds and traffic forecasts can be used in project planning. Due to limited right-of-way and capital resources, the preliminary modal prioritization can inform likely improvements for investment.

Other strategies for addressing modal needs within the limited right-of-way can be further analyzed, such as sharing space between modes; time-of-day allocations of space such as signing to allow off-peak parking; or moving dedicated bike lanes/routes to parallel streets. This will allow more efficient delivery of Complete Streets project planning. As corridor studies are conducted to develop modal improvements, an integrated planning process that includes

Mode Performace Targets by Street Type

Street Type	Auto	Transit	Ped	Bike	Parking	Design Speed (mph)
Boulevard and Parkway	1	1	1	2	3	25 to 35
Avenue	2	3	2	1	3	25 to 35
Main Street	3	1	1	2	3	20
Street	2	2	1	3	3	25 ot less
Residential Street	2	3	1	3	3	15
Mail (Pedestrian or Tranit)		1	1	2		N/A
Rural Road	2	3	3	3	3	25 or Higher
Lane/Alley	3		1	2	3	5 to 10

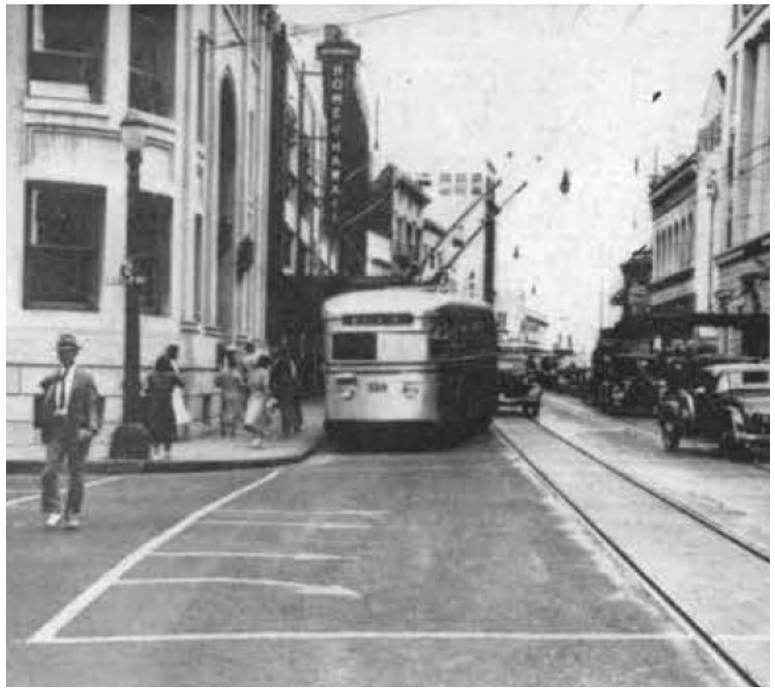
This matrix identifies the target comfort level of a particular mode on each Street Type. Modes assigned '1' are established to perform at a higher standard of operational perfromance and influence the preliminary assessment of how to fit street elements into the existing right-of-way. Scenic Byways are not included in this table as they are designated by national or statewide registers as historic or culturally significant roads.

public engagement should be applied to develop the Complete Streets improvements. The typical process is shown below for Complete Streets corridor studies to prioritize the features to be incorporated in the limited right-of-way.

