Fast Forward Fort Lauderdale

Design and Construction Manual

For a Sustainable and Resilient Community and Cohesive Public Realm

dcm

November 19, 2019

The design and construction manual (DCM) provides a set of guidelines and principles for the development of a sustainable, resilient and a cohesive public realm within the city of Fort Lauderdale. The DCM addresses open spaces, streets, building frontage and City-owned parcels and is intended to bridge the city's objectives and current planning documents. The DCM is a tool that can help the city achieve its vision and communicate its ideals with designers, developers, engineers and neighbors. The DCM was developed collaboratively with input from multiple City departments and external stakeholders.

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contents

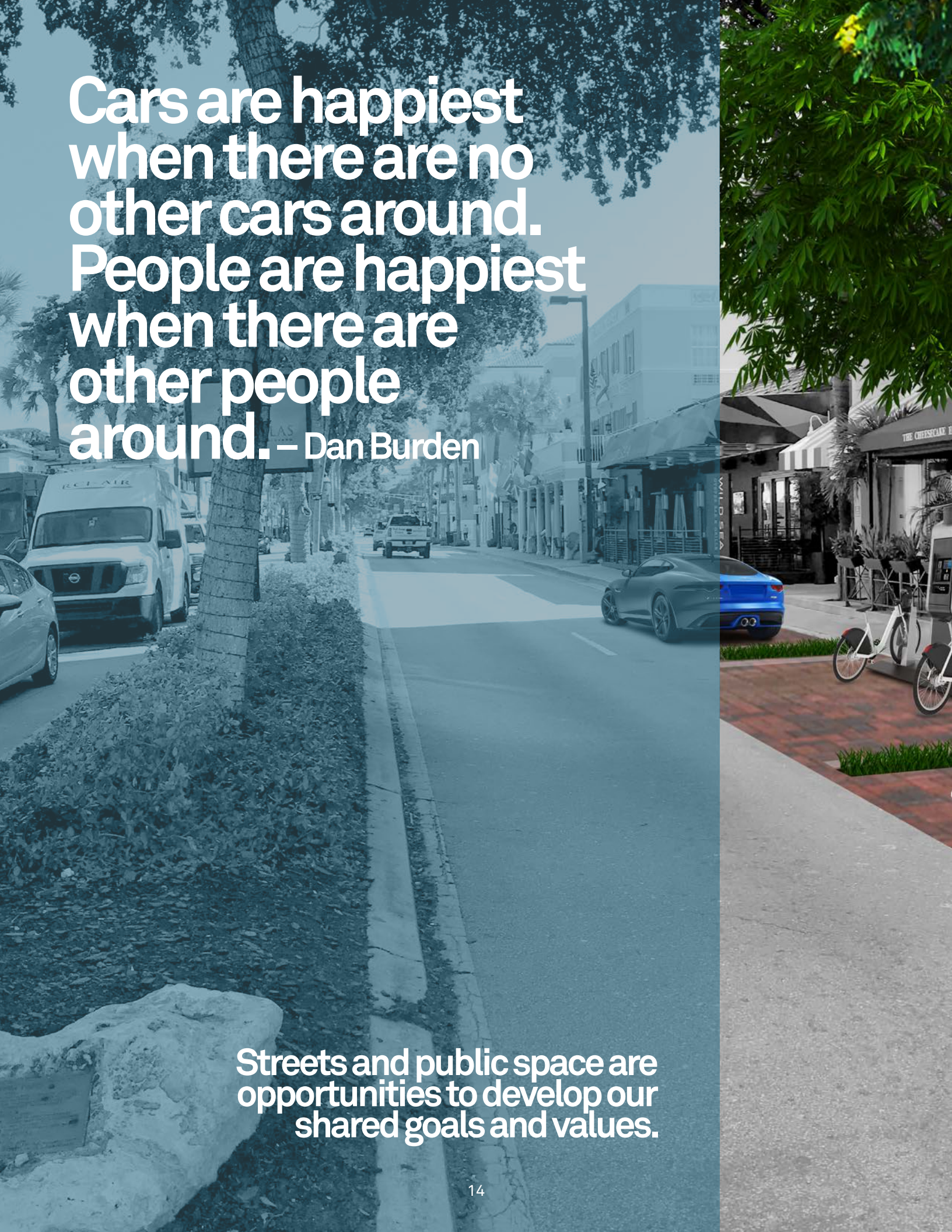
“Cultures and climates differ all over the world, but people are the same. They will gather in public if you give them a good place to do it”

-Jan Gehl

Fort Lauderdale has an incredible capacity to re-envision its public realm to enhance livability, resilience & sustainability for future generations. The next generation of investments must align with the values and goals of our community.

“If you don’t know where you are, you don’t know who you are.”
-Wendell Berry

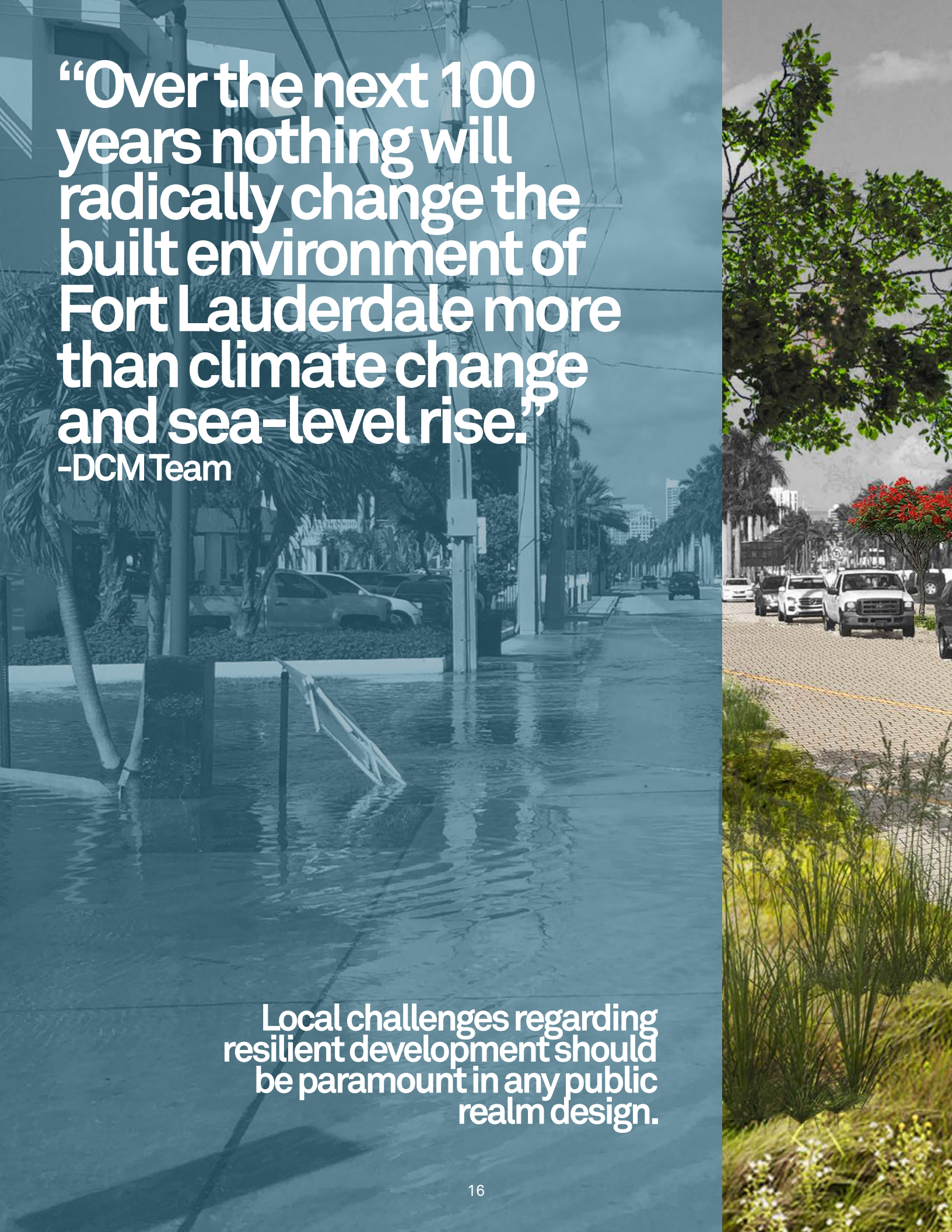
Place-based design standards will ensure creative solutions are tied to economic opportunities.



Cars are happiest when there are no other cars around. People are happiest when there are other people around. – Dan Burden

Streets and public space are opportunities to develop our shared goals and values.


METERED ON-STREET
PARKING SCHEDULE
HOMBRE NIÑO



“Over the next 100 years nothing will radically change the built environment of Fort Lauderdale more than climate change and sea-level rise.”

-DCM Team

Local challenges regarding resilient development should be paramount in any public realm design.

achieving the City's strategic plan goals

In an effort for a better future the City of Fort Lauderdale has adopted our community's *Vision Plan*. The *Press Play, Strategic Plan* is the first step towards achieving our long-term *Vision*. The *Fast Forward Fort Lauderdale Design and Construction Manual for a Sustainable and Resilient Community and Cohesive Public Realm* (**DCM**) is intended to align with the City's existing Plans and be a tool to achieve the goals laid out by *Press Play*. The City's *Press Play Strategic Plan* provides 12 goals, 38 objectives, 191 initiatives and 142 performance indicators that will serve as a guide to elements and tactics to be presented. As the City's *Strategic Plan*, the goals outlined will become critically important to move forward. The most significant goals and objectives that are associated with the **DCM** are as follows:

Infrastructure

Goal 1: Be a pedestrian friendly, multi-modal City
Objective 1: Improve transportation options and reduce congestion by working with agency partners
Objective 2: Integrate transportation land use and planning to create a walkable and bike-able community
Objective 3: Improve pedestrian, bicyclist, and vehicular safety

Goal 2: Be a sustainable and resilient community
Objective 1: Proactively maintain our water, wastewater, road and bridge infrastructure
Objective 2: reduce flooding and adapt to sea level rise
Objective 3: improve climate change resiliency by incorporating local, regional and mega- regional plans.
Objective 4: reduce solid waste disposal and increase recycling.
Objective 5: improve air and water quality and our natural environment.
Objective 6: secure our community's water supply.

Public Places

Goal 3: be a community that finds opportunities and leverages partnerships to create unique, inviting, and connected gathering places that highlight our beaches, waterways, urban areas, and parks.
Objective 1: improve access to and enjoyment of our beach, riverwalk, waterways, parks, and open spaces for everyone.
Objective 2: enhance the city's identity and image through well-maintained green space, parks, major corridors, gateways, and medians.
Objective 3: integrate arts and culture into public places.
Objective 4: cultivate our urban forest.

Goal 4: be a healthy community with fun and stimulating recreational activities for our neighbors.
Objective 2: celebrate our community through special events and sports.

Neighborhood Enhancement

Goal 5: be a community of strong, beautiful, and healthy neighborhoods.
Objective 2: enhance the beauty, aesthetics, and environmental quality of neighborhoods.
Objective 3: increase healthy living through locally grown and fresh foods.

Goal 6: be an inclusive community made up of distinct, complementary, and diverse neighborhoods.
Objective 1: evolve and update the land development code to balance neighborhood quality, character, and livability through sustainable development.

Internal Support

Goal 12: be a leading government organization, managing our resources wisely and sustainably.
Objective 1: ensure sound fiscal management
Objective 2: achieve excellent procurement services through technological advancements, improved procedures and outreach programs.
Objective 3: provide safe, efficient and well-maintained vehicles, equipment and facilities and integrate sustainability into daily operations.

The strategic initiatives and performance indicators for each objective will be a platform on which the DCM can build and exceed future sustainability and resiliency objectives.

The City of Fort Lauderdale Sustainability Action Plan (SAP) was developed prior to the Fast Forward and Press Play documents, but is being redeveloped to align with the goals and vision directives. The progress report to the SAP, *Making Waves,* updates the SAP and further incorporates regional guidance provided through recommendations in the Southeast Florida Regional Climate Compact's *Regional Climate Action Plan* (RCAP). The SAP is organized by eight major headings: 1) Leadership, 2) Air Quality, 3) Energy, 4) Water, 5) Built and Natural Environment, 6) Transportation, 7) Waste and Recycling, and 8) Progress Tracking. Within each of these headings there are goals and associated action items. There are 103 action items that provide the foundation for a long-term and comprehensive strategy to help the City become more sustainable within a low-carbon economy. Some of the goals and action items in the SAP are applicable to the DCM, and the DCM will aide in achieving them.

Leadership

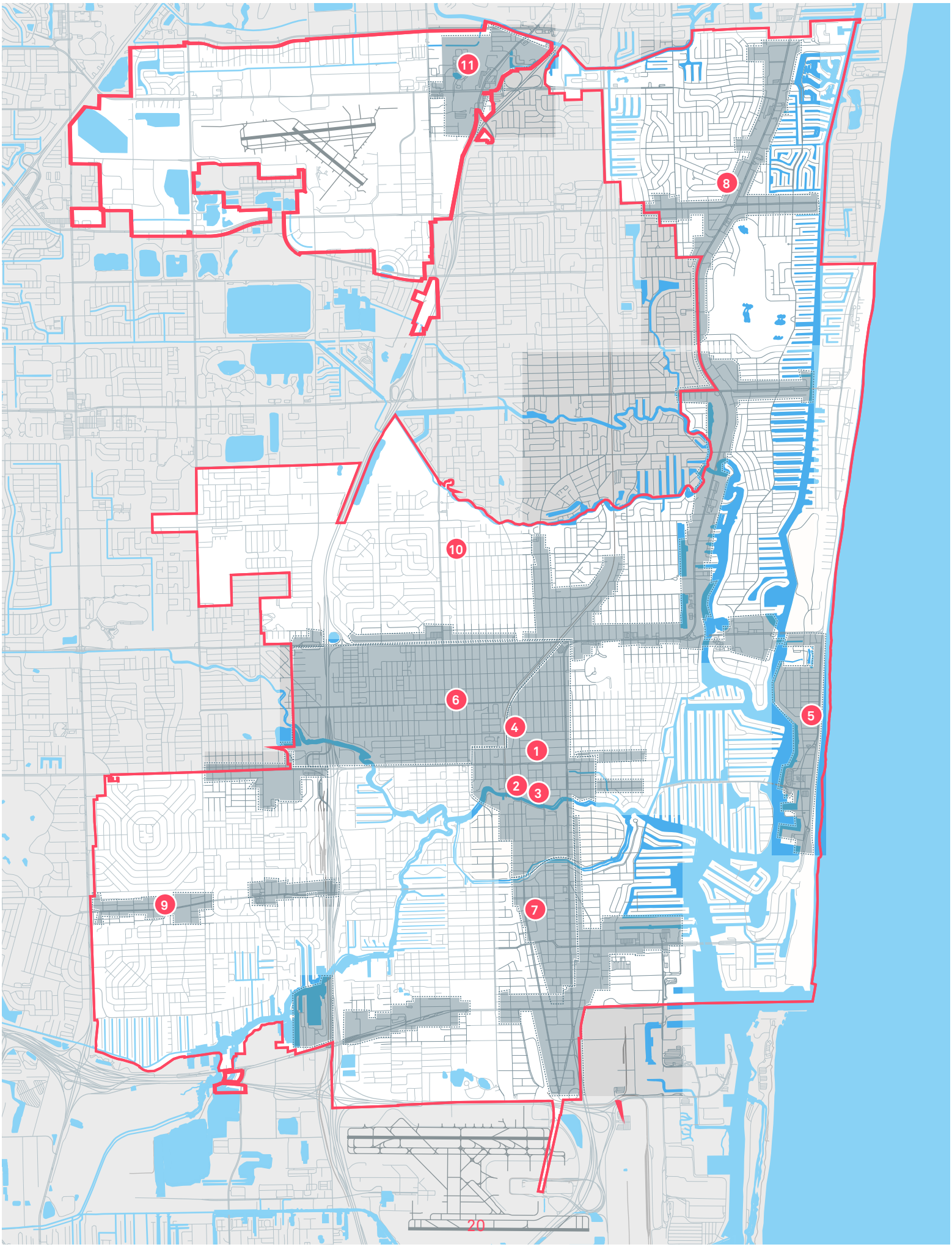
Action 1.1.3: *Create common data base of best green management practices.*
Action 2.1.3: *Reflect and incorporate sustainability in new and existing policies*
Action 4.1.1: *Include adaptation/mitigation strategies into the City's plans.*
Action 4.1.2: *Enhance communication about climate change adaptation in coordination with other agencies and municipalities.*

Water

Action 2.2.2: *Bio-retention swales in urban areas.*

Built & Natural Environment

Action 1.1.3: *Develop Green Building checklist.*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Master Plans and Planning Initiatives

The City of Fort Lauderdale's goal is to enhance the quality of life by improving livability. In order to do so, Master Planning documents have been compiled with design principles that direct orderly growth for well-designed development and redevelopment opportunities. The design principles included in these documents should be understood as a base level of information, serving as a guide for how to begin to look at a project prior to reviewing the following chapters in this manual. The *Fast Forward Fort Lauderdale Design and Construction Manual for a Sustainable and Resilient Community and Cohesive Public Realm* (**DCM**) picks up where there are no master plan, providing greater standard throughout the city.

The following is a list of planning initiatives (master plans) that have been commissioned and produced by the City of Fort Lauderdale in response to the City's Strategic Plan:

1. **Downtown Master Plan**
2. **Downtown New River Master Plan**
3. **Riverwalk District Plan**
4. **Transit-Oriented Development**
5. **Central Beach Master Plan**
6. **Northwest Regional Activity Center Master Plan**
7. **South Andrews Avenue Master Plan**
8. **North US1 Urban Design Plan**
9. **Davie Blvd. Corridor Master Plan**
10. **Neighborhood Design Criteria Revisions (NDCR)**
11. **Uptown Urban Village Plan**

The successful implementation of these master plans is a result of cooperation between both the public and private sectors, and this manual aims to follow the same trajectory of creating a cohesive public realm for the City of Fort Lauderdale.

In the event that a Master plan document conflicts with the DCM the more stringent of the two will dictate with which to proceed.

Stormwater Master Plan

A priority for the City of Fort Lauderdale is to address current flooding and stormwater management issues with an updated Stormwater Master Plan. The updated Stormwater Master Plan incorporates flexible, pragmatic, and a balance of conventional and innovative approaches while also utilizing the natural environment as an asset.

The Floodwater Management and Shoreline Infrastructure tools found in the **TOOLS** section of the **DCM**, correlates with details found in the Stormwater Master Plan. The **DCM** provides an overview and design considerations while more technical information can be found in the Stormwater Master Plan.

In the event that a Stormwater Master Plan detail conflicts with the DCM the more stringent of the two will dictate with which to proceed.

using the manual

This manual can be reviewed episodically or read in its entirety for a comprehensive understanding of how to design and manage construction in the public realm. The manual is organized into Context, Tactics, and Tools to motivate design awareness and implementation of sustainable, resilient and cohesive solutions for public realm design in a wide cross-section of the City of Fort Lauderdale. The Context section acknowledges the **"why"**, Tactics provide the **"how"**, and Tools provide the **"what"**; within implementation across the public realm. Furthermore; each section provides a basis for understanding, employing, and selecting various methods and tools within project design and construction.

start here

start

coordination **checklist**

check the coordination checklist as you move through the manual

prioritize project **context**

the 'why'

The **CONTEXT** section helps to outline design principles that address context-related issues and opportunities regardless of project size. These principles should be prioritized, so that context-specific design solutions may emerge for each project site.

is this a design project or a retrofit project?

design

retrofit ***(maintenance | improvement)***

choose your **tactic**

the 'how'

The **TACTICS** section provides options and strategies for various project types and addresses the issues and opportunities defined by the **GOALS** section.

select your **tools**

the 'what'

The **TOOLS** section provides performance-based elements and systems necessary for the completion of sustainable and resilient public realm projects. A project may consist of the replacement or implementation of one tool element or an assembly of several tools.

finalize **implementation**

The **IMPLEMENTATION** section navigates the process of project implementation and how to manage or maintain it.

finish

coordination **checklist**

finish here

dcm coordination checklist

The coordination checklist is to ensure that all impacted departments are aware of projects and have been given the opportunity to add their input and concerns. The checklist also allows for the opportunity to align multiple projects and streamline the possibility of construction and implementation in the public realm.

step 1. project information

project name:	
responsible department and division:	
project contact and department:	
project location:	
project timeline:	
project budget:	
project goals:	

step 2. project scope

What is the purpose of this project?

- ☐ *complete design project*
- ☐ *retrofit project*
  - ☐ *maintenance (CIP)*
  - ☐ *improvement (IEI)*
- ☐ *scope development*
- ☐ *budget development*

step 3. project context

*Context of project based on prioritization checklist in context section (i.e., how will the . . . based on context considerations) (**see DCM page 35**).*

- ☐ *place + identity* *pts: ___*
- ☐ *focused development* *pts: ___*
- ☐ *healthy + active* *pts: ___*
- ☐ *flood adaptation* *pts: ___*

step 4. project transect

*Identify project transect based on where in the public realm it is located and/or which aspects of the public realm will be affected (**see DCM page 55**).*

- ☐ *open space*
- ☐ *streets*
- ☐ *frontage*
- ☐ *parcel*

additional comments:

step 5. project collaboration

Cross-department information that is applicable to the project location or context, i.e. are there any design opportunities that have been brought to light through collaborative discussions with other departments?

department + contact:	*project + date:*	*budget + time impact:*
☐ *sustainable development* • *urban design* • *building services*		
☐ *parks and recreation* • *lighting* • *landscape* • *sanitation*		
☐ *transportation + mobility* • *engineering* • *parking*		
☐ *public works* • *engineering* • *utilities* • *sustainability*		

Cross-department information that is applicable to the project location or context, i.e. are there any design opportunities that have been brought to light through collaborative discussions with other departments?

department + contact:	*project + date:*	*budget + time impact*
☐ *fire department*		
☐ *federal*		
☐ *state*		
☐ *county*		
☐ *private development*		
☐ *private development*		
☐ *private development*		

step 6. project tools

Tools selected for project.

assemblies:

The tool **"assemblies"** are design elements for traffic calming, bicycle facilities and pedestrian facilities.

- ☐ *chicane*
- ☐ *mid-block islands*
- ☐ *roundabout*
- ☐ *curbless street*
- ☐ *bike lane*
- ☐ *side path*
- ☐ *raised bike lane*
- ☐ *bike parking*
- ☐ *mid-block curb extensions*
- ☐ *pinch point*
- ☐ *special markings + signage*
- ☐ *corner radii*
- ☐ *sharrow*
- ☐ *separated bike lane*
- ☐ *bike box*
- ☐ *bike boulevard*
- ☐ *crosswalk (unsignalized)*
- ☐ *corner curb extensions*
- ☐ *entryway islands*
- ☐ *raised crossing*
- ☐ *raised intersection*
- ☐ *advisory bike lane*
- ☐ *buffered bike lane*
- ☐ *contraflow bike lane*
- ☐ *trail (shared-use path)*
- ☐ *crosswalk (signalized)*

additional comments:

Tools selected for project.

elements:

The tool **"elements"** are individual components that can be found in the public realm.

- ☐ *utilities - underground*
- ☐ *utilities - aboveground*
- ☐ *utilities - pole-mounted*
- ☐ *street lights*
- ☐ *pedestrian lights*
- ☐ *raised accent lights*
- ☐ *planters*
- ☐ *seating*
- ☐ *waste receptacles*
- ☐ *bike racks*
- ☐ *shading structures*
- ☐ *signage + wayfinding*
- ☐ *hardscapes - surface treatment*
- ☐ *hardscapes - poured-in-place*
- ☐ *hardscapes - modulated*
- ☐ *hardscapes - aggregates*
- ☐ *public art*
- ☐ *landscape - trees*
- ☐ *landscape - ground cover*
- ☐ *landscape - shrubs*
- ☐ *landscape - grasses/sedges*
- ☐ *stormwater tree*
- ☐ *bio-retention planters*
- ☐ *bio-filtration planters*
- ☐ *hybrid bio-retention planters*
- ☐ *bio-retention swale*
- ☐ *permeable pavement*
- ☐ *oversized pipes*
- ☐ *underground detention*
- ☐ *wet vault*
- ☐ *rainwater harvesting*
- ☐ *root dunes*
- ☐ *living shoreline*
- ☐ *levee*
- ☐ *constructed wetland*
- ☐ *seawall*
- ☐ *reefwall*
- ☐ *engineered shoreline*
- ☐ *revetment*

additional comments:

step 7. project implementation

Establish important dates of project and develop communication and navigation plan for jurisdiction and establish regulations that the project must follow.

dates started/anticipated to start

- ☐ _____ *planning*
- ☐ _____ *preliminary design*
- ☐ _____ *final design*
- ☐ _____ *construction*

jurisdiction + contact

_____
_____
_____
_____

City of Fort Lauderdale

- ☐ PARKS AND RECREATION
- ☐ SUSTAINABLE DEVELOPMENT
- ☐ PUBLIC WORKS
- ☐ TRANSPORTATION AND MOBILITY

_____
_____

Broward County

- ☐ BROWARD COUNTY PLANNING COUNCIL
- ☐ BROWARD COUNTY METROPOLITAN PLANNING ORGANIZATION

_____
_____
_____
_____
_____

Regional Agencies

- ☐ SOUTH FLORIDA REGIONAL PLANNING COUNCIL
- ☐ SOUTH FLORIDA WATER MANAGEMENT DISTRICT
- ☐ SOUTH FLORIDA REGIONAL TRANSPORTATION AUTHORITY
- ☐ DEPARTMENT OF ENVIRONMENTAL REGIONAL MANAGEMENT
- ☐ ARMY CORPS OF ENGINEERS

_____
_____
_____

State Agencies

- ☐ FLORIDA DEPARTMENT OF TRANSPORTATION
- ☐ FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS
- ☐ FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

project completion:

date:

project manager:

step 8. project operations + maintenance

Ensure the department that will conduct operations + maintenance of project is aware and familiar with project.

department responsible:

contact information:

outline responsibilities:

- contacts

- specifications

- maintenance agreements (MOA)

- warranties

- costs of maintenance

- note: *• homeowner vs City responsibility*

• additional comments

• permitting

context

There are four context scenarios that influence improvements in the public realm: **Place + Identity, Healthy + Active Lifestyle, Focused Development,** and **Flood Protection.** They provide context and/or ideals that impact the design and construction of projects due to varying issues and opportunities. In most cases, a project will incorporate multiple context scenarios that, when viewed together or prioritized in relation to one another, may pre-determine some of the tools that will be used in the design and construction of the project.

PLACE +
IDENTITY

HEALTHY + ACTIVE
LIFESTYLE

FOCUSED
DEVELOPMENT

FLOOD
PROTECTION

prioritize your context

The following checklist will assist in determining which context might take priority for a project based on context-specific issues. Place a check mark next to each question that is answered “yes”, and total the points for each project context category to the right. For context categories that have more points than others, this indicates a high level of importance for consideration in project scope development. Each category has its own set of principles outlined in the following pages.

Check, if yes: **TOTAL:**

place + identity

Is the project territory a part of any defined Regional Activity Center? (1 pt)
Design principles with a specific set of characteristics may already be established through planning initiatives and should be addressed.

Is the project site lacking a pedestrian experience or difficult to distinguish from other areas in the City? (3 pts)
Giving a project site a unique identity contributes to the navigability of a place and brings value to the community.

Does the project site already have strong identifiable characteristics? (1 pt)
Understanding the character of a site is important as a base for conforming to, or setting a project apart from, its surroundings.

healthy + active

Do bike lanes already exist, or are they proposed, within the bounds of the project? (1 pt)
When bike lanes are present, bicycle facilities and other modes of transportation, such as bus stops, should be considered in the project.

Is the project situated within a network of green spaces and lacking connectivity? (2 pts)
Using a project site as a means for connecting greens spaces is a viable way to stimulate economic growth and active connectivity for a community.

Is the project within a walkable distance of commerce? (2 pts)
Providing safe environments for pedestrians and bicyclists to commute to and from commerce helps to promote a healthier lifestyle for residents and visitors alike.

focused development

Is the project location going through, or part of, a neighborhood-scale redevelopment plan? (2 pts)
All public realm projects should take into consideration the population growth that will occur when it is a part of a larger redevelopment.

Is the project located close to major transit hubs or bus terminals or stations? (1 pt)
Connectivity to public transportation is an important part of the economic activity for projects that are within a focused development.

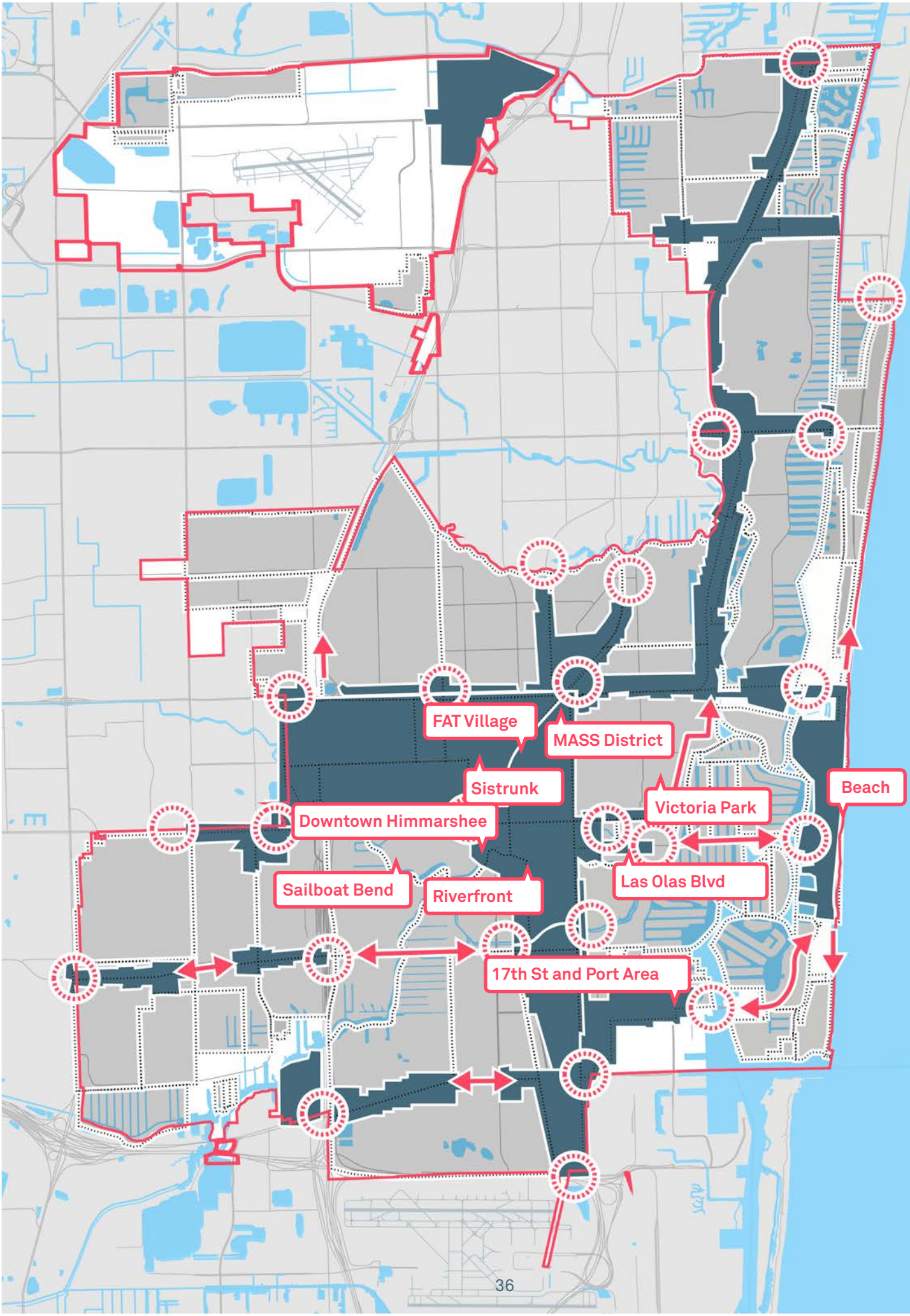
Is the project located within a high-density zoning district, thus requiring wider sidewalks and bike lanes? (2 pts)
The public realm must be designed to accommodate a higher amount of pedestrians and cyclists in high-density zoning districts.

flood protection

Does the project contain large amounts of impervious surfaces? (1 pts)
Impervious surfaces contribute not only to the heat island effect, but also to standing water.

Does the project flood during rainfall or king tides? (2 pts)
If the project floods during rainfall or king tides, this is an indication that floodwater management needs special attention for a project.

Is the project located in an area projected to be affected by sea level rise? (2 pts)
Planning for the future with appropriate tools is an important part of how the City invests in projects for today.


FAT Village
MASS District
Sistrunk
Beach
Victoria Park
Downtown Himmarshee
Las Olas Blvd
Sailboat Bend
Riverfront
17th St and Port Area

0 .5 1 mile

place + identity

Great cities galvanize a strong sense of identity and place for residents and visitors alike. Streets, neighborhoods, cities and ecoregions can influence our well-being, what we value in a place, and how we describe and interact with a place. Our respect for ecosystems and other species, and our desire to build more sustainable and resilient urban communities, all contribute to the character of a city. Our sense of place also reflects our historical and experiential knowledge of a place, and helps us imagine its more sustainable future.

Outlined in the map to the left, nodes and corridors of interest for potential gateways and placemaking have been highlighted. The legend below indicates the meaning of the symbols found on the map. The City can address placemaking by:

1. referencing existing master plan principles
2. introducing gateways for neighborhoods
3. establishing identity-building toolkits
4. highlighting existing or strong characteristics

- corridors
- potential gateways
- neighborhood extents
- Regional Activity Centers

Character Areas

Tools associated with a Place + Identity:

SIGNAGE + WAYFINDING
p188

Signage and wayfinding are good opportunities for branding a context or place and helping visitors or new residents to navigate their way around the City.

HARDSCAPES
p192

Hardscape materials can contribute to a sense of place by varying in pattern, color, or material type.

FURNISHINGS
p182

Furniture may also contribute to a sense of place by varying in design: color, or material, as defined by different context scenarios.

LANDSCAPE
p200

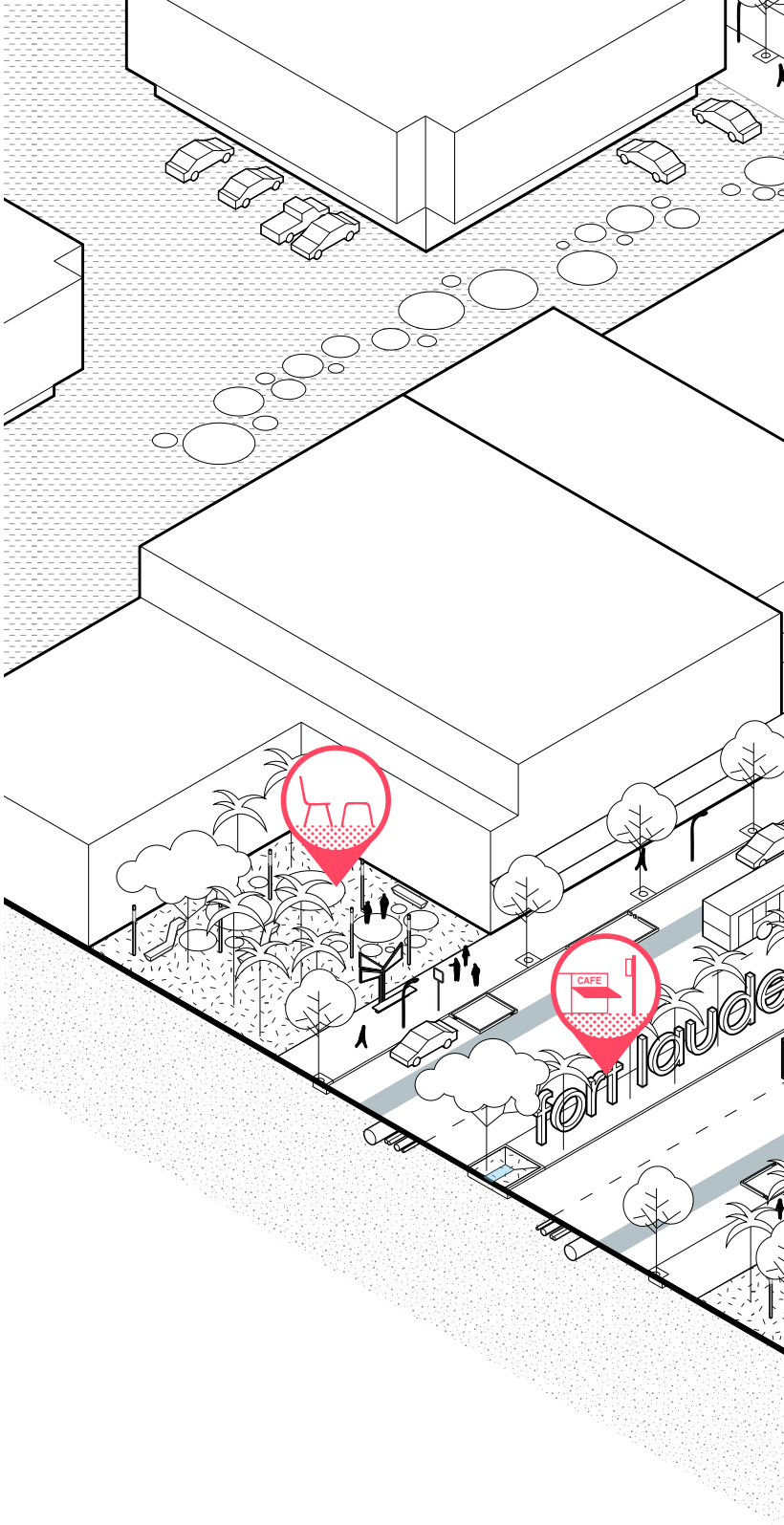
A landscape palette may be chosen for a specific street, some of which may flower seasonally reminding us of a particular time, contributing to a sense of place or identifying a specific street or neighborhood.

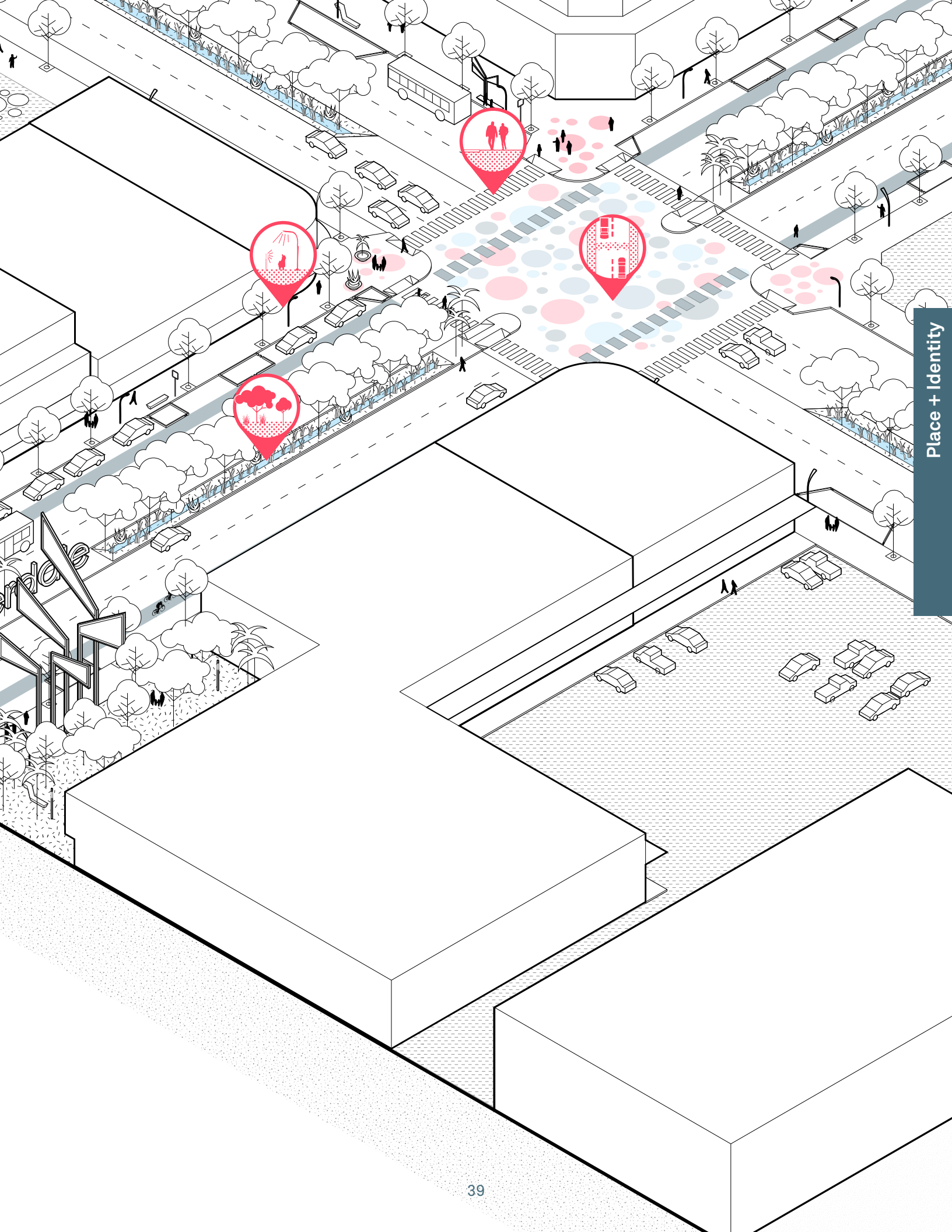
LIGHTING
p176

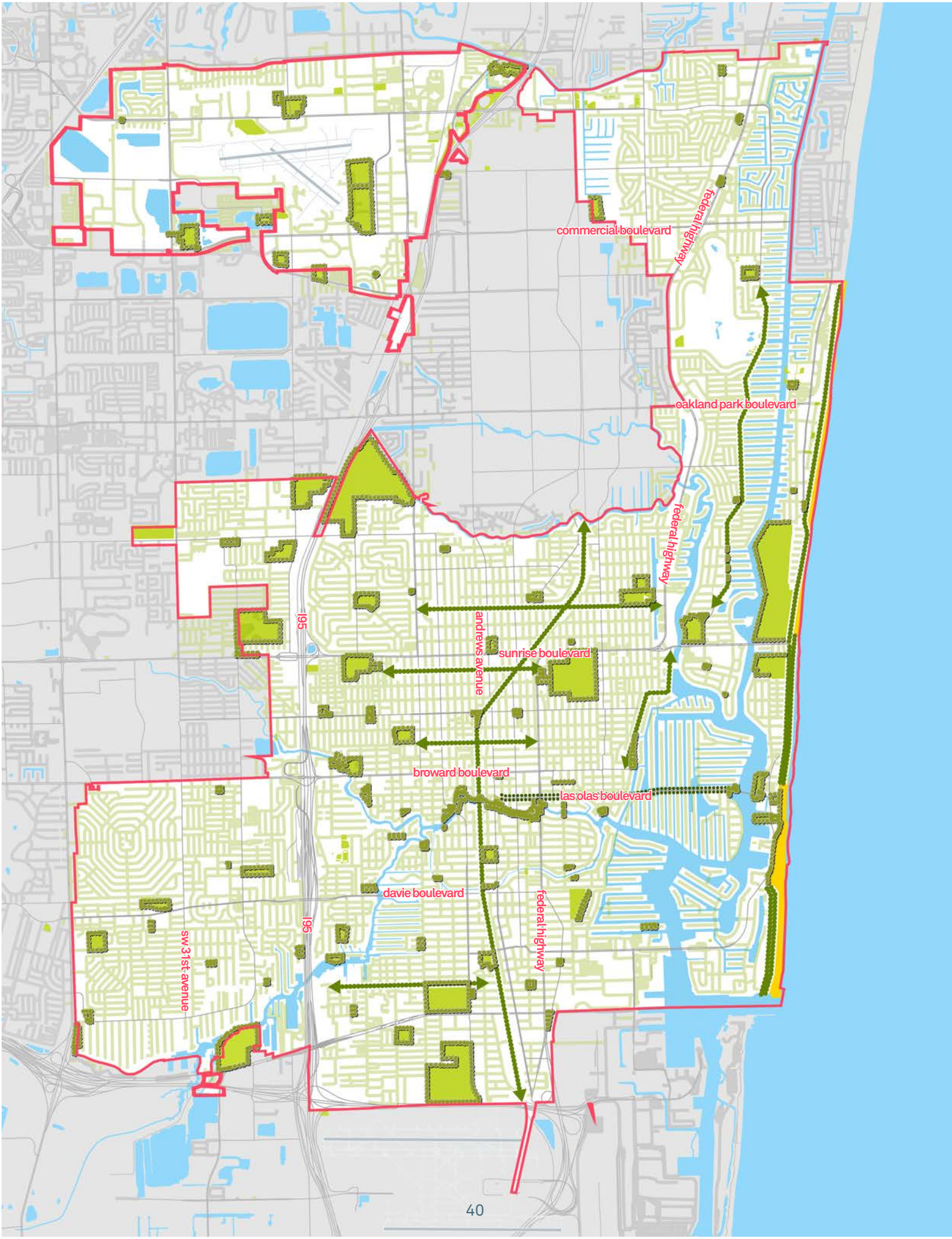
Selecting lights based on material, light intensity and function can contribute to a sense of place by adding a level of security for pedestrians and contributing to the quality of a space.

PEDESTRIAN FACILITIES
p162

Pedestrian facilities will provide pedestrians with a safe walking experience and can be designed with a unique plant or material palette to highlight a sense of place.






commercial boulevard
federal highway
oakland park boulevard
federal highway
i95
andrews avenue
sunrise boulevard
broward boulevard
las olas boulevard
davie boulevard
federal highway
i95
sw 31st avenue

* shaded spaces can be up to15 degrees cooler due to the lack of exposure to solar radiation

* data provided by https://www.osha.gov/SLTC/heatillness/heat_index/pdfs/all_in_one.pdf

0 .5 1 mile

healthy + active lifestyle

Health and design should be part of the discussions of sustainability and resilience in the public realm. The World Health Organization defines health as a state of complete physical, mental, and social well-being. The urban realm provides a platform for everyday experiences and must, therefore, be designed to support human health and well-being of our neighbors.

The map on the left suggests, but does not limit, areas of interest for future greenways or parks. All streets have the potential to actively engage in encouraging sidewalk usage as shown on the map. The legend below indicates symbols used for streets, parks and greenways. To begin to understand how the City can encourage a healthier and a more active lifestyle for residents and visitors, the City should look at ways to:

1 make great streets

2 connect destinations and parks

3 promote street activity

4 increase multi-modality especially bike facilities

streets

parks

greenways

Tools associated with a Healthy + Active Lifestyle:

SIGNAGE + WAYFINDING
p188

Signage and wayfinding are both important for cyclists and pedestrians to navigate their way through the city and to potentially notify drivers of their presence.

HARDSCAPES
p192

Hardscape materials help to differentiate different zones for cyclists and pedestrians in order to set it apart from vehicular travel lanes.

FURNISHINGS
p182

Furnishings can provide pedestrians, cyclists, and runners a place for rest.

LANDSCAPE
p200

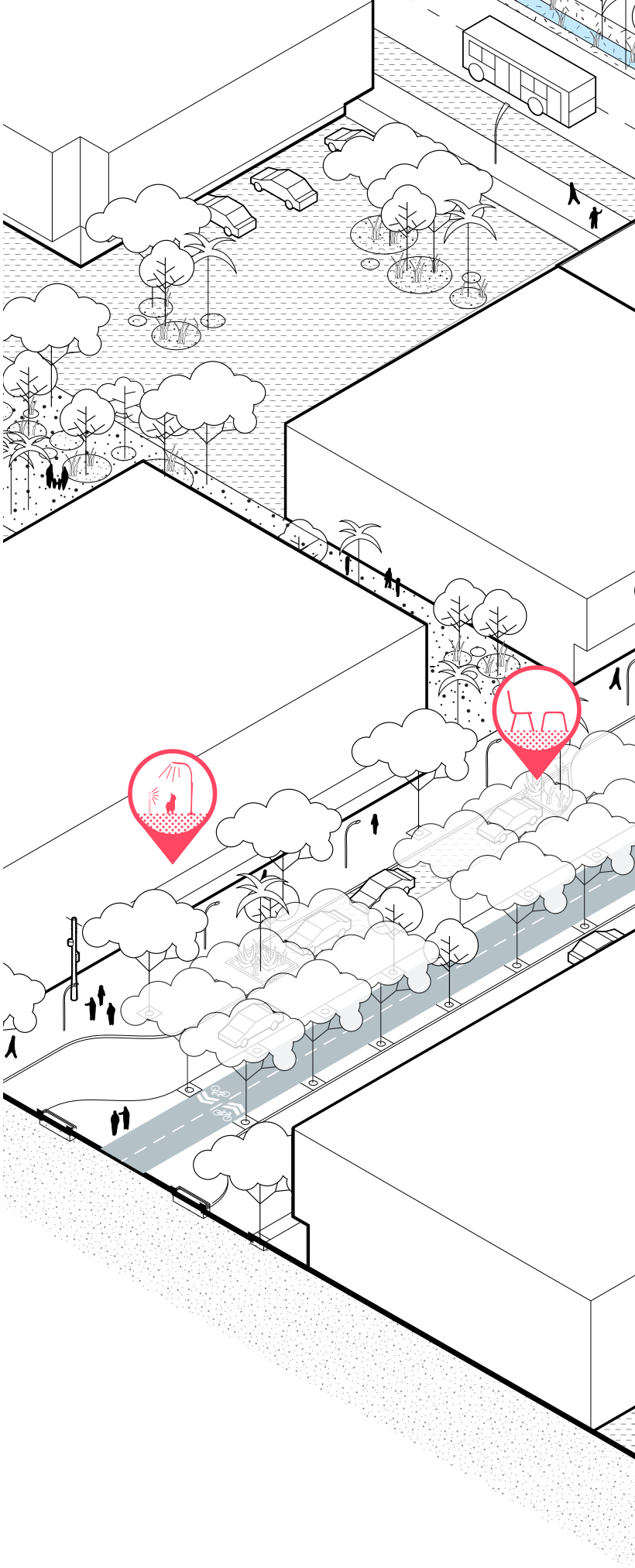
Canopy trees and other types of landscape reduce heat island effects and create a cooler, more walkable environment.

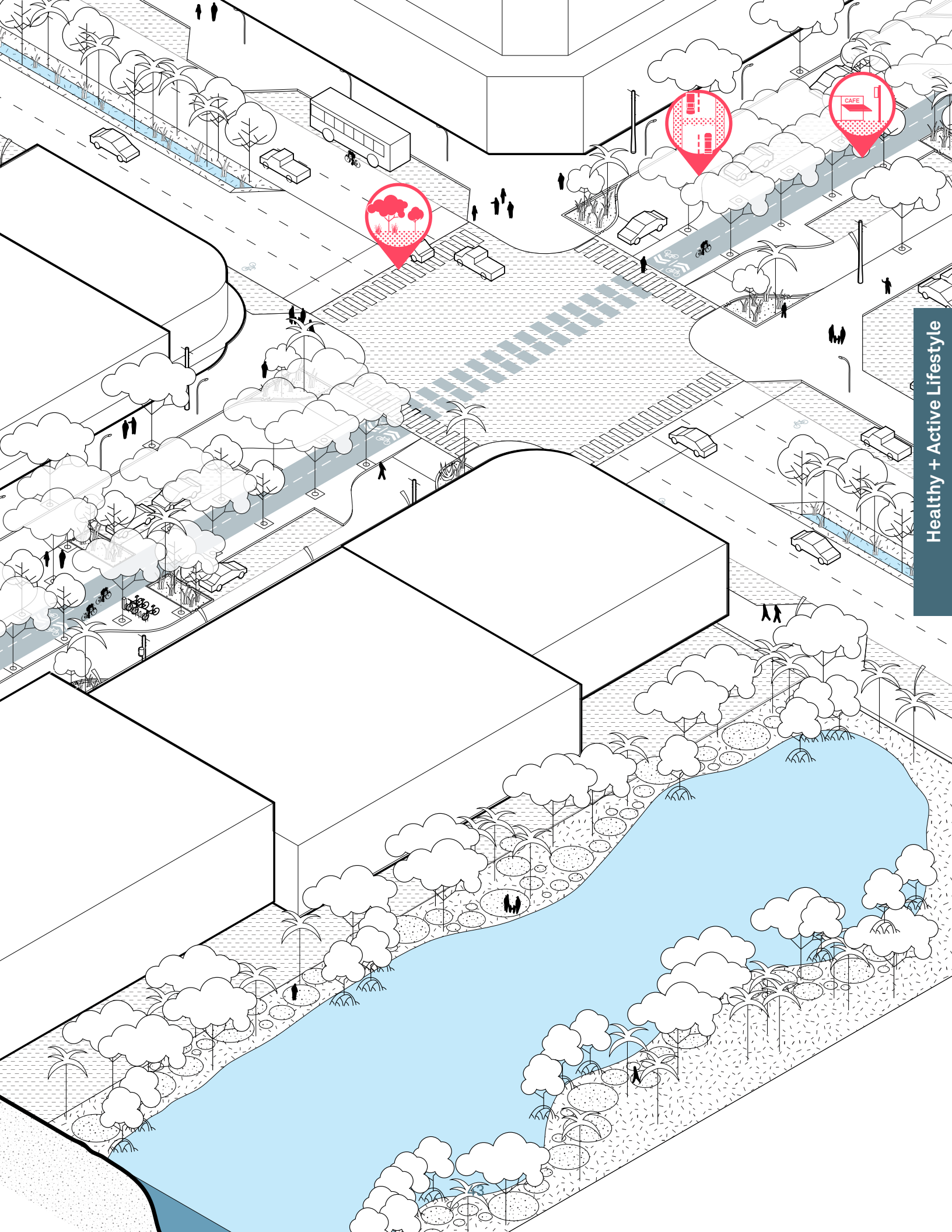
PEDESTRIAN FACILITIES
p162

In order to encourage a healthier and more active lifestyle, it is important to provide a safe pedestrian experience.

LIGHTING
p176

Lighting can encourage walking at night and activate spaces for use after the sun goes down.

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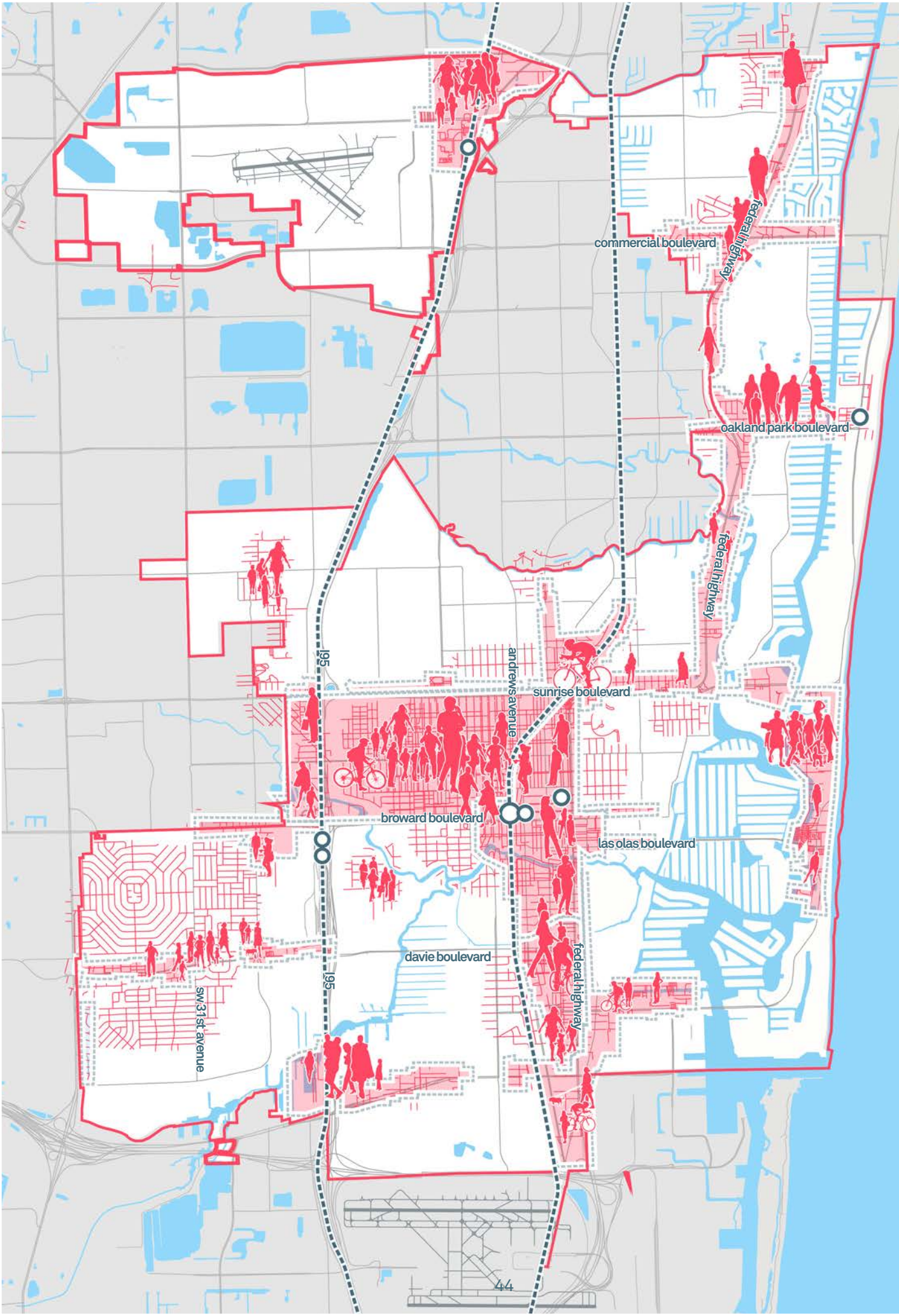
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federal highway
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sw 31st avenue
95
44

focused development

A safe, vibrant, efficient public realm and transit network is essential to the economic health of the City. It plays a major role in facilitating access to formal and informal commerce, jobs, or the wholesale movement of goods and services. The upfront costs of constructing the public realm should be balanced with the benefits its design will confer throughout its lifespan, as well as its durability. Costs related to shaping these spaces should also be considered in relation to the economic value and tax base of the private development it serves.

Regional Activity Centers, as defined by the City of Fort Lauderdale Master Plan, are highlighted to the left. Population density and streets affected by these centers are also highlighted on the map. Principles for designing better Focused Developments should not be limited to the areas suggested in the illustration. To better serve the context scenario with Focused Development, the City should:

1 create compact, transit-oriented developments

2 develop walkable urbanism

3 implement complete streets

transit hubs

streets

regional activity centers

population density

0 .5 1 mile

Tools associated with a Focused Development:

SIGNAGE + WAYFINDING
p188

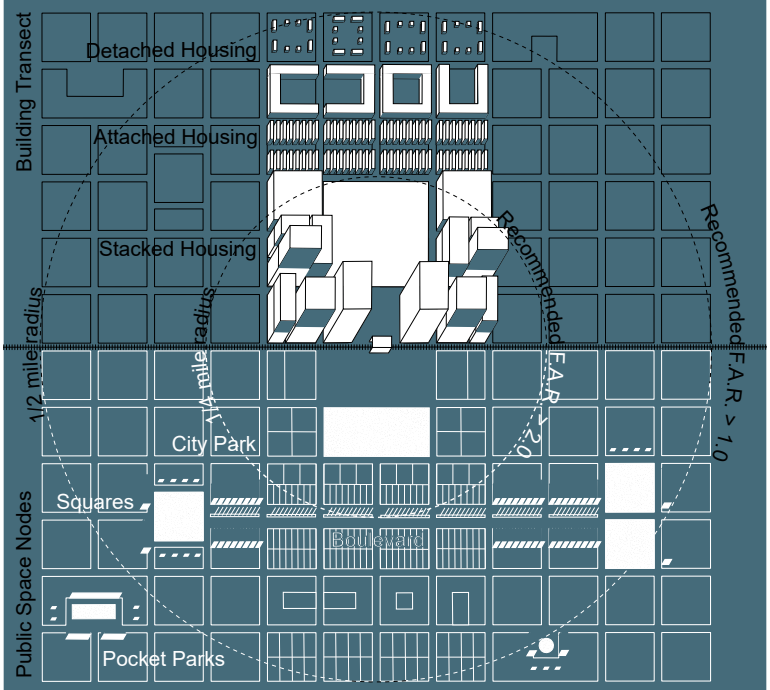
Signage and wayfinding are important tools for visitors to navigate areas developed around transit and walkability; they provide a sense of comfort for free movement in unfamiliar places.

FURNISHINGS
p182

Street furniture will encourage pedestrian activity in the public realm where Focused Development occurs.

HARDSCAPES
p192

Varying hardscapes at intersections and crossings in Focused Development areas with heavy pedestrian traffic can increase safety for pedestrians.



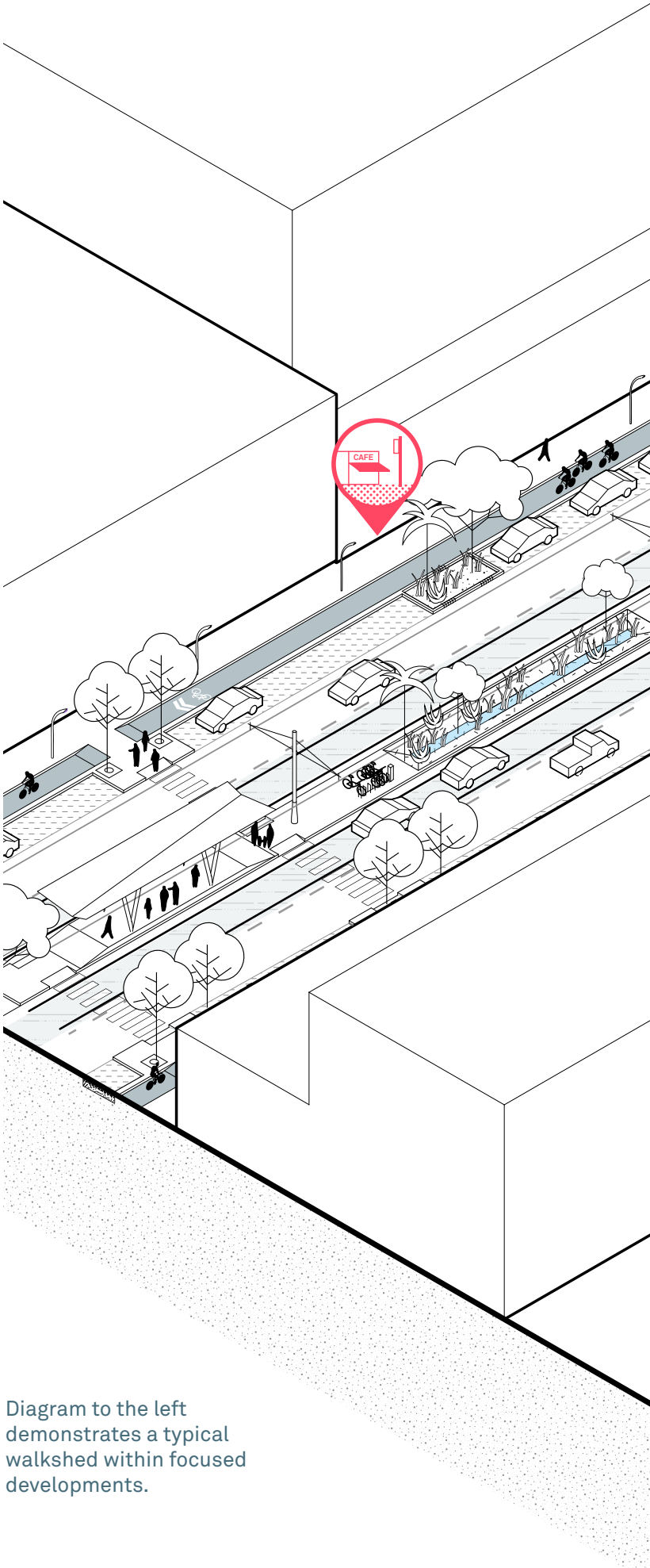
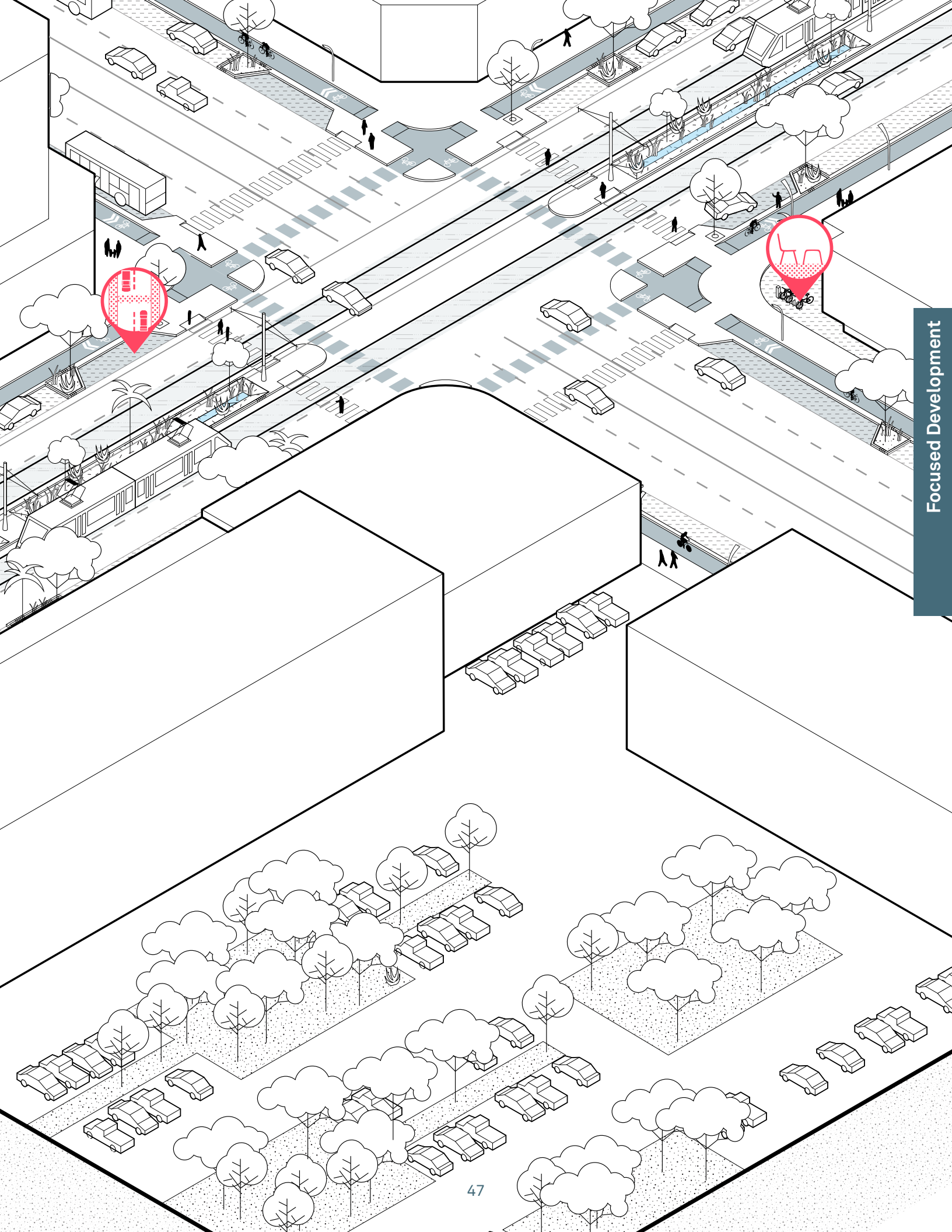
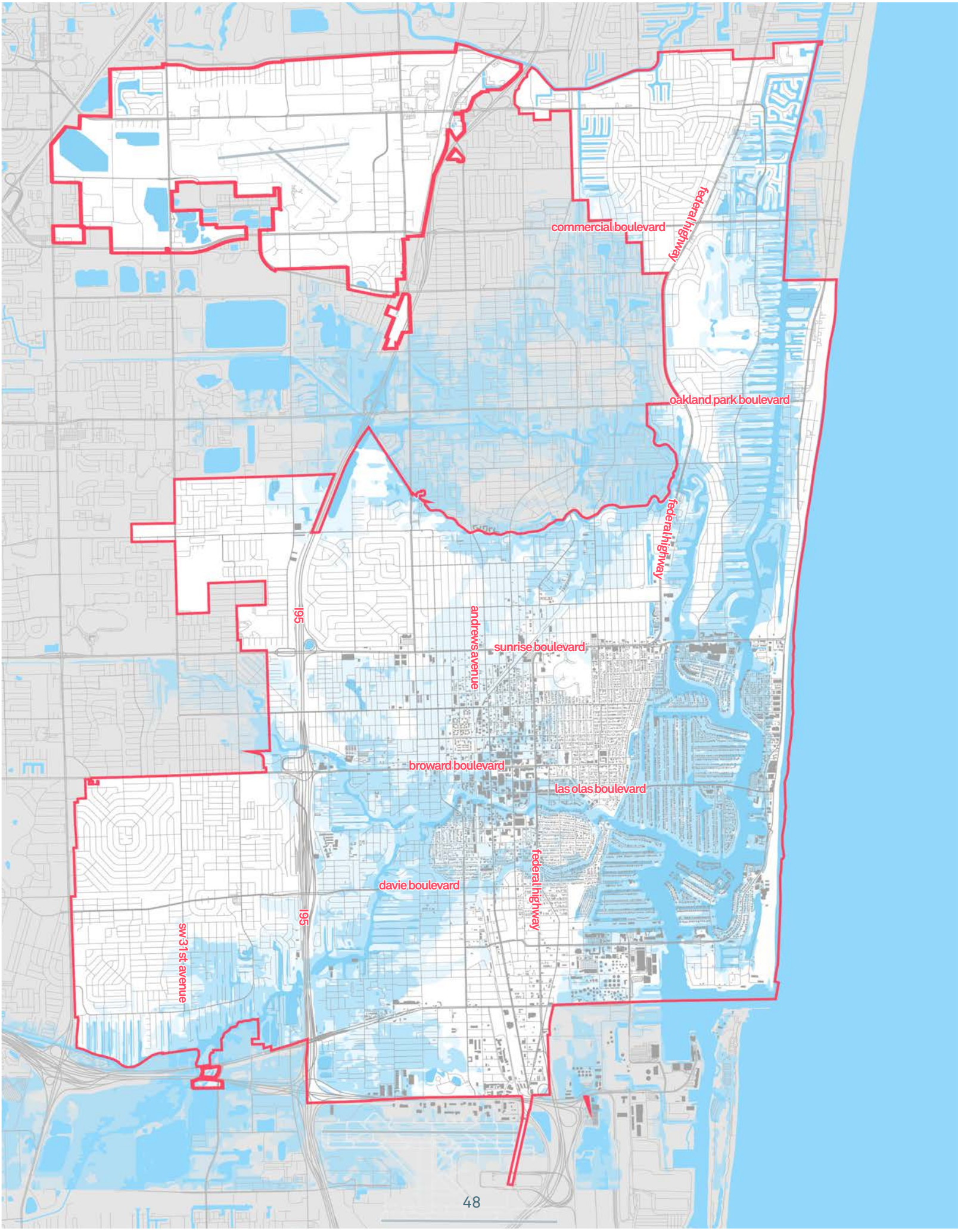


Diagram to the left demonstrates a typical walkshed within focused developments.

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sw 31st avenue

flood protection

Regional flooding is an ongoing climatic phenomenon that continues to put coastal populations at risk. Flooding following extreme storms and king tide events where sea water inundates low-lying areas serves as a precursor of future flooding that will become an increasing challenge due to sea level rise. This is a critical concern, since Fort Lauderdale is a coastal city. Hence, much of the local economic activity is tied to coastal communities and industries.

In order to better prepare for these conditions, it is important to understand if a project site is affected by regional flooding due to precipitation, king tides or sea level rise. The map on the left illustrates sea level rise projections, indicated in the legend below. It also demonstrates urban areas highly concentrated with impervious surfaces shown in gray. To address some of the issues around regional flooding, the City must:

1. understand how we flood
2. armor against storm surge and sea-level rise
3. mitigate stormwater runoff
4. reduce impervious surfaces

- existing sea level
- sea level at 3 feet
- sea level at 6 feet

Tools associated with a flood protection:

FLOODWATER MANAGEMENT
p248

Floodwater Management tools should take into consideration a saltwater plant palette or gray infrastructure that can tolerate high levels of salt.

SHORELINE INFRASTRUCTURE
p260

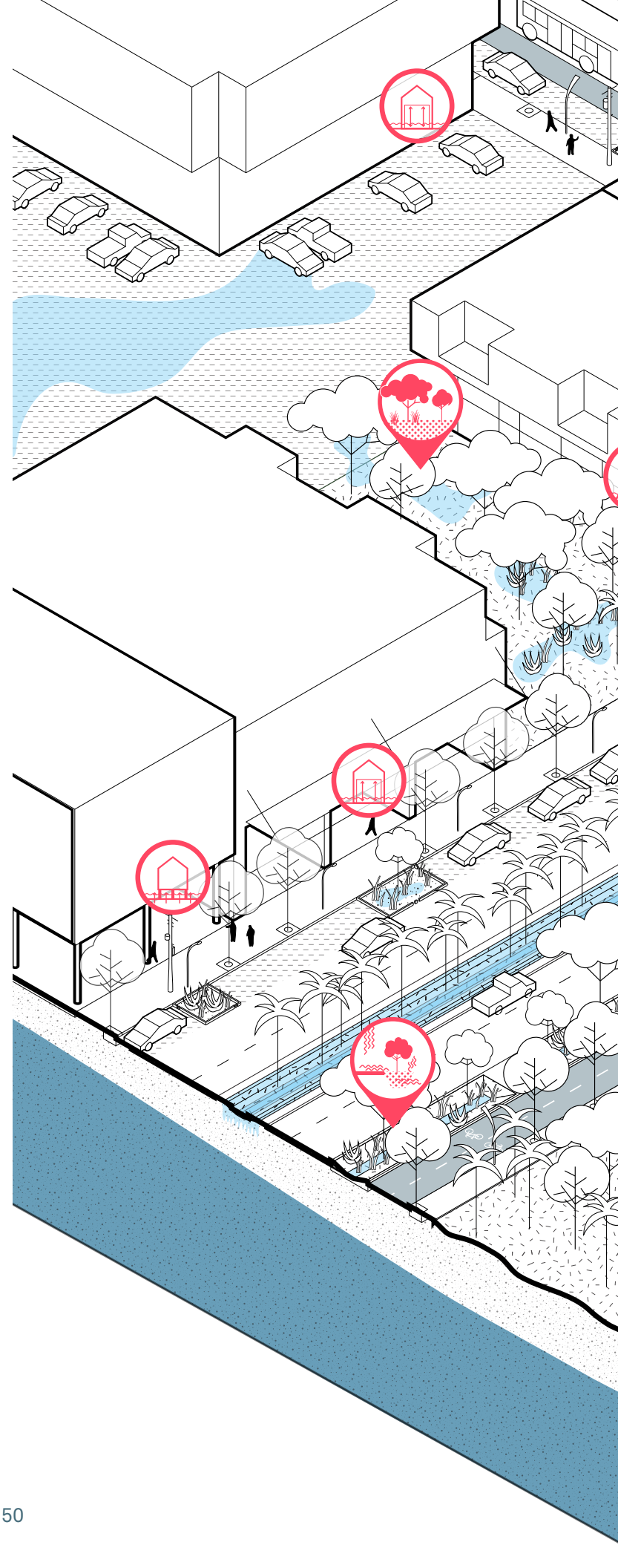
Shoreline infrastructure is important in areas with regional flooding to combat against king tide events and sea level rise, as well as storm surge.

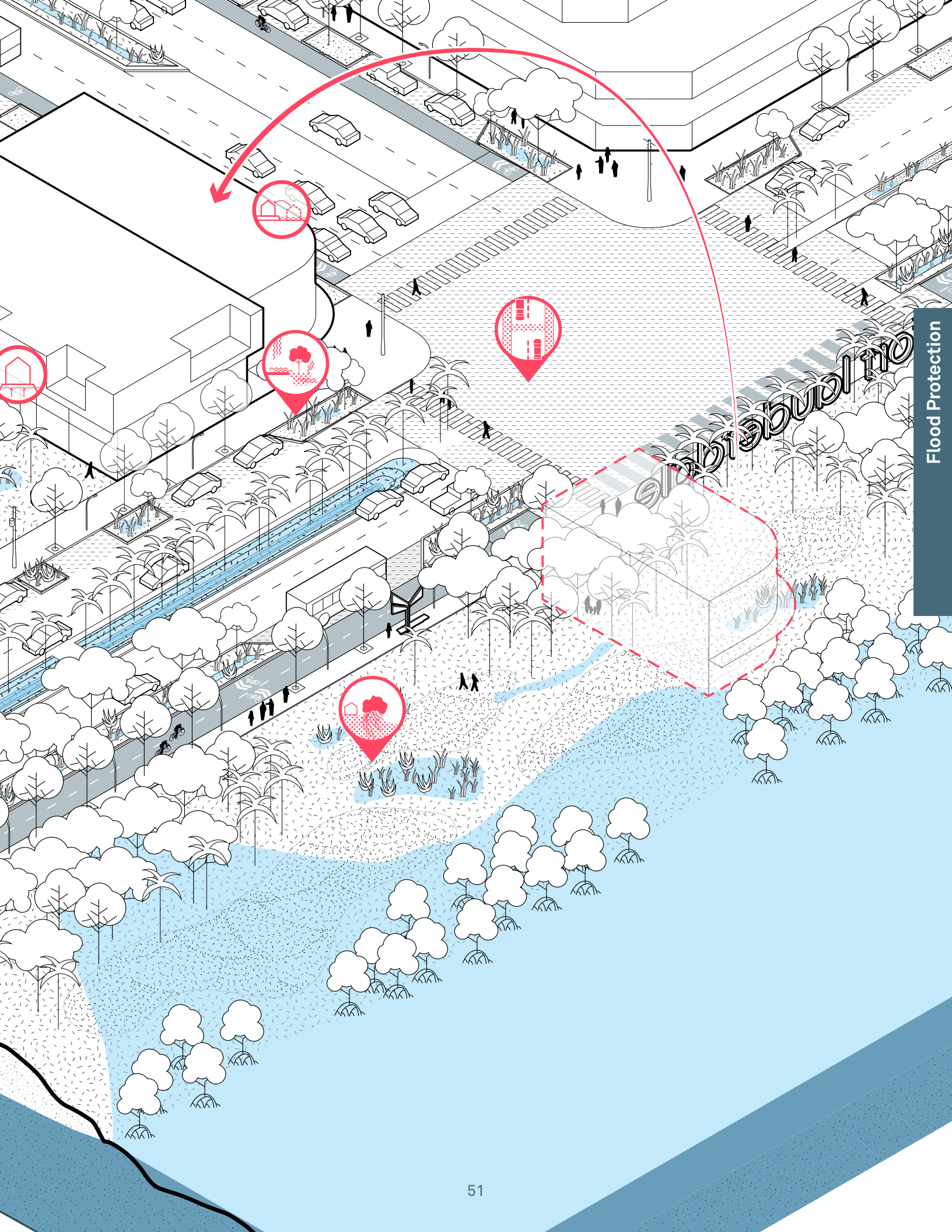
HARDSCAPES
p192

Asphalt and poured-in-place hardscapes may be replaced with permeable or modulated hardscapes to promote the movement of water through the hardscape, as conditions permit.

LANDSCAPE
p200

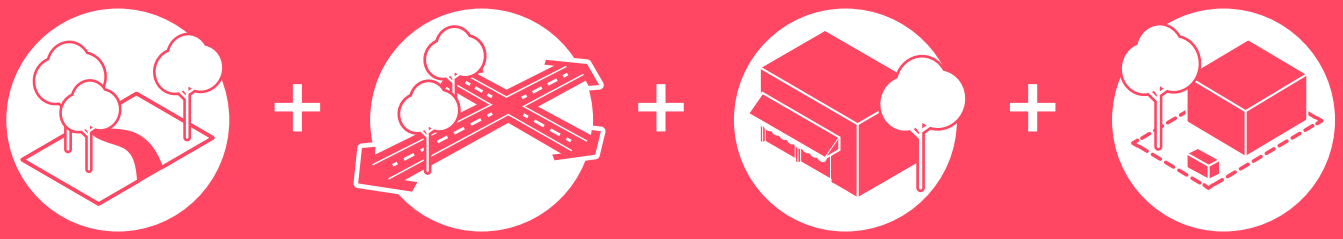
Replacing hardscapes with landscape can reduce the amount of impervious surfaces, giving water a place to percolate beneath paved surfaces. Take into consideration a saltwater plant palette when working in a context with regional flooding.




Flood Protection

tactics

Tactics provide design principles and strategies for various project types within the public realm that address issues and opportunities as defined in the **Context** section. The tactics are divided into four sections based on a transect methodology; open space, streets, frontage, and parcels. Select a transect or transects based on your project and identify the appropriate tactics to employ. These tactics will help identify which tools may be appropriate to employ to achieve context-based goals.



OPEN SPACE

Comprehensively plan open space as a green network that delivers ecological and social services.

STREETS

Design the streets to achieve traffic calming and stormwater management.

FRONTAGE

Connect buildings to the public realm seamlessly while adding to the public realm rather than taking away.

PARCELS

Substitute ecologically based stormwater treatment systems for an otherwise decorative landscape.

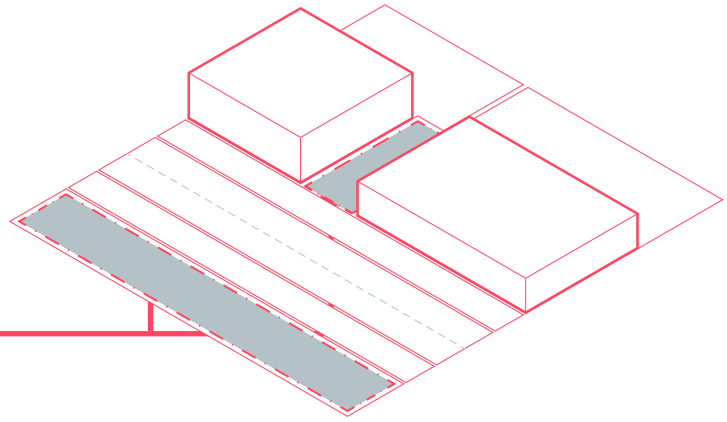
identify transect + choose tactics

Choose tactics based on where it is located in the public realm and/or which aspects of the public realm will be affected. In some cases, the project may be adjacent to or connect to multiple parts of the public realm. The following sections provide strategies and principles for how to design according to each transect.

does the project ...

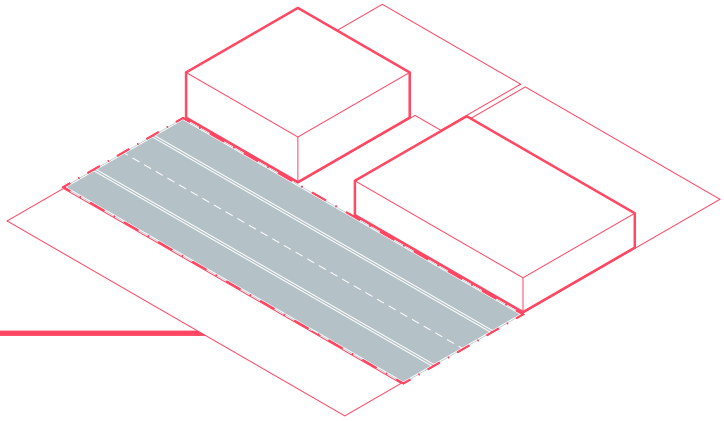
open space

- encompass park space
- connect to a park or other outdoor space
- require outdoor space
- include/incorporate part of a trail or green network



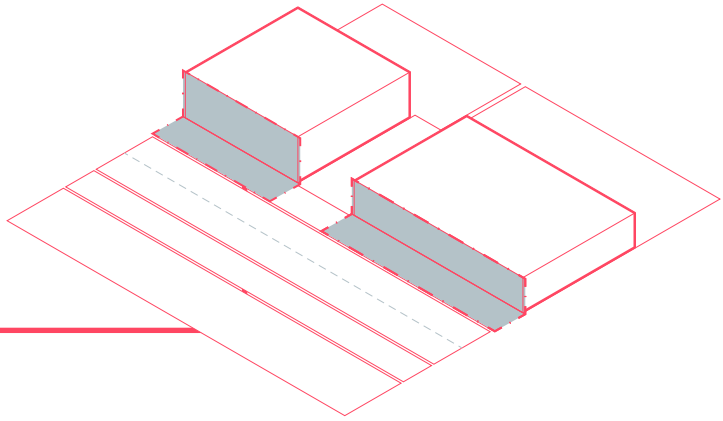
streets

- affect the transportation network
- affect sidewalks or pedestrians
- alter the right-of-way



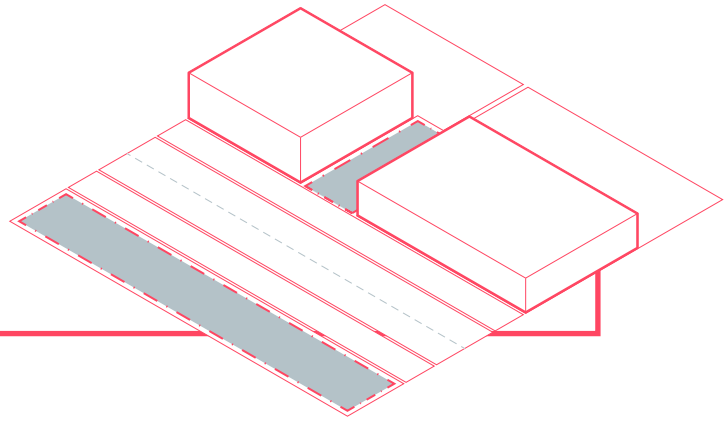
frontage

- abut to sidewalks or open spaces
- abut to any buildings



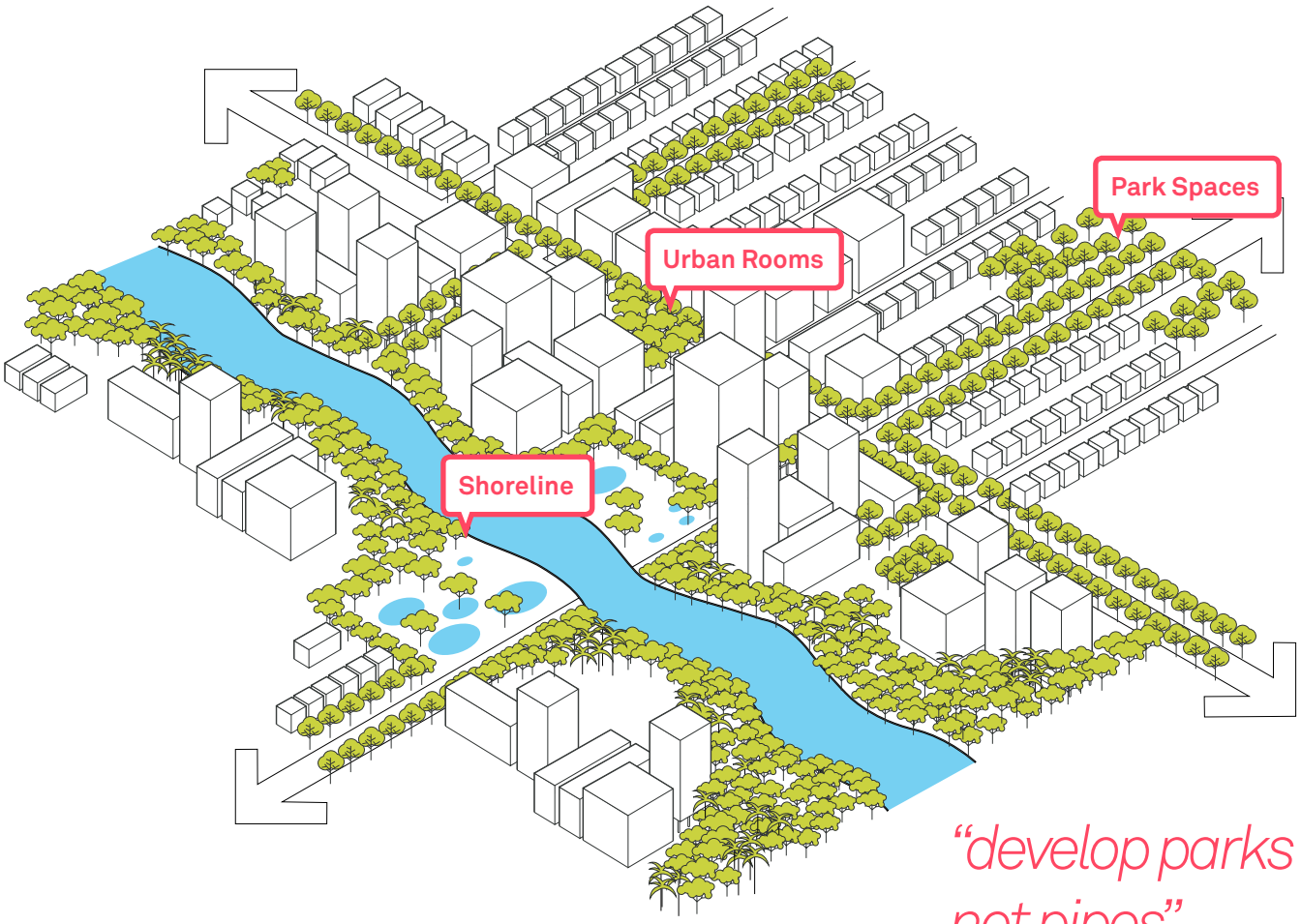
parcels

- encompass any city owned property not part of the right-of-way
- encompasses parking lots or parking structures
- non-contributing areas of private lots



open space

The open space section includes design guidance for urban, suburban, and coastal areas throughout the city. Comprehensively planning open space as a cohesive public realm network will ensure delivery of social and ecological services related to healthy and active lifestyles, transportation, sense of place, and resilience at the city scale. One major goal is the integration of green infrastructure for adaptation to future climate change resilience. Open space should be considered at a city-wide scale and within individual circumstances.

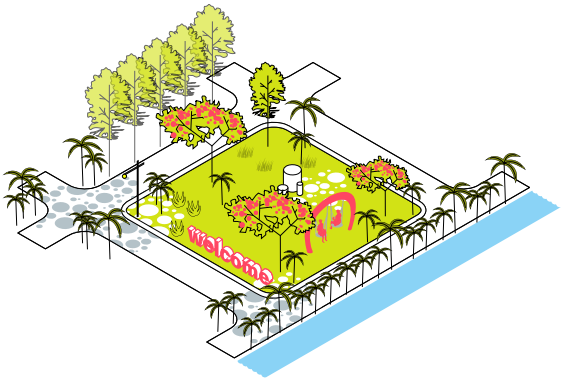


"develop parks not pipes"

open space

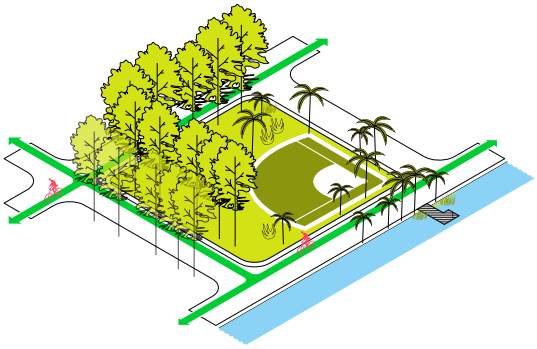
Open space includes publicly-regulated land areas and water bodies that conserve and shape the urban/built environment. Currently, open spaces offer recreational, aesthetic, and ecological functions. With proper planning, they can deliver more comprehensive ecological services related to climate regulation, nutrient cycling, flood protection, and habitat creation.

Vegetated open space at the scale of a city and region can deliver vital ecological services not feasible at the scale of a lot, block, or neighborhood. To achieve this, open space should be planned as a green network that maintains water body functioning and ecosystem connectivity using designed parks, greenways, and self-organizing conservation areas. Studies in multiple disciplines, from public health to economics and transportation planning, have found that well-planned urban open space systems yield compounding economic, environmental, and social returns far beyond the estimates and expectations that motivated initial project investments.



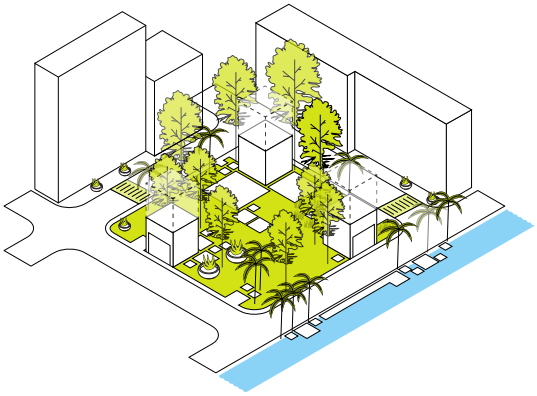
Place and Identity

Open spaces with a focus on **Place and Identity** may utilize regional or site-specific trees or plants that bloom seasonally, offering a place-based aesthetic. Other place-making tools, such as public art, lighting and furniture, may also be incorporated.



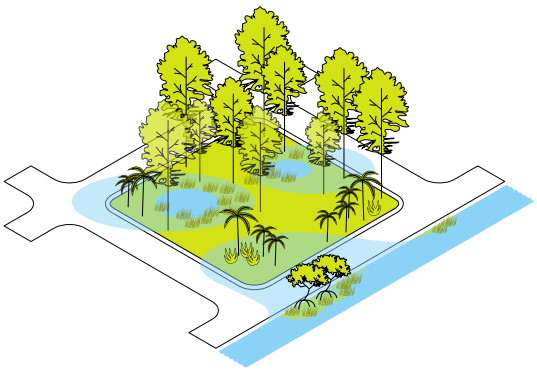
Healthy and Active Lifestyle

Open spaces that design with a **Healthy and Active Lifestyles** in mind should add active parks, incorporating sports fields and bike paths. These components offer enhanced community connectivity that provide options beyond the use of the automobile. Safe and attractive infrastructure promote physical activity.



Focused Development

Open spaces located within a **Focused Development** area should provide outdoor spaces that improve the urban quality within denser areas. Intensification of private development within these areas must be balanced with recreational activities and infrastructure that achieves greater walkability and livability for residents.



Flood Protection

Open spaces that fall within **Flood Protection** should look at hardscapes, landscape, shoreline infrastructure and floodwater management tools when implementing plants and hardscapes, that can improve site and regional flooding issues while offering attractive co-benefits.

A combination of all four context scenarios within a open space network will reduce maintenance costs and create enhanced economic opportunities.