3. **Informing City efforts to improve transportation equity**. The equitable distribution of transportation facilities across the island's communities is necessary to provide an effective, accessible transportation system for all users. Currently, approximately 16 percent of Oahu's right-of-way space (roughly 1,550 acres) is dedicated to transportation facilities within Title VI and environmental justice communities. Often the second highest household expense, transportation further burdens those who are already spending too much on housing (source: https://htaindex.cnt.org/fact-sheets/?focus=county&gid=366). Investments in lower-cost transportation options, such as pedestrian, bicycle, and transit facilities, is critical to serving the needs of all community members, particularly environmental justice communities. With right-of-way prioritization, almost 100 acres of pedestrian zones and sidewalks and more than 40 acres of bicycle facilities could be added to these communities, but this investment would not significantly increase the overall equity of multimodal transportation street assets. Digital mapping developed as part of the Right-of-Way Widths for Planned Street Improvements project combines street right-of-way, planned modal improvements, and Title VI/environmental justice community locations. This mapping tool could be used to improve transportation equity by highlighting and identifying planned modal improvement locations and encouraging purposeful investments in improvements that specifically expand transportation access and mobility for and within Title VI/environmental justice communities.
4. **Informing adaptations to climate change and sea level rise.** Many of Oahu's streets are susceptible to the effects of climate change and extreme weather events. Streets along the island's perimeter and lower level coastal area often serve as critical lifelines for communities and access for emergency services. Roughly 2 percent of Oahu's right-of-way is currently located within an area vulnerable to the effects of sea level rise. The digital mapping tool developed as part of this project allows right-of-way, planned modal improvements, and areas affected by sea level rise to be viewed simultaneously as overlapping layers. Areas where sea level rise affects streets can quickly be identified. This mapping will inform decision-making and provide guidance on where and how investments in transportation could be made as understanding where critical areas are located and investing in areas less likely to be affected by future sea level rise, supports and increases the City's ability to address transportation resiliency.

Greenhouse gas emissions from ground transportation on Oahu account for about 20 percent of the island's total emissions. To reduce some ground transportation, improvements to pedestrian, bicycle, and transit modes should be made to attract and shift users to these modes. The digital mapping tool will inform not only where non-motorized improvements could be made, but where right-of-way might allow the inclusion of shade trees and landscaping. Public comments to this project identified shade trees as an important factor in making streets comfortable and inviting for non-motorized modes.

King Street at Bishop Street, Downtown Honolulu, 1944



This photo of the intersection of King Street and Bishop Street in downtown Honolulu shows multiple modes of travel including automobiles, pedestrians, and a Honolulu Rapid Transit trolley bus. Source: https://commons.wikimedia.org/wiki/File:Honolulu_trolley_bus_at_the_corner_of_King_and_Bishop_Streets,_on_24_October_1944.jpg

Planning Process for Complete Streets Corridor Studies

The City's engagement process for Complete Streets improvements includes multiple community outreach steps before designs are finalized.

References

City and County of Honolulu (CCH). 1983. Rules and Regulations of the Department of Transportation Services for the Establishment and Administration of Right-of-Way Widths and Setback Lines for Planned Street and Public Transit Improvements. http://www4.honolulu.gov/docushare/dsweb/View/Collection-2504

City and County of Honolulu (CCH). 2012. *Oahu Bike Plan: A Bicycle Master Plan.* August.

City and County of Honolulu (CCH). 2016. *Complete Streets Design Manual*. September.

City and County of Honolulu (CCH). 2019a. *Bicycle Facility Design Toolkit*. February.

City and County of Honolulu (CCH). 2019b. *Oahu Bike Plan: 2019 Update*. December.

City and County of Honolulu (CCH). 2020a. *Transportation Impact Assessment Guide*. November.

City and County of Honolulu (CCH). 2020b. *Climate Adaptation: Design Principles for Urban Development*. December.

City and County of Honolulu (CCH). 2021a. *Oahu Pedestrian Plan, Draft.* June.

City and County of Honolulu (CCH). 2021b. O*ne Climate One Oahu: Climate Action Plan* (2020-2025).

City and County of Honolulu Department of Parks and Recreation, Division of Urban Forestry (DUF). 2006. *Urban Reforestation Master Plan*. December.

City and County of Honolulu Department of Parks and Recreation, Division of Urban Forestry, and Office of Climate Change, Sustainability and Resiliency (DUF/CCSR). *2019. Urban Tree Plan.* March.

City and County of Honolulu Department of Planning and Permitting (DPP). 2017. *Storm Water Best Management Practices Guide for New and Redevelopment.* July.