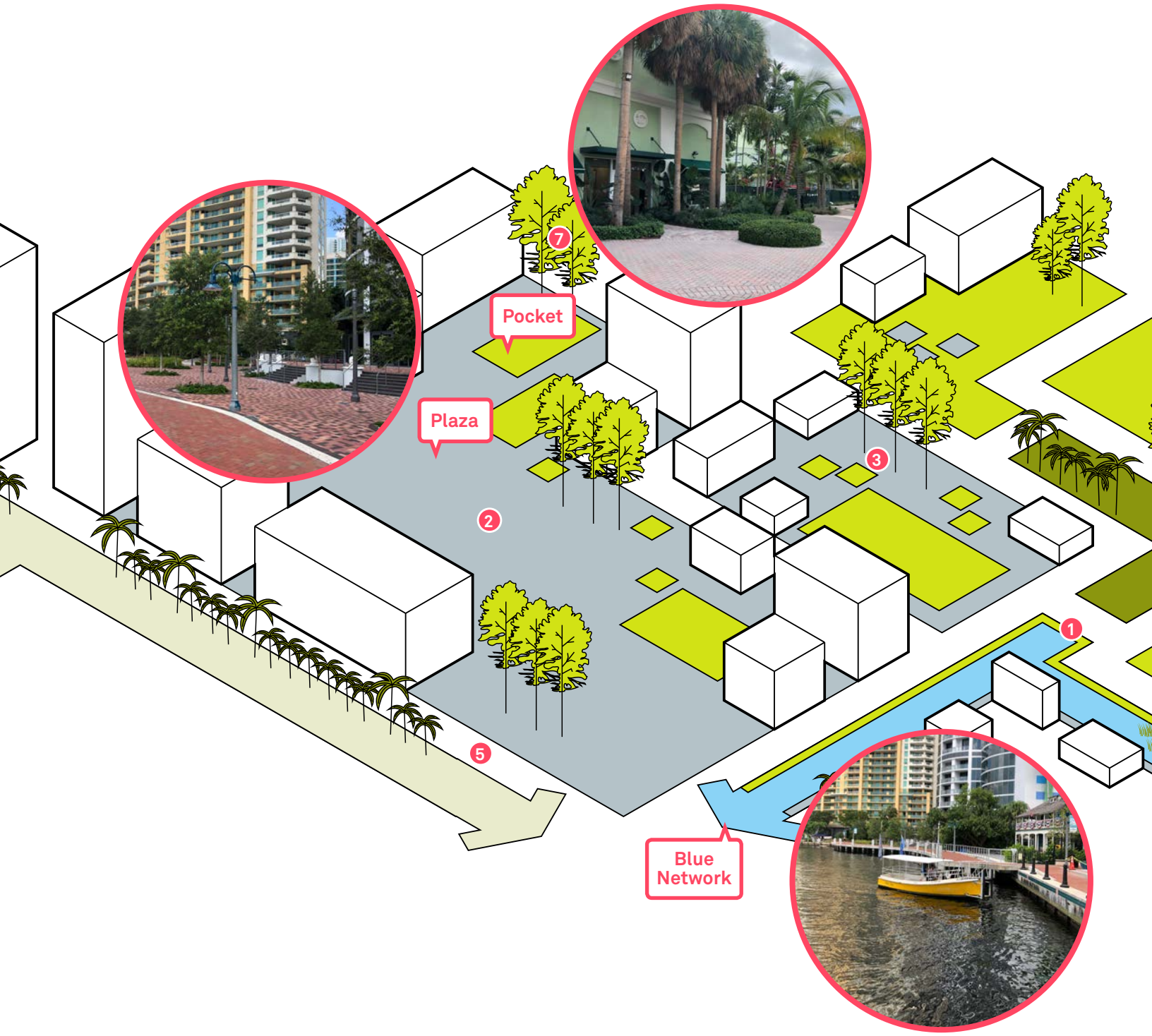
open space design principles

1 Fort Lauderdale is known as the "Venice of America" because of its vast network of canals. Consider mapping out blue networks within the City to connect public parks, and provide stand-up paddleboard and kayak services for watergoers.

2 Urban plazas are usually defined by multiple buildings on at least two edges. Plazas are typically paved in all or most areas. Review **Hardscapes (p192)**

3 Plan to incorporate floodwater management tools in low-lying areas that experience flooding. Refer to the **Floodwater Management (p248)** tools to choose the right tool type for the right space.

4 Look at ways to have passive and active parks engage with one another thematically, through either **Landscape (p200)**, **Hardscape (p192)** or **Lighting (p176)**.

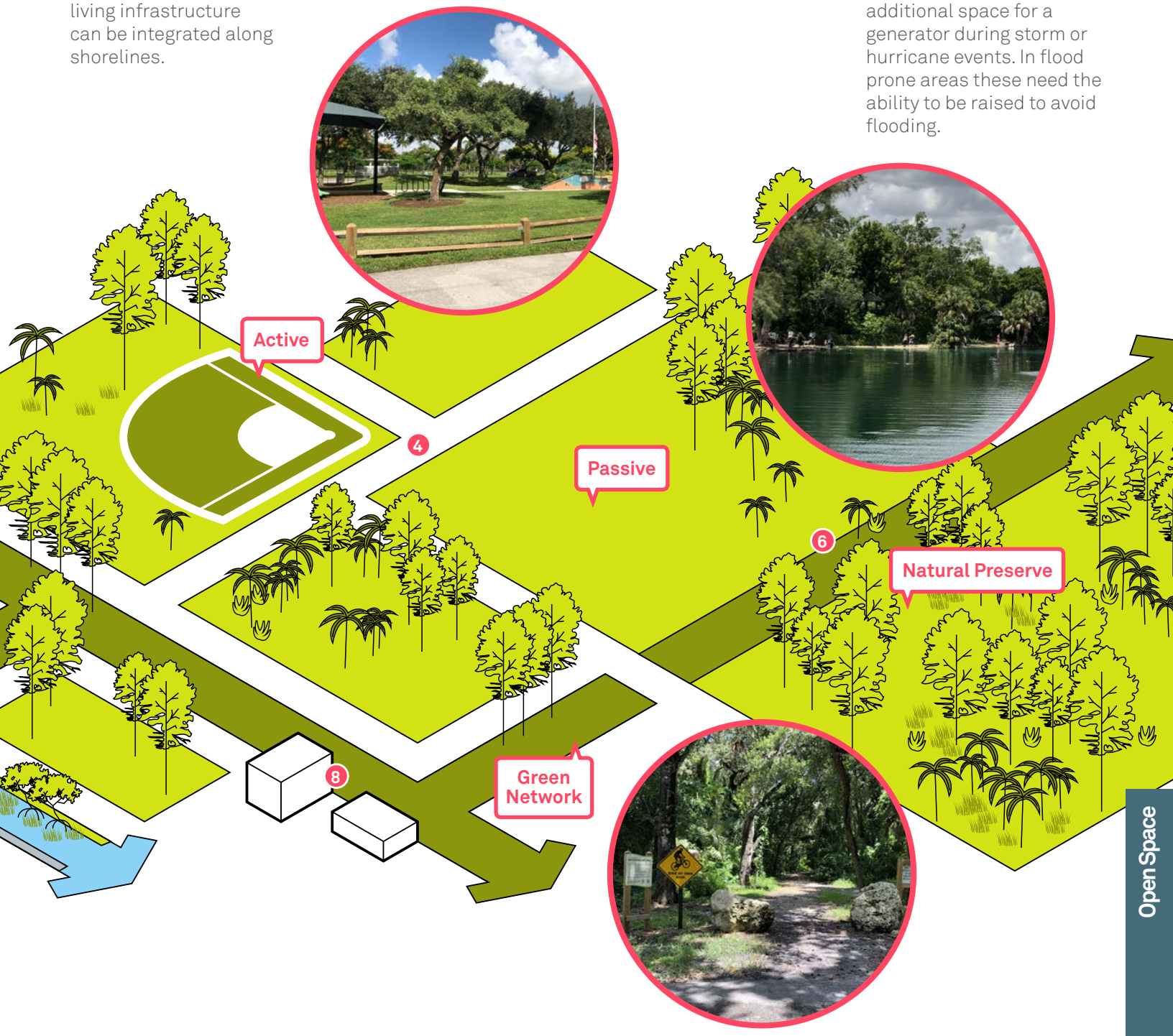


5 Open spaces that abut beaches or shorelines should be designed so that **Landscape (p200)**, **Lighting (p176)**, and **Furnishings (p182)** do not disrupt natural ecology. Go to the **Shoreline Infrastructure (p260)** tool to see how living infrastructure can be integrated along shorelines.

6 Allow green networks to move through larger passive parks. Review the **Bicycle Facilities (p148)** to appropriately design bike paths.

7 Pocket parks typically occupy residual spaces or unoccupied parcels of land within densely developed streets. Look at preserving or reusing existing **Landscape (p200)** or **Hardscape (p192)** for the pocket park.

8 Lift or pump stations move wastewater from lower to higher elevations which are necessary at locations where gravity flow is not sufficient for moving sewage to the treatment plant. Lift stations often require additional space for a generator during storm or hurricane events. In flood prone areas these need the ability to be raised to avoid flooding.



urban rooms

Urban rooms may consist of plazas or squares, or pocket plazas, that fit within one or several city blocks. Urban rooms typically have a hard edge, defined by streets, buildings or public throughways. Some urban rooms may have a shoreline edge on one or more sides.

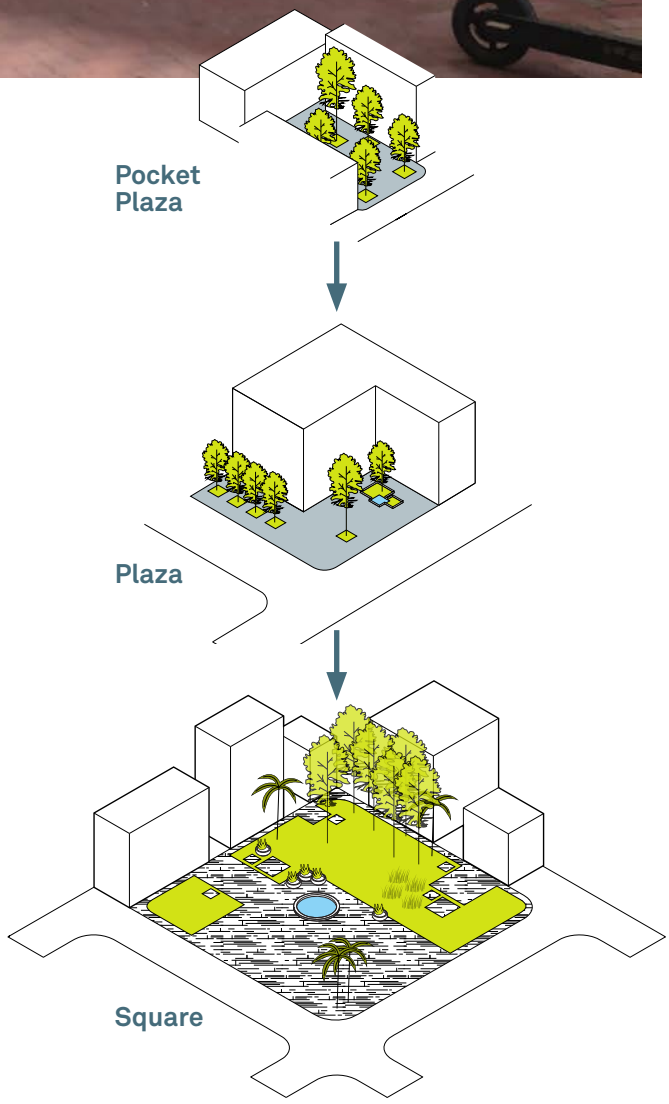
Considerations

When designing urban rooms, consider how the edge of a park interacts with the architectural frontage that lines it, especially in pocket parks or plazas.

Encourage businesses to provide **Architectural Frontage** to urban rooms.

Urban rooms may spill out into the waterfront or sidewalks without obstructing the pedestrian path.

Urban rooms can exist at the scale of one lot or encompass an entire block.



park spaces

Park spaces come in a variety of scales, from one lot to many blocks, and consist mostly of softscape (trees and plants). Park spaces may be found in urban or suburban communities, and may have one or more shoreline edges. Park spaces may either be active (sports/play) or passive.

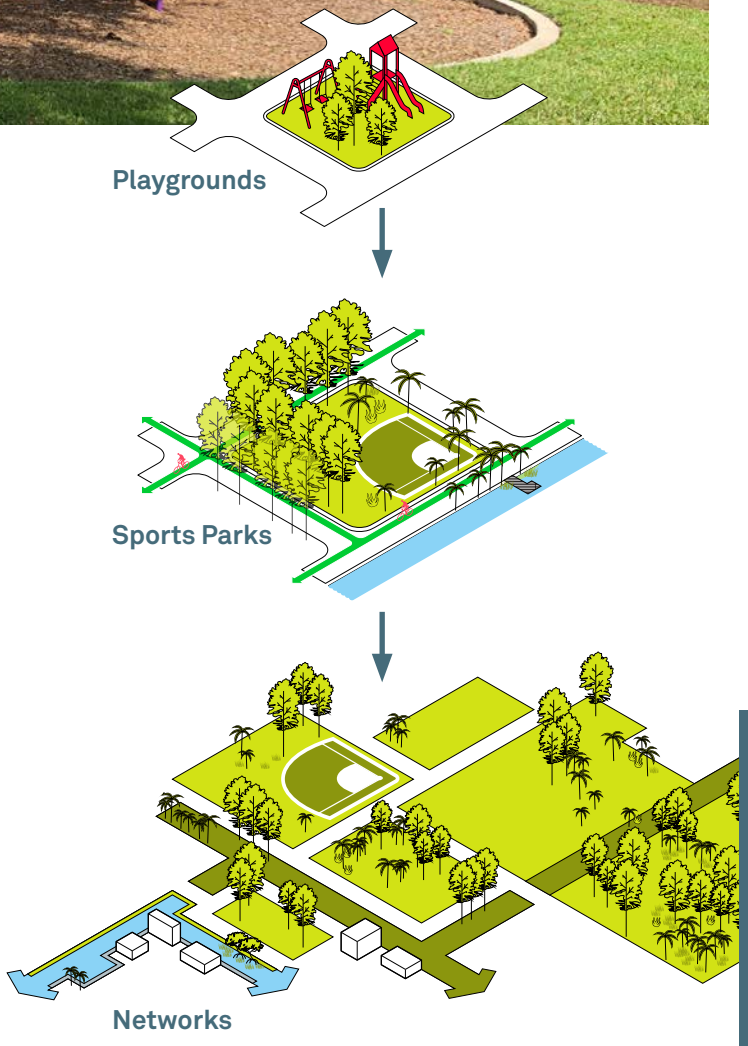
Considerations

Park spaces in suburban areas should be located near transit hubs, central to multiple neighborhoods, and easily accessible to residents and visitors of all ages and abilities. Connecting parks with bike paths or multipurpose trails can also encourage a **Healthy and Active** community.

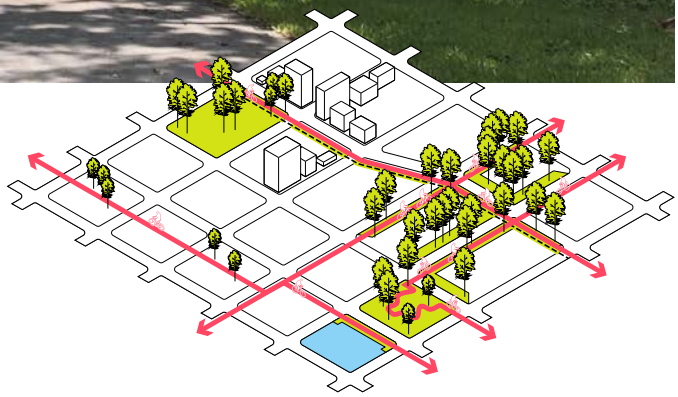
Using native landscape and xeriscape can reduce the need for maintenance and irrigation. Biodiversity can bolster landscaping and allow it to react to disease or natural disasters. Whenever possible incorporate landscape to manage stormwater.

Durable materials should be used to reduce maintenance needs, withstand environmental conditions, and vandalism. (see **Materials p170**)

Active parks (sports parks and playgrounds) should provide aesthetically pleasing recreational facilities with character that is reflective of the place and embraces natural, cultural, and historical resources as themes or design features of its surroundings.



multi-purpose trails



Multi-purpose trails can be thought of as a network that may connect the open spaces of a larger region. These trails are typically found outside of vehicular networks, utilizing easements or abandoned railways. Multipurpose trails may also be found running through larger parks, or along the shorelines of beaches or canals.

Considerations

Plenty of shade should be provided to maintain continuous usage year-round. Most of the shading may come from trees but sporadic shade structures may also be incorporated. These shade structures can provide refuge during sudden downpours and integrate solar panels to provide power for lighting at night.

These trails may connect or run along other open space areas and develop larger networks. In these cases, they should be planned and utilized as a larger network that can function holistically to deal with issues such as **flood protection, place and identity** or **focused development**.

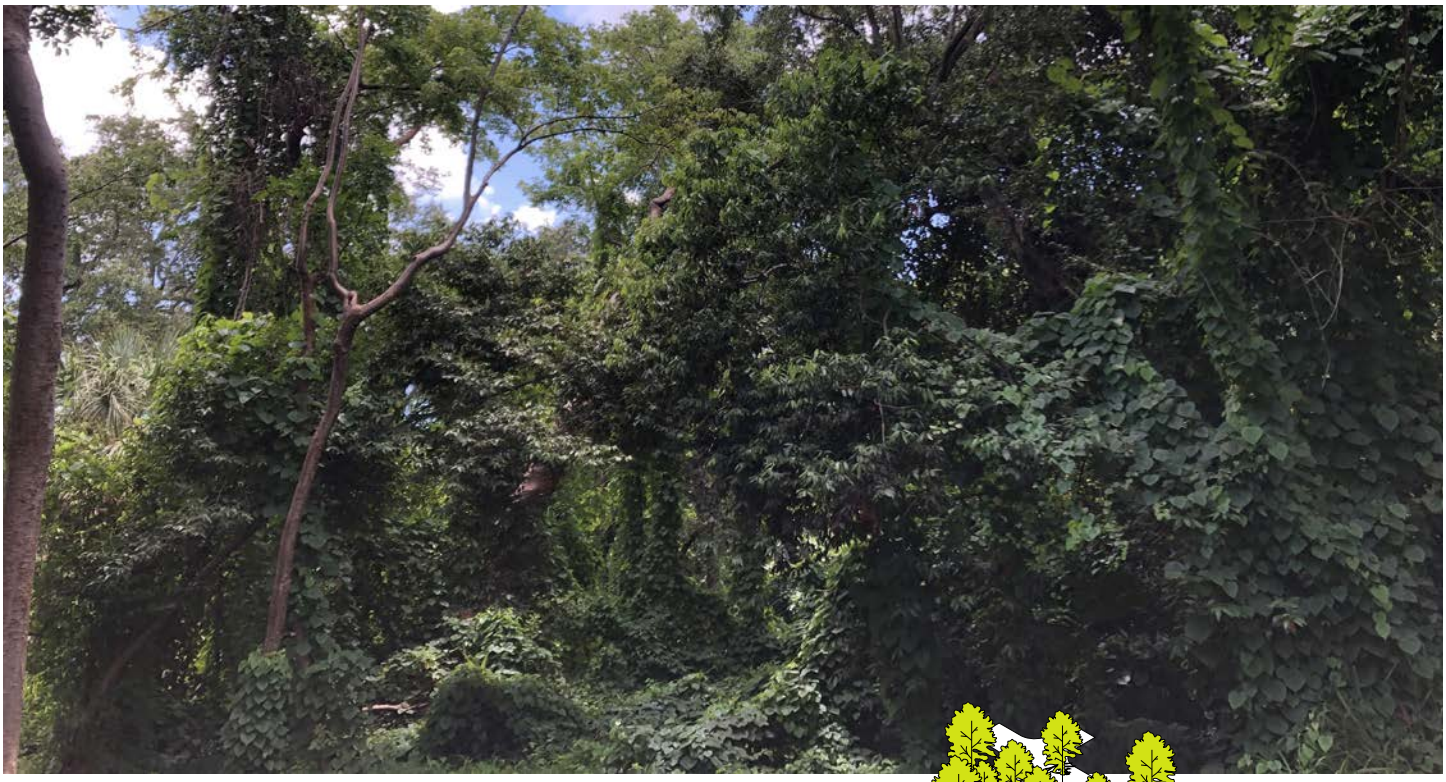
Accessibility plays an important role since these trails are part of transportation and recreation facilities. The federal Americans with Disabilities Act (ADA), requires certain design standards for facilities to be in compliance with the law.

The American Association of State Highway and Transportation Officials' (AASHTO) design guidelines recommends a minimum of 10 ft as the standard width for multi-use trails and areas where heavy use is anticipated, a 12-14 ft width is recommended.

Separate, parallel paths can increase safety and comfort in areas with high use and create unique experiences for different users. E.g. a hard-surfaced path can be provided exclusively for bicyclists next to a softer path for pedestrians and runners.

User experience, accessibility, initial purchase cost and installation, maintenance cost, and life expectancy should be considered when choosing the surface materials for the trail.

conservation/preservation areas

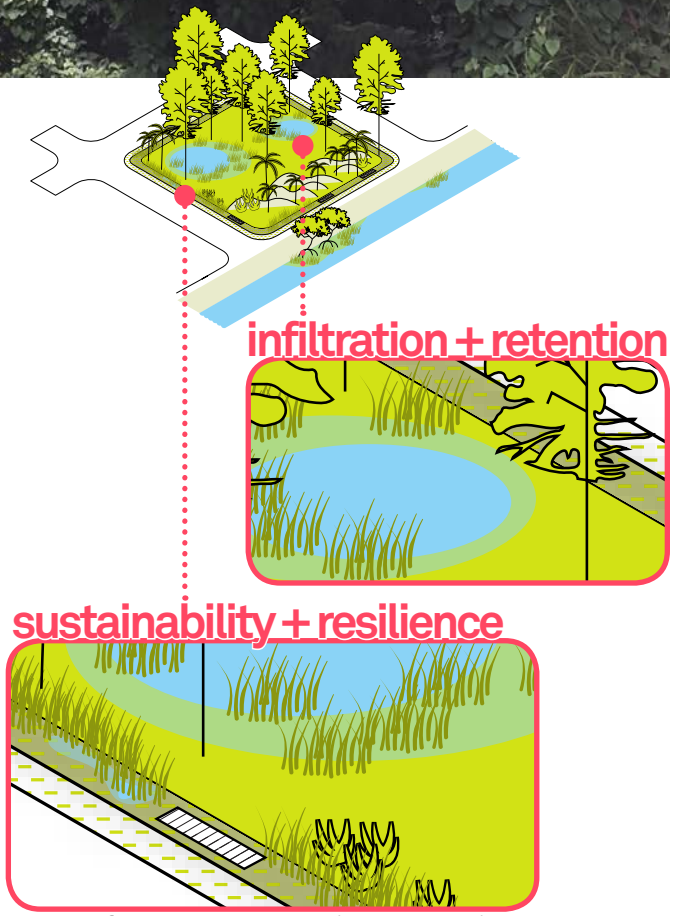


Conservation or preservation areas are protected areas that preserve the landscape and vegetation of that area. These places are left alone to exist in a natural state with minimal intervention. For example, when a tree falls it is left alone unless it is blocking a trail or similar. Connecting these spaces to the urban environment requires limiting run-off into these areas and minimal disruption of the ecosystem.

Considerations

Urban run-off from adjacent or nearby development should be controlled or treated before entering these areas to remove any potential contaminants from the run-off. Green stormwater management systems may be incorporated along the edges to mitigate and treat run-off.

These areas can help to reduce flood conditions since they have pervious surfaces that can infiltrate water.



Living infrastructure in combination with gray stormwater systems can help deal with or hold run-off before it enters these areas. For a bio-swale to be successful the bottom should be at least 4 ft wide (see **Floodwater Management p248**) .

streets

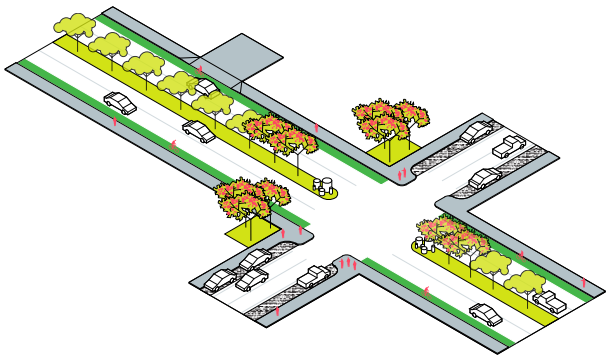
Streets should be designed and constructed to provide safety, a sense of place, multi-modality, and ecological functions. This section will define the components, or the anatomy of a street, as well as design tactics for the different street types. Street types in this manual range from streets to boulevards, as outlined in the City's Complete Streets Manual, and each type will explore various techniques and best practices for providing successful street design.

Design streets for everyone.

streets

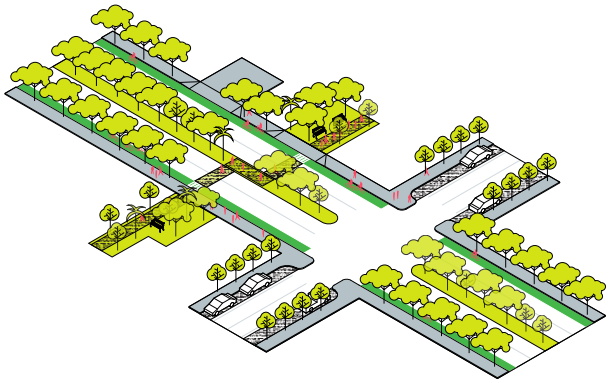
Typically, the automobile dominates the design of streets; however, these spaces must also meet the needs of pedestrians, cyclists and infrastructure such as stormwater management. Streets should be designed with triple-bottom-line thinking related to environmental, social and economic functions to achieve traffic calming and water management. Streets play an important role in placemaking/keeping and can be integrated with traffic calming tactics. Landscaping, materials and means of conveyance can define a place and how people occupy that place. An individual street or section of a street might not be effective in dealing with rising flood conditions, but a network of multiple streets can increase the ability to deal with these conditions as well as social and economic functions.

Similar to smart buildings, streets need to be designed to function ecologically, amplifying strategic natural resource use. Low impact development (LID) streets, or green streets, are context-sensitive, designed to accommodate multiple transit modes, ensure pedestrian and bicycle safety, enhance sociability, and provide ecologically-based stormwater management. LID stormwater management goals for the right-of-way include minimization of impervious pavement and maximization of landscaped spaces and surfaces. This may entail design of new street geometries like the Dutch-inspired “shared street”, a street type essentially configured to function like a series of public gardens rather than solely as a traffic corridor.



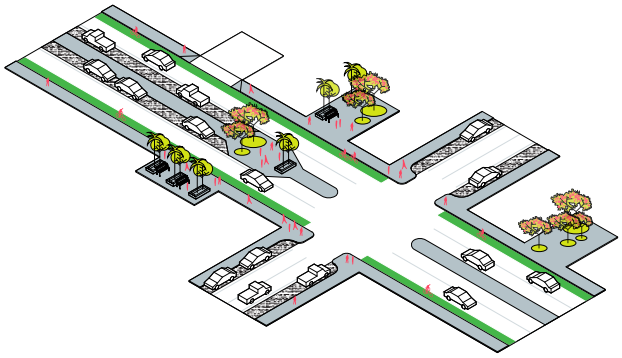
Place and Identity

Streets that highlight a sense of **Place and Identity** can incorporate landscaping that give a certain character or visual aesthetic based on characteristics of specific trees and plants. Streets may also integrate gateways for neighborhoods, districts or the City. Unique hardscapes can also be used to add to the identity or character of a place.



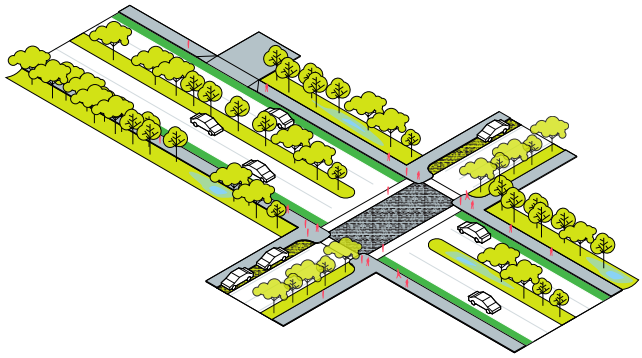
Healthy and Active Lifestyle

Street design that leans toward a **Healthy and Active Lifestyle** should facilitate safe biking and encourage walking by providing wider sidewalks and canopy trees for shading.



Focused Development

Streets within a **Focused Development** area should provide for multi-modal users by including wider sidewalks to accommodate pedestrian activity, adding transit stops and bike facilities. In some cases, street design may also consider on-street parking either on the primary or side streets to support economic growth.

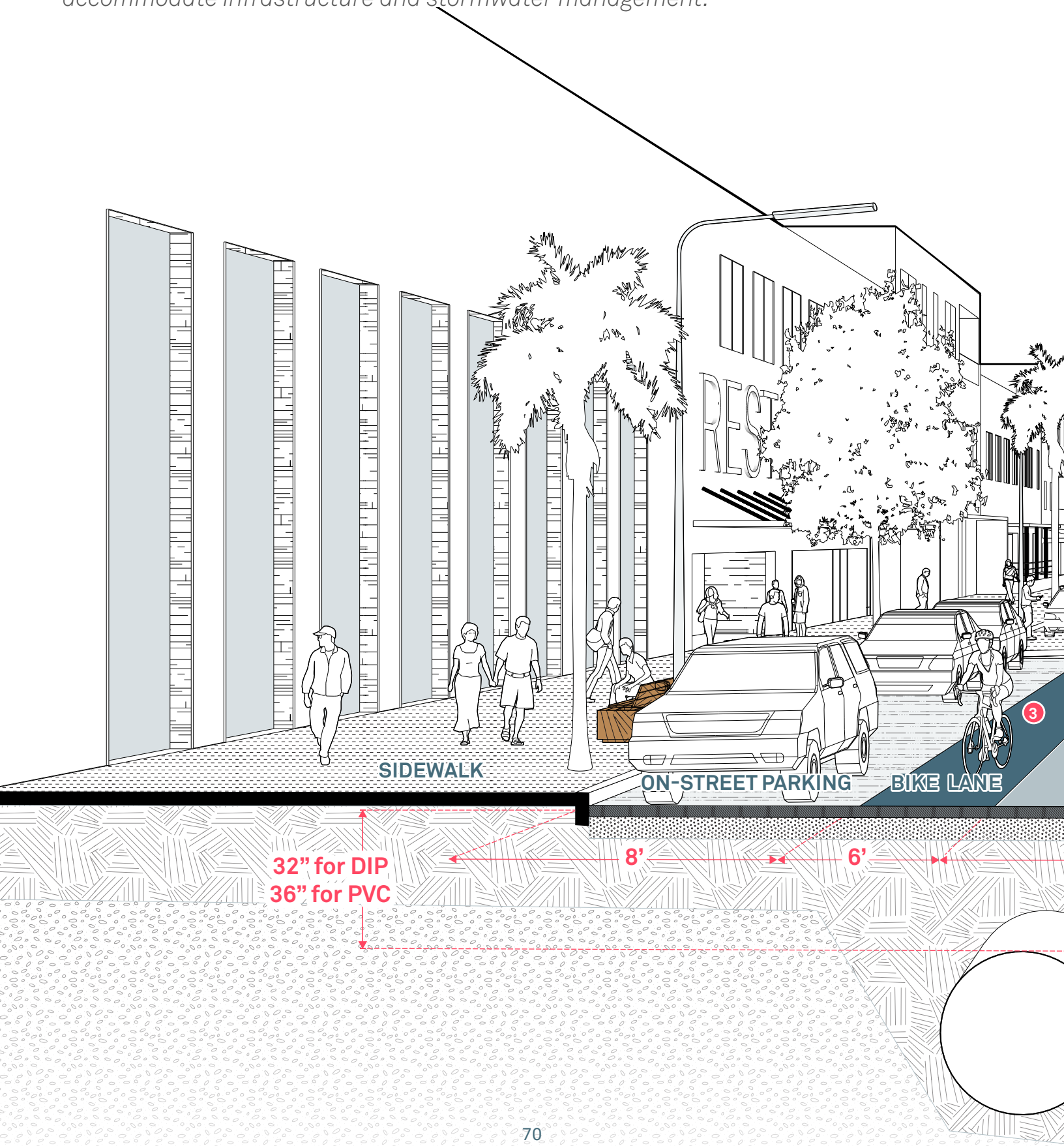


Flood Protection

Street design for **Flood Protection** should consider permeable hardscapes, landscape, and floodwater management tools when designing.

street anatomy

Streets are designed for safe utilization by multiple users; pedestrians, cyclists, motorists, and transit commuters all overlapping in a single space. Streets also accommodate infrastructure and stormwater management.



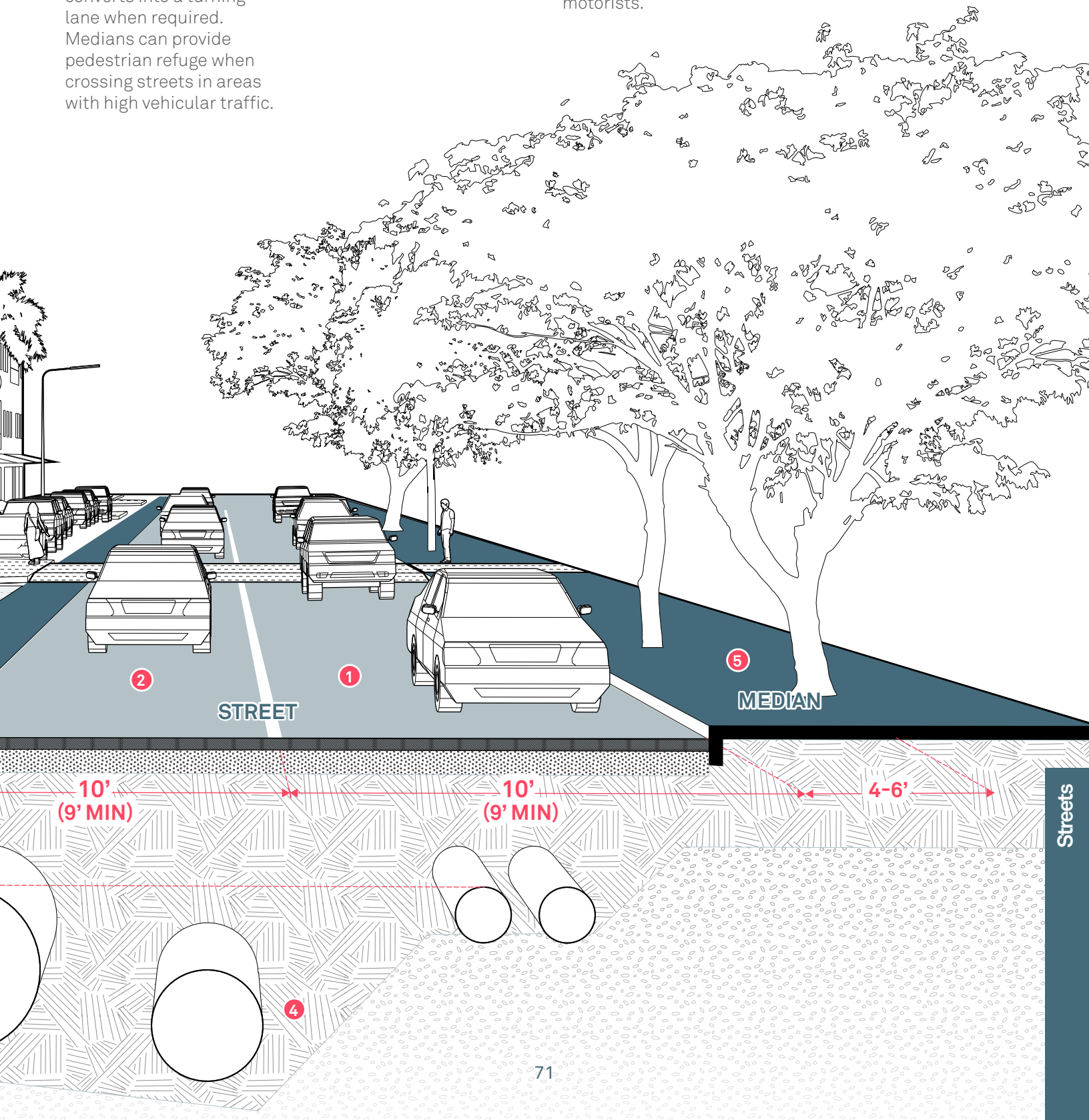
1 Typical lane widths range from 10 ft to 12 ft but can be reduced to 9 ft wide, based on the design vehicle.

2 When wider lanes are introduced to accommodate buses or large trucks they should be located on the side closest to the sidewalk. The lanes toward the center can be narrower.

3 Bike lanes are recommended to be 6ft wide but can be as narrow as 4ft. Where narrow bike lanes are adjacent to parallel parking spaces, a buffer should be added if space permits to protect cyclists/bikers from the door swings of exiting motorists.

4 Utilities should be located toward the center of the roadway to minimize removing or disturbing living infrastructure. See **Utilities p172** or **Reference Guide p294** for more details.

5 A median is a space that typically runs along the center of a road and converts into a turning lane when required. Medians can provide pedestrian refuge when crossing streets in areas with high vehicular traffic.



design speed

Design speed = Target speed. *Design speed is a tool used to determine geometric features of the roadway, not the maximum safe operating speed. Deliberately designing for desired vehicle speeds and behavior by changing street design can result in safer roads for all users. The assumed design speed should be logical with respect to the street typology, target speed, adjacent land use, and multi-modality. The range of walking, cycling, and activity, as well as the degree to which various commuting modes are mixed or separated, is a critical factor for safe vehicle speed. Creating safe vehicle speeds can provide opportunities to make a street feel more integrated with a city.*

15 mph SHARED STREETS SHOULD BE DESIGNED TO PRODUCE OPERATING SPEEDS THAT GENERALLY DO NOT EXCEED 15 MPH.

25 mph RESIDENTIAL STREETS SHOULD BE DESIGNED TO PRODUCE OPERATING SPEEDS THAT GENERALLY DO NOT EXCEED 25 MPH.

35 mph ARTERIALS AND COLLECTORS SHOULD BE DESIGNED TO PRODUCE OPERATING SPEEDS THAT GENERALLY DO NOT EXCEED 35 MPH.

35+ mph SPEEDS ABOVE 35 MPH ARE NOT SAFE FOR URBAN STREETS AND GREAT CARE IS NEEDED TO PROTECT OTHER USERS.

10-15 MPH

PERIPHERAL VISION ●●●●●●●●●●○○
STOPPING DISTANCE ●●●●●●●●●○○
SAFETY ●●●●●●●●●●●●

20-25 MPH

PERIPHERAL VISION ●●●●●●●○○○○
STOPPING DISTANCE ●●●●●●●○○○○
SAFETY ●●●●●●●●○○○

30-35 MPH

PERIPHERAL VISION ●●●○○○○○○○○
STOPPING DISTANCE ●●●●●○○○○○○
SAFETY ●●●●●○○○○○○

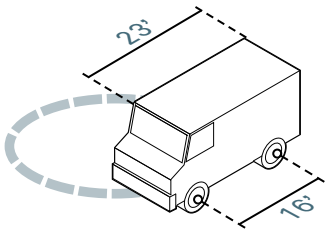
40+ MPH

PERIPHERAL VISION ●●○○○○○○○○○
STOPPING DISTANCE ●●●○○○○○○○○
SAFETY ●●●○○○○○○○○

design vehicle

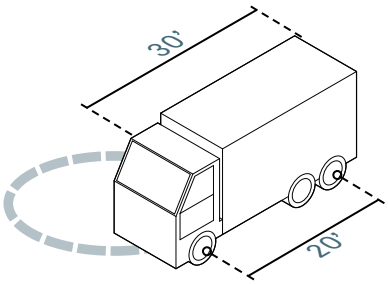
Streets should be designed for all users, including the most vulnerable. While street designs need to accommodate emergency vehicles, such as large fire trucks, it shouldn't dominate the safety, comfort, and characteristic of the public realm. The design vehicle focuses on pedestrian safety, low speeds and street access per vehicle type.

minimum design radius (MDR)
minimum inside radius (MIR)



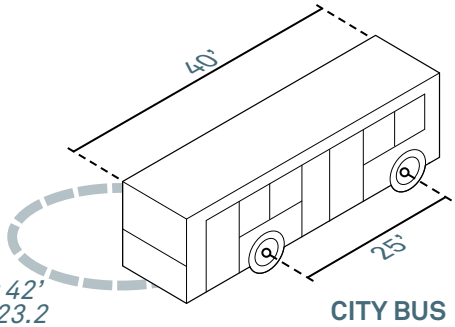
MDR: 24'
MIR: 15.3'

UPS TRUCK



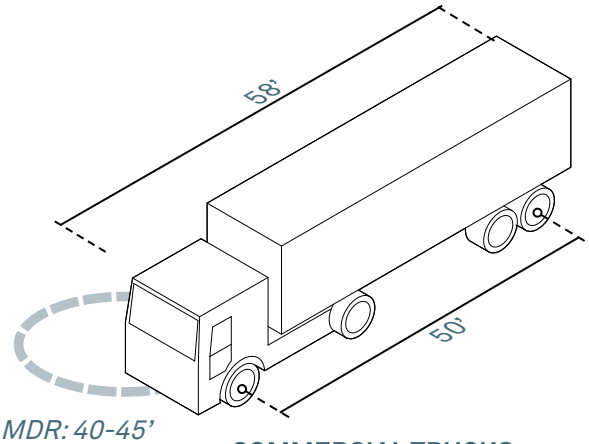
MDR: 42'
MIR: 28.4'

COMMERCIAL DELIVERY VEHICLE



MDR: 42'
MIR: 23.2

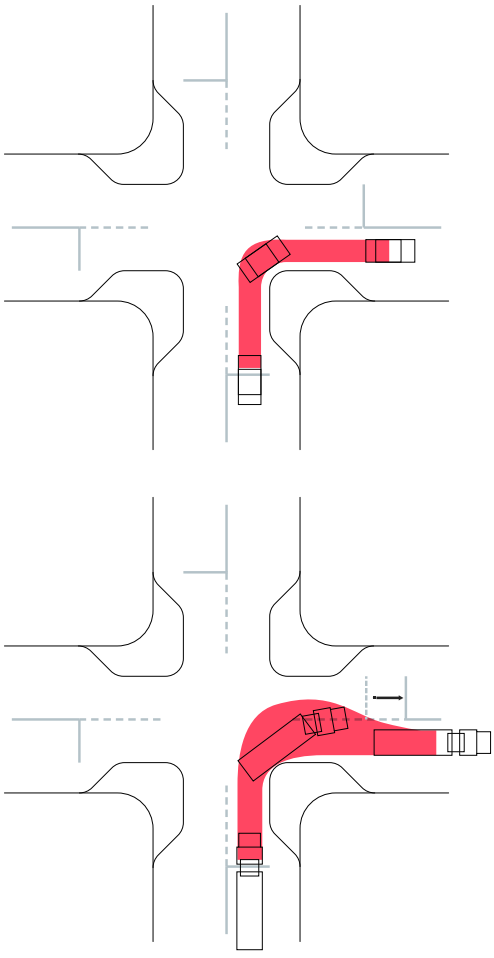
CITY BUS



MDR: 40-45'
MIR: 19.9-22.5'

COMMERCIAL TRUCKS

1. **CONSIDER THE TERRITORY AND DESIGN CHARACTERISTIC OF STREET.**
2. **SELECT AN APPROPRIATE DESIGN VEHICLE BASED ON STREET TYPOLOGY. THESE STREETS MAY NEED TO BE FLEXIBLE IN ORDER TO ACCOMMODATE LARGER VEHICLES. THE DESIGN VEHICLE IS CONSIDERED A FREQUENT USER OF THAT STREET.**
3. **ADJUST CURB RADII FOR THE DESIGN VEHICLE. THIS CAN BENEFIT PEDESTRIANS WHEN THE CROSSING DISTANCE IS REDUCED.**
4. **EMERGENCY VEHICLES, SUCH AS LARGE FIRE TRUCKS, HAVE CERTAIN REQUIREMENTS THAT NEED TO BE MET AND MAY REQUIRE THE FULL USE OF THE RIGHT-OF-WAY. THIS MEANS THAT, IF NECESSARY, THEY MAY NEED TO USE THE OPPOSITE LANE WHEN MAKING TURNS.**
5. **RESTRICT LARGE VEHICLES, SUCH AS TRUCKS AND BUSES, ON CERTAIN STREETS. THESE STREETS INCLUDE MORE PEDESTRIAN FRIENDLY STREETS OR STREETS THAT ARE VULNERABLE TO REGIONAL FLOODING.**



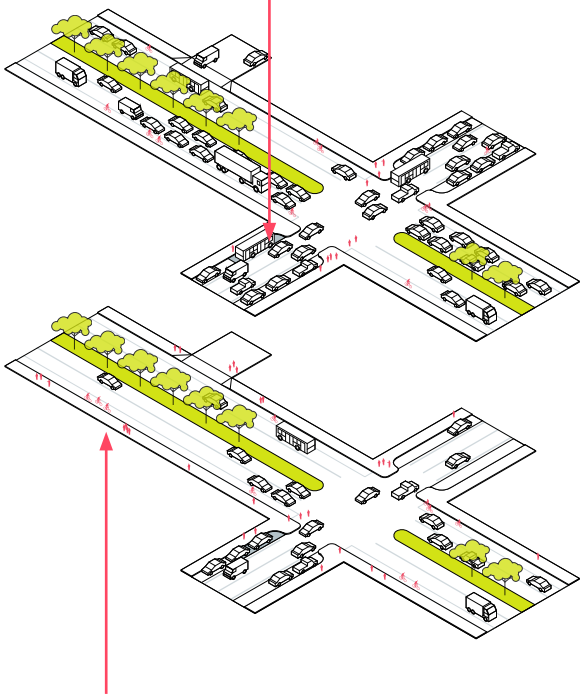
The image above shows how a street may be designed for smaller vehicles, but allows for larger vehicles to occasionally use by pushing back traffic stop and allowing the use of the oncoming lane.

design hour

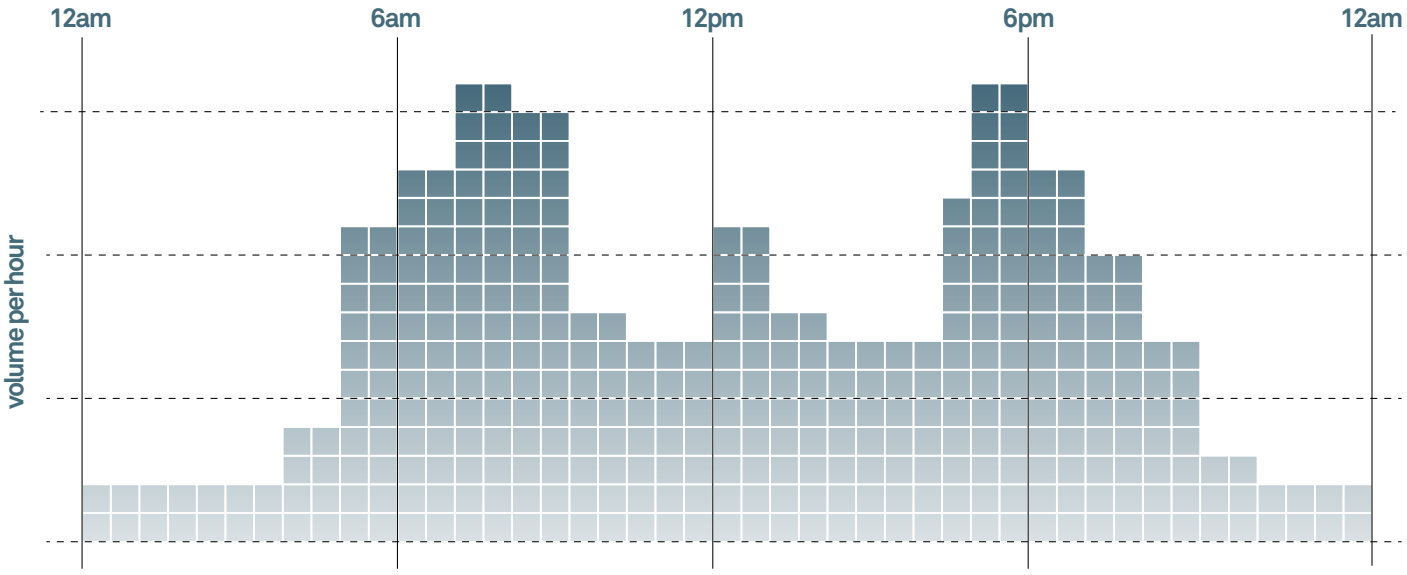
Streets can function differently throughout the day, the week and the year. The design hour looks at how streets can be designed to address this phenomenon effectively for all user types. During the span of a day, the number and variety of users of a street may differ. Certain areas may have more activity during weekdays, while the types of activities or number of users may vary considerably over weekends. Streets should be designed to operate comfortably, safely, and efficiently during a typical hour of the day rather than just the peak hours. A typical hour is usually the average between activity levels during peak, late night, mid-day, and weekend hours.

1. TO DEVELOP A MORE ACCURATE DESIGN HOUR, CONSIDER USING PERSON-TRIPS RATHER THAN JUST VEHICLE-TRIPS AS A MEASURE. THIS WILL ACCOUNT FOR PEDESTRIANS, TRANSIT USERS, MICRO COMMUTERS, AND CYCLISTS AS WELL.
2. THE DESIGN HOUR ANALYSIS SHOULD LOOK AT VARIOUS PEAK TIME HOURS THROUGHOUT THE DAY AND ACROSS THE WEEK, SINCE MODES OF TRAVEL, AMOUNT OF SHARED TRAVEL, AND TRAFFIC VOLUMES MAY FLUCTUATE.
3. BASED ON THE DESIGN HOUR, THE PUBLIC REALM CAN BE DESIGNED TO SWITCH BETWEEN PEAK TIMES AND DOWN TIMES. FOR EXAMPLE LANES CAN FUNCTION AS ON STREET PARKING DURING WEEK NIGHTS OR WEEKENDS

BUS DROP-OFF AREAS CAN BECOME PARKING SPACES DURING DOWNTIME AND OVER WEEKENDS, AS CAN LOADING ZONES.



SIDEWALKS CAN SUPPORT PEDESTRIAN MOVEMENT DURING PEAK TIMES AND CONVERT TO OUTDOOR EATING OVER WEEKENDS AND AT NIGHT.



Analyzing peak usage during the day.

design year

The design year is based on an estimation of the future traffic demand and volume for a specific street. These future projections should be aligned with the City's goals to achieve an intended outcome. The design year relies on travel demand models that usually assume an upward traffic demand for vehicles even when trends show otherwise. Capacity should be measured based on each mode of transport to the desired mode and activity on a street.

1. **A GIVEN MODE OF TRANSPORTATION MAY SEE AN INCREASE OF BENEFITS, SUCH AS COST, TIME AND EASE, AND OVERSHADOW ANOTHER MODE.**
2. **SINGLE OCCUPANT VEHICLE USE CAN DECREASE IN URBAN AREAS WHEN STREET DESIGN PROVIDES ALTERNATE MODES OF TRANSPORTATION, SUCH AS WALKING, BIKING, AND PUBLIC TRANSIT.**
3. **PARKING PLAYS A SIGNIFICANT ROLE IN TRAVEL DEMAND. IT CAN MAKE IT EASIER TO DRIVE A CAR AND REDUCE THE USE OF OTHER MODES OF TRANSPORT. ADJUSTING PARKING REQUIREMENTS CAN EQUALIZE THE SUPPLY OF PARKING BY ENCOURAGING THE USE OF PUBLIC TRANSPORTATION.**
4. **INCREASING CAPACITY FOR TRANSIT, BIKES, AND PEDESTRIANS WILL PROVIDE EXPONENTIALLY MORE SPACE TO MOVE MORE PEOPLE PER SQUARE FOOT OF LIMITED RIGHTS-OF-WAY.**

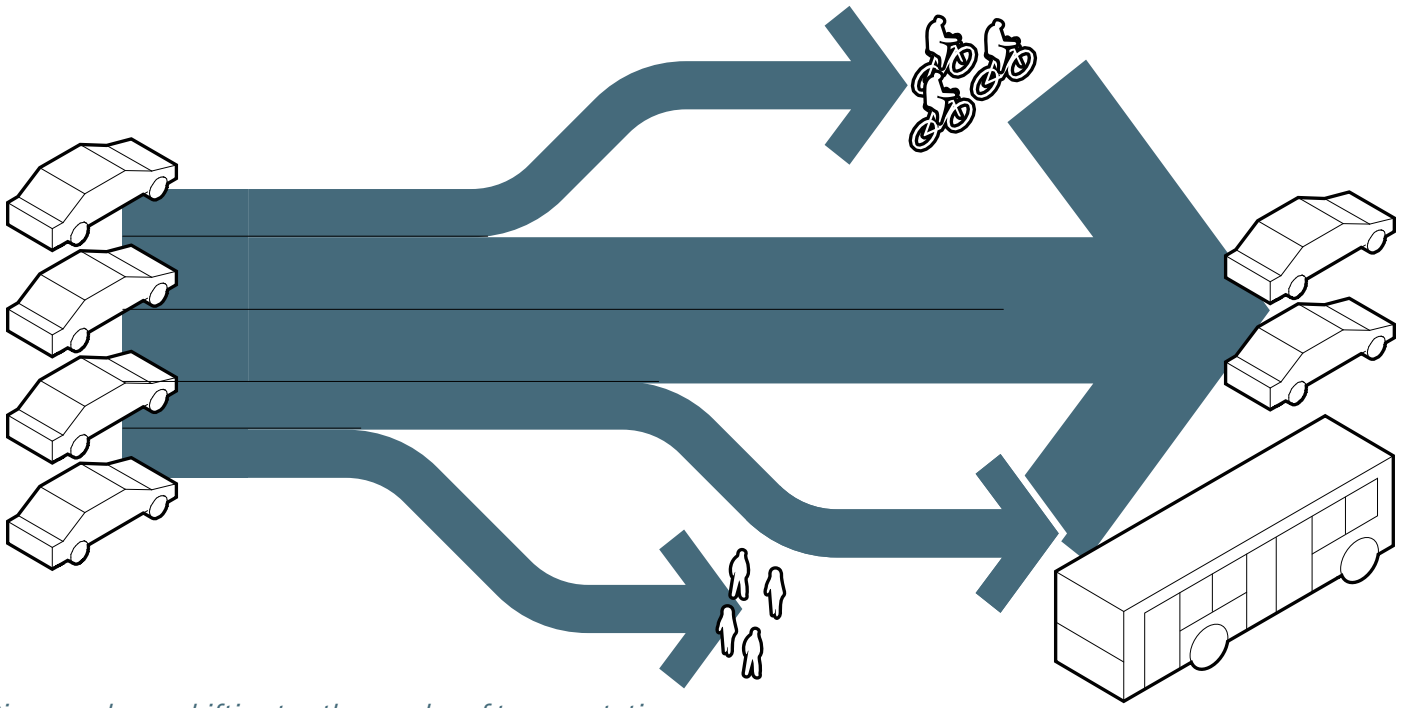
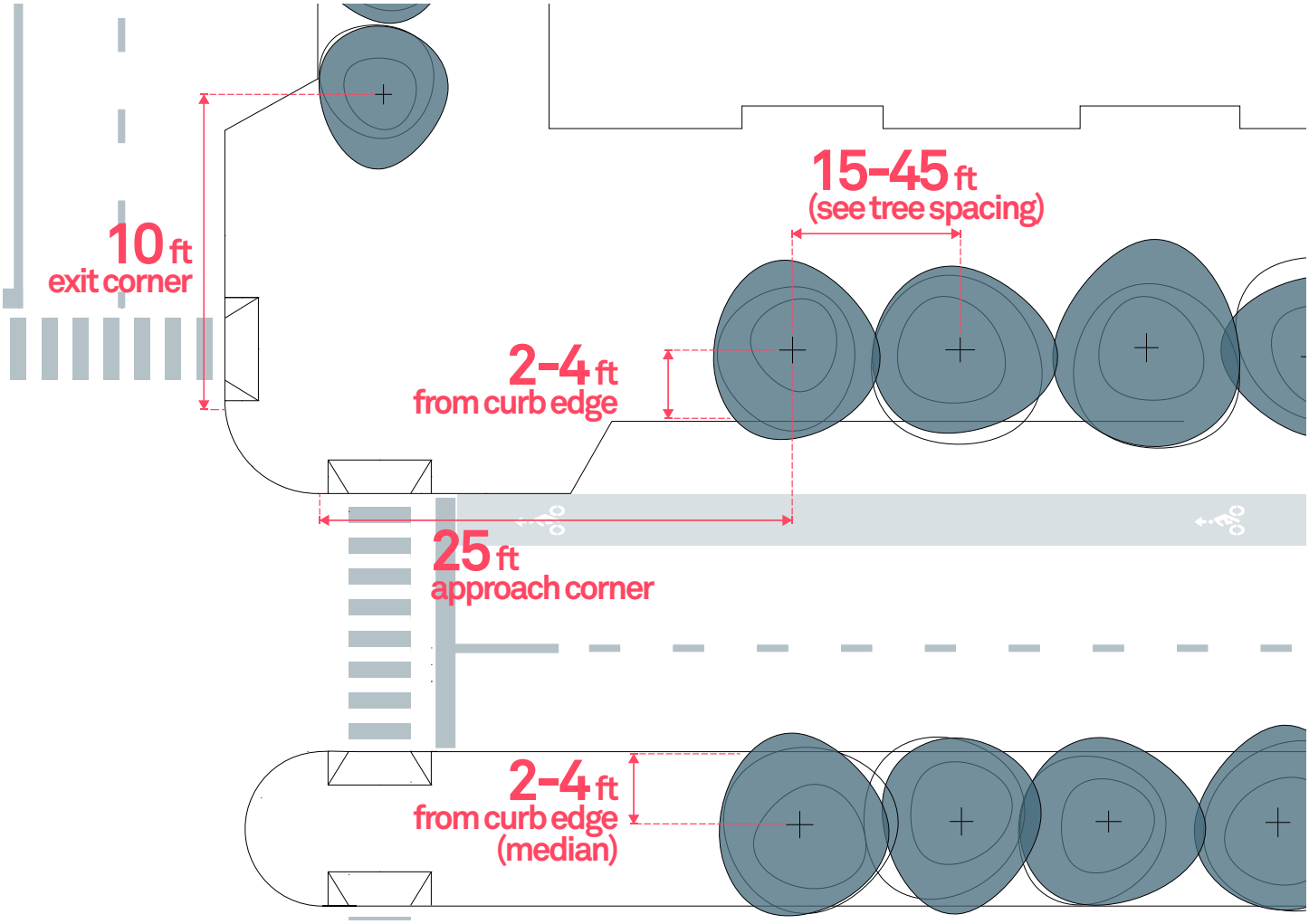


Diagram shows shifting to other modes of transportation or shifts in peak time use in the future.



street trees

Street trees provide both environmental and urban benefits. Selecting the appropriate tree for the appropriate location can ensure healthy growth and longevity while enhancing the streetscape and achieving the City's goals. Not all trees are appropriate for planting along streets since their roots may be destructive, their canopies may impede on utilities or roadway clearance, or they may not thrive in that type of environment. Selecting the appropriate tree may require additional input based on context and available space.

tree spacing

Small trees (less than 20 ft mature crown) spacing should be 15 to 20 ft on center between trees.
Medium sized trees (less than 45 ft mature crown) spacing should be 20 to 30 ft on center between trees.
Large trees (more than 45 ft mature crown) spacing should be 25 to 45 ft on center between trees.

tree coordination

2-4 ft	DISTANCE FROM CURB EDGE TO TREE
5 ft	DISTANCE FROM LIGHT POLE TO TREE
10 ft	DISTANCE FROM INTERSECTION TO TREE (EXIT CORNER)
25 ft	DISTANCE FROM INTERSECTION TO TREE (APPROACH CORNER)
6 ft	DISTANCE FROM BUS STOP TO TREE
50 ft	MINIMUM SETBACK FROM UTILITY LINES FOR LARGE TREES
30 ft	MINIMUM SETBACK FROM UTILITY LINES FOR MEDIUM TREES
0 ft	SMALL TREES LESS THAN 14 FT TALL MAY BE PLANTED ADJACENT TO UTILITY LINES

root environment

Open Tree Trenches

An open tree trench is an area of soil connecting a row of trees covered with either mulch, groundcover, or turf grass. The sidewalk should be pitched towards the open tree trench to aide in stormwater management. Open tree trenches are suited for local and collector streets with a typical size of 4 ft wide and 3 ft deep. In constrained areas it may be as wide as 2.5 ft.

Covered Tree Trenches

A covered tree trench is a linear channel covered by pavement. It is designed to providing structural support for sidewalks while accommodating root growth. Covered trenches should permit passive irrigation to reach the soil. Alternative coverings may include pervious pavement or flexible, perforated pipes beneath the pavement. Covered tree trenches are appropriate for areas with heavy pedestrian traffic and high turnover parking. The trench should be at least 5 ft wide and 3 ft deep. A 2 x 2 ft opening needs to be provided around the tree trunk.

Tree Well

Tree wells or tree pits are in-ground box housing for a single tree. Tree wells can have walled sides, modular suspended pavement system (e.g. Silva Cell) or structural soil systems to protect soil from compaction and retain stormwater. Tree wells should be used where space or resources do not permit the use of open or covered tree trenches. The tree well should be made as large as possible to provide maximum rooting volume without impeding the Pedestrian Zone or setback from curb edge. An ideal tree well size is at least 4 ft by 10 ft and 3 ft deep with an opening around the trunk of 2 x2 ft. Smaller tree wells can be as narrow as 2.5 ft

Raised Tree Beds

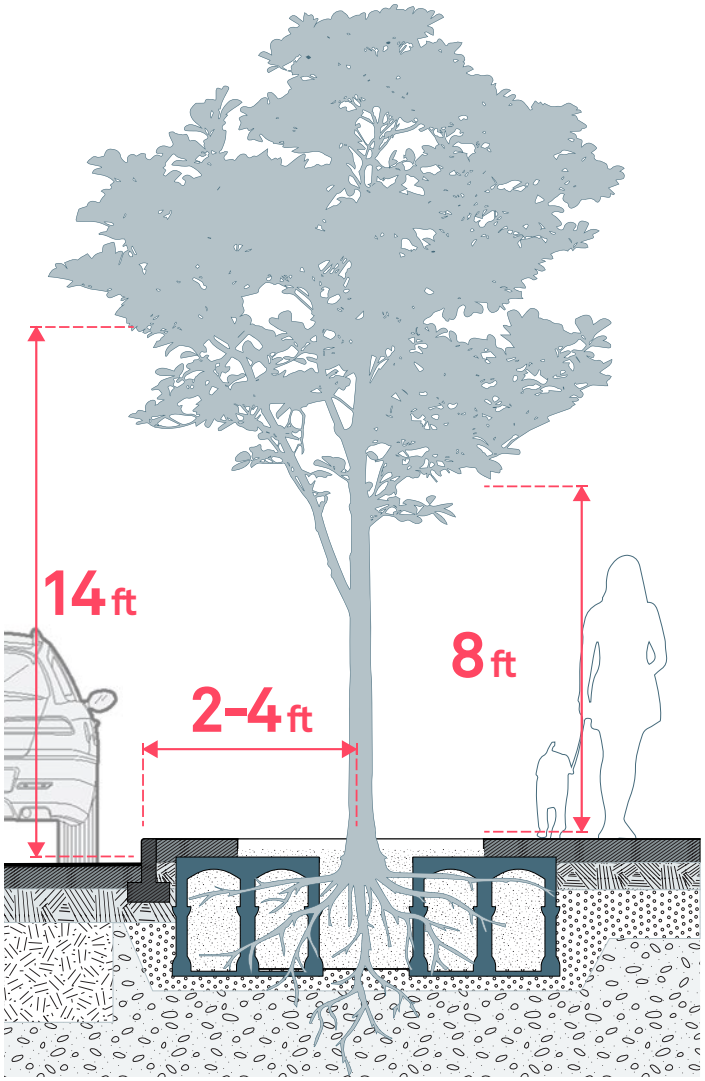
Raised tree beds contain much of the soil volume in structures above grade to accommodate trees in areas where subsurface conditions might prohibit other methods (e.g. saltwater intrusion). The tree growth is limited by the size of the raised bed and is appropriate for smaller trees. Heights of the tree bed may vary between 1 ft and 2 ft but is preferred at 18 in if seating is a consideration. Tree beds should be sized as large as needed to provide enough rooting volume while maintaining appropriate sidewalk clearances. If subsurface space is available for root growth a shallow layer of structural soil should be added below the adjacent pavement.

street tree options:

- GUMBO LIMBO
- PIGEON PLUM
- SILVER BUTTONWOOD
- RED MAPLE
- RED MULBERRY
- EVERGLADES PALM
- CABBAGE PALMETTO
- ROYAL PALM

see Landscape p200

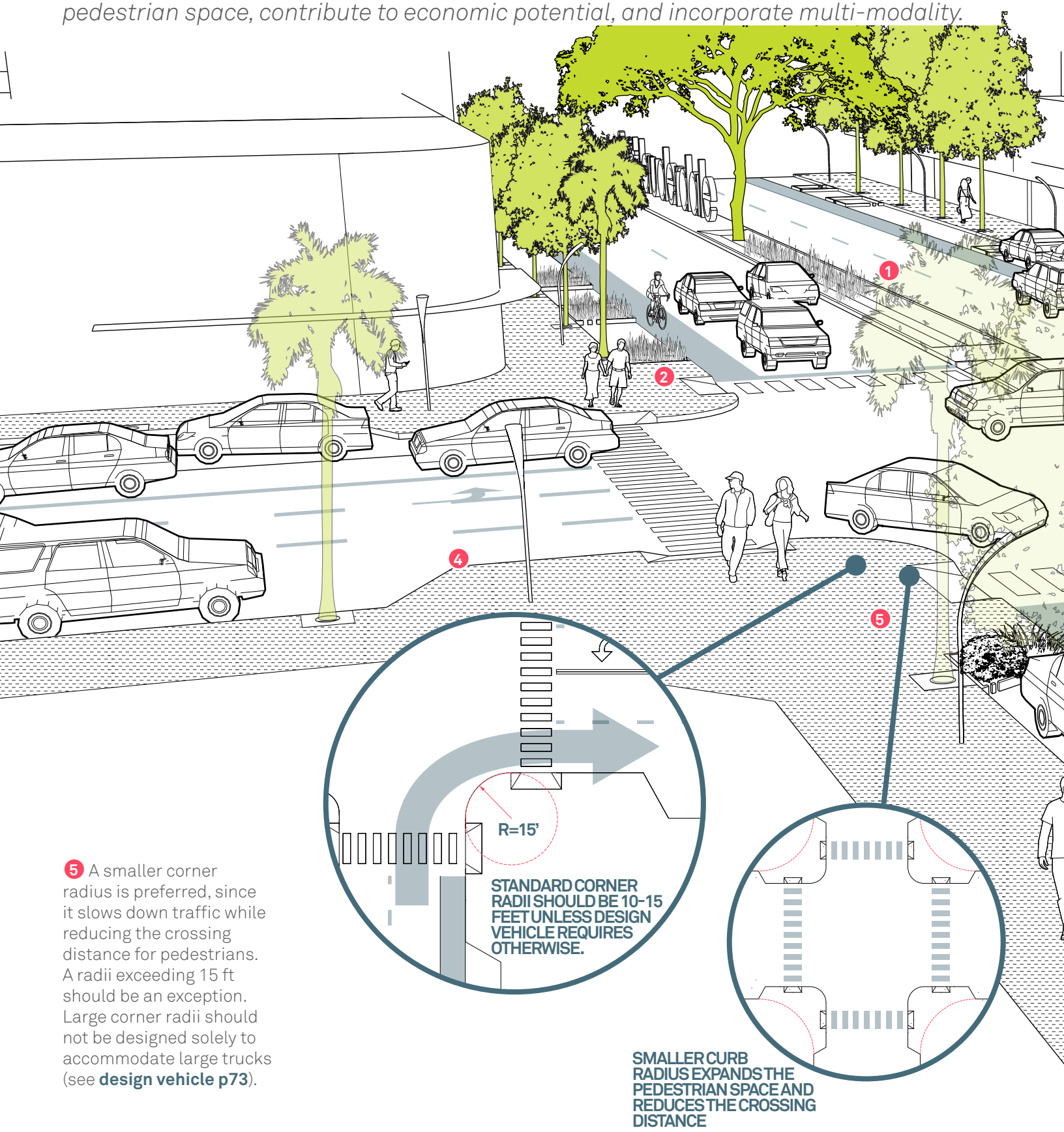
1. **SHADE TREES ARE PREFERRED WHENEVER POSSIBLE.**
2. **PALMS AND COLUMNAR TREES ARE BETTER SUITED FOR NARROW PLANTING SPACES, WHILE TREES WITH LARGE CANOPIES AND DENSE FOLIAGE ARE BETTER FOR STREETS WITH WIDER SIDEWALKS AND MEDIANS.**
3. **TREES WITH BRANCHES THAT EXTEND INTO THE PATH OF TRAVEL SHOULD MAINTAIN 8.5 FT OF VERTICAL CLEARANCE FOR SIDEWALK AND 14.5 FT FOR STREET.**
4. **BEFORE SELECTING A STREET TREE, IT SHOULD BE UNDERSTOOD IF THE SELECT SPECIES WILL BE ACCOMMODATING OF OTHER STREET ELEMENTS, POLE-MOUNTED UTILITIES, AND STRUCTURES WHEN IT IS FULL GROWN.**
5. **ALLEES CAN BE CREATED ON SELECT STREETS WITH ENOUGH WIDTH BY PLANTING A DOUBLE ROW OF TREES. ALLEES CAN BE A DISTINCTIVE DESIGN USED FOR GATEWAYS.**
6. **HEALTHY ROOTS REQUIRE AN ACCEPTABLE AMOUNT OF SPACE BASED ON TYPE OF TREE (SEE LANDSCAPE PALETTE P200). IN SOME CASES IT MAY BE MORE BENEFICIAL TO FIND SPACE TO CLUMP TREES TOGETHER RATHER THAN TRYING TO FORCE THEM INTO ROWS WITH NARROW SPACE.**



Root environment for street trees

intersections

Intersections need to function efficiently while providing safety and comfort to all users. When designed appropriately, intersections can create gateways, maximize pedestrian space, contribute to economic potential, and incorporate multi-modality.



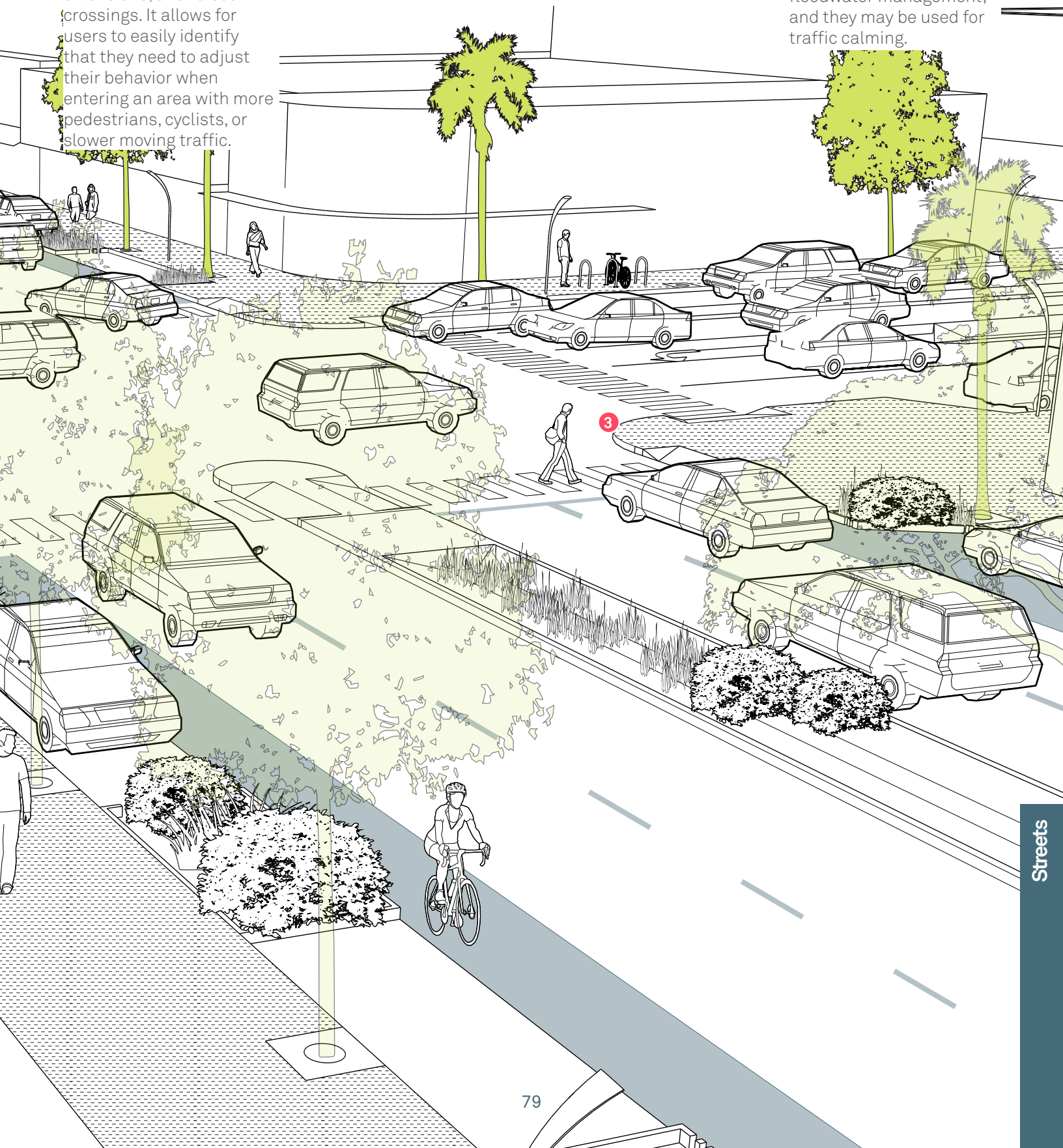
5 A smaller corner radius is preferred, since it slows down traffic while reducing the crossing distance for pedestrians. A radii exceeding 15 ft should be an exception. Large corner radii should not be designed solely to accommodate large trucks (see **design vehicle p73**).

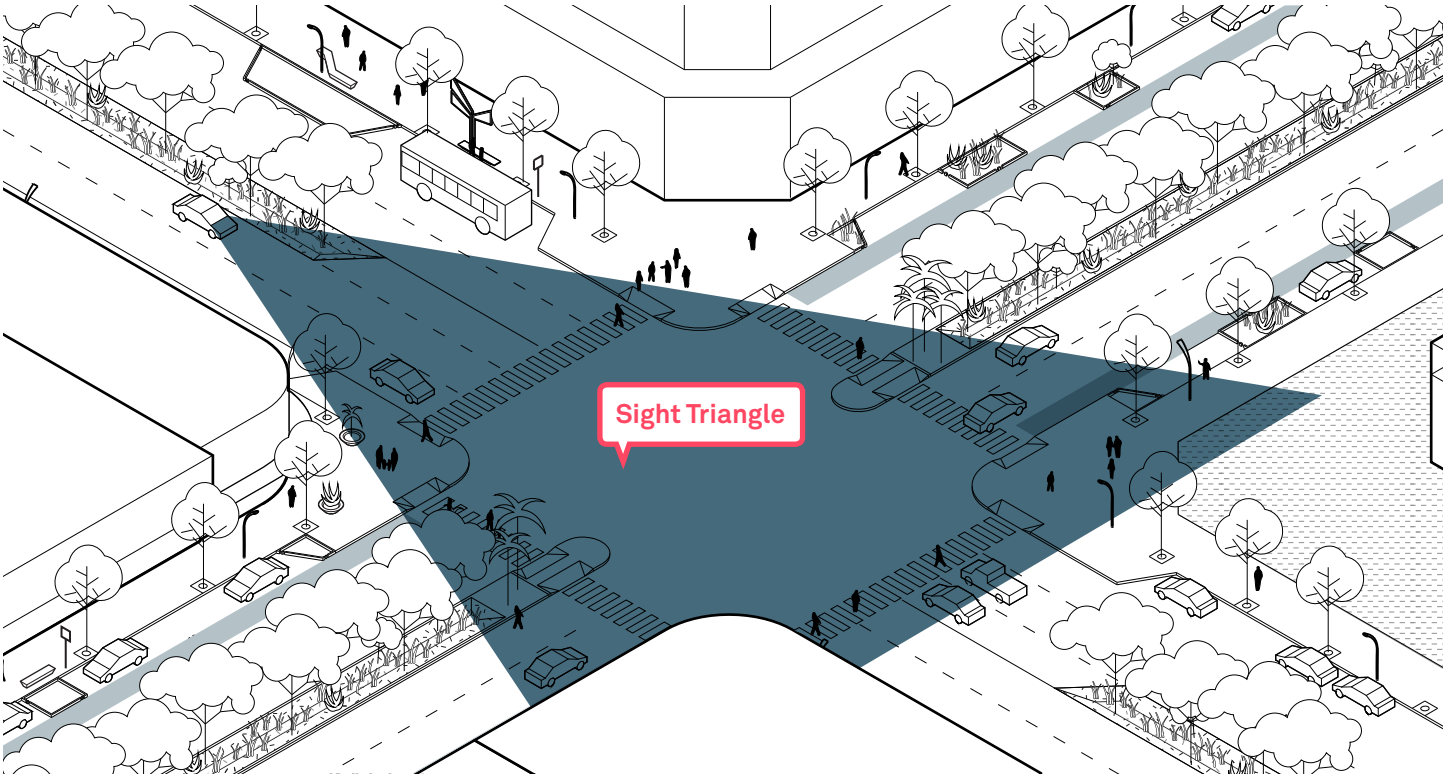
1 Intersections can perform like gateways, since they may sometimes create a transition from larger to smaller streets, using treatments such as reduced corner radii, curb extensions, and raised crossings. It allows for users to easily identify that they need to adjust their behavior when entering an area with more pedestrians, cyclists, or slower moving traffic.

2 Intersections are shared spaces and should be designed for mutual awareness of all users, allowing everyone to feel comfortable while crossing the intersection.

3 Intersections should be accessible for all users. ADA standards must be met at all intersections for pedestrian crossing.

4 Curb extensions may be used for several different reasons. They can increase the visibility of pedestrians while reducing the crossing distance. They may be used for floodwater management, and they may be used for traffic calming.





visibility

Intersections should be designed to facilitate visual contact between street users, ensuring that motorists, cyclists, pedestrians, and transit vehicles read intersections as shared spaces. This can be achieved through a variety of design strategies, such as low-speed intersection approaches, trees, and curbside amenities so as not to impede standard approach, departure, and sight distances.

1. INTERSECTIONS SHOULD BE DESIGNED TO FACILITATE EYE CONTACT BETWEEN MOTORISTS, CYCLISTS, AND PEDESTRIANS.
2. VISIBILITY CAN BE IMPROVED BY REMOVING ON-STREET PARKING WITHIN 20 FT OF THE INTERSECTION.
3. STREET TREES CAN BE LOCATED NO CLOSER THAN 10FT FROM THE INTERSECTION AT AN EXIT CORNER AND 25FT AT AN ENTRANCE CORNER.
4. INTERSECTIONS NEED TO BE APPROPRIATELY LIT TO ENSURE VISIBILITY, INCLUDING PEDESTRIAN SCALED LIGHTS.
5. TO PREVENT HIGHER SPEEDS AND INCREASE PEDESTRIAN SAFETY, SIGHT LINE STANDARDS SHOULD BE DETERMINED USING TARGET SPEEDS.
6. COMPACT INTERSECTIONS PLACE MORE ACTIVITIES WITHIN THE SIGHT TRIANGLE. ALLOWING EVERYONE TO BE AWARE OF EACH OTHER AND POTENTIAL CONFLICTS.

VEHICLE SPEED	STOPPING SIGHT DISTANCE
15 mph	70 ft
20 mph	90 ft
25 mph	115 ft
30 mph	140 ft
35 mph	165 ft

major intersections

Intersections of two major streets require critical evaluation when designing. The streets leading up to these intersections often handle higher traffic volumes across multiple modes of transport. They use a larger design vehicle and may be part of evacuation routes. The preferred components, such as compact design, pedestrian focused crossings, and landscaping, may not always be possible, and may need some design negotiation. These intersections should balance traffic volumes and design to establish a hierarchy of street users, while enhancing safety and function of the intersection.

1. **MAJOR INTERSECTIONS SHOULD APPROPRIATELY DESIGNED TO MAINTAIN EASE OF USE FOR ALL USERS.**
2. **MINIMIZE UNUSED SPACE BY ALLOWING FOR CYCLIST AND PEDESTRIAN USE.**
3. **LANES SHOULD BE ALIGNED THROUGH INTERSECTIONS AND CURB EXTENSIONS ADDED TO ADMINISTER TURNING LANES AND REDUCE MERGING AND WEAVING.**
4. **BIKE FACILITIES SHOULD BE CLEARLY MARKED ESPECIALLY WHEN ADJACENT TO LEFT TURNING LANES.**

major/minor intersections

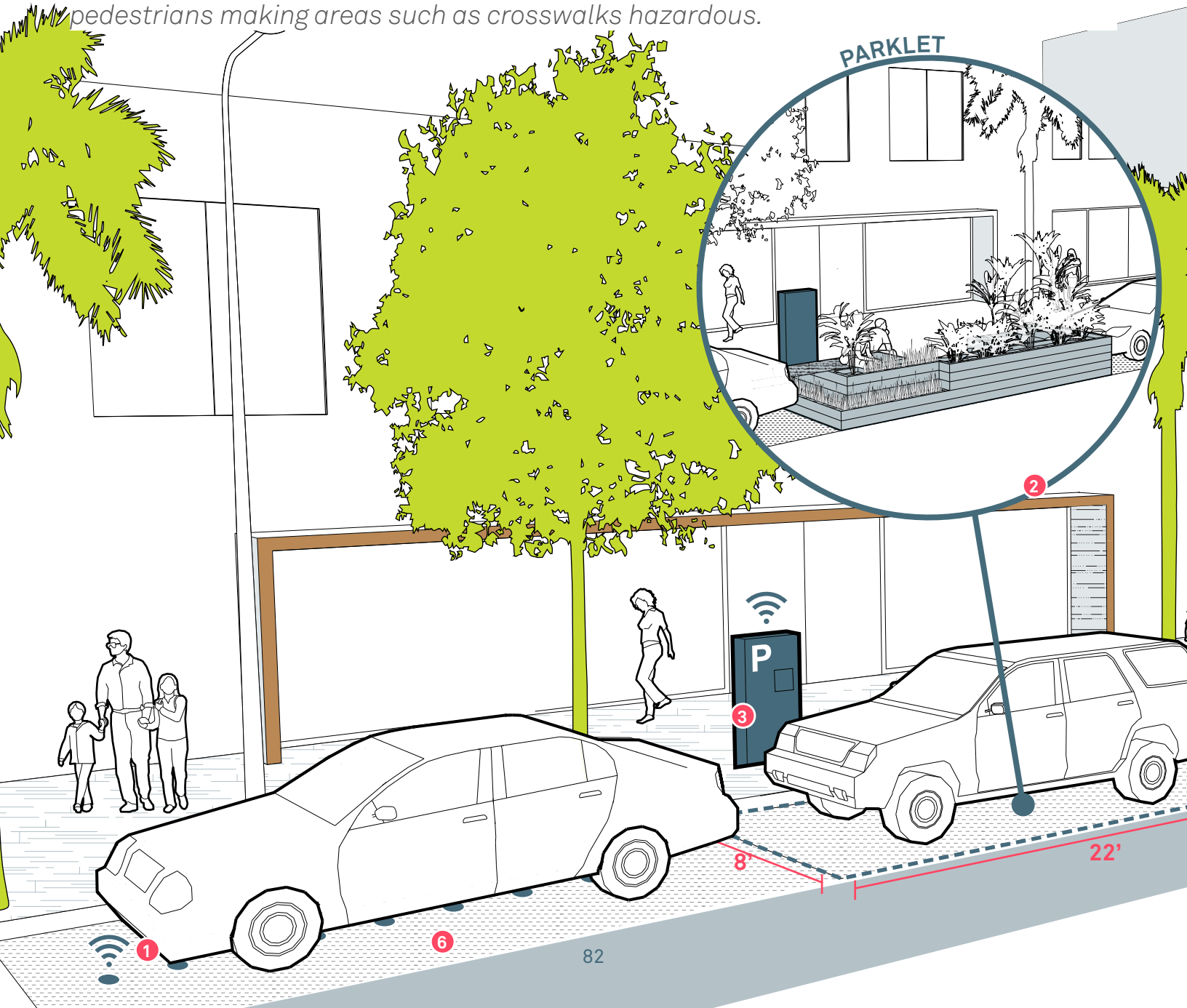
Major streets that intersect with minor streets have a smaller presence than most major intersections. They are not designed to the same extend as major intersections and can sometimes overlook pedestrians and cyclists. Major/minor intersections should be designed to alert drivers when turning onto a street with slower speeds.

1. **USE TRAFFIC CALMING TOOLS TO REDUCE TRAFFIC SPEEDS ALONG MAJOR STREETS TO HELP IMPROVE CROSSING SAFETY FOR PEDESTRIANS AND CYCLISTS ALONG MINOR STREETS.**
2. **INTRODUCE RAISED CROSSINGS, CURB EXTENSIONS, OR REDUCED CURB RADII TO REDUCE TURNING SPEEDS ONTO MINOR STREET.**
3. **SITUATE BUS STOPS AFTER THE INTERSECTION TO IMPROVE SAFETY AND VISIBILITY.**

on-street parking

On-street parking offers a number of important benefits. On-street parking is more efficient than off-street since the spaces are used more frequently and continuously due to their proximity to destinations and ease of access. Businesses are supported by on-street parking and residential streets also benefit from an appropriate amount of available spaces. On-street parking also has a traffic calming effect, encouraging drivers to slow down. The orientation or proximity of parked vehicles to the travel lanes changes driving behavior and reduces traffic speeds.

Implementing on-street parking requires appropriate design elements and considerations. When designing on-street parking, consideration should be given to clearance for opening car doors, as well as passing cyclists and pedestrians. Improperly placed parked vehicles can also impede sight lines for other drivers or pedestrians making areas such as crosswalks hazardous.



1 Smart spaces make use of sensors in each parking space to determine if the space is empty and available for use. If available, the associated app notifies users that a space is available and the location of the space. Smart spaces can reduce congestion since fewer drivers will be circling around to find an available space.

2 On-street parking spaces can be converted into parklets. Parklets are conversions of one or more on-street parking spaces, either temporarily or long-term, creating extensions of the public realm that provide seating, green space or commercial use. In some dense areas bike sharing or bicycle parking may be a priority and with limited sidewalk room parking spaces may need to be converted to accommodate the need.

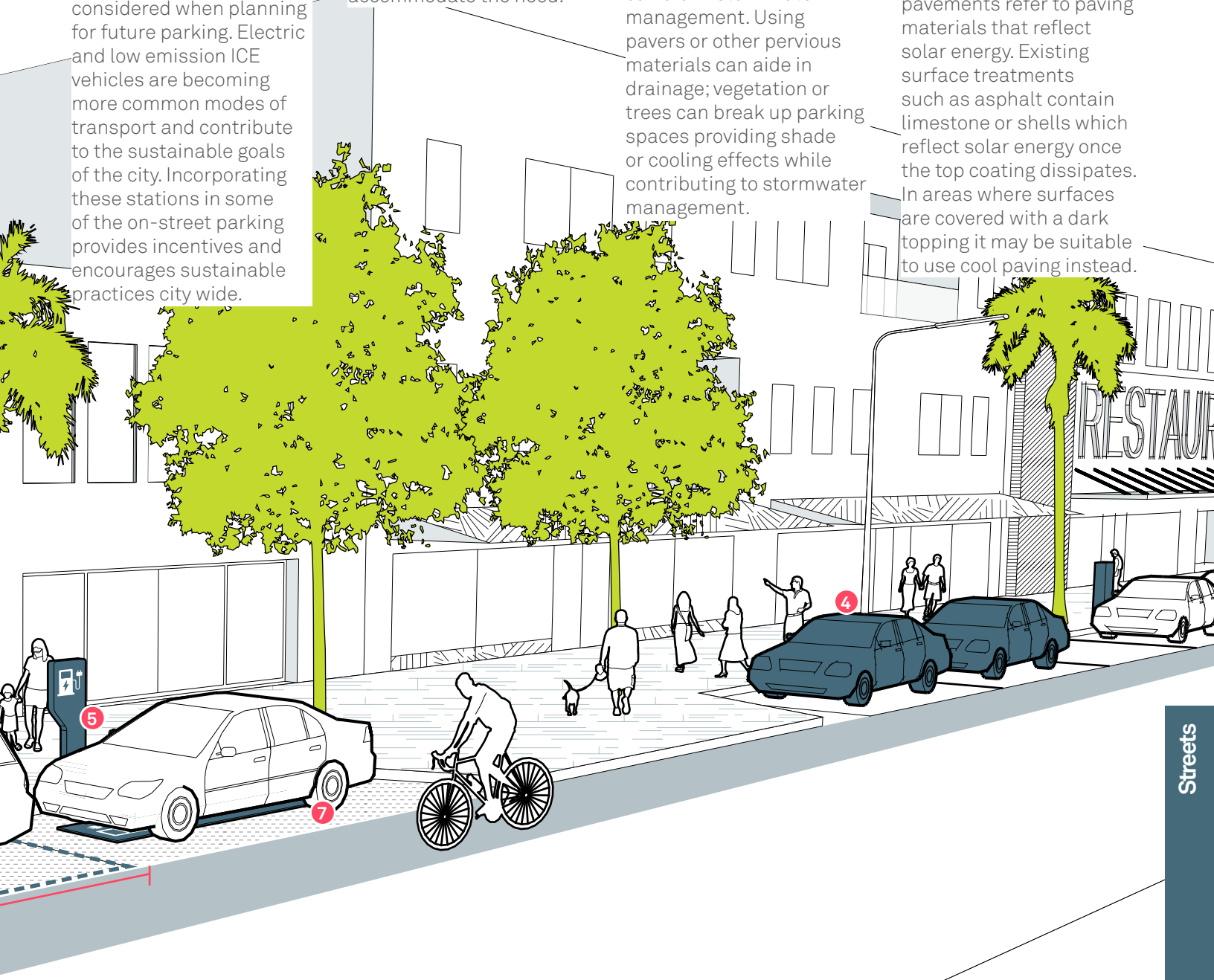
3 Smart meters reduce the amount of parking meters since they can be associated with multiple parking spaces and are typically solar powered. They also provide multiple payment methods and can be accessed via a phone app. The app also provides the ability to extend the parking and reduce ticketing.

4 Parked cars create a vertical separation between the road and sidewalks that act as a buffer for pedestrians. When shifting the bicycle lane to the space between the on-street parking and sidewalk the parked cars can provide the same safety to cyclists.

5 Vehicle charging stations should be considered when planning for future parking. Electric and low emission ICE vehicles are becoming more common modes of transport and contribute to the sustainable goals of the city. Incorporating these stations in some of the on-street parking provides incentives and encourages sustainable practices city wide.

6 The materials used for on-street parking can aid in stormwater management. Using pavers or other pervious materials can aide in drainage; vegetation or trees can break up parking spaces providing shade or cooling effects while contributing to stormwater management.

7 Cool pavements can be used on unshaded surfaces to reduce heat islands. The term cool pavements refer to paving materials that reflect solar energy. Existing surface treatments such as asphalt contain limestone or shells which reflect solar energy once the top coating dissipates. In areas where surfaces are covered with a dark topping it may be suitable to use cool paving instead.



sidewalk anatomy

Sidewalks are a vital part of the public realm -- these conduits not only allow for movement and access of pedestrian traffic, but also provide space for interaction and enhance the city. Sidewalks should provide pleasant and safe pedestrian environments while serving multiple functions, including: green infrastructure, opportunities for resting, commercial activities, utilities, and other amenities. Sidewalks should almost always be provided on both sides of the street. To balance desired amenities and safe comfortable pedestrian spaces sidewalks should be organized based on a series of sidewalk zones. These zones exist between the building edge and the curb edge.

1 The **frontage zone** is where the building extension connects with the sidewalk. The extension or connection can happen through entryways, doors, overhangs, seating, or even sandwich boards. The frontage zone comprises of the structure, façade and accessories of the building that fronts the street, including the space immediately adjacent to the building.

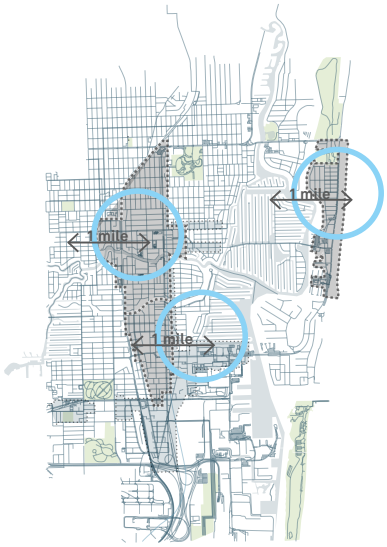
2 The **pedestrian zone** is the primary accessible through zone that runs parallel to the street. It is the area of the sidewalk that conveys movement of pedestrians by providing safe, adequate and accessible space.

3 The **furniture zone** is the area of the sidewalk where furniture, infrastructure and other amenities are located. The furniture zone is located between the curb edge and the pedestrian zone. It is often the section of the sidewalk that contracts when adequate space is not available or expands when traffic calming tools or living infrastructure such as bioswales, planters or rain gardens are added to the street.

walkability

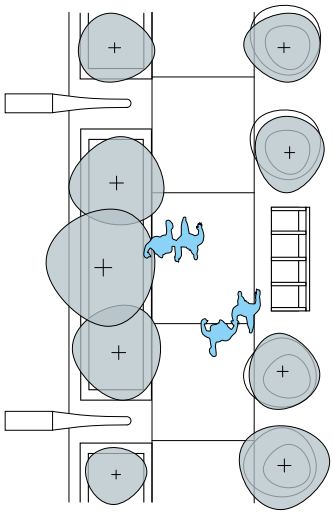
Walkability is a measure of how practical and pleasant an area is to walk. There are several factors that contribute to making a street walkable. These factors include; access, proximity, comfort, and safety. Walkable areas can contribute to a ***Healthy and Active Lifestyle, Place and Identity,*** *and* ***Focused Development.***

1. **INTERCONNECTED STREETS MIXED WITH PUBLIC SPACES PROVIDE OPPORTUNITIES FOR PEDESTRIAN ACCESS AND MOBILITY.**
2. **STREETS SCALED WITH PEDESTRIANS IN MIND AND TRAFFIC CALMING TOOLS TO SLOW MOTOR VEHICLE SPEEDS CAN IMPROVE SAFETY AND COMFORT.**
3. **INCORPORATE COHESIVE STREET FURNISHINGS AND PUBLIC ART TO ENHANCE THE PEDESTRIAN EXPERIENCE WITHOUT INTERFERING WITH THE PEDESTRIAN ZONE.**
4. **WELL-DESIGNED INTERSECTIONS AND MIDBLOCK CROSSINGS CAN ENSURE SAFE AND CONVENIENT CROSSINGS FOR PEDESTRIANS.**
5. **PLANTING BUFFERS AND OTHER LANDSCAPING CAN IMPROVE THE AIR QUALITY AND PROVIDE A COOLING EFFECT WHILE REDUCING THE URBAN HEAT ISLAND EFFECT.**
5. **WALKABILITY CAN BE EXTENDED TO ADJACENT AREAS BY INTEGRATING OTHER MODES OF TRANSIT SUCH AS BIKING, MICRO COMMUTING (SCOOTERS), OR PUBLIC TRANSIT.**



PROXIMITY TO URBAN CENTERS

Walkability is measured by the proximity to an urban center or an amenity and typically falls within a radius of 1/4-mile to 1-mile distance depending on the type of destination.