Hawai'i Climate Change Mitigation and Adaptation Commission. (CCMAC). 2017. *Hawai'i Sea Level Rise Vulnerability and Adaptation Report.* Prepared by Tetra Tech, Inc. and the State of Hawai'i Department of Land and Natural Resources, Office of Conservation and Coastal Lands, under the State of Hawai'i Department of Land and Natural Resources Contract No: 64064.

Oahu Metropolitan Planning Organization (OahuMPO). 2020. *Title VI and Environmental Justice Program Implementation Plan*. September.

US PIRG Education Fund and Frontier Group (US PIRG). 2015. *Who Pays for Roads?*

Ulupono Initiative (Ulupono). 2021. *The Costs of the Vehicle Economy in Hawai'i, Final Report*. January.

Project Consultants: From Jacobs Engineering - Tim Bevan/Project Lead; Ray Mangan/Digital Mapping Lead; Terry Shin/Transportation Planning Lead; Sara Hoeber/Graphic Design Lead; Julissa Murry/Graphic Design Support; Alex Oliver/Geographic Information Systems Support. From Urban Pacific Consulting – Mark Garrity/Planning, Public and Agency Coordination.

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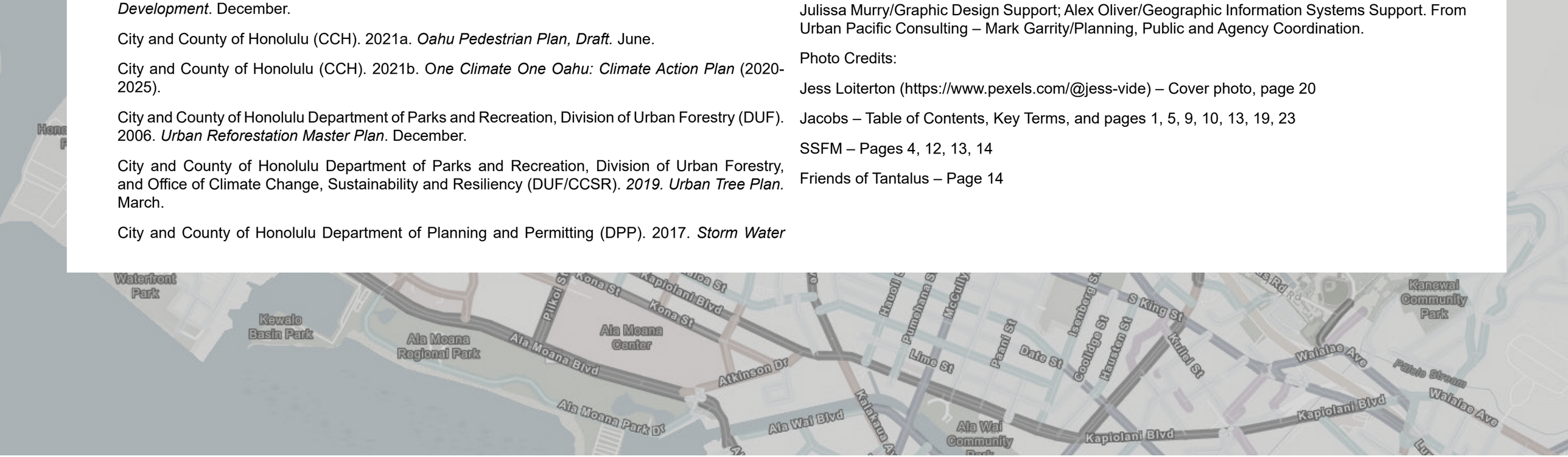

Honolulu COMPLETESTREETS

Contact Information:

There are several ways you can get involved and join our efforts to create safer streets and livable communities across Oahu:

Sign up for our newsletter
www.honolulu.gov/completestreets

Email the Complete Streets Program
completestreets@honolulu.gov

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