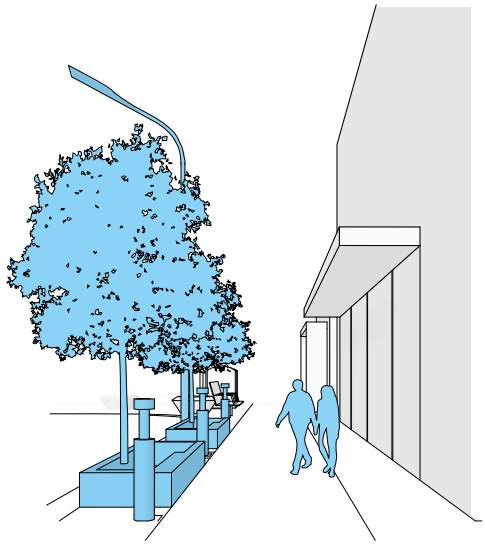


ADEQUATE CLEARANCE

The American Disabilities Act (ADA) requires that sidewalks provide a minimum of 5 ft clear width for sidewalks, to allow for 2 wheelchairs to navigate alongside each other. However, in thriving urban centers, it is desirable to have at least 8 ft of sidewalk width for 2 couples to pass each other.

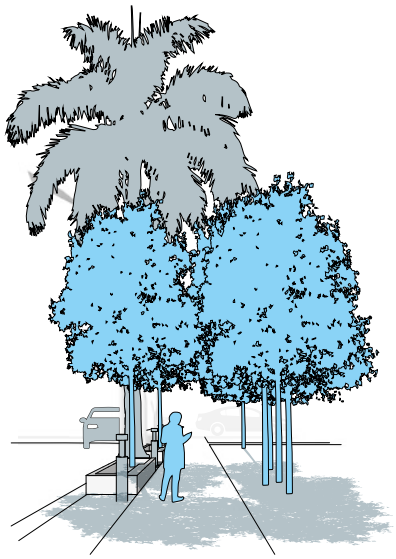
AVAILABILITY OF SEATING

Seating provides a place of rest for pedestrians of all ages. When designing seating, consider the orientation to the street and access to shade.



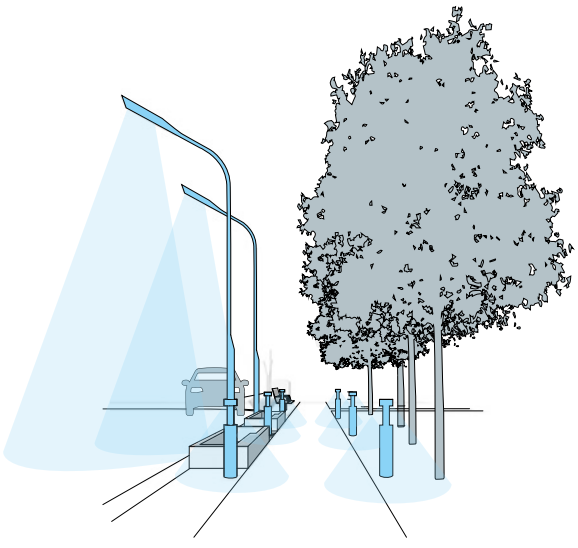
PEDESTRIAN SAFETY

Pedestrian safety is enhanced by providing a buffer between vehicular traffic and the pedestrian zone. Examples include on-street parking bollards, planters, street lights and bike racks.



SHADED SIDEWALKS

In order to prevent heat exhaustion, line sidewalks with shade trees or structures. Pedestrian zones can feel up to 15 degrees cooler with proper shade.



WELL-LIT SIDEWALKS AND STREETS

Pedestrians should feel a sense of safety throughout the day and the night. An even distribution of lighting will allow for farther visibility and improve visibility of the road at a pedestrian scale.

street types

Streets are the largest aspect of the public realm and encompasses more than just the conveying of people and traffic. Streets impact economies, provide social opportunities, and help to establish communities. It is important to design streets to support the context and multifaceted needs of a community. Different street types can serve different functions, and each can play an important role in a neighborhood. Street Types are also not always continuous along the entire length of the street and it may change typologies as the context or functions of the road changes. Street designs should balance multi-modality and create vibrant public spaces that enhance the quality of life for residents and encourage healthy living and active lifestyles.

roadway functional classification system

Like most jurisdictions in the United States, Fort Lauderdale's streets have been categorized to better understand how they serve motor vehicle traffic. Each road's classification has been determined by the state using guidelines developed by AASHTO. Occasionally projects need to take into consideration this roadway classification as it helps determine how the road and network needs to be treated to handle traffic volumes and other conflicts that may arise as a result of design changes. The road classifications for Fort Lauderdale are as follows:

- Urban Principal Arterial
- Urban Minor Arterial
- Urban Major Collector
- Urban Minor Collector
- Urban Local Road

complete street typologies

The typologies are based on the street typologies found in the city of Fort Lauderdale's "Complete Streets Manual". The Complete Street typologies take into consideration additional attributes such as types of users, surrounding land and environmental factors which are not taken into consideration by the functional classification system. These typologies allow for a more holistic understanding of existing and future functions, and aid in identifying the design treatments that are appropriate for a given street. the complete streets.

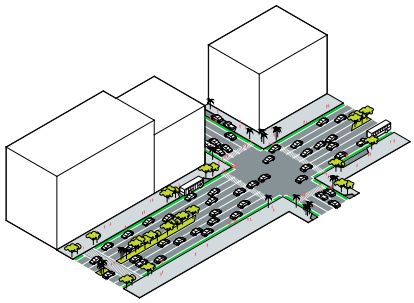
The matrix to the right shows the various street typologies found in the City of Fort Lauderdale.

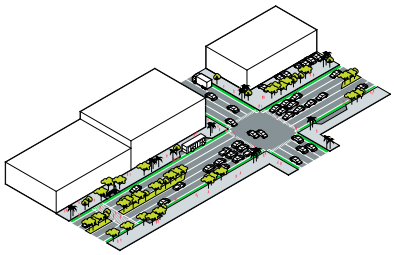
City Center

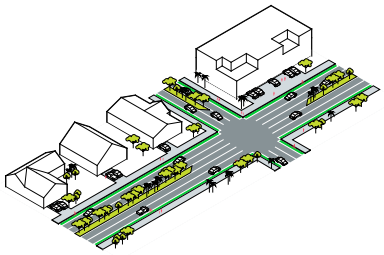
Commercial

Residential

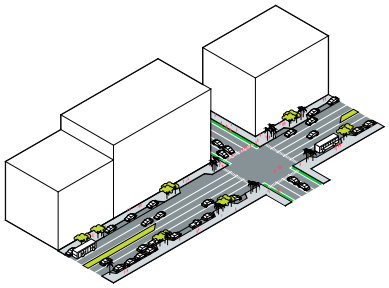
Boulevards

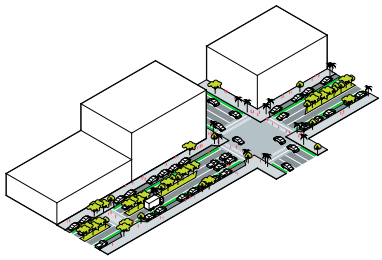


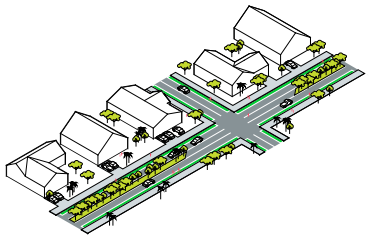




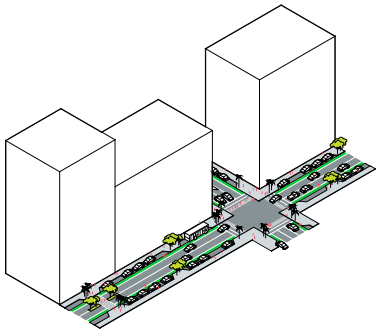
Avenues

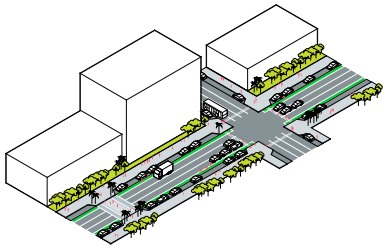


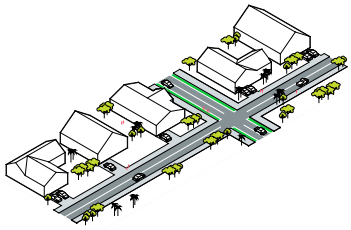




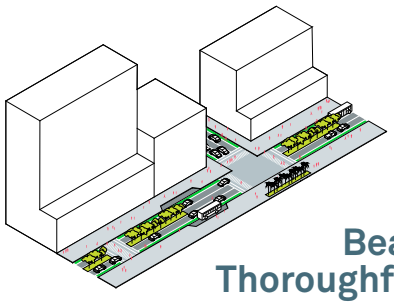
Streets



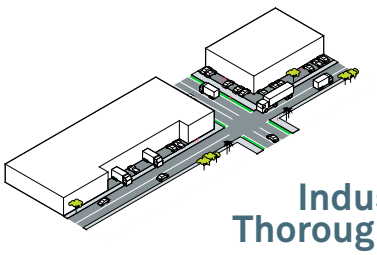




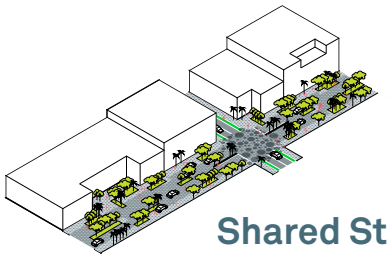
Special Designations



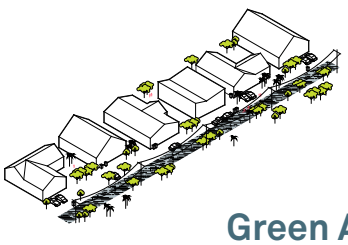
Beach Thoroughfare



Industrial Thoroughfare



Shared Street



Green Alley

complete street typologies

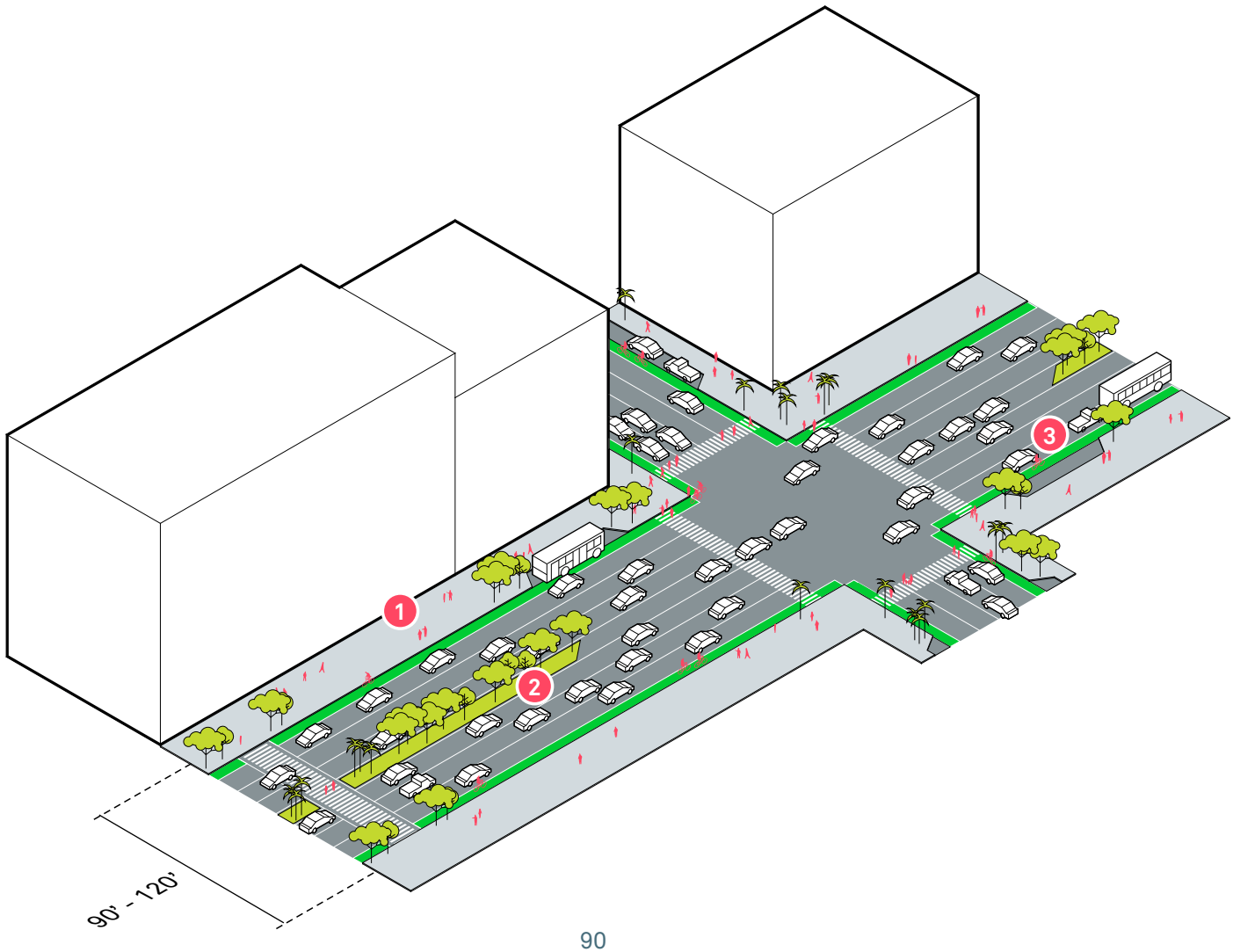
city center boulevard (arterial)

City center boulevards consist of the portions of Boulevards that run through the highest-density mixed-use centers in the City including the Downtown Core. High-rise development may be located along or proximate to the City center boulevards. Due to the density of mixed uses, and proximity to the center of activity, these streets should contain the highest level of multi-modal accommodations including dedicated bike lanes, slow traffic speeds, enhanced pedestrian areas including wide sidewalks, special treatments for crosswalks, transit accommodations, and on-street parking to support street level commercial activity.

Broward Blvd

CONSIDERATIONS

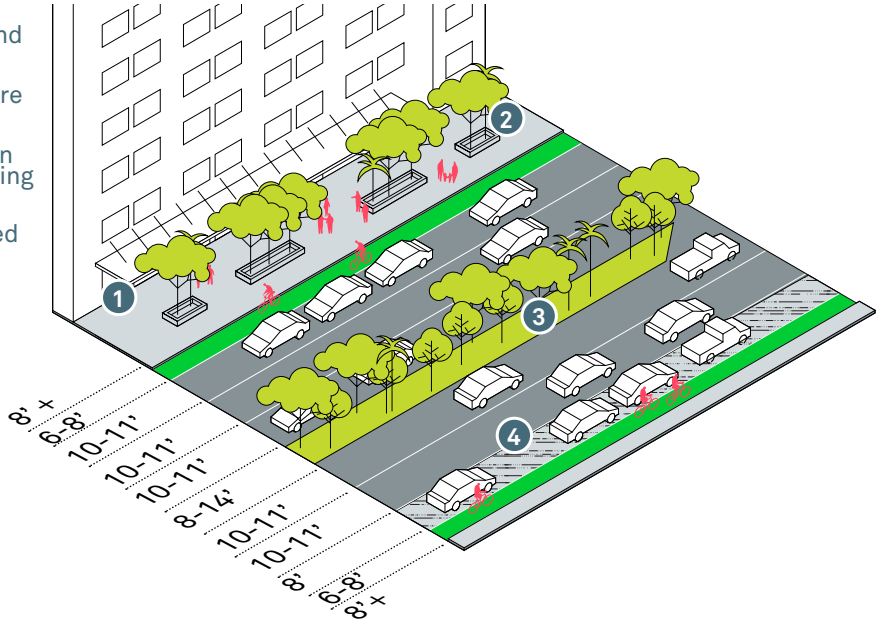
1. WIDER SIDEWALKS
2. TRAFFIC CALMING: MEDIAN
3. MULTI MODAL: BIKE LANES, TRANSIT, MICRO COMMUTER



EXAMPLE 1:

1. Architectural frontage is an important part of the pedestrian experience, providing shade and reducing solar exposure to sidewalks.
2. 11ft sidewalks provide space for a 3 ft furniture zone and 8 ft for a pedestrian zone.
3. Continuous median islands provide pedestrian refuge, shade, and the potential for placemaking utilizing a specific landscape palette.
4. Lanes adjacent to bike lane could be converted into on-street parking.

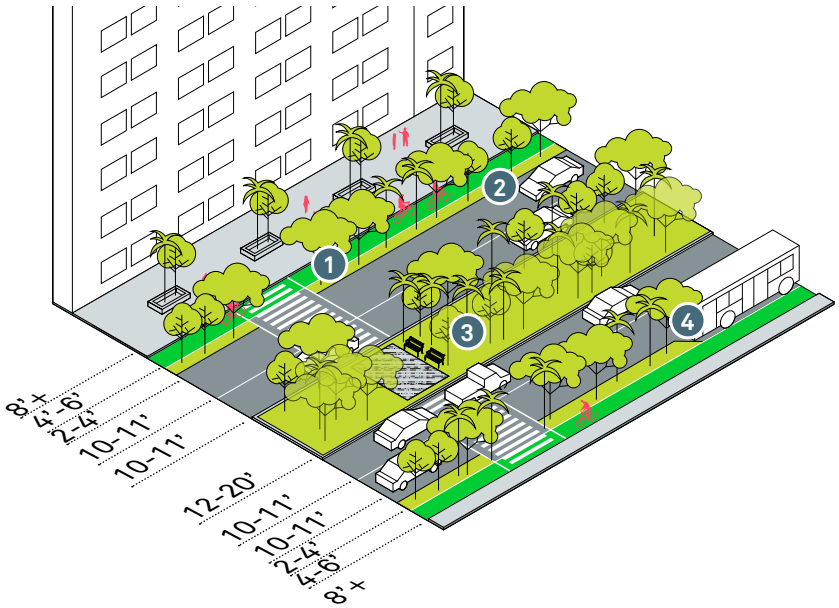
8' +	SIDEWALK	
6-8'	BIKE LANE	PLANTER
10-11'	CAR LANE	8' PARKING
8-14'	MEDIAN WITH LANDSCAPE	



EXAMPLE 2:

1. Landscape buffer can increase comfort and safety for cyclists. Buffer can be widened to accommodate bioswale if median is reduced.
2. In flood prone areas consider using bioswales instead of just a landscape buffer, either on one or both sides of the street for floodwater management.
3. Large median can accommodate pedestrian refuge or interim park space.
4. Landscape buffer can incorporate bus bay without conflict to cyclists.

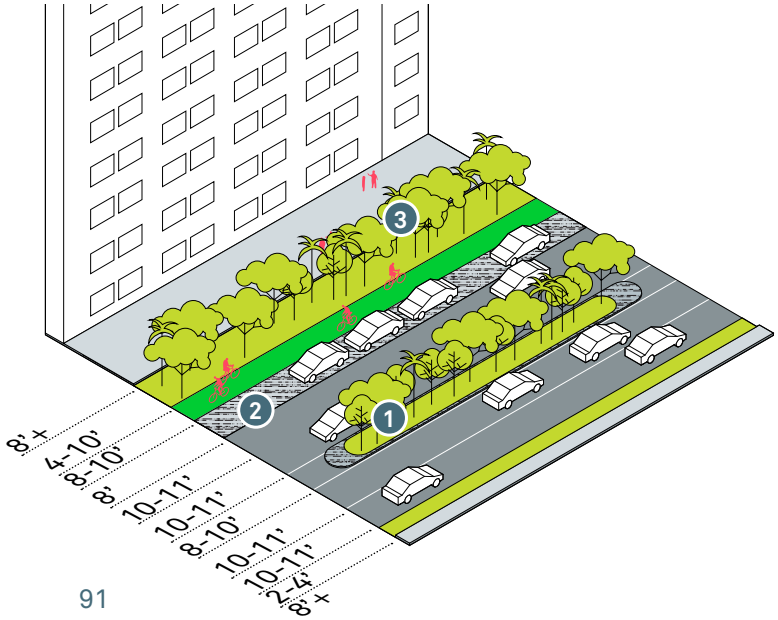
8'+	SIDEWALK
4-6'	BIKE LANE
2-4'	BUFFER
10-11'	CAR LANE



EXAMPLE 3:

1. Mid-block islands provide a visual means for driver awareness and traffic calming. These can also act as a pedestrian refuge for crossing.
2. Parking surfaces can use modular pavers to help with floodwater management and to add to the character of a certain area.
3. A specific palette of landscaping and placement can be used in the median and bioswale to design a street with a specific look.

8'+	SIDEWALK	
4-10'	BUFFER	BIOSWALE
8-10'	BIKE LANE	
8'	PARKING	
10-11'	CAR LANE	
8-10'	MEDIAN	



complete street typologies

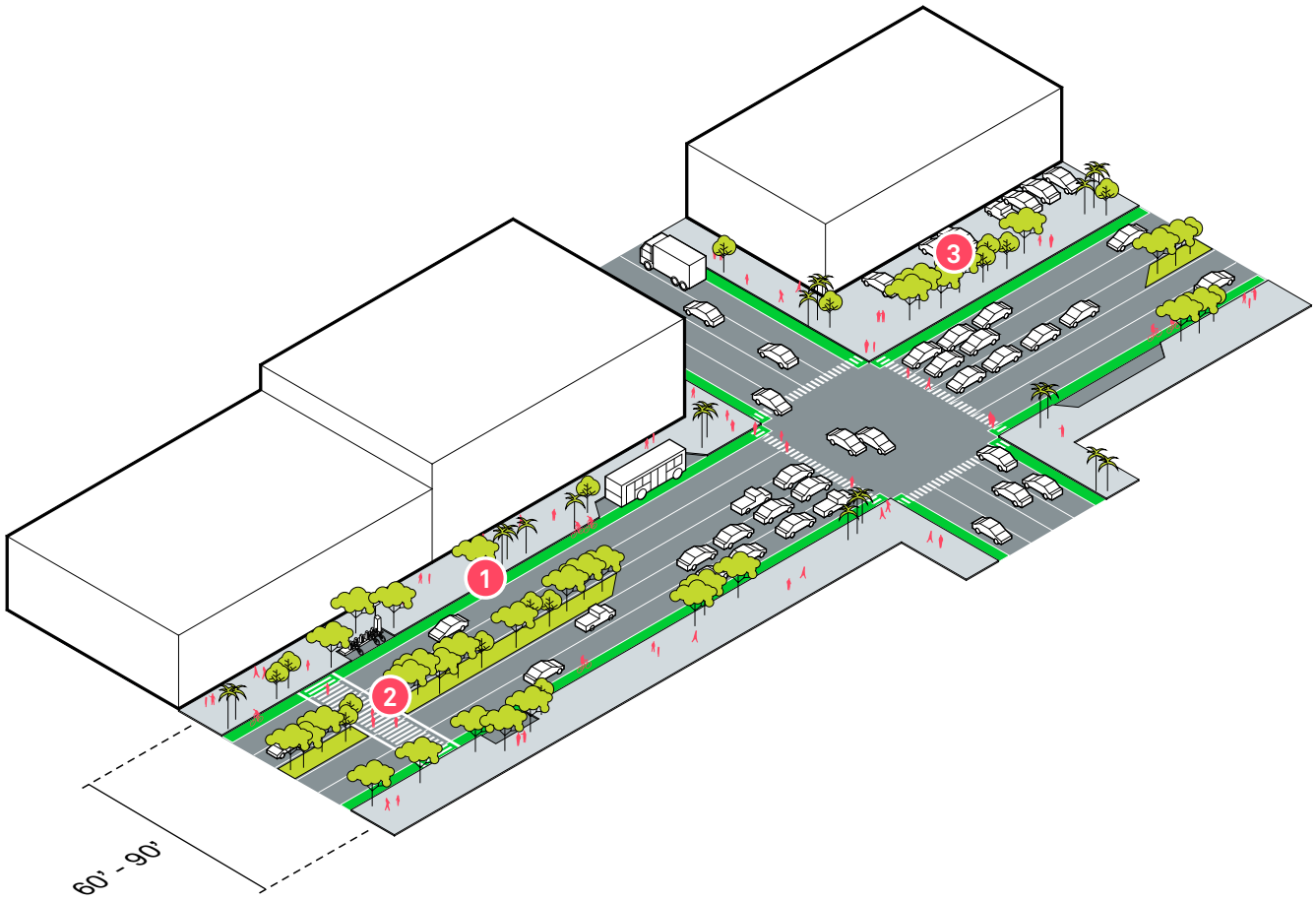
commercial boulevard (arterial)

Commercial boulevards serve primarily commercial uses and are designed to move high vehicular volumes. Traffic may flow faster than desired for ideal pedestrian and bicycling conditions. Surrounding land uses include retail, commercial, and some higher density residential. They serve as primary transit routes, and as routes for the movement of goods. These streets should include dedicated bike facilities, pedestrian enhancements, and transit accommodations as needed.

CONSIDERATIONS

1. DEDICATED BIKE LANES
2. PEDESTRIAN REFUGE AT MID-BLOCK CROSSINGS
3. SHADE TREES FOR PEDESTRIANS

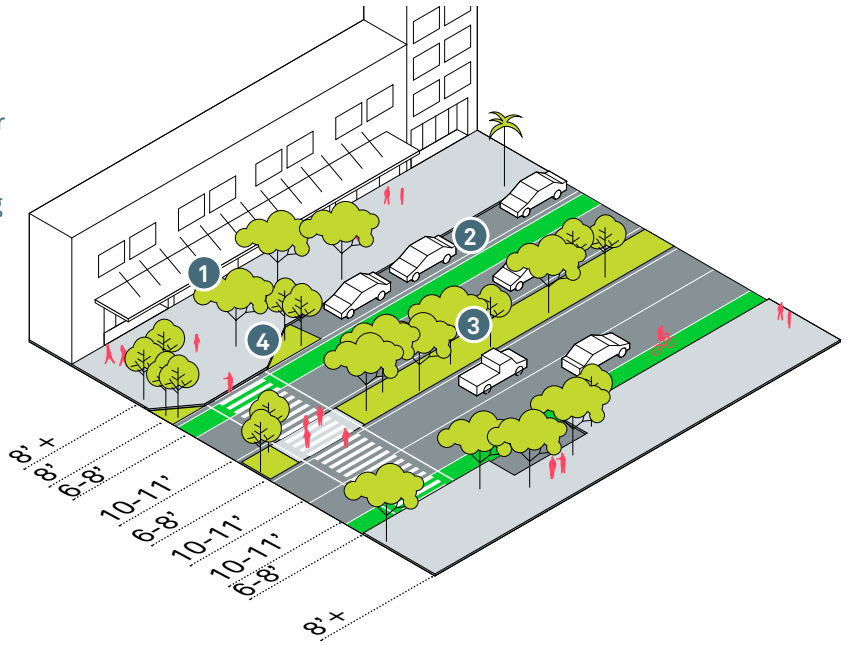
Sunrise Blvd



EXAMPLE 1:

1. Architectural frontage is an important part of the pedestrian experience, providing shade and reducing solar exposure to sidewalks.
2. Buffered bike lanes can protect cyclists from car doors opening.
3. Continuous median islands provide pedestrian refuge, shade, and the potential for placemaking utilizing a specific landscape palette.
4. Left over space around curb extension can be used for landscaping and bolster stormwater management while adding shade and marking crossing points.

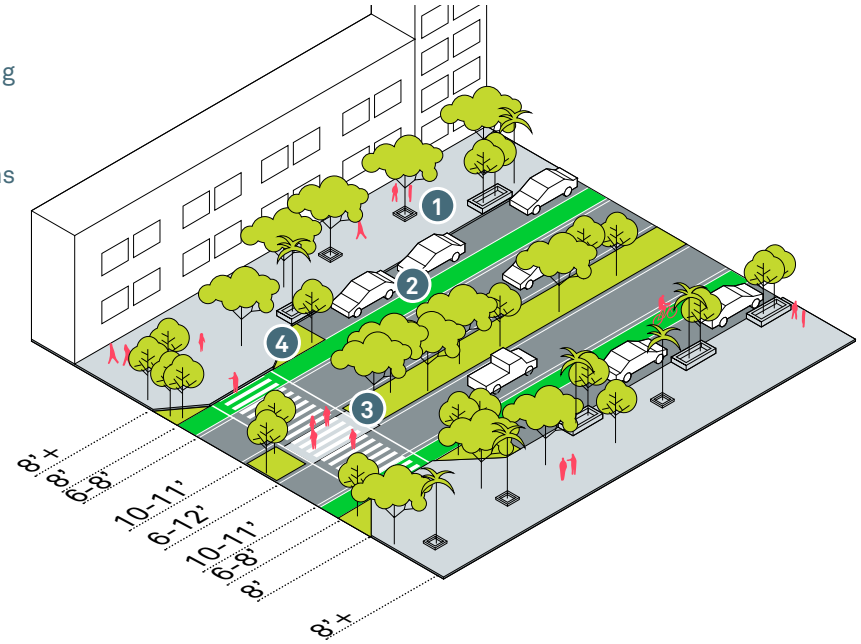
8' +	SIDEWALK	8' PARKING
6-8'	BIKE LANE	
10-11'	CAR LANE	
6-8'	MEDIAN WITH LANDSCAPE	



EXAMPLE 2:

1. Tree planters can provide seating while elevating landscape in areas where saltwater intrusion occurs.
2. On-street parking are beneficial to commercial and retail while providing a buffer to pedestrians from traffic and noise.
3. Large medians can accommodate pedestrian refuge seating areas or bike racks.
4. Mid-block curb extensions provide a buffer between parking and pedestrian crossing.

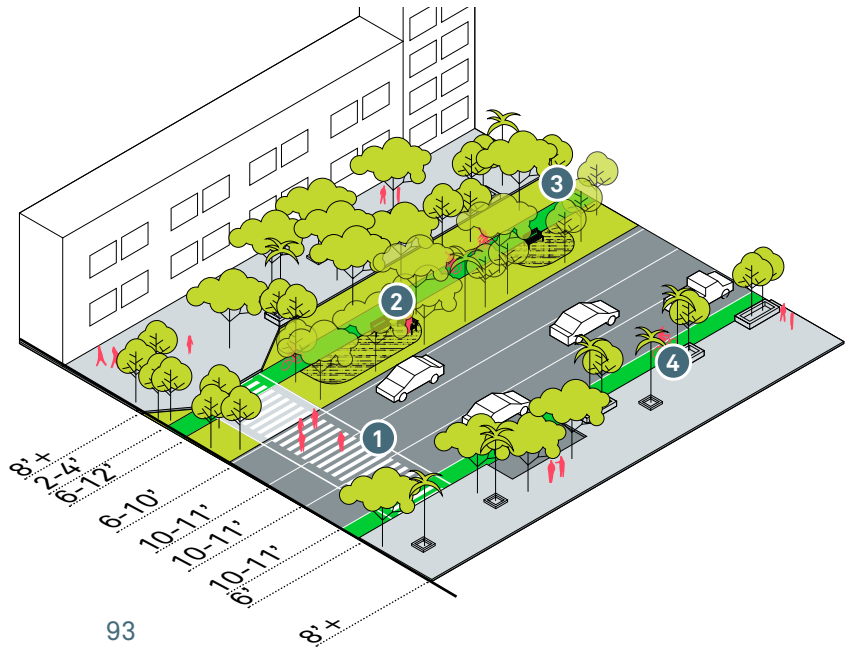
8'+	SIDEWALK
6-8'	BIKE LANE
6-12'	MEDIAN WITH LANDSCAPE
10-11'	CAR LANE



EXAMPLE 3:

1. Raised crosswalks can act as a speed hump and provide pedestrians with another level of safety for street crossing.
2. Adding a landscape buffer on one side can create a multipurpose trail and provide green space for pedestrians to rest.
3. Wider landscaping strips can help stormwater management.
4. Creating unique streets can help orient visitors and create a sense of place.

8'+	SIDEWALK	
2-4'	BUFFER	BIOSWALE
6-10'	BUFFER	BIOSWALE
10-11'	CAR LANE	



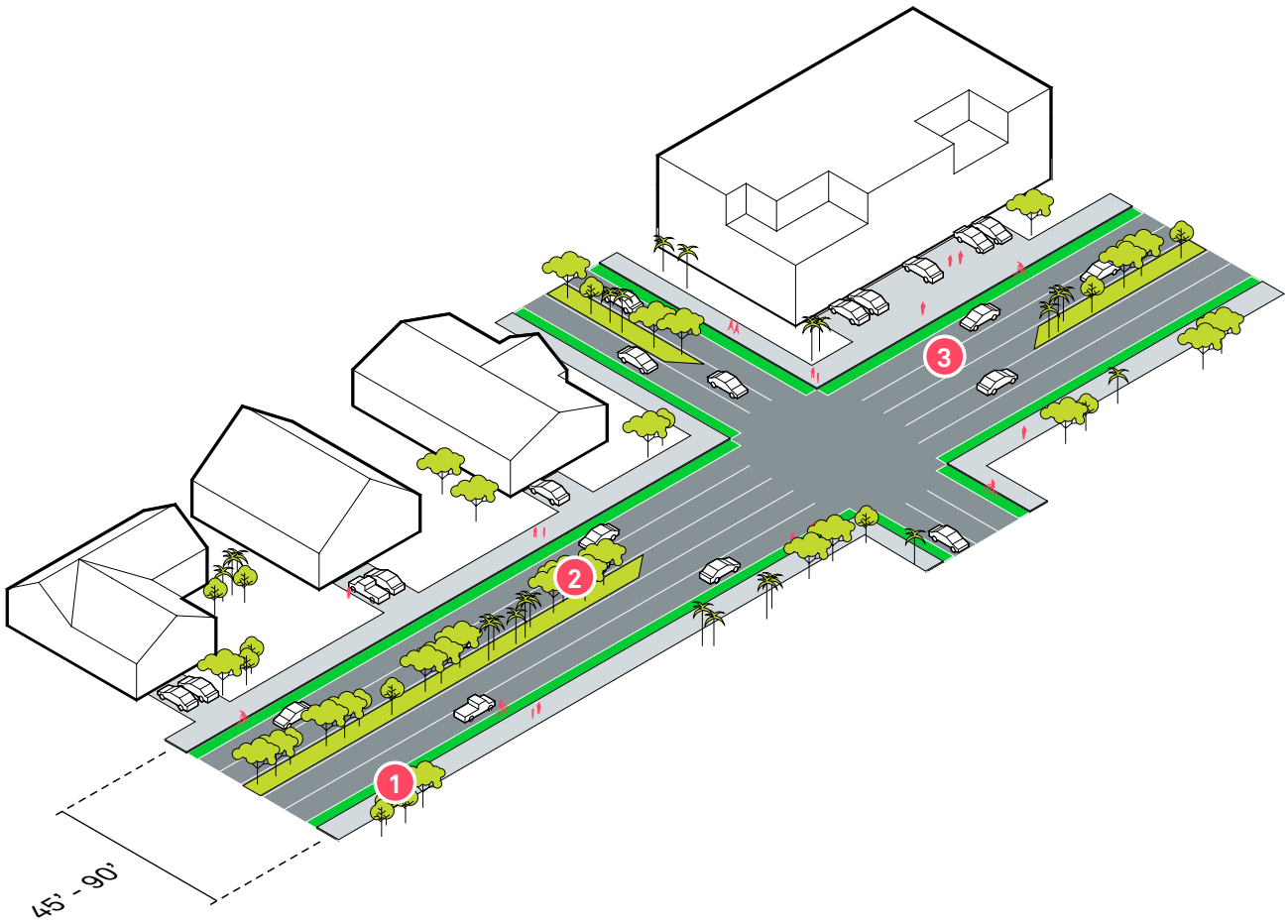
complete street typologies
residential boulevard (arterial)

Residential boulevards serve primarily residential uses to move high vehicular volumes. Traffic moves slower on residential boulevards since they run through or parallel to residential neighborhoods. Transit service may be provided since residential boulevards connect residential neighborhoods to denser areas. These streets have frequent curb cuts while bike lanes and sidewalks are provided on both sides of the street

CONSIDERATIONS

1. STREET TREES
2. BIOSWALES TO AID STORMWATER MANAGEMENT
3. ROAD DIETS TO HELP WITH TRAFFIC CALMING

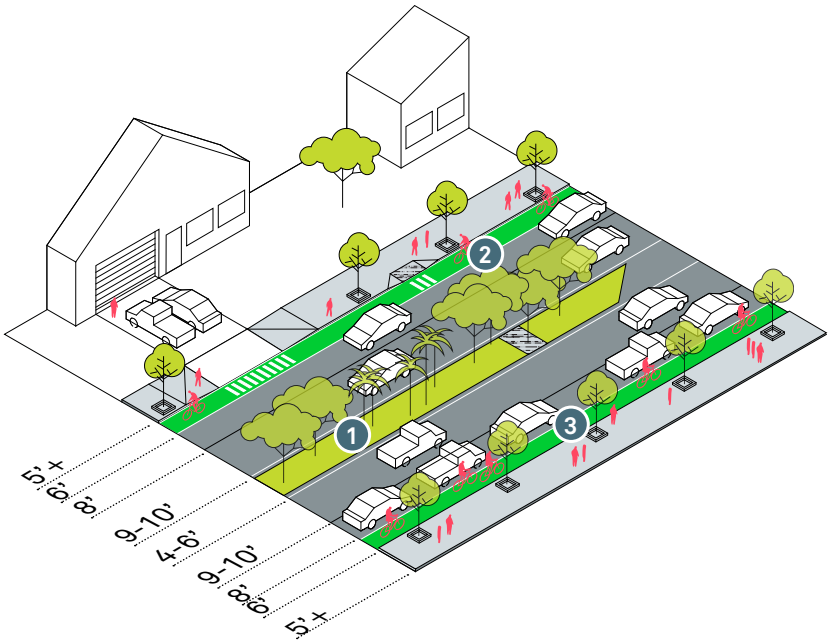
NW 9th Ave



EXAMPLE 1:

1. Continuous median islands provide pedestrian refuge, shade, and the potential for placemaking utilizing a specific landscape palette.
2. On-street parking can provide a buffer for cyclists.
3. Tree planters can provide landscape in areas that suffer from saltwater intrusion.

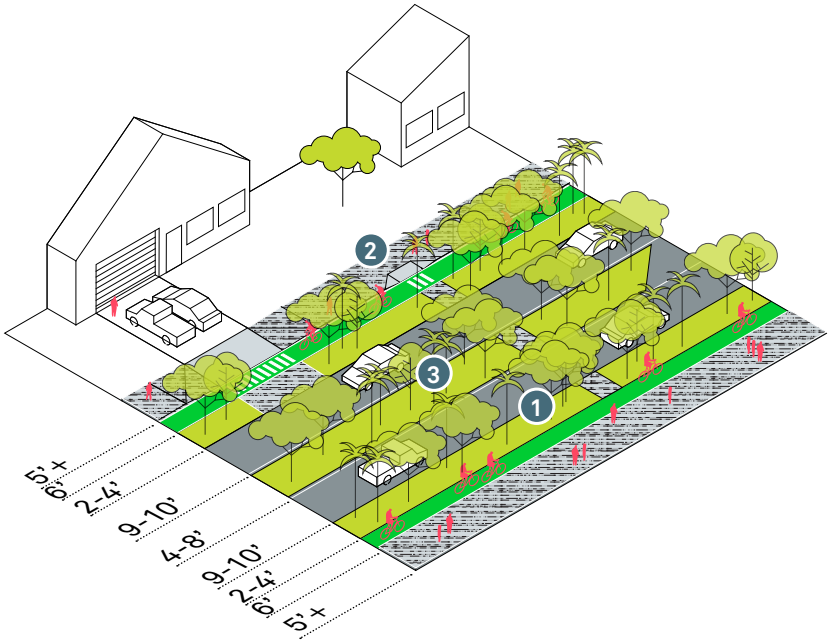
5’ +	SIDEWALK	8’ PARKING
6’	BIKE LANE	
9-10’	CAR LANE	
4-6’	MEDIAN WITH LANDSCAPE	



EXAMPLE 2:

1. Bioswales can better deal with stormwater management through filtration, infiltration or retention.
2. Modulated pavers can improve infiltration of stormwater and provide character to a neighborhood.
3. A continuous median island can help reduce street noise for residents and provide traffic calming. Incorporating trees or bioswales into the median can help improve stormwater management.

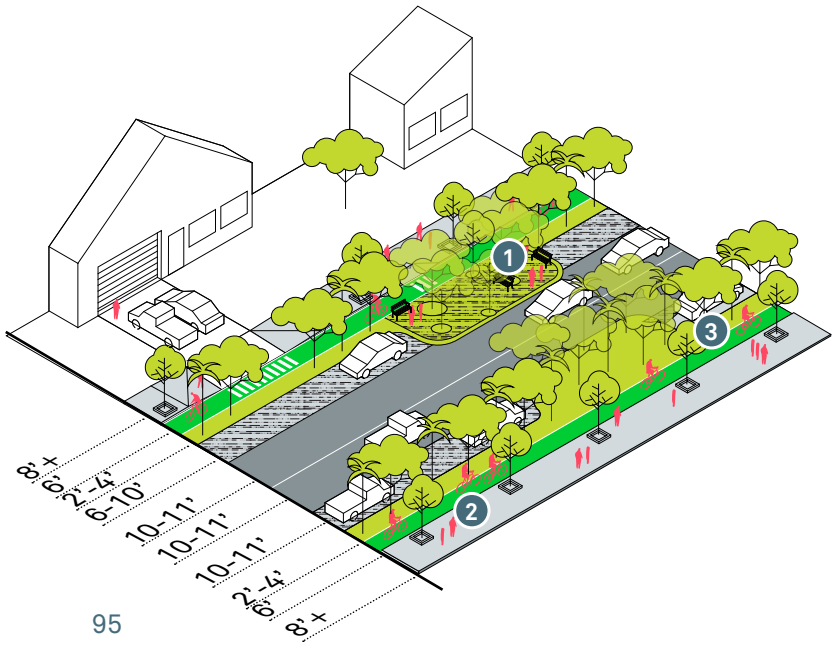
5’+	SIDEWALK
6’	BIKE LANE
4-8’	MEDIAN WITH LANDSCAPE
9-10’	CAR LANE



EXAMPLE 3:

1. Landscape, rest areas or public art can be incorporated into pinch points to create unique neighborhood streets.
2. Landscaping along the street can use a unique palette and placement to distinguish different neighborhoods. Creating unique streets can help orient visitors and create a sense of place.
3. Wider landscaping strips can help stormwater management.

8’+	SIDEWALK	
2-4’	BUFFER	
6-10’	BUFFER	BIOSWALE
10-11’	CAR LANE	



complete street typologies

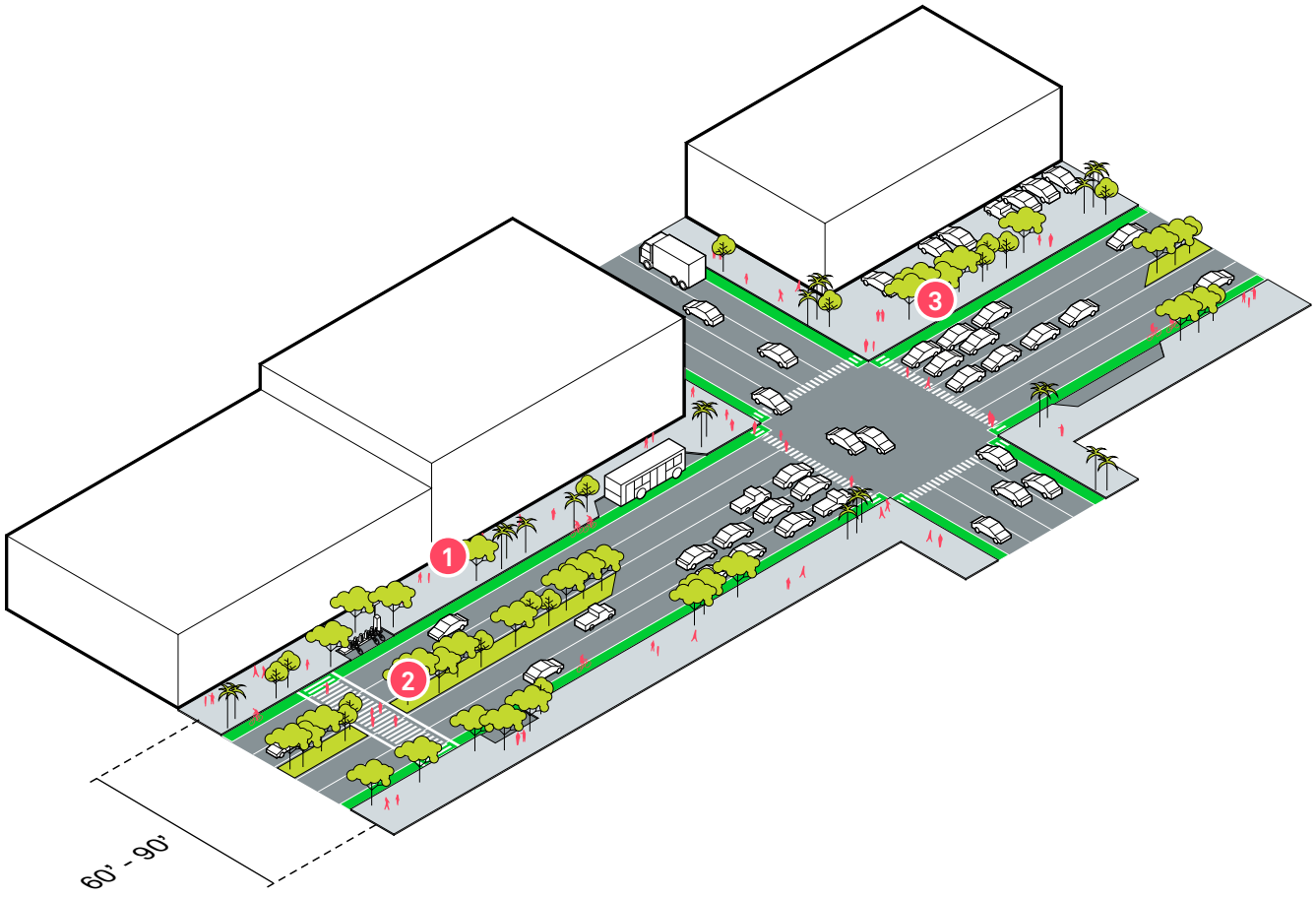
city center avenue (urban minor arterial/urban collector)

City center avenues traverse higher-density mixed-use areas, such as the Downtown Core. The surrounding built environment consists of mid- to high-rise buildings that support a variety of functions, are closely spaced, have minimal setbacks, and contain active uses on the ground floor. Management of parking and loading facilities on these avenues is critical, as these uses typically are imperative to the vitality of businesses but may conflict with pedestrian and bicycle use. These avenues should contain premium transit facilities, enhanced pedestrian facilities to accommodate the high pedestrian use and on-street parking to support ground floor uses.

NE 3rd Ave

CONSIDERATIONS

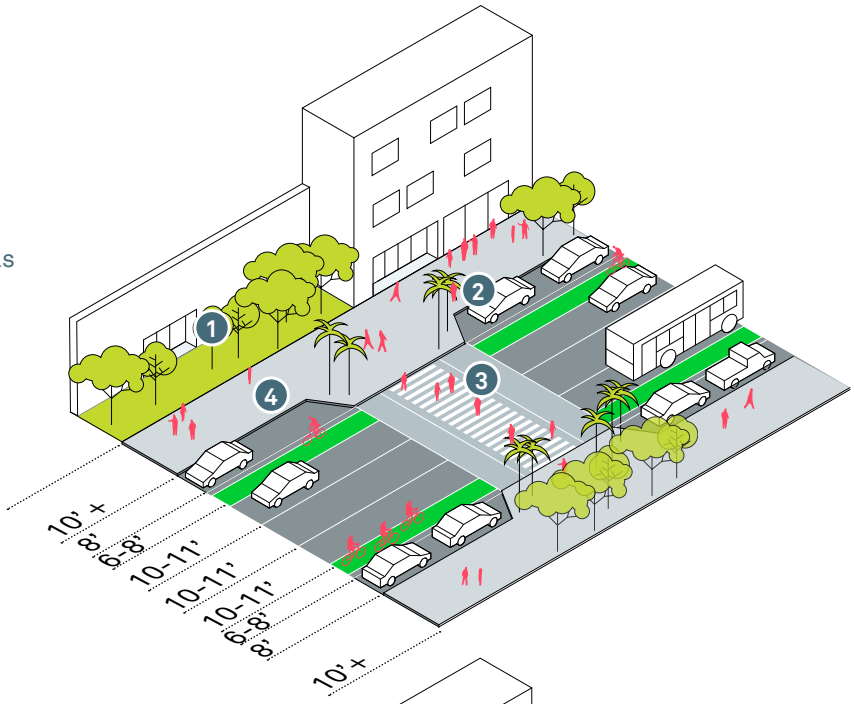
1. WIDER SIDEWALKS
2. MID-BLOCK CROSSINGS WITH PEDESTRIAN REFUGE
3. ON-STREET PARKING



EXAMPLE 1:

1. Private development setbacks can allow for intermittent green space for landscape and pedestrians in dense locations
2. Buffering bike lanes can protect cyclists from car doors opening.
3. Raised crosswalks can aide in traffic calming and provide some safety for pedestrians in areas that cant accommodate pedestrian refuge.
4. On-street parking can benefit local businesses while providing a buffer to pedestrians.

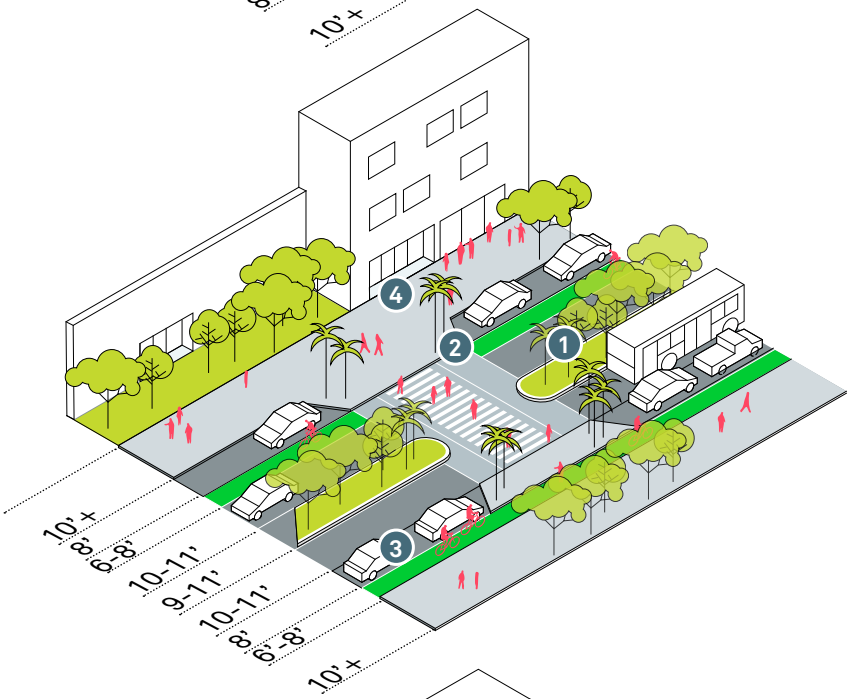
10' +	SIDEWALK
6-8'	BIKE LANE
10-11'	CAR LANE
8'	PARKING



EXAMPLE 2:

1. Median can accommodate pedestrian refuge and help with stormwater management.
2. Curb extensions provide pedestrian safety and expand the pedestrian realm.
3. On-street parking can be used as a buffer for bike lanes
4. Architectural frontage is an important part of the pedestrian experience, providing shade and reducing solar exposure to sidewalks.

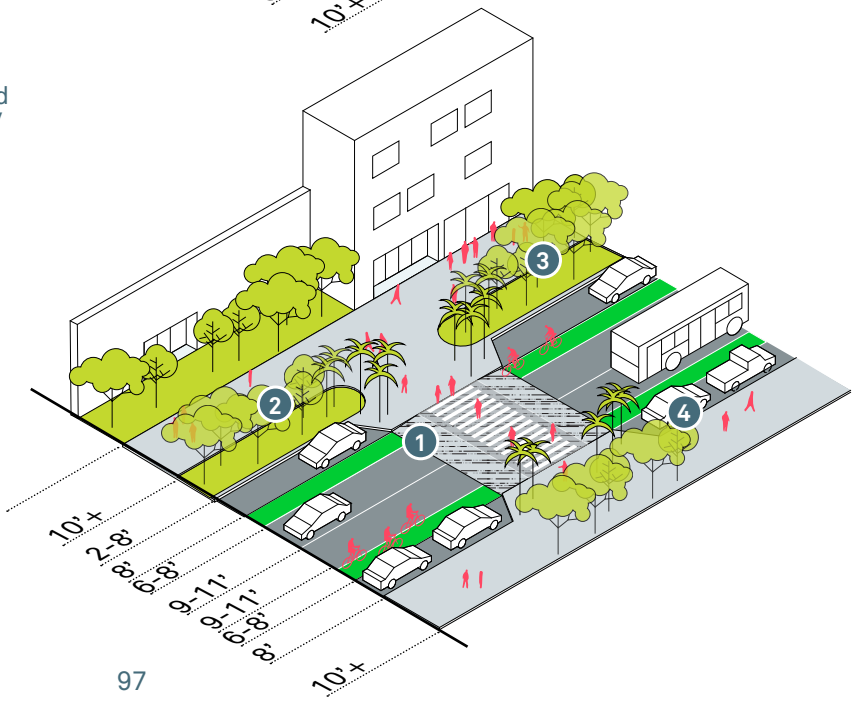
10'+	SIDEWALK		
6-8'	BIKE LANE	8'	PARKING
9-11'	MEDIAN WITH LANDSCAPE		
10-11'	CAR LANE		



EXAMPLE 3:

1. Raised crosswalks can act as a speed hump and provide pedestrians with another level of safety for street crossing.
2. Adding a landscape buffer on one side can create a multipurpose trail and provide green space for pedestrians to rest.
3. Wider landscaping strips can help stormwater management.

10'+	SIDEWALK		
2-8'	BUFFER		
8'	PARKING	6-8'	BIKE LANE
10-11'	CAR LANE		



complete street typologies

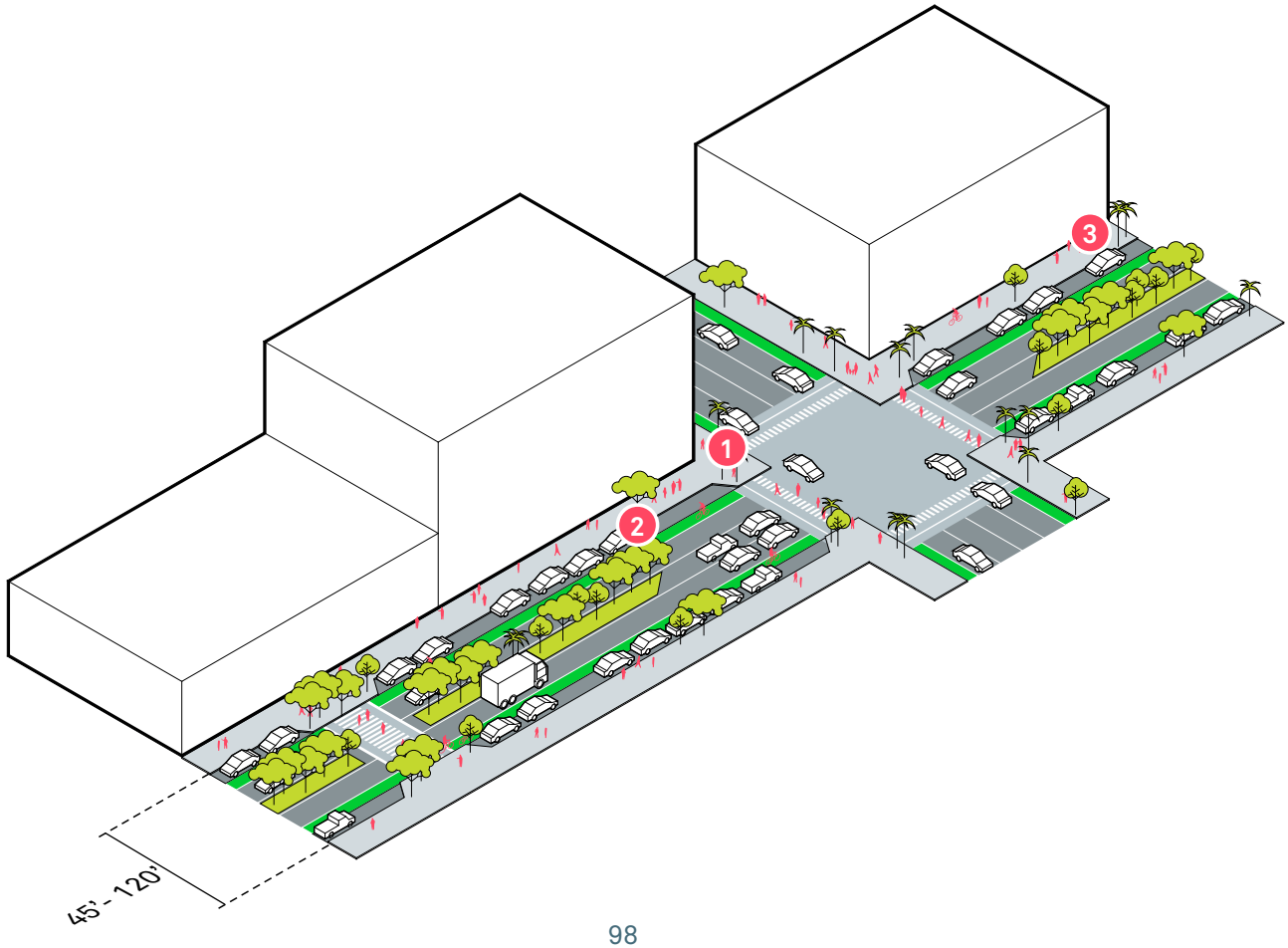
commercial avenue (urban minor arterial/urban collector)

Commercial avenues tend to have faster moving traffic than other Avenues and act to connect one development node to another. They are secondary to Commercial boulevards and serve local districts, connecting main arteries with local roads. The surrounding land uses are low- to mid-rise structures at a lower density that may have larger setbacks and serve as transition areas to the higher density of the City center. The uses on these Avenues typically consist of restaurants, shops, small offices, and multi-family homes. On-street parking should be provided for street- fronting businesses. Additional parking may also be needed such as structured parking.

Las Olas Blvd

CONSIDERATIONS

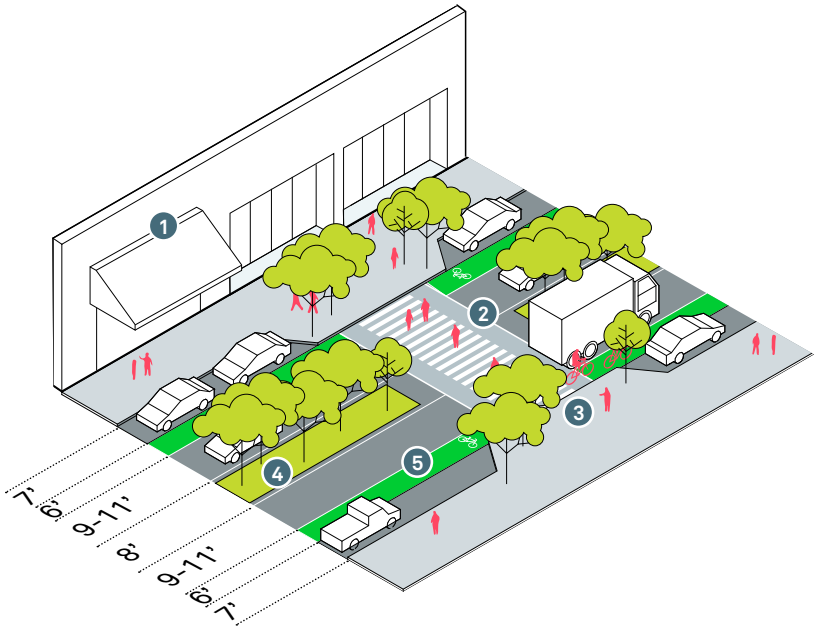
1. REDUCED CURB RADII AND CURB EXTENSIONS
2. DEDICATED BIKE LANES WITH BUFFERING
3. WIDER SIDEWALKS



Example 1:

1. Architectural frontage is an important part of the pedestrian experience, providing shade and reducing solar exposure to sidewalks.
2. Raised crosswalks encourage pedestrian crossing and slow traffic.
3. Mid-block curb extension provide a spatial buffer from the center of the crosswalk and parked vehicles.
4. Bioswales with trees should be used in medians to reduce heat island effects and encourage more street activity.
5. When possible, provide a bike lane to encourage a healthy and active lifestyle.

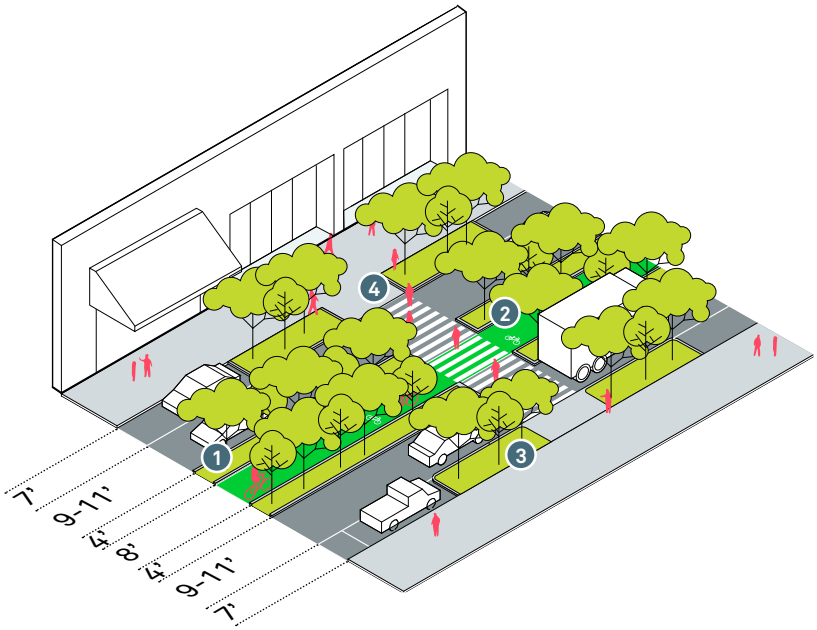
7’	PARKING	PINCH POINT	BULB OUT
6’	BIKE LANE (4’ is allowed only with buffer)		
9-11’	CAR LANE		
8’	MEDIAN	BIOSWALE	
7’	SIDEWALKS		



Example 2:

1. Planters that buffer a 2-way bike path provide another level of safety and shade for cyclists.
2. Bike lanes at the center of the street allow for a free flow of bike traffic while avoiding vehicular traffic.
3. Mid-block curb extensions provide a spatial buffer from the center of the crosswalk and parked vehicles.
4. When raised crosswalks are not an option due to budget, painted surfaces may be used to give attention to pedestrian crossing areas.

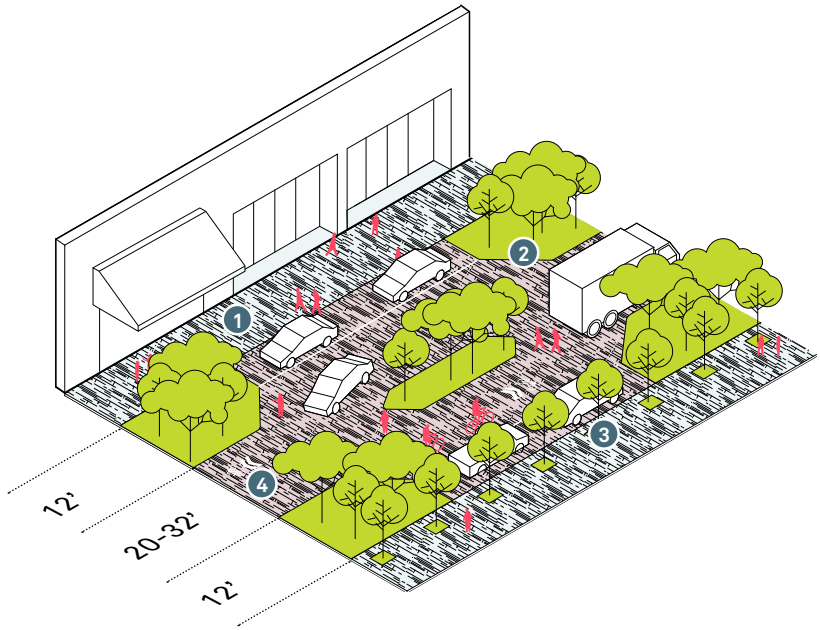
7’	PARKING	PINCH POINT	BULB OUT
9-12’	CAR LANE		
4’	PLANTER		
8’	BIKE LANE		



Example 3:

1. Use a different material or a different color to differentiate between pedestrian and vehicular zone.
2. Landscaping can be used to shift the traffic flow to reduce speeds. The landscaping also functions as stormwater management.
3. Provide street trees to shade the sidewalk and reduce heat island effects.
4. In a curbless street, use sharrows to alert vehicular traffic about cyclists on the road.

7-12’	PARKING	PINCH POINT	BULB OUT
20-32’	CAR LANE AND MEDIAN		



complete street typologies

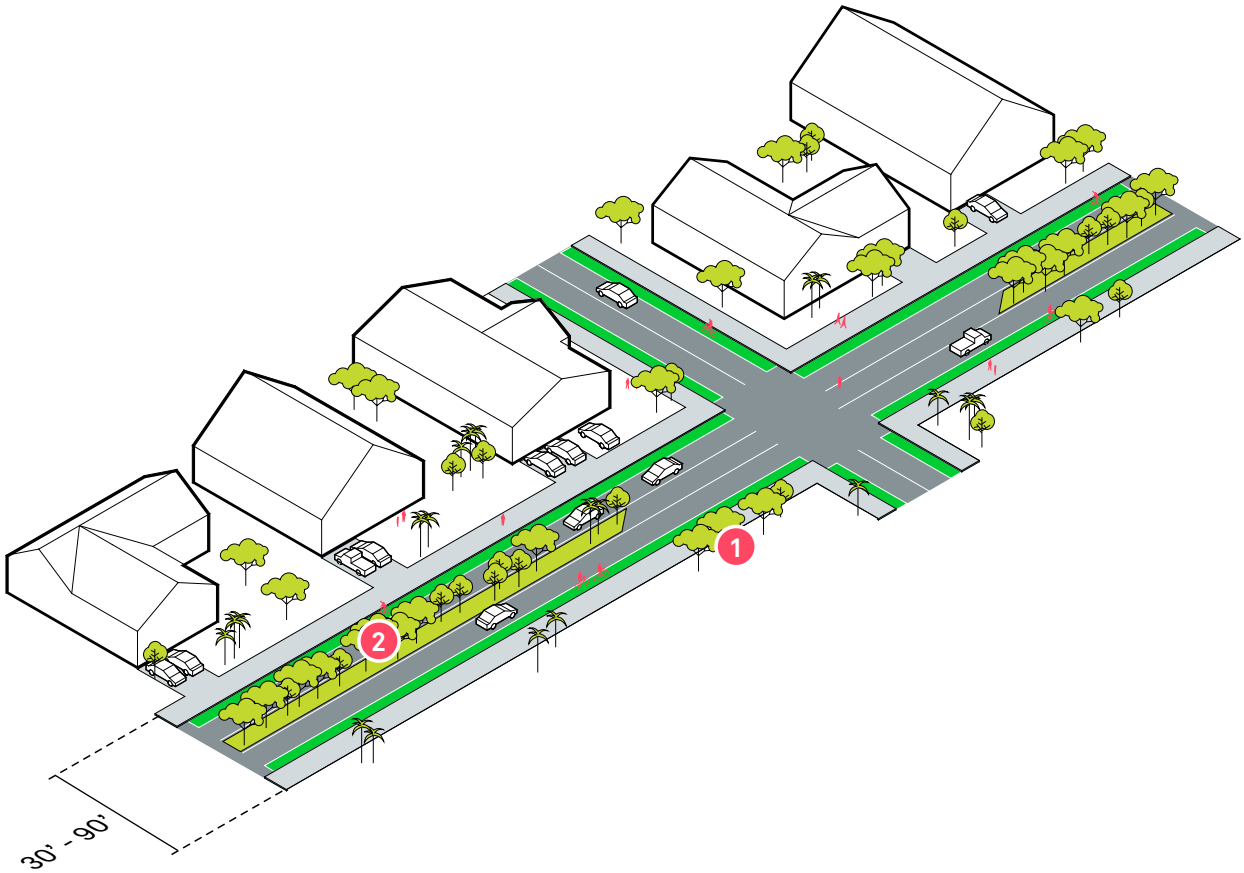
residential avenue (urban minor arterial/urban collector)

Residential avenues are smaller in scale than commercial avenues, have slower moving traffic, and may serve as alternative routes to connect neighborhoods. They typically contain signalized intersections where they cross boulevards. Surrounding land uses are generally residential with some neighborhood commercial.

NE 15th Ave

CONSIDERATIONS

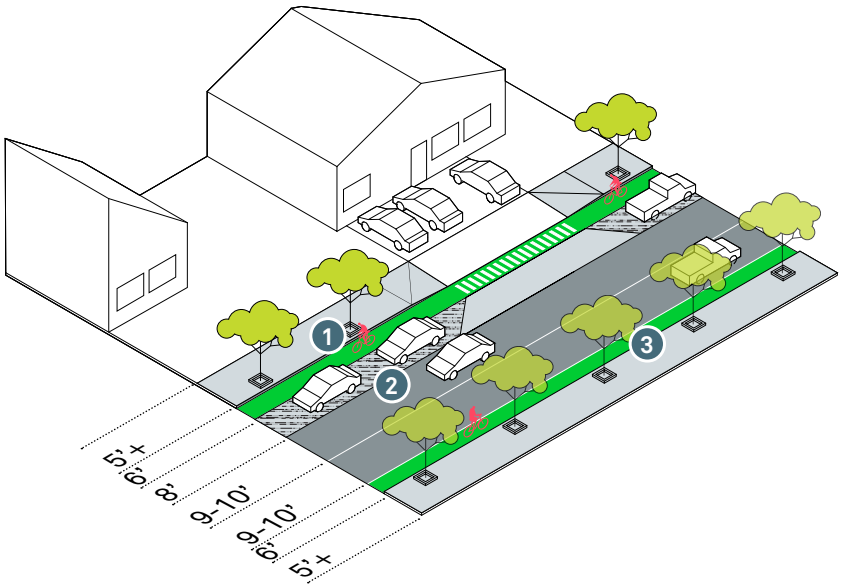
1. STREET TREES TO IMPROVE WALKABILITY
2. MEDIANS TO AIDE TRAFFIC CALMING



EXAMPLE 1:

1. Adding dedicated bike lanes and wider sidewalks improve walkability and bike-ability.
2. On-street parking can provide a buffer for cyclists and provide additional parking in more dense areas.
3. Shade tees can add to walkability, reduce the heat island effect and when planted in a formal layout it can create a distinct character to the street.

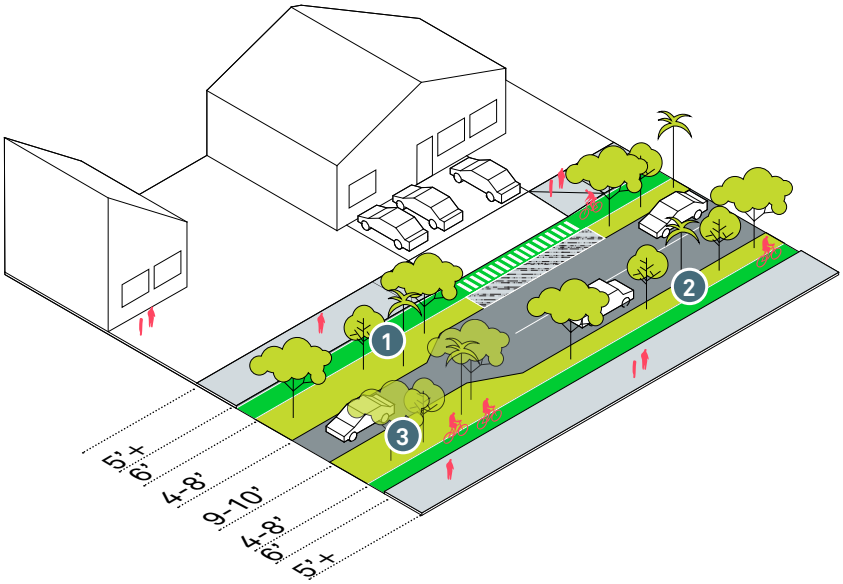
5' +	SIDEWALK
6'	BIKE LANE
9-10'	CAR LANE
8'	PARKING



EXAMPLE 2:

1. Bioswales or planters help with stormwater management through filtration, infiltration or retention.
2. Bike lanes are buffered using landscaping and can use pervious pavement to aide in water infiltration.
3. Stormwater systems such as bioswales can be used to create pinch points or chicanes to help with traffic calming.

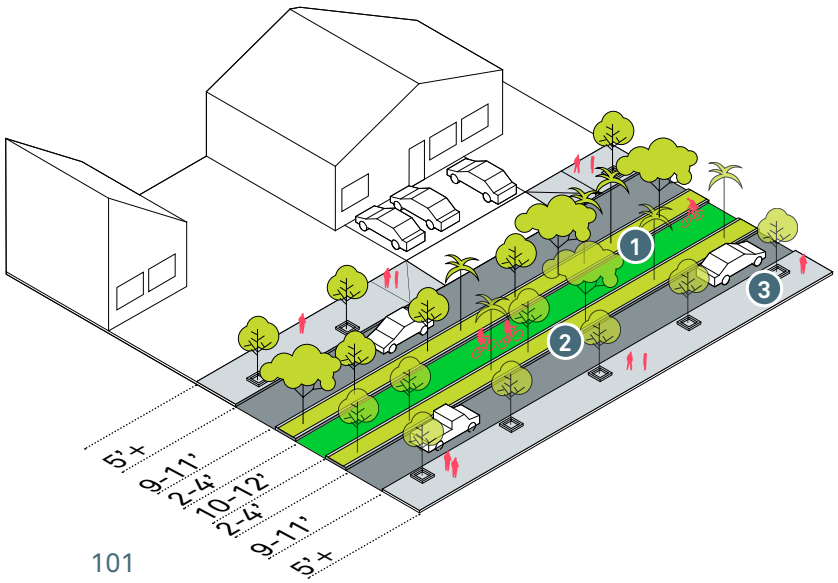
5'+	SIDEWALK
6'	BIKE LANE
4-8'	BIO SWALES PLANTERS
9-10'	CAR LANE



EXAMPLE 3:

1. Bike lanes or multi-purpose trails improves mobility and creates a unique street experience.
2. Adding landscape buffers to the trail gives the opportunity to add more landscaping for stormwater management.
3. Landscaping can use a special palette and placement to create a street with a specific look.

5'+	SIDEWALK
2-4'	BUFFER BIOSWALE
10-12'	BIKE LANES
9-11'	CAR LANE



complete street typologies

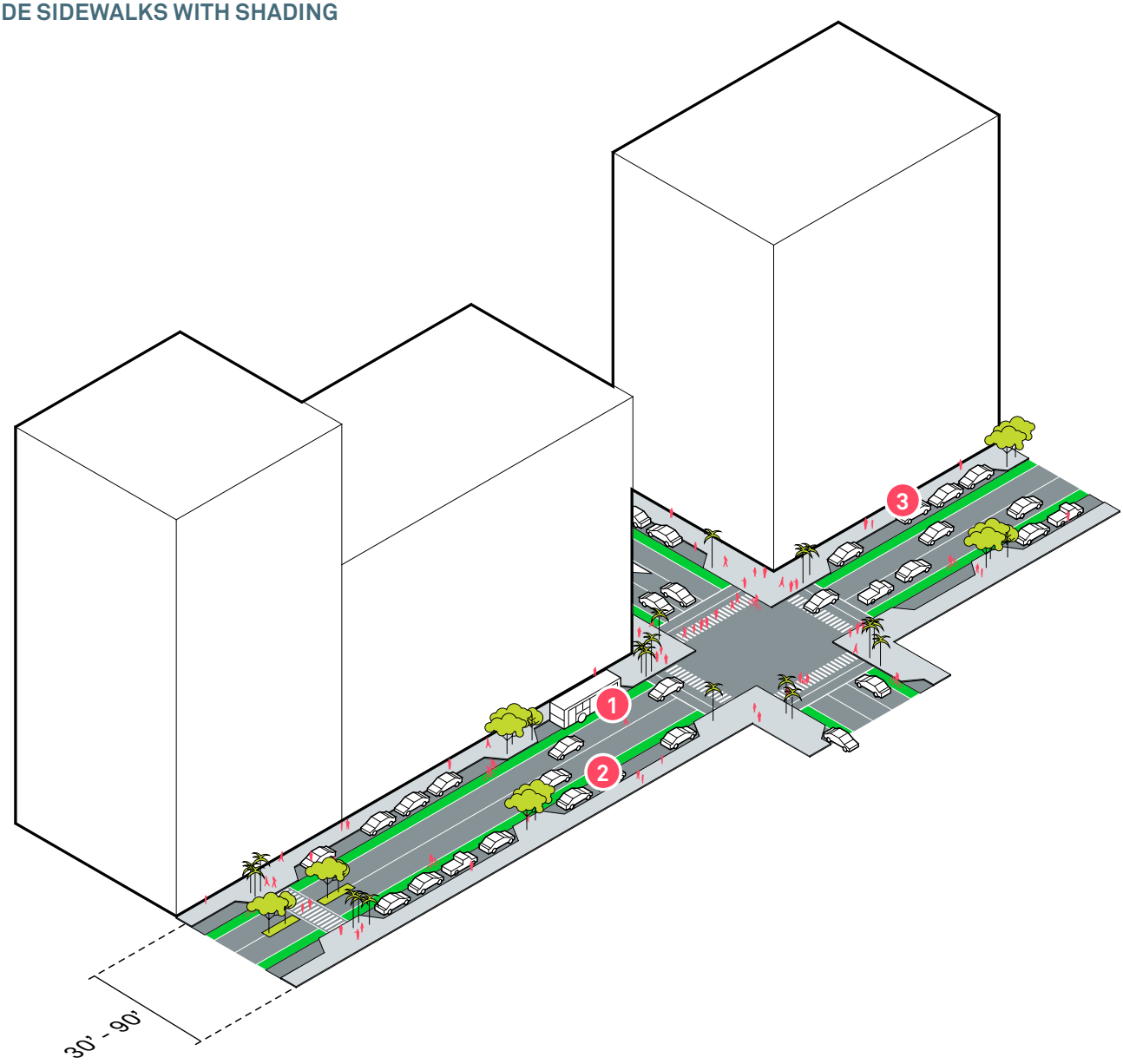
city center street (urban minor arterial/local)

City center streets are located within the city center, and run through the highest-density mixed-use centers in the city including the Downtown Core. High rise development may be located along or in close proximity to these streets. Due to its density of mixed uses, and proximity to the center of activity, these streets should contain the highest level of multi-modal accommodations including dedicated bike lanes, slow traffic speeds, enhanced pedestrian areas, special treatments for crosswalks, and on-street parking to support street-level commercial activity.

Las Olas Blvd

CONSIDERATIONS

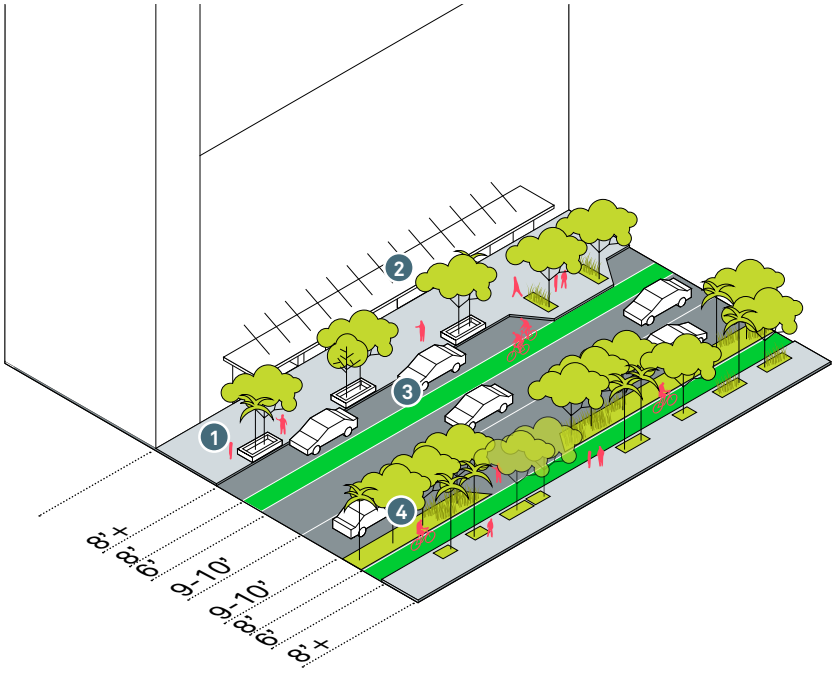
1. MULTI-MODALITY; BIKE LANES, MICRO-COMMUTER, TRANSIT
2. ON-STREET PARKING
3. WIDE SIDEWALKS WITH SHADING



Example 1:

1. Walkability is improved with wider sidewalks and allows commercial activities to spill out on street.
2. Additional shading can be provided by overhangs to increase pedestrian comfort and protect them from sudden downpours.
3. On-street parking can provide a buffer between pedestrians and vehicular traffic, increasing their safety and comfort.
4. Bioswales or planters can buffer bike facilities and help with stormwater management.

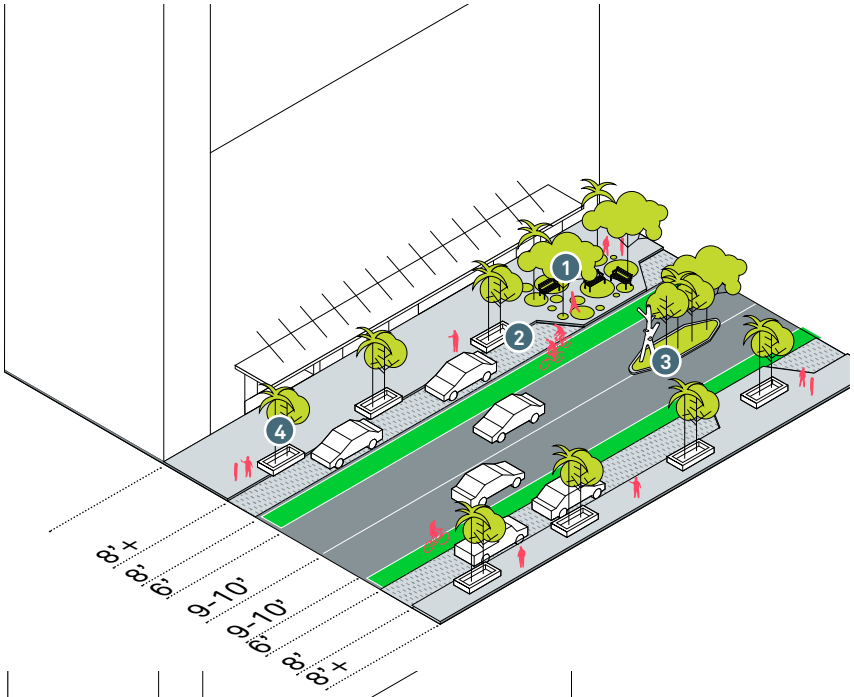
8'+	SIDEWALK	
8'	PARKING	GREEN BUFFER
6'	BIKE LANE	
9-10'	CAR LANE	



Example 2:

1. Bulb outs can help with traffic calming and provide opportunities for social spaces.
2. Pavers or other forms of paving can be used to help manage stormwater and distinguish certain streets or neighborhoods, either through the textures , colors, or patterns.
3. Islands or pinch points can be used to calm traffic and become gateways or markers with artwork that can identify a street or neighborhood.
4. A curated landscape palette and organization can give a certain character to a street or neighborhood to make it identifiable.

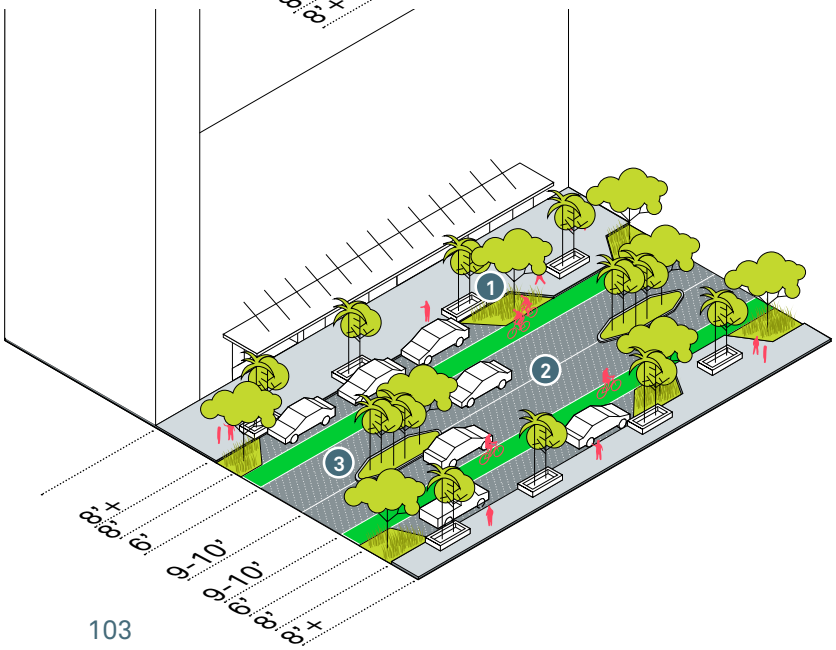
8'+	SIDEWALKS	
8'	PARKING	CURB EXTENSION
9-10'	CAR LANE	
6'	BIKE LANE	



Example 3:

1. Bioswales or planters can be incorporated with on-street parking catch run-off and help with stormwater management.
2. Pervious paving can help with infiltration or reflective surfaces can help reduce the heat island effect.
3. Curb cuts can be added to median islands to allow stormwater to be retained or to infiltrate the ground.

8'+	SIDEWALKS		
8'	PARKING	BIOSWALE	
6'	BIKE LANE		PLANTERS
9-10'	CAR LANE		



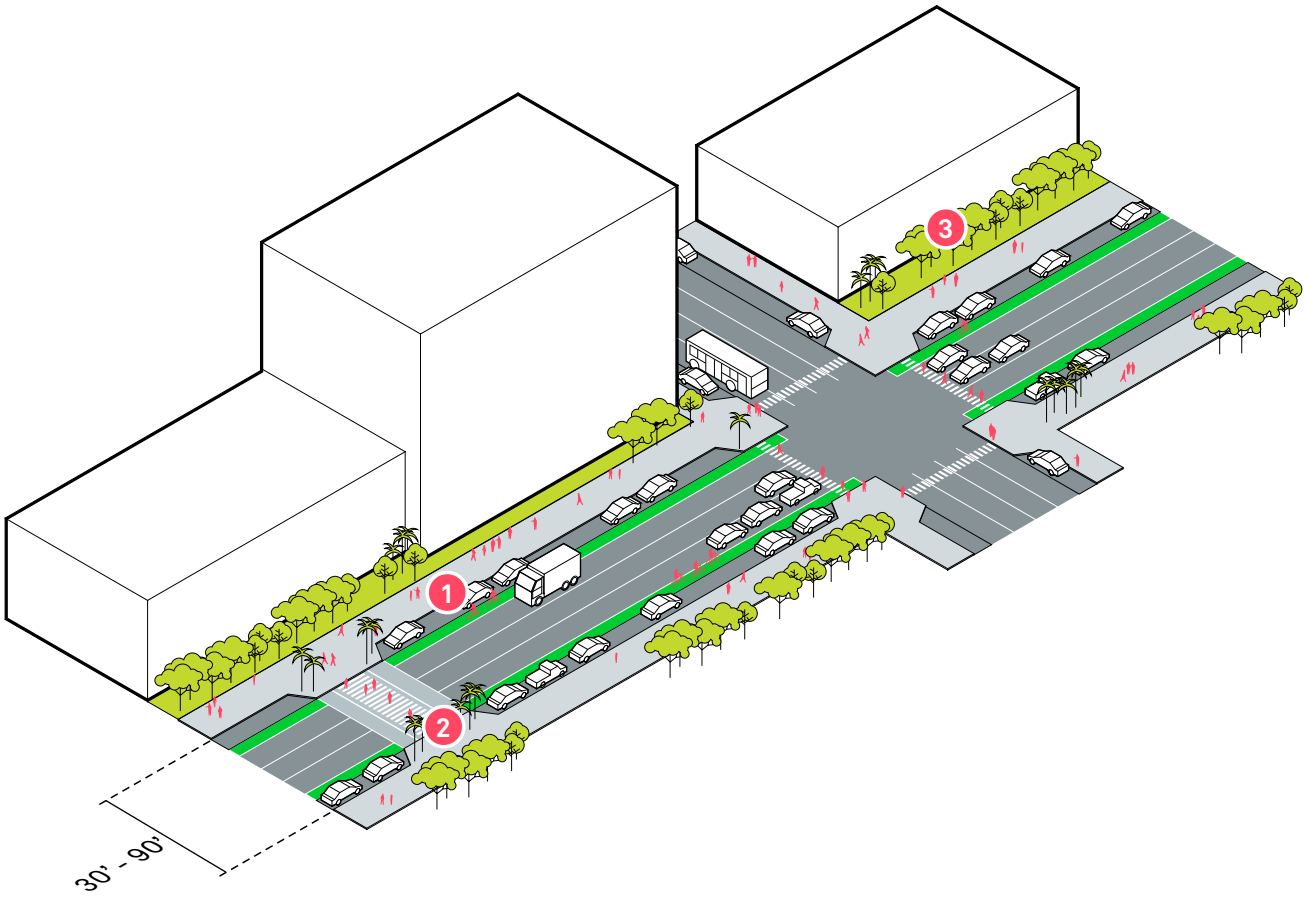
complete street typologies
commercial street (local)

Commercial streets are less dense than city center streets in character, and primarily serve commercial districts. These streets are secondary to commercial avenues and serve to connect residential areas and commercial districts. Surrounding land uses are low to mid-rise structures at a lower density and may have larger setbacks and serve as transition areas to the higher density of the center city. These streets typically host restaurants, shops, small offices, and multi-family homes. On-street parking should be provided for street-fronting businesses.

CONSIDERATIONS

1. ON-STREET PARKING
2. CURB EXTENSIONS
3. LANDSCAPING

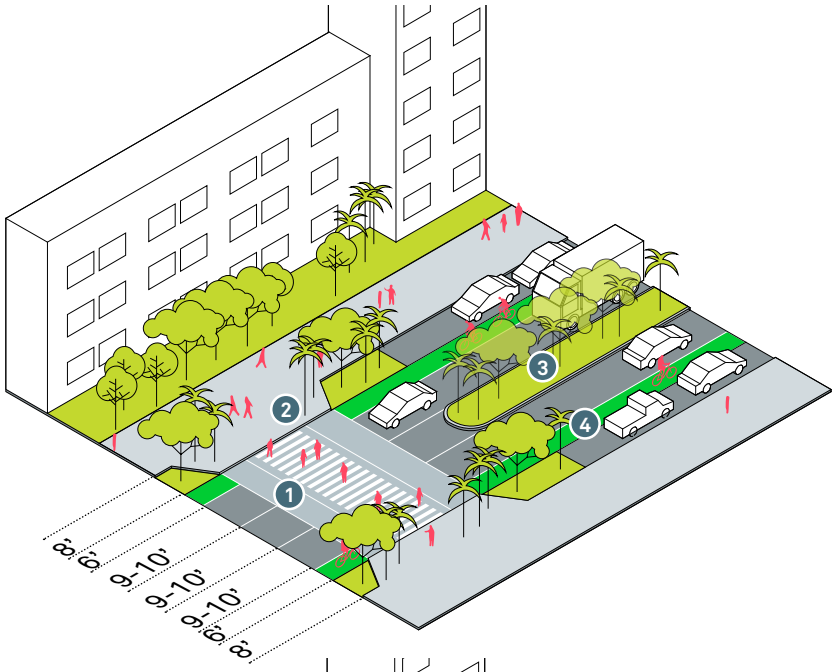
SW 7th St



Example 1:

1. Raised crosswalks encourage pedestrian crossing and slow traffic.
2. Mid-block curb extension provide a spatial buffer from the center of the crosswalk and parked vehicles.
3. Landscaping with trees should be used in medians to reduce heat island effects and encourage more street activity.
4. When possible, provide a bike lane to encourage a healthy and active lifestyle.

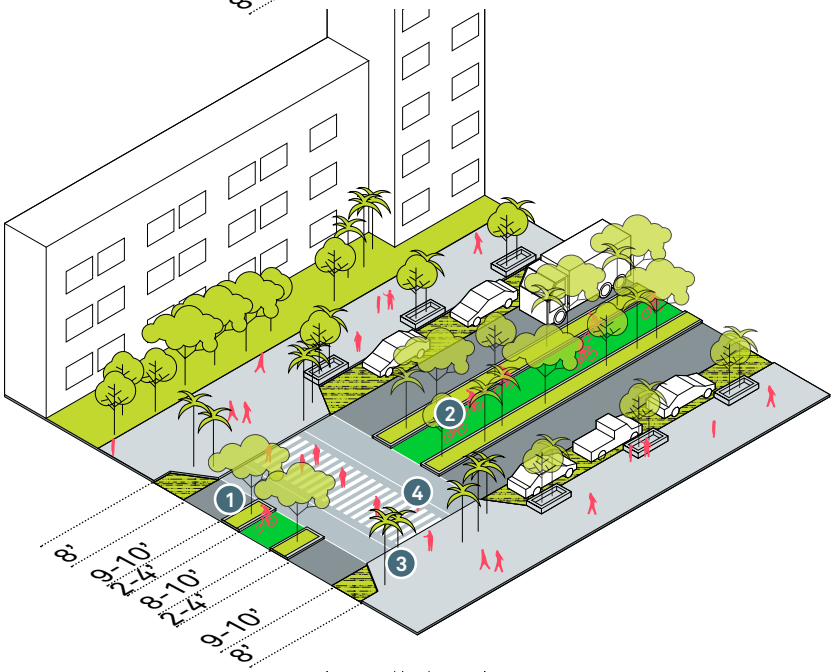
8’	PARKING PINCH POINT BULB OUT
6’	BIKE LANE (4’ is allowed only with buffer)
9-10’	CAR LANE



Example 2:

1. Planters that buffer a 2-way bike path provide another level of safety and shade for cyclists.
2. Bike lanes at the center of the street allow for a free flow of bike traffic while avoiding parking cars.
3. Mid-block curb extensions provide a spatial buffer from the center of the crosswalk and parked vehicles.
4. When raised crosswalks are not an option due to budget constraints, painted surfaces may be used to give attention to pedestrian crossings.

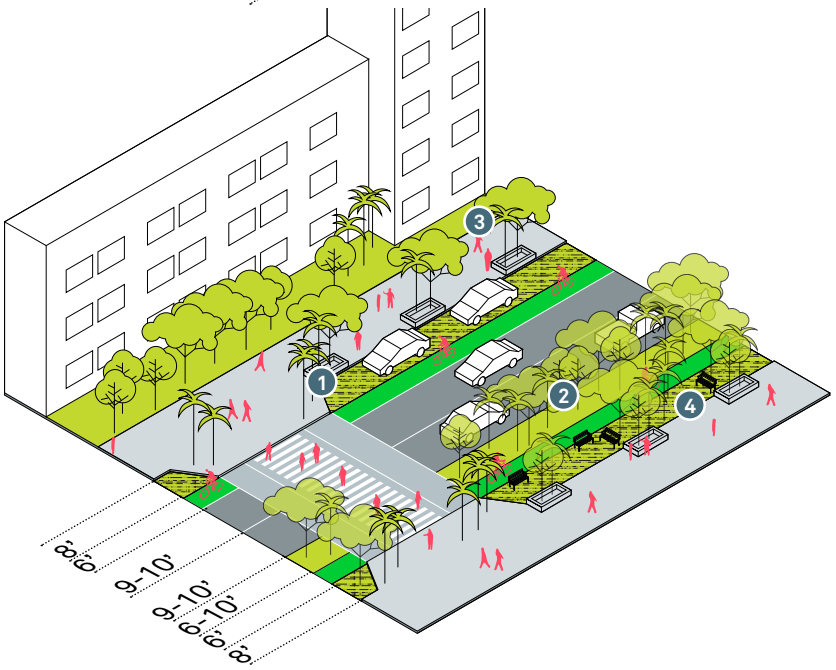
8’	PARKING PINCH POINT BULB OUT
9-10’	CAR LANE
2-4’	BUFFER
8-10’	BIKE LANE



Example 3:

1. Modulated pavers mixed with groundcover can help with stormwater management and urban run-off through infiltration.
2. Landscaping or bioswales can be shifted to one side of the road to create green spaces for pedestrians and cyclists.
3. Provide street trees to shade the sidewalk and reduce heat island effects.
4. Green spaces or linear parks can benefit focused development

8’	PARKING CURB EXTENSION
6’	BIKE LANE
9-10’	CAR LANE AND MEDIAN
6-10’	BUFFER BIOSWALE



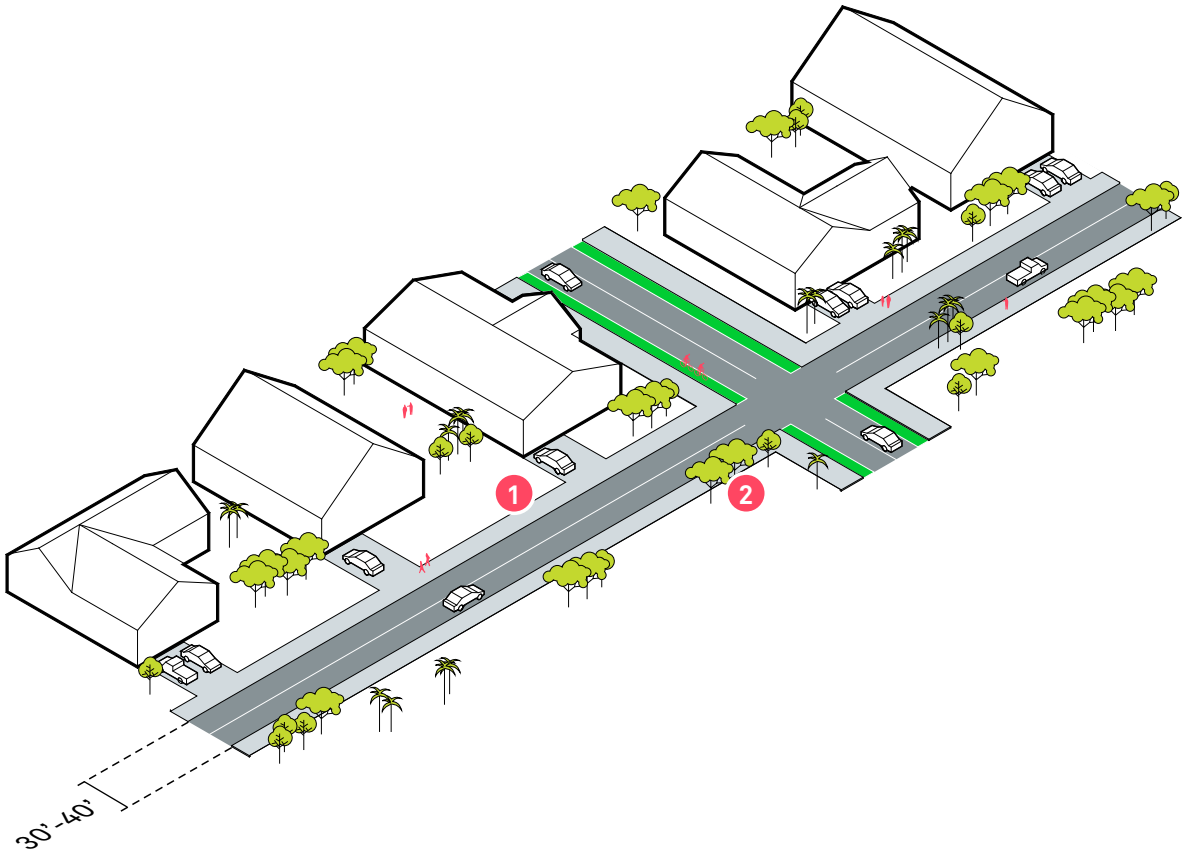
complete street typologies
residential street (local)

Residential Streets are purely residential in character and serve lower-density neighborhoods. These streets have low volume, slow moving traffic. Separate bike lane facilities are typically not required. Sidewalks are encouraged on both sides of the street but will depend on constraints in some areas that may prevent them on both sides.

CONSIDERATIONS

1. SIDEWALKS ON AT LEAST ONE SIDE OF THE ROAD
2. LANDSCAPING

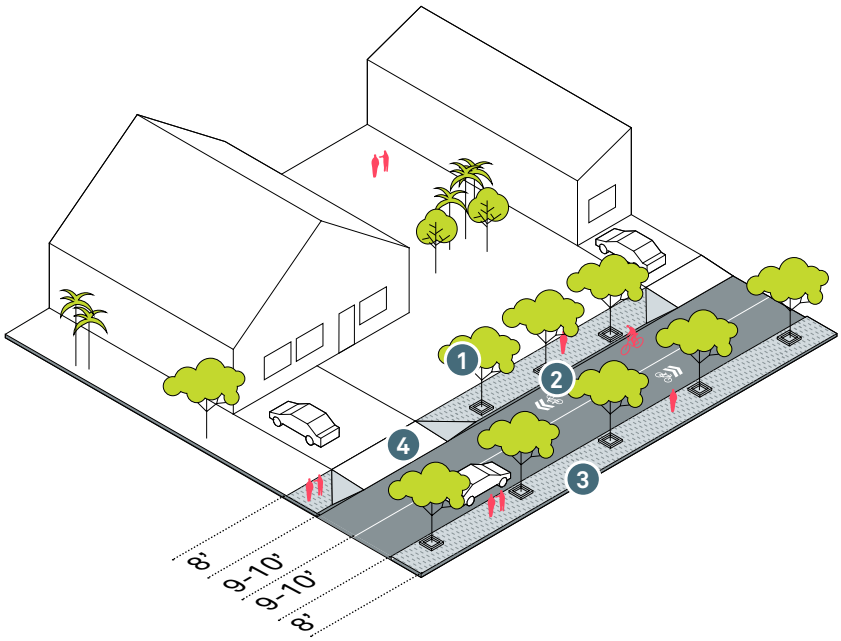
NE 5th St



EXAMPLE 1:

1. Use stormwater trees to provide shade and increase floodwater management.
2. Sharrows should be used for cyclist safety on residential streets that are part of a Healthy and Active Lifestyle territory.
3. Sidewalks should be at least 8' for stormwater trees and pedestrian accessibility.
4. Consider where hardscape variation occurs due to driveways.

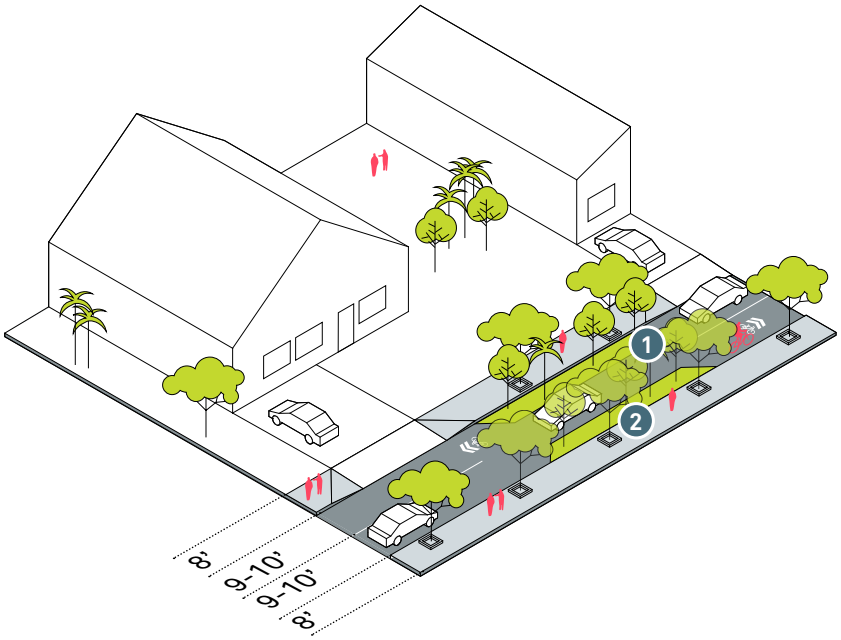
8'	SIDEWALK
9-10'	CAR LANE



EXAMPLE 2:

1. Pinch points create driver awareness and provide traffic calming on streets with lesser traffic volume.
2. Incorporate bioswales or planters within the pinch points to provide shade for pedestrians.

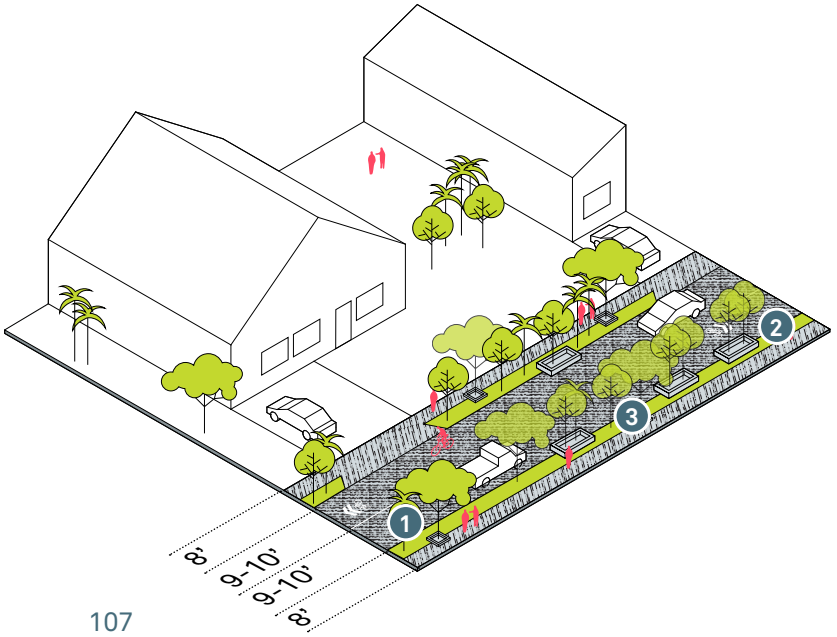
8'	SIDEWALK
9-10'	CAR LANE AND PINCH POINT



EXAMPLE 3:

1. Use curbless streets to create more user awareness.
2. Use pavers for areas that need more floodwater management and differentiate the pattern between car lanes and pedestrian zones.
3. Bioswales and planters can be used to catch run-off and help with stormwater management.

8'	SIDEWALK
9-10'	CAR LANE AND PINCH POINT



complete street typologies

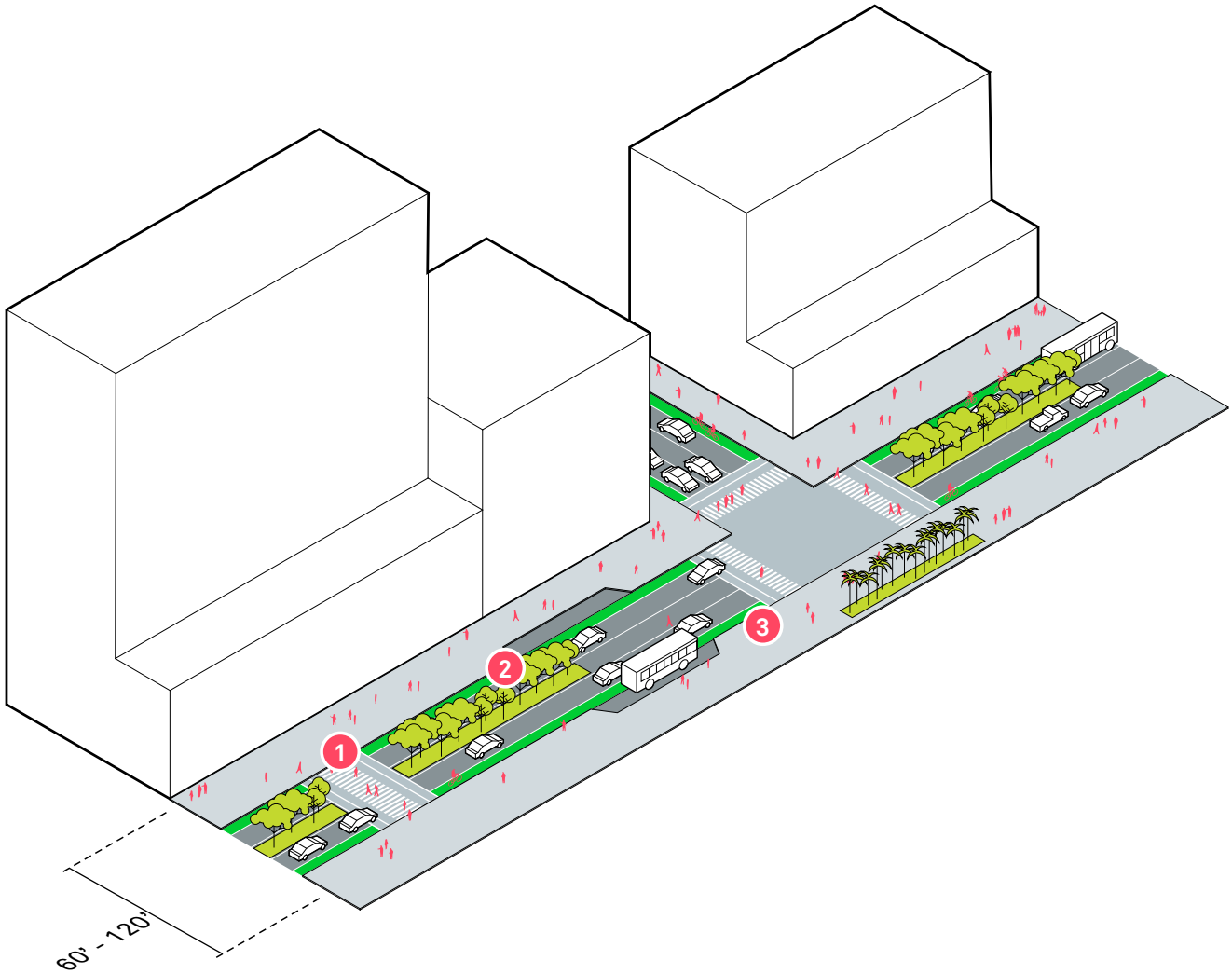
beach thoroughfare (special designation)

Beachside thoroughfare applies to roads adjacent to or near the beach. These roads have very high levels of every mode of travel. They support festivals, parades, and high levels of tourists throughout the year. The built environment includes a vibrant mixture of low- to high-rise residential, hotels, restaurants, retail, bars, and cafes. Pedestrians tend to cross at all points of the road, so traffic calming and other pedestrian safety measures are essential. Beachside Thoroughfares are fronted by wide sidewalks that facilitate many types of activity, such as sightseeing, bicycling, exercising, and other shopping and dining.

A1A

CONSIDERATIONS

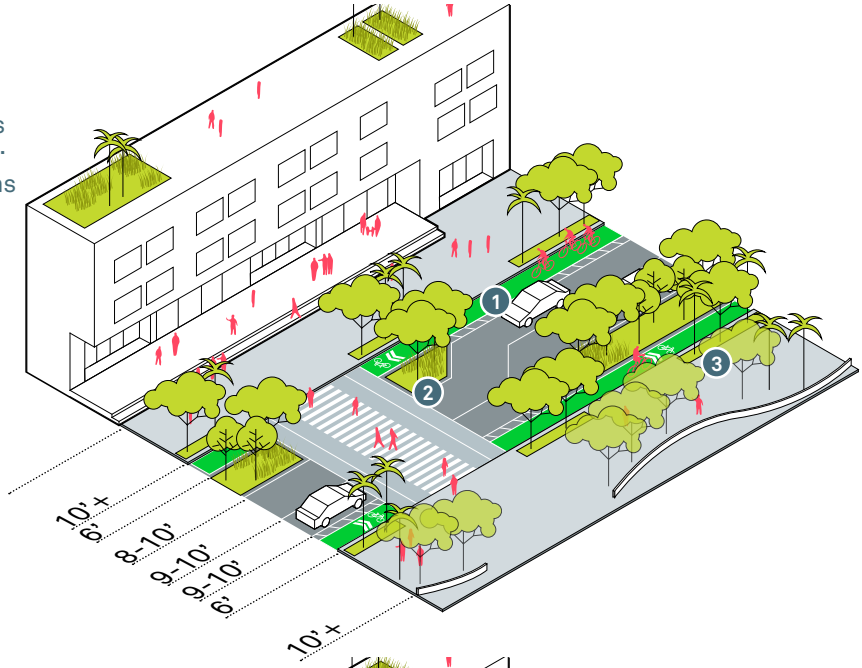
1. RAISED PEDESTRIAN CROSSINGS
2. STREET TREES AND OTHER FLOODWATER MANAGEMENT TOOLS
3. BIKE FACILITIES



Example 1:

1. Buffered bike lanes provide safety and comfort for cyclists.
2. Offsetting bioswales can allow for wider swales while shifting lanes to help with traffic calming.
3. Increasing shade trees provide better conditions for pedestrians and improves walkability.

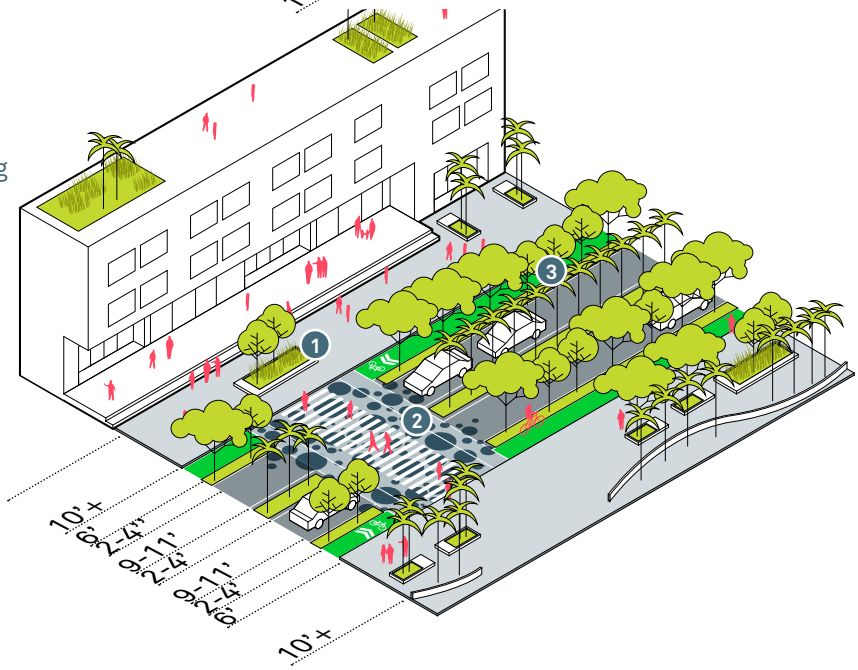
10'+	SIDEWALK	
6'	BIKE LANE	
9-10'	CAR LANE	
8-10'	BIOSWALE	PLANTER



Example 2:

1. Raised planters protect landscape from saltwater intrusion and provide seating and social spaces for pedestrians.
2. Mid-block crossings can be highlighted by using painted surfaces and function as wayfinding by identifying locations.
3. Locations or certain areas can be highlighted or distinguished by using certain landscape configurations. Additional trees can also help reduce heat island effects and provide comfort for pedestrians and cyclists.

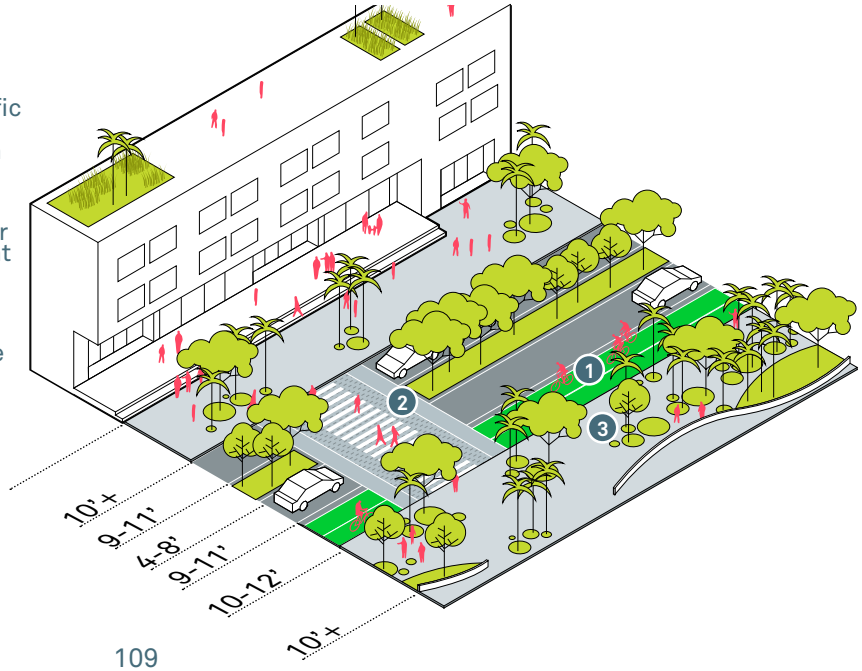
10'+	SIDEWALK
6'	BIKE LANE
2-4'	LANDSCAPE BUFFER
9-11'	CAR LANE



Example 3:

1. An elevated bike path can improve the safety and comfort for cyclists in areas with high traffic volume. A sloped curb edge allows for the path to be used by vehicles during storm evacuation or flood conditions.
2. Different materials and elevation change can be used for crossing areas to improve safety for pedestrians. Pavers or other pervious pavement can help infiltrate water.
3. More landscape and trees can provide comfort for pedestrians and aide in stormwater management. These trees can also help reduce erosion during storm surge events.

10'+	SIDEWALK	
9-11'	CAR LANE	
4-8'	BIOSWALE	MEDIAN
10-12'	ELEVATED BIKE LANE	



complete street typologies

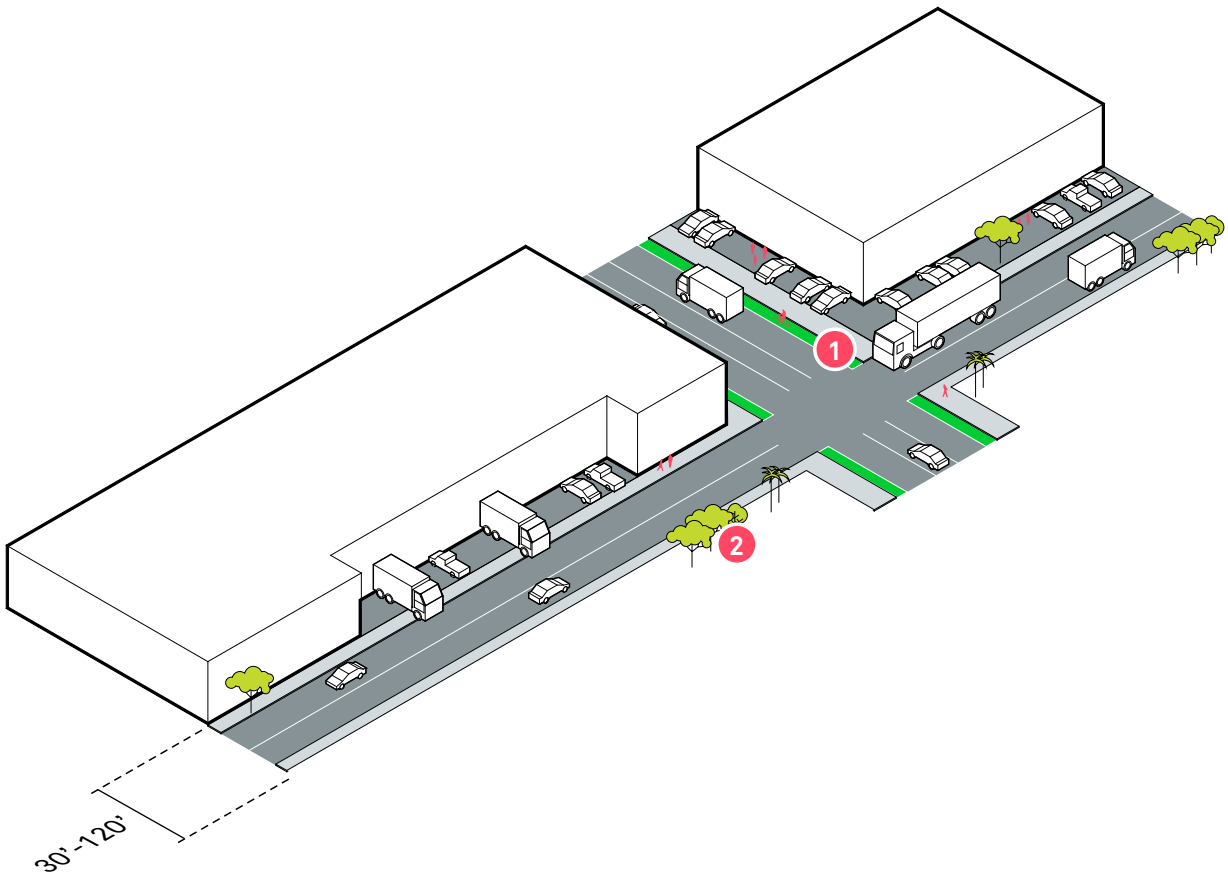
industrial thoroughfare (special designation)

Industrial thoroughfares are mainly defined by surrounding land uses such as large-scale production, distribution, and repair facilities, and are highly concentrated along the Florida East Coast Rail line and surrounding Port Everglades. They have less active street frontage and focus less on the pedestrian environment due to the presence of large driveways, loading docks, and other motor vehicle or freight facilities necessary to support industrial operations. They are wider roads that can accommodate large trucks and are unlikely to include many pedestrian or transit amenities. These streets have little to no tree canopy or landscaping to deal with urban run-off or heat islands effects. Added shading and bike facilities could attract more cyclists to use these streets especially since vehicular traffic is minimal and often focused only at specific times.

SW 2nd Ave

CONSIDERATIONS

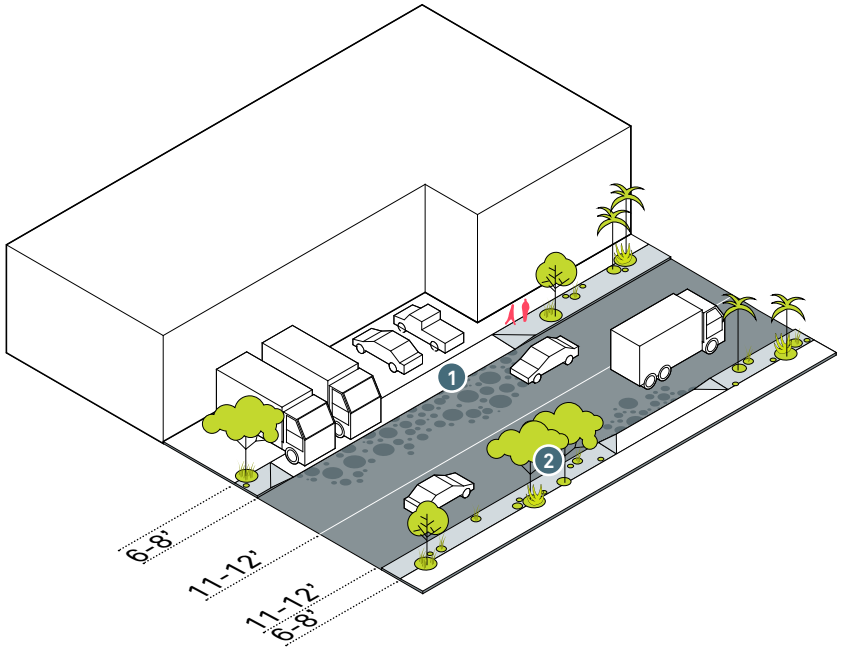
1. BIKE FACILITIES
2. LANDSCAPING



Example 1:

1. Painted surfaces can highlight loading areas or areas where parking is prohibited while adding to a dull street.
2. Landscaping can be added sporadicly to help with stormwater management and reducing heat island effects.

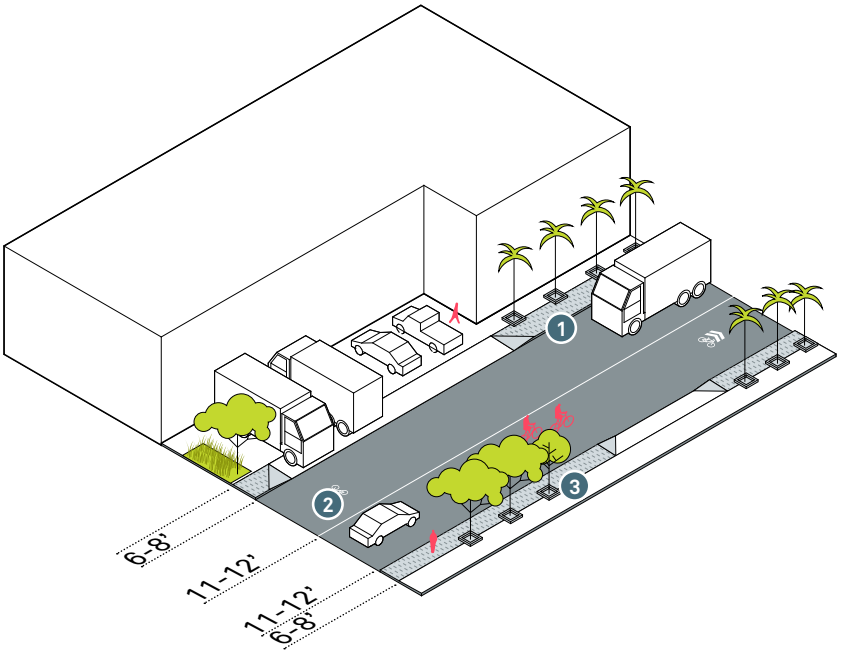
6-8’	SIDEWALK
11-12’	CAR LANE



Example 2:

1. Stamped concrete or pavers on the sidewalks allow for water infiltration.
2. Sharrows indicate that bicybles share the road with other vehicles.
3. Planters can provide seating while elevating trees or other landscaping in areas where salt water intrusion may occur.

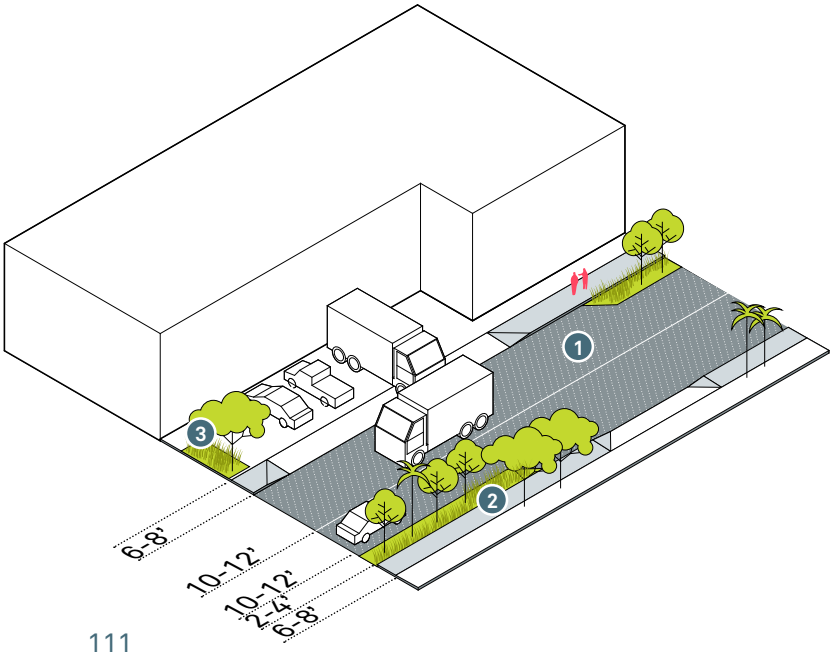
6-8’	SIDEWALK
11-12’	CAR LANE



Example 3:

1. Using reflective surfaces on these roads can help reduce the heat island effects. Pervious pavement can also be used to help with stormwater management.
2. Bioswales help with stormwater management. To allow for larger design vehicles these can be offset along the length of the roadway.
3. Easements, setbacks and unused spaces can be converted into landscape areas to beautify and help with stormwater management.

6-8’	SIDEWALK
10-12’	CAR LANE
2-4’	BIOSWALE



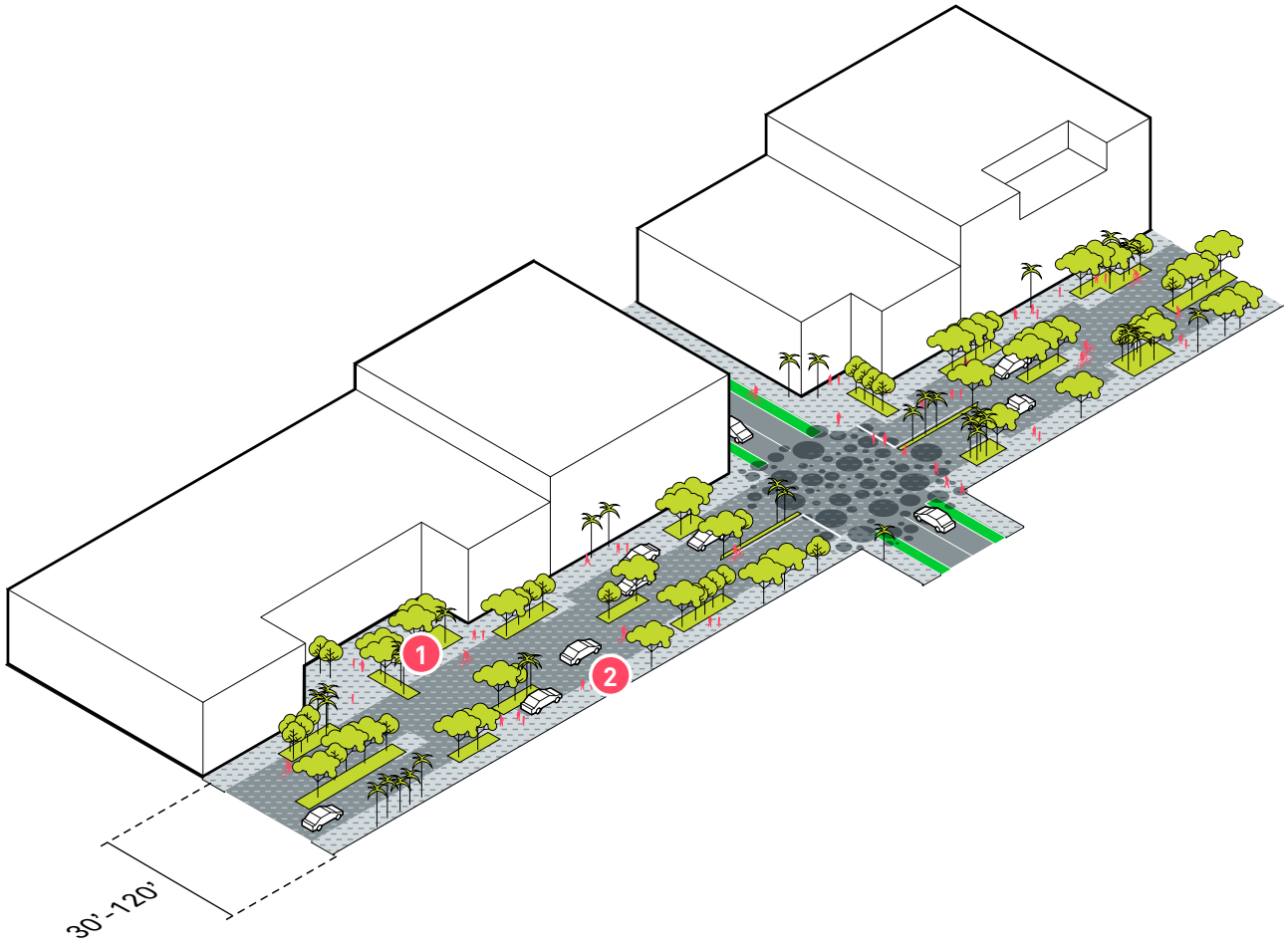
complete street typologies

shared street (special designation)

Shared streets are curbless streets with a continues surface and grade shared by all modes of transportation and pedestrians. Formal distinctions between dedicated areas such as sidewalks, bike lanes and traffic lanes are removed. Shared street environments are place where pedestrian activity is often high while vehicle volumes are low. Vehicles and transit move at slow speeds (15mph) to allow for pedestrians and bicycles to intermingle. A variety of activities and uses can be supported with shared streets such as restaurants, retail, entertainment, and residential.

CONSIDERATIONS

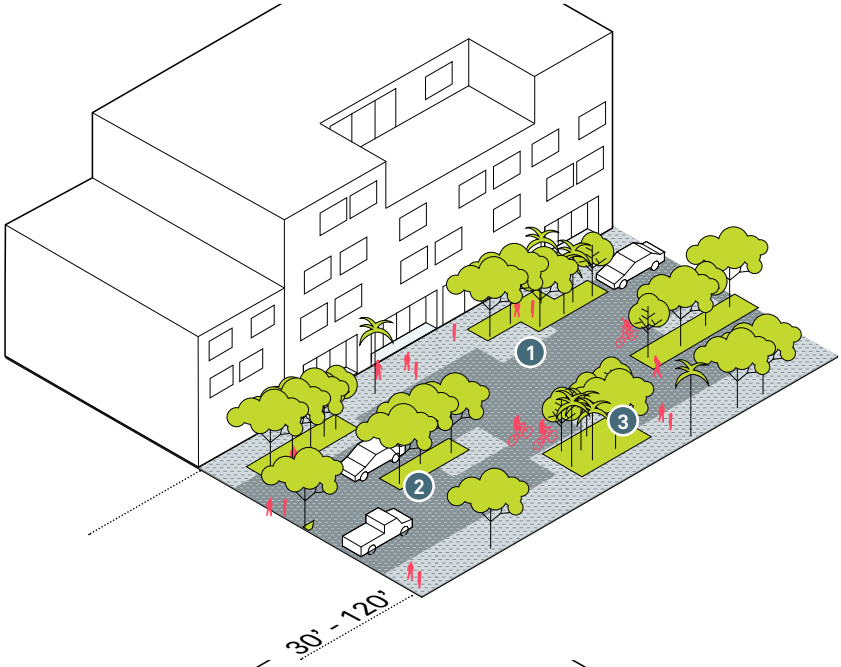
1. LANDSCAPE
2. HARDSCAPE



Example 1:

1. Removing curbs and using a single surface material such as pavers or stamped concrete from edge to edge removes the user hierarchy. Changing the surface color can organize certain uses or spaces.
2. Bioswales or planters can be integrated through out the shared street to help manage stormwater and help with traffic calming.
3. Shade trees mixed throughout the shared street can help reduce heat island effects, provide shade for pedestrians and cyclists. Having trees more spread out with room for roots improves their health.

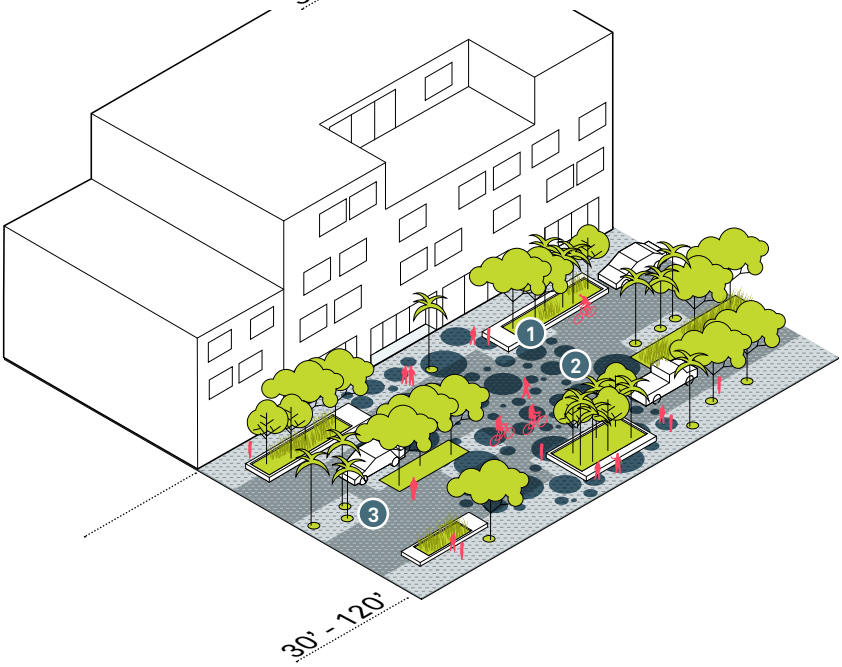
CAR LANES	BIKE FACILITIES
PARKING	PEDESTRIAN
LANDSCAPE	



Example 2:

1. Raised planters can incorporate seating and create social spaces for pedestrians by buffering them from vehicular traffic.
2. Paint or other art work can be added to create streets unique to certain locations and create a sense of place. These markings or artwork can also indicate things such as specific locations or high pedestrian areas.
3. Landscaping can be tailored specifically to select locations while calming vehicular traffic.

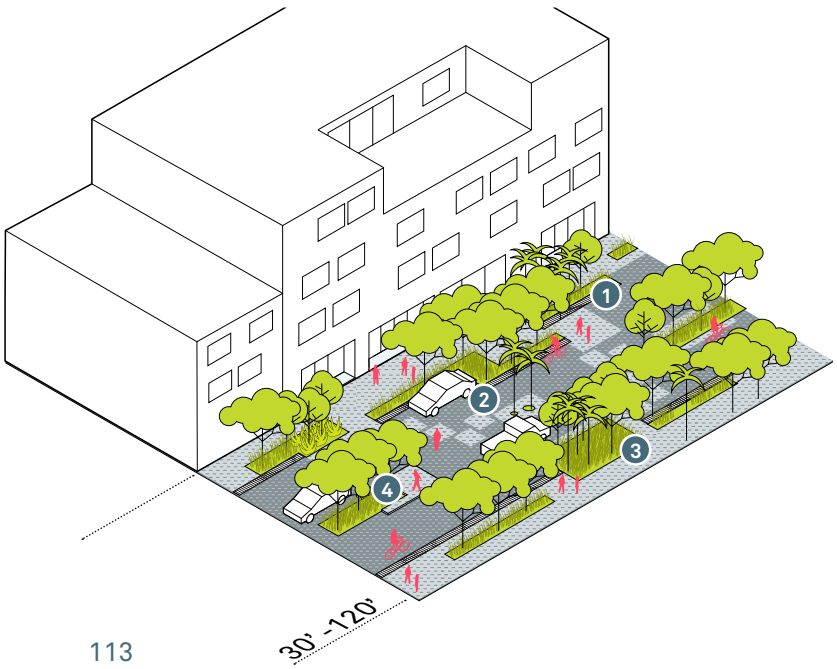
CAR LANES	BIKE FACILITIES
PARKING	PEDESTRIAN
LANDSCAPE	



Example 3:

1. Wet vaults or underground detention can be paired with landscaping to help manage stormwater.
2. Surface materials or colors can be used to indicate specific areas such as major crossing areas or gathering spaces.
3. Bioswales or planters can be designed to hold and manage stormwater.
4. Raised areas provide rest and refuge spaces while slowing down vehicular traffic.

CAR LANES	BIKE FACILITIES
PARKING	PEDESTRIAN
LANDSCAPE	



complete street typologies

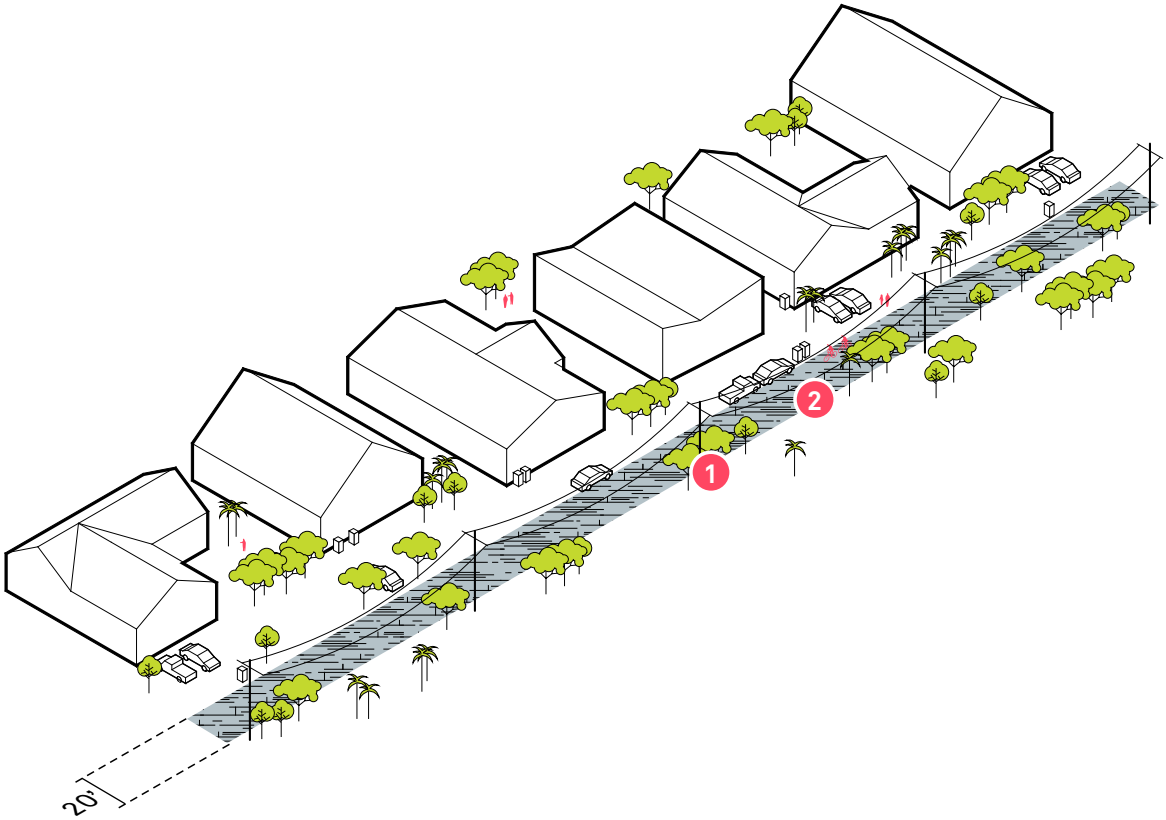
green alley (special designation)

Most residential alleys have low traffic and are conduits for infrastructure and services. Green alleys integrate sustainable materials, pervious pavements, and living infrastructure to create an inviting public space for people while effectively managing stormwater.

CONSIDERATIONS

1. FLOODWATER MANAGEMENT TOOLS
2. HARDSCAPES

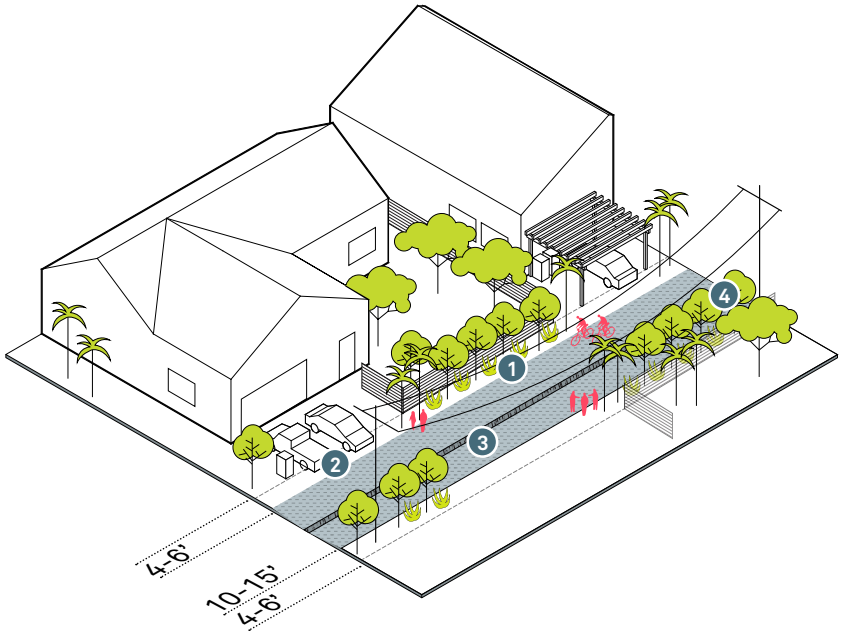
Victoria Park



Example 1:

1. Unique landscaping and plant palettes can be created for individual alleys or neighborhood alleys to create a sense of place or help with wayfinding.
2. Pavers or pervious pavement can be used to aide in water infiltration while providing a surface for bicyclists and pedestrians.
3. Sloping alleys to the center and incorporating drainage systems can help manage stormwater.
4. Ensure appropriate trees are used in consideration of overhead utilities.

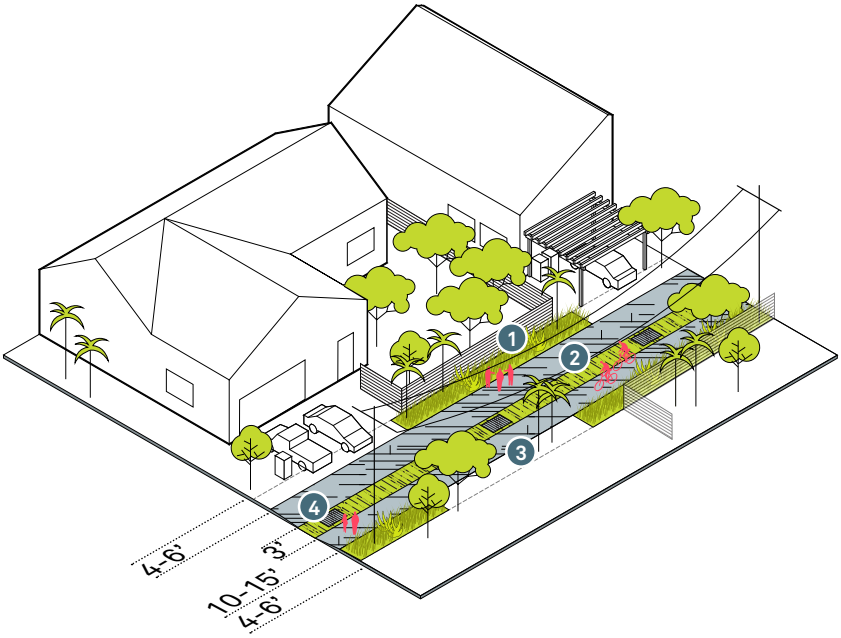
4-6’	SETBACK
10-15’	ACCESS EASEMENT



Example 2:

1. Setback spaces can be used to incorporate bio-swales or planters to help manage stormwater.
2. The center of the alley can be used for water infiltration by removing any hard surfaces and planting low vegetation such as grasses or ground cover that wont impede vehicles to travel through.
3. Use pervious pavement and reflective materials to reduce heat island effects and benefit drainage.
4. Incorporate wet vaults when possible to help retain water during storm events.

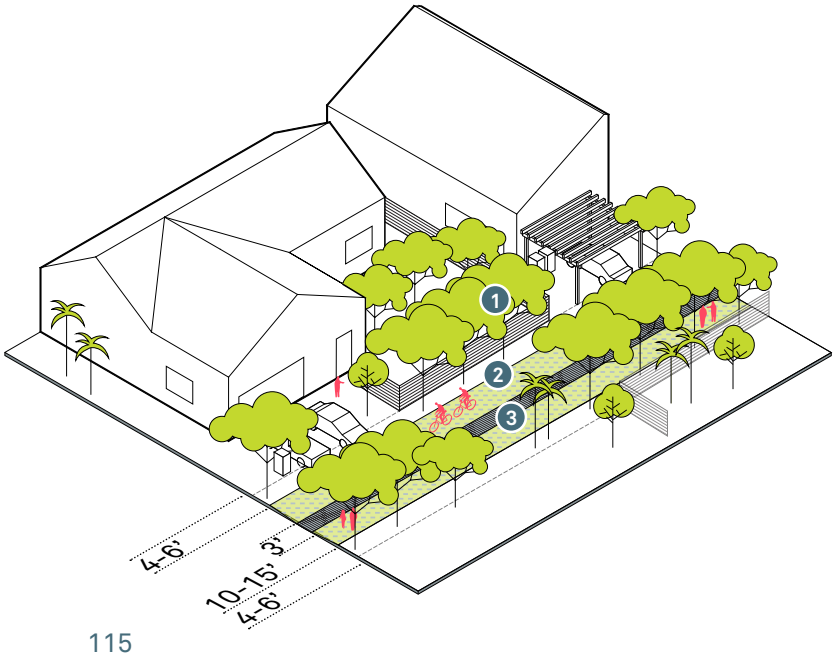
4-6’	SETBACK
10-15’	ACCESS EASEMENT
3’	INFILTRATION STRIP



Example 3:

1. Provide shade trees to shade the sidewalk and reduce heat island effects.
2. Pavers can be mixed with grasses or ground cover to reduce heat island effects, improve drainage and allow for walkability.
3. Utilities can be buried or make use of a utility trench at the center of the alley.

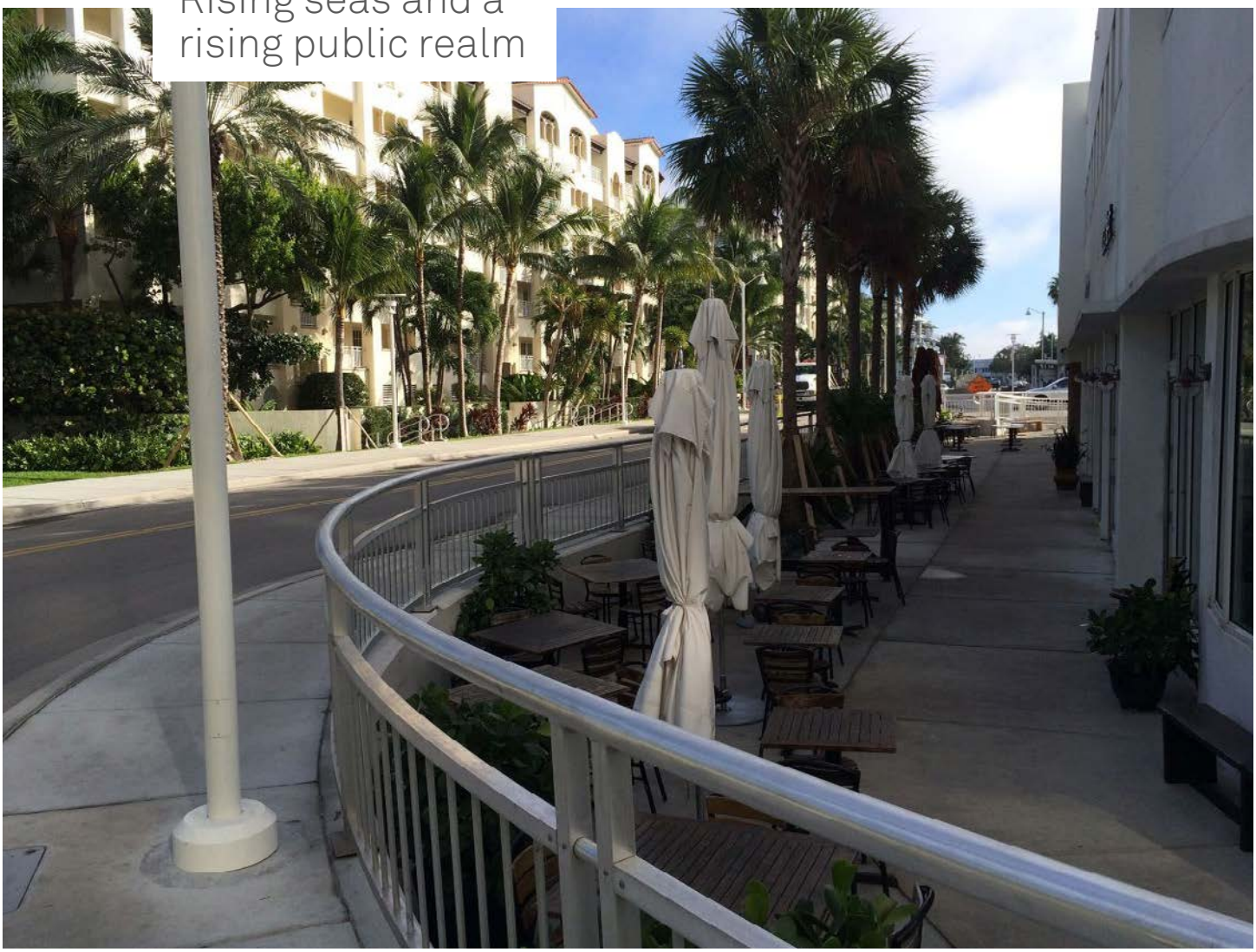
4-6’	SETBACK
10-15’	ACCESS EASEMENT
3’	UTILITY TRENCH




DELI
CAFE
FINE FOOD

frontage

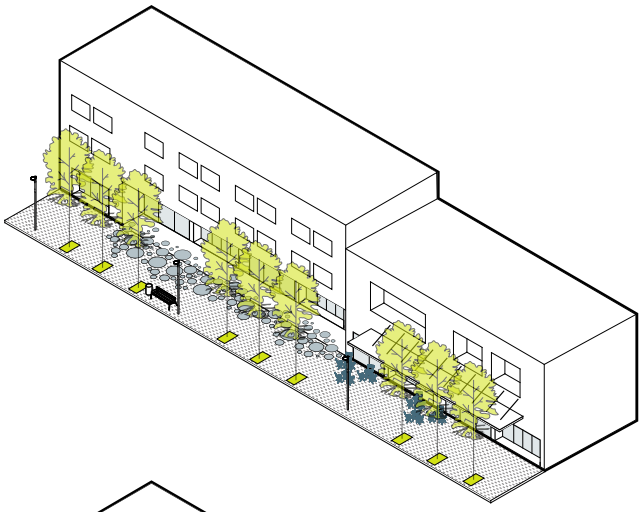
Frontage refers to part of the sidewalk where the building or buildings meet the public realm. This can sometimes be a gray area since there is no clear line where one ends and the other begins often resulting in an overlap.



frontage

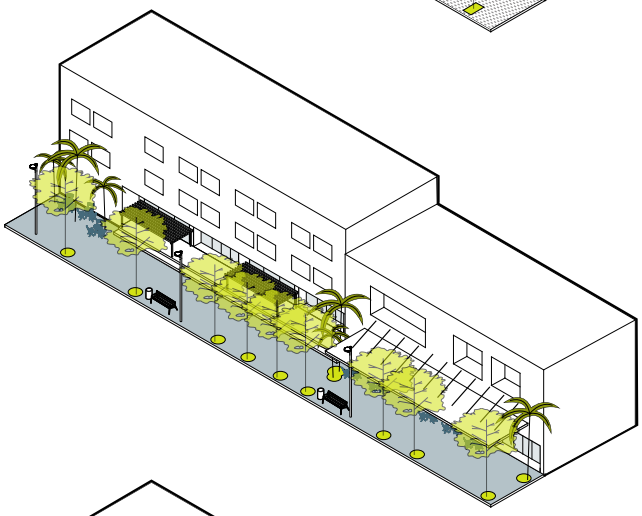
Frontage refers to the interaction between a building and the public realm and is often referred to when dealing with sidewalks. The frontage can be as simple as an overhang from the building over the sidewalk or it can be more elaborate by incorporating outdoor spaces and elevation changes. It may also go beyond a single building and stretch along an entire block.

The street environment and public realm works together with building facades or the private realm to create unique and active edges. This relationship between the public and private realm plays an important role in activating a street, creating a sense of place and improving walkability. Buildings with elevated first floors require a transition to meet the public realm. Exterior transitions, including stairways, railings, and ramps, must not impede the public right of way nor make the building seem removed from the public realm. Integrating access and level change into the interior of the building is generally preferable, but not always feasible.



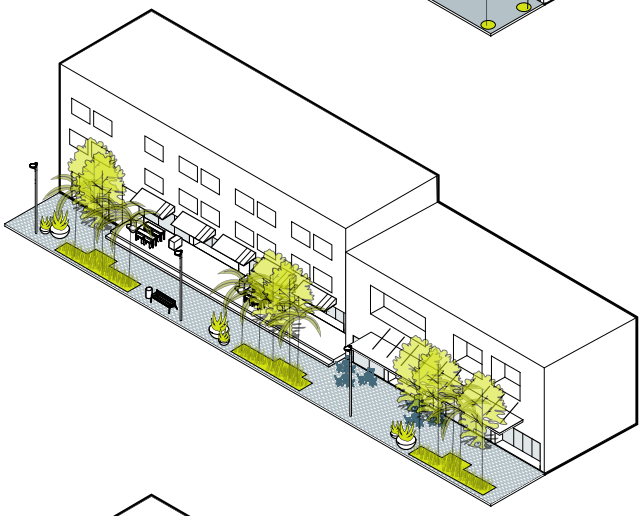
Place and Identity

Frontage with a focus on **Place and Identity** should incorporate architectural details appropriate for the area and create spaces for people to rest and socialize. Aesthetics associated with frontage can also align with aesthetics from the rest of the street/sidewalk to create a cohesive public realm.



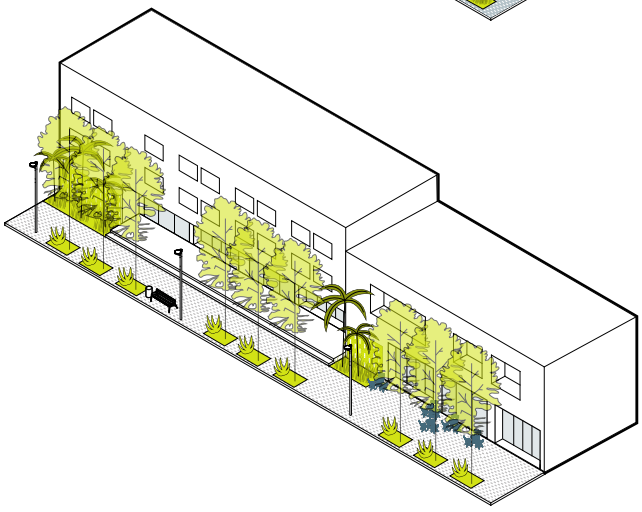
Healthy and Active Lifestyle

Frontage that has an emphasis on a **Healthy and Active Lifestyle** should incorporate wider sidewalks with little to no obstruction; if a level change is introduced it should be seamless without interfering with the pedestrian experience. Shading and protection from sudden downpours improve the pedestrian experience and allows for year-round use.



Focused Development

Frontage associated with **Focused Development** should have a better connection between the private domain and the public realm. Architecture can allow for interior spaces to spill out on the street and provide public spaces for people to socialize.



Flood Protection

Frontage associated with **Flood Protection** can incorporate bio-retention planters or street trees to infiltrate or retain stormwater. Elevation change or other flood mitigation strategies should not impede or disconnect the public realm from buildings.

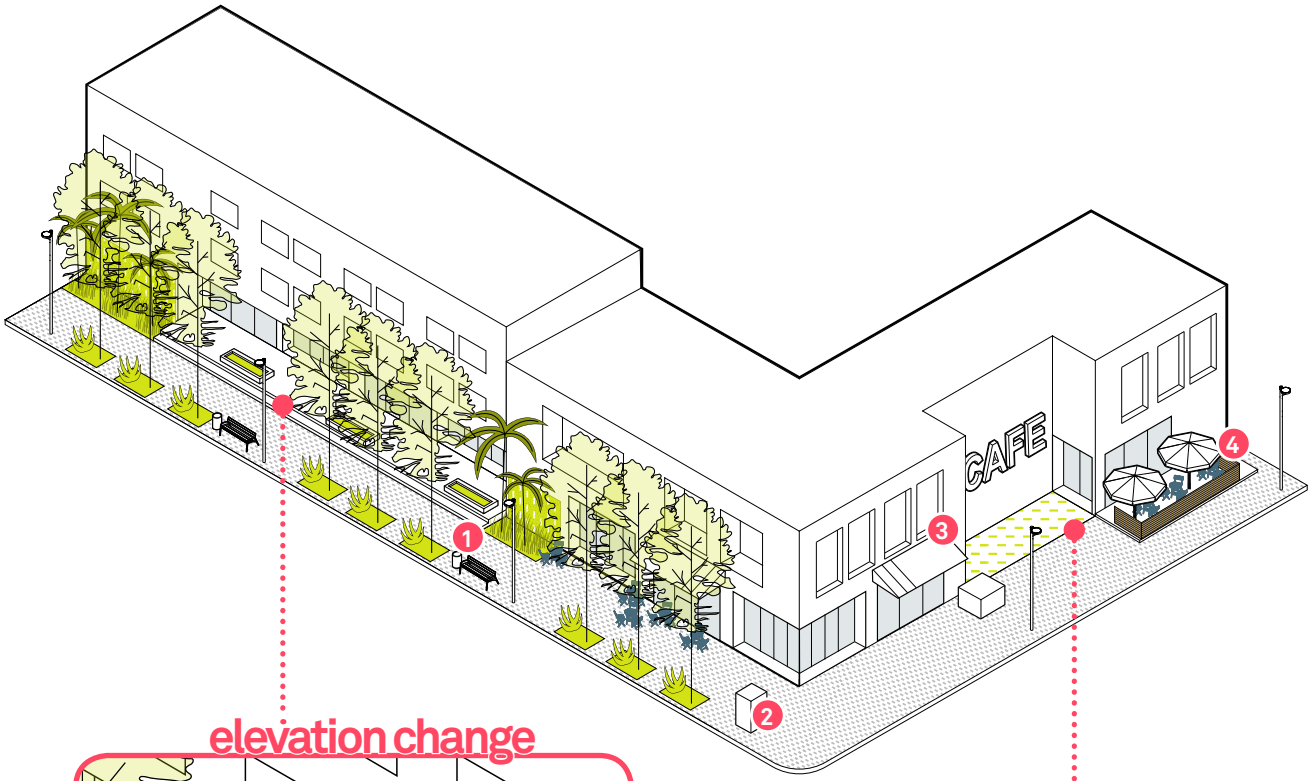
frontage design principles

1 Bio-retention planters, street trees, and other living infrastructure helps manage stormwater and urban run-off. Green walls and other landscaping can improve environmental conditions for pedestrians such as providing shade and cooling qualities.

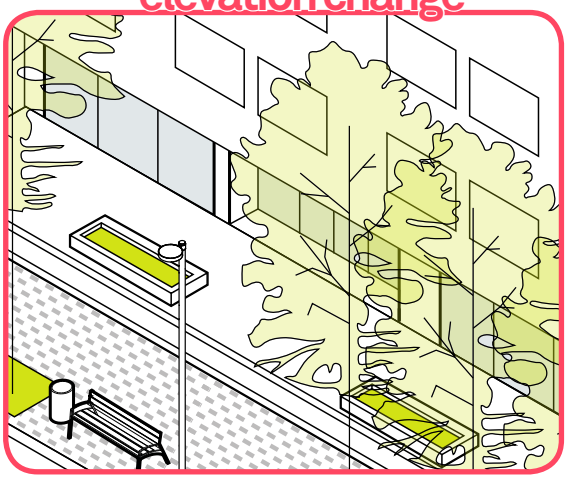
2 Utilities and other infrastructure can be integrated into frontage and buildings through alcoves or setbacks to reduce clutter in the right of way while still allowing for access

3 Overhangs and other shading devices provide protection for pedestrians during sudden downpours and provide shade when trees are not an option as a result of available space or utility infrastructure. Shading devices can also add to the identity of a place.

4 Frontage can incorporate social and resting spaces such as cafes and other seating elements. Additionally, these spaces can be connected to the public realm by using similar aesthetics found in the neighboring public realm.

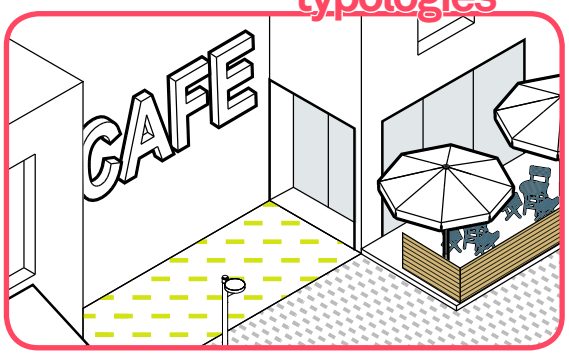


elevation change



Architecture connects the public realm with the private realm. Access and openings shape this connection and can add to the identity and experience of the pedestrians. Elevation changes as a result of designing for flood events can alter this connection and should be done without loosing the connection.

typologies



Frontage typologies should reflect the **Place and Identity** while being appropriate for the immediate public realm.

flood-adaptive building/public realm interface

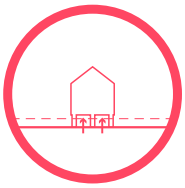
To accommodate future sea level rise many new developments are designing with a higher elevation in mind. In some cases, the public realm may be raised, this could include roads and sidewalks, and both existing and new buildings would have to find a way to connect to this new baseline.

ELEVATE

Instead of elevating the ground floor from the exterior, connect to the public realm by using the interior of the building to bring people up to the elevated level as needed over time.

ADAPT

New construction can integrate adaptive building strategies, such as a higher floor to ceiling height on the first floor. Instead of a traditional 15' it should be built to 20'. This allows for the floor to be raised incrementally in the future to match the roads and public realm as they are incrementally raised.

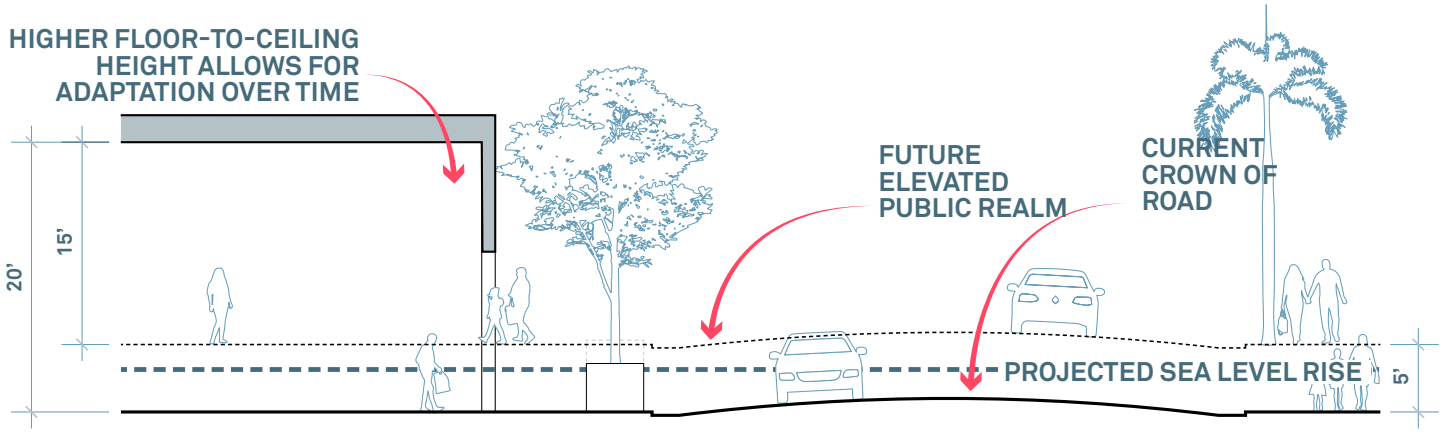


INUNDATE

Some buildings will interact with water and parts of the structures maybe inundated with water. These buildings will look at new connections to the public realm that may require water connections.

RETREAT

In some cases, buildings and structures will have to retreat as a result of sea level rise. These retreated areas will be new areas of opportunity for resilient and sustainable public realm projects that are continuously or regularly flooded.



typologies

STOREFRONT

Storefronts directly abut the property line and have a high level of transparency to the interior of the building. Storefronts provide visual interaction between businesses and pedestrians, helping to activate the public realm.

CONSIDERATIONS: PORTIONS OF THE STOREFRONT ARE OFTEN SET BACK OR CHAMFERED TO INCREASE WINDOW SURFACE AREA AND TO CREATE A FOYER INTO THE SHOP.

PATIO

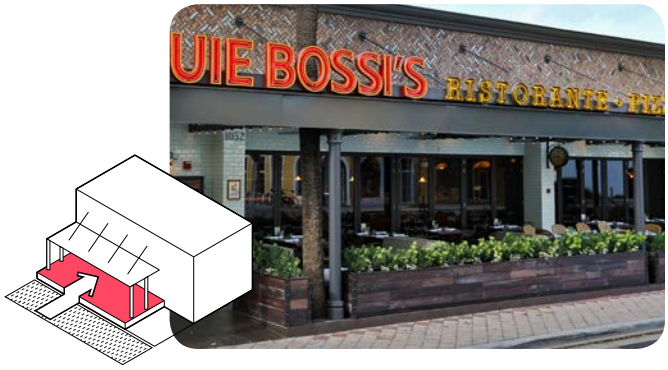
A patio is a small outdoor space for dining or recreation that adjoins a building; they are often paved and enclosed by a fence or a wall.

CONSIDERATIONS: USE SMALL TREES, AWNINGS OR FURNITURE TO SHADE THE PATIO OR PROVIDE PROTECTION FROM HARSH WEATHER. HARDSCAPE MAY MATCH THE SIDEWALK OR VARY, INDICATING WHERE PUBLIC PROPERTY ENDS AND BUSINESS-OWNED PROPERTY BEGINS.

TERRACE

A terrace is an outdoor extension of an interior room raised above the level of the adjacent lawn or walk. More raised ground than a constructed platform, a terrace has a finished floor surface and no roof. Often with steps and bounded by a fence or low wall, the eye level of the inhabitant is just at or above that of the passing pedestrians.

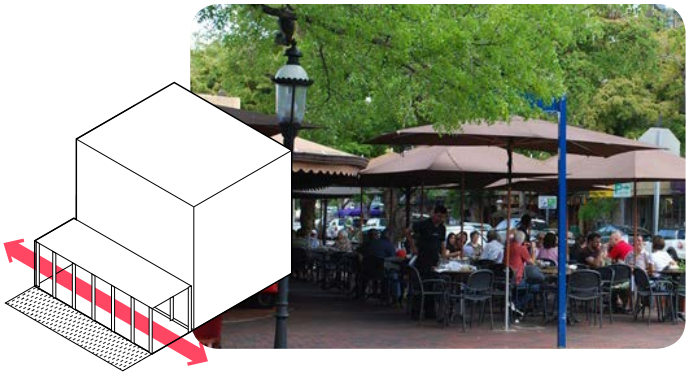
CONSIDERATIONS: RAMP AND STAIR DESIGN IS IMPORTANT FOR ACCESSING BUILDINGS WITH TERRACES. THE TERRACES MAY BE DIRECTLY CONNECTED TO THE PUBLIC REALM OR ACCESSED THROUGH A PRIVATELY-OWNED BUILDING.



PORCHES

Porches should be furnishable and have a depth of no less than eight feet. Where feasible, residential porches should be raised from the level of the walk by at least 24 inches. A social space at the front of the building, porches offer both client prospect and pedestrian refuge.

CONSIDERATIONS: USE SMALL TREES, AWNINGS OR FURNITURE TO SHADE THE PORCH OR PROVIDE PROTECTION FROM HARSH WEATHER.



GALLERY

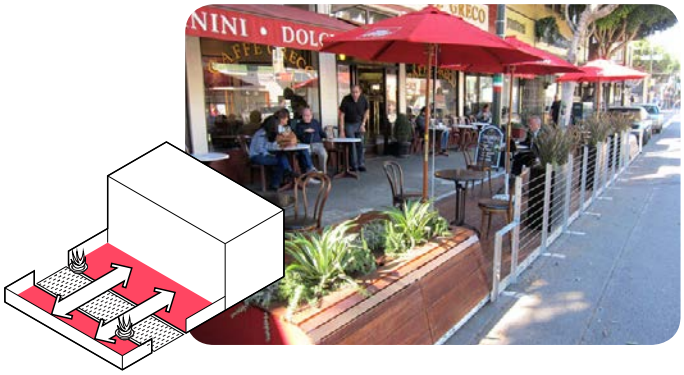
A gallery is a canopy (with or without columns) that may be attached or detached from the building that provides shelter for pedestrians. Galleries should be a minimum of ten feet wide.

CONSIDERATIONS: THE BEGINNING AND END OF A GALLERY SHOULD BE DESIGNED IN SUCH A WAY THAT ACKNOWLEDGES ADJACENT BUILDINGS OR PROPERTIES. LIGHTING DESIGN IS IMPORTANT FOR THE PEDESTRIAN EXPERIENCE AND SAFETY AT NIGHT.

ARCADE

An arcade is a habitable setback formed by a rhythm of columns supporting the building above, or a subtraction of space from the mass of the building; it should be a minimum of ten feet wide.

CONSIDERATIONS: THE BEGINNING AND END OF AN ARCADE SHOULD BE DESIGNED IN SUCH A WAY THAT ACKNOWLEDGES ADJACENT BUILDINGS OR PROPERTIES. LIGHTING DESIGN IS IMPORTANT FOR THE PEDESTRIAN EXPERIENCE AND SAFETY AT NIGHT.



ANNEX

An annex is privately-owned space that is detached or separated from the business, often by public right-of-way. While the annex is detached, there is still a form of visual or spatial connection that ties back to the business.

CONSIDERATIONS: THERE MAY BE OPPORTUNITIES FOR BUSINESSES TO RENT ON-STREET PARKING FOR ADDITIONAL SEATING. USE SMALL TREES OR FURNITURE TO SHADE THE ANNEXED SPACE OR PROVIDE PROTECTION FROM HARSH WEATHER.

FORECOURT

Forecourts are used intermittently and mixed with other frontages. A portion of the building is set back from the building line of the block, providing a relief space for lawns, gardens, vehicular drop-offs and porte-cocheres.

CONSIDERATIONS: FORECOURTS HELP TO BRING BUSINESSES OUT AND ACTIVATE THE STREET WHERE SETBACKS ARE SMALL AND PUBLIC SPACE IS SCARCE. CONSIDER HOW THE HARDSCAPE INTERACTS WITH THE PUBLIC RIGHT-OF-WAY TO ENCOURAGE PATRONS.

parcels

Parcels are City owned and operated properties including easements, parking lots and utility sites such as lift stations. Designing for these can look at individual strategies or connected strategies that can provide expanded ecological services.

The City can set an example for sustainable + resilient practices.

parcels

City parcels can be looked at from two different scales: the lot and the block. Both the lot and the block have design principles that have implications on overall walkability and sustainability in a city. City-owned parcels are primarily occupied by buildings, and the spaces surrounding the structures can benefit from sustainable and resilient practices where they connect to the public realm.

Proper layout of a lot or block and implementation of the right tools can improve the microclimate of a site. Utilizing tools, such as living infrastructure, can increase the tree canopy along a street, aligning with the City's goals while reducing the heat island effect.

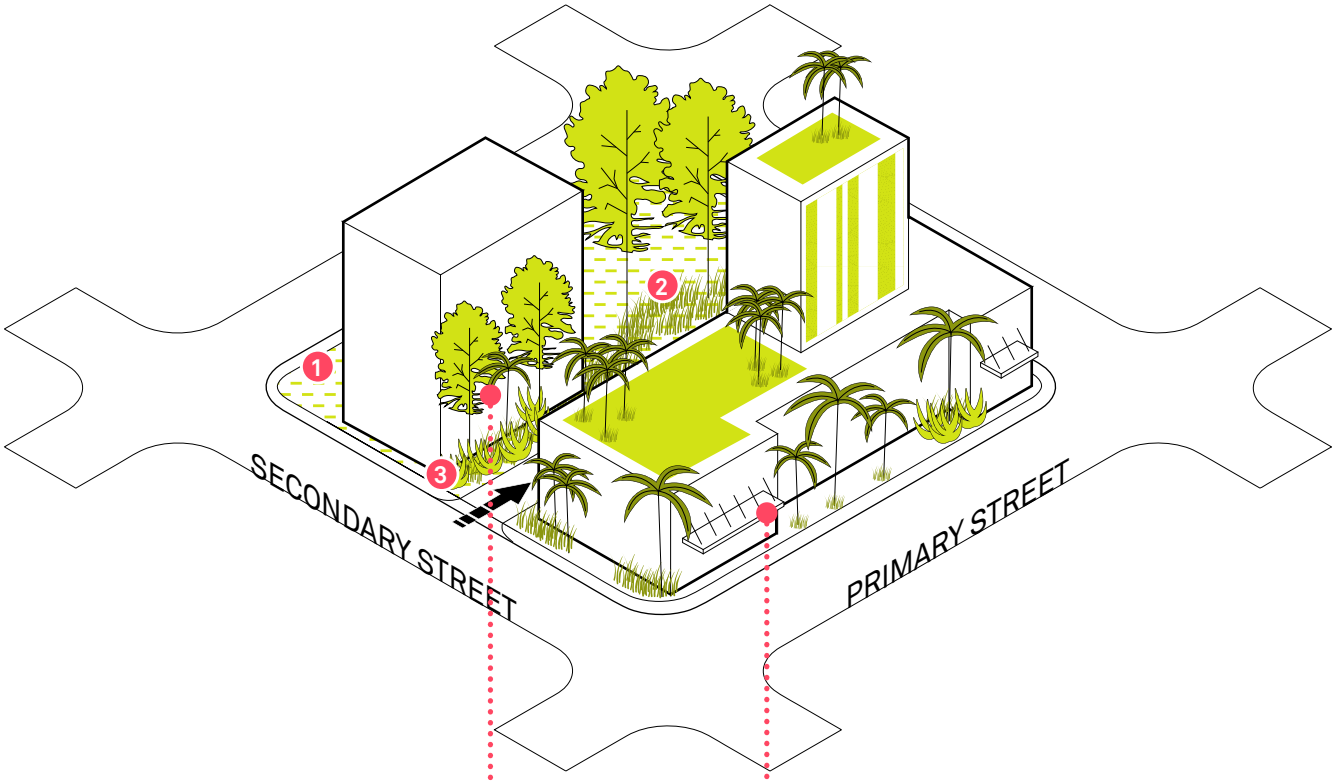
Parcel design can also address how floodwater is managed, reducing the amount of runoff that needs to be conveyed or stored elsewhere. Parcels must also take into consideration sea level rise strategies, such as how to deal with elevating pump stations, garbage storage, and extended periods of inundation.

1 Additional pervious surfaces increase the amount of water that infiltrates the ground and decrease run-off and flooding. More trees and vegetation can absorb and evapotranspiration water that does not infiltrate.

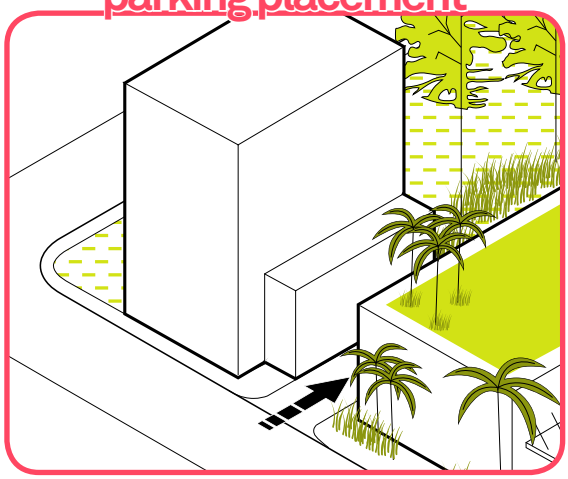
2 Larger ecosystems can be stitched together through multiple parcels, creating a more robust ecology that is able to deliver improved ecosystem services.

3 Parking or service access should be located on the secondary street to avoid vehicular traffic moving through the pedestrian zone and interrupting the continuity of Architectural Frontage.

4 When the lot or block coverage creates a large amount of impervious surfaces, consider requiring green roofs, green walls or expanding landscape areas around the building in order to mitigate urban runoff and reduce heat island effects.

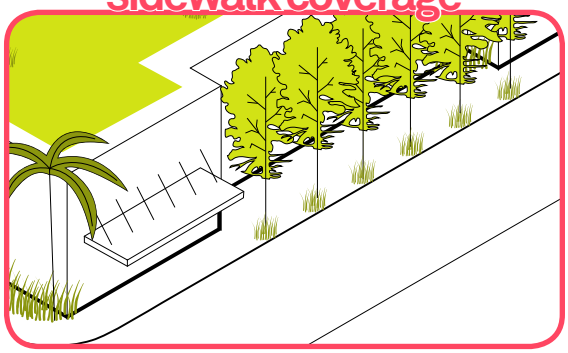


parking placement



When surface parking lots are not an option, provide parking garage access in the alley or secondary street at the rear of the building whenever possible.

sidewalk coverage

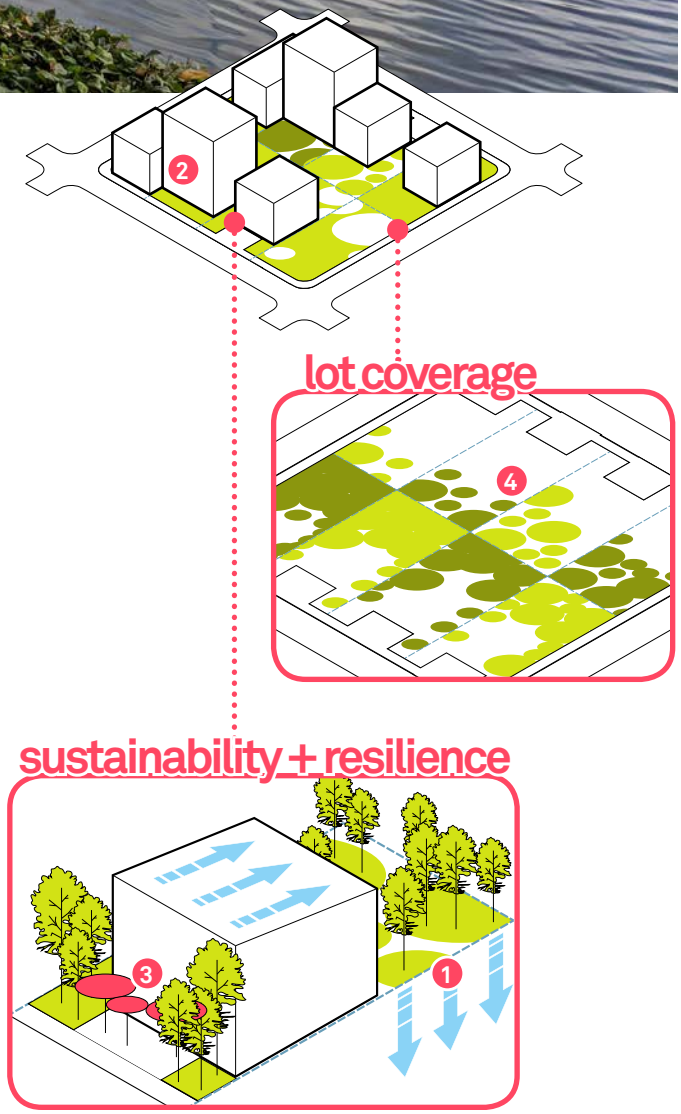


Extend awnings to provide shade where consistent shade tree canopy is required but not possible in the pedestrian right-of-way.

lot design

How a lot is designed and how the building sits within it contributes to the experience of the public realm. Lot design should be sustainable and resilient; this includes measures that minimize impervious surfaces, protect ecologically sensitive areas on the site, and increase infiltration through the use of vegetation (for appropriate vegetation types and required space, visit the Tools section). Lots may also be designed with a reduced driveway length, incorporate recycled materials and use pervious pavements. Building footprints should be minimized in order to make more space for new and existing vegetation.

1. **DIRECT URBAN RUNOFF TO GREEN STORMWATER INFRASTRUCTURE AT THE REAR OF THE LOT, WHERE IT CAN INFILTRATE PLANTERS AND RAIN GARDENS.**
2. **BUILDINGS ON LARGER LOTS SHOULD STEP BACK AFTER A CERTAIN DISTANCE IN ORDER TO BREAK THE MONOTONY ALONG THE STREET. THESE DISTANCES MAY BE FOUND IN THE MASTER PLANNING DOCUMENTS.**
3. **WHEN A BUILDING STEPS BACK, IT SHOULD PROVIDE SHADED SPACE USING TREES OR FURNITURE.**
4. **IMPERVIOUS SURFACES ON A LOT CAN BE REPLACED WITH PERVIOUS SURFACES AND LIVING INFRASTRUCTURE TO IMPROVE THE ABILITY TO MANAGE STORMWATER.**



block design

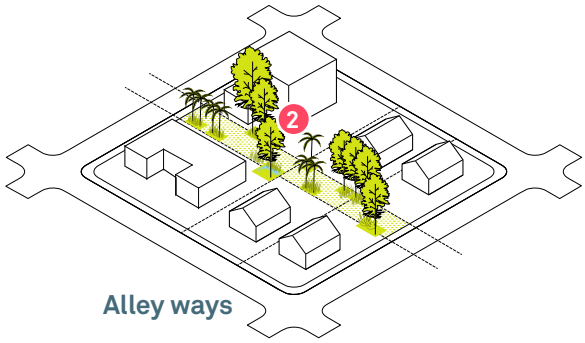
Block design looks at how a series of buildings can work together to address sustainable and resilient practices across a larger scale, consisting of multiple lots many times. Connecting lots with sustainable and resilient practices in the public realm can provide better ecosystem services, stormwater management and other attributes since the practices create an interconnected system.

1. **CONNECTING MULTIPLE PROPERTIES TO EASEMENTS THROUGH LIVING INFRASTRUCTURE SUCH AS BIO-SWALES CAN DELIVER MULTIPLE ECOLOGICAL SERVICES FOR STORMWATER MANAGEMENT.**

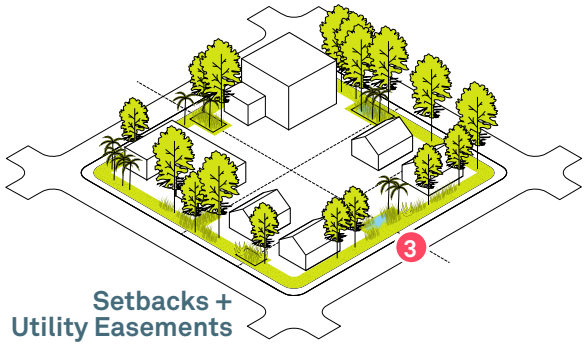
2. **ALLEYS CAN BE RETROFITTED WITH LIVING INFRASTRUCTURE OR CONVERTED TO GREEN ALLEYS. WITH LOW TRAFFIC USAGE ALLEYS ARE GOOD CANDIDATES FOR PERVIOUS PAVING TO HELP INFILTRATE STORMWATER.**

3. **SETBACKS OR EASEMENTS AT THE FRONT OF PROPERTIES CAN INCORPORATE BIO-SWALES AND CONNECT THEM ACROSS SEVERAL PROPERTIES TO CREATE A NETWORK OF LIVING INFRASTRUCTURE WHILE ADDING CHARACTER AND CANOPY TO THE STREET.**

Easements



Alley ways



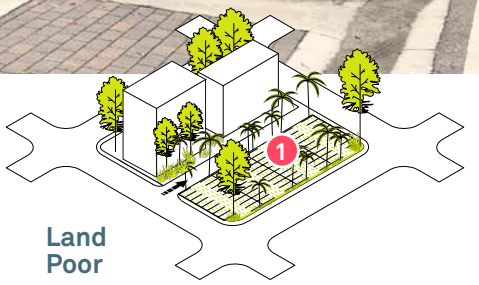
Setbacks +
Utility Easements

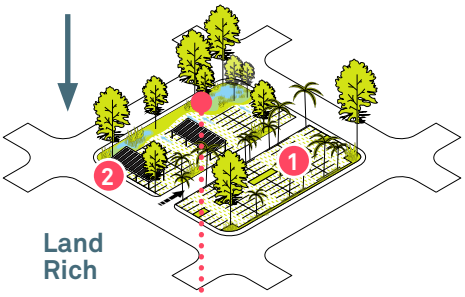
parking lots

Parking lots refer to surface lots and include both public parking and city parking lots. Parking lots can vary in size starting with small infill lots or large lots that can encompass a block. Based on the size and required capacity different tactics can be implemented but the size of the lot will ultimately define the sustainable and resilient success of the project. With more space more living infrastructure can be incorporated.

CONSIDERATIONS

1. **TO REDUCE STANDING WATER CONDITIONS PERVIOUS PAVING OR PAVERS MIXED WITH GROUND COVER CAN BE USED AS SURFACE MATERIALS. TO REDUCE HEAT ISLAND EFFECTS REFLECTIVE SURFACES MAY ALSO BE USED.**
2. **IF ARTIFICIAL SHADING DEVICES ARE USED INSTEAD OF SHADE TREES PHOTOVOLTAICS SHOULD BE INCORPORATED. THE ENERGY PRODUCED CAN BE USED FOR LIGHTING IN THE EVENINGS.**
3. **LIGHTING SHOULD INCORPORATE LED AND BE DARK SKY COMPLIANT.**





Living infrastructure such as wetlands can hold water during storm events and filter urban run-off. see **Constructed Wetland p265** or **Floodwater Management p248.**

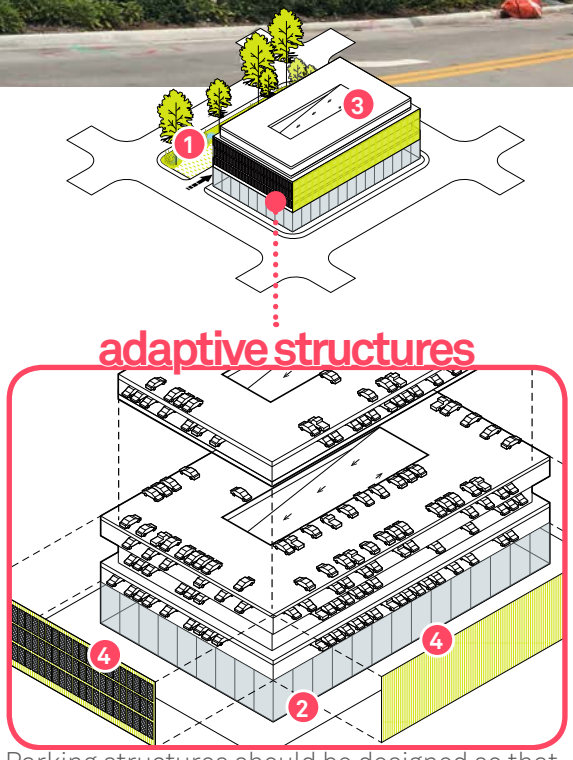
parking structures

Conventional parking structures, or car parks, allow for a high density of vehicles to be parked on one lot at multiple levels at one time. These buildings provide an opportunity for multiple programs to inhabit the ground level. Newer parking structures incorporate technology, indicating vacant parking spaces for drivers and improving overall efficiency and experience.

While parking lots tend to be sources of pollution, parking structures can more easily control stormwater runoff.

CONSIDERATIONS

1. **THE LANDSCAPING THAT SURROUNDS PARKING STRUCTURES SHOULD BE ABLE TO TREAT URBAN RUN-OFF.**
2. **THE FIRST FLOOR COULD BE BETTER UTILIZED AS COMMERCIAL SPACE WITH A HIGH FLOOR TO CEILING HEIGHT.**
3. **REFLECTIVE MATERIALS OR PAINT SHOULD BE USED ON THE TOP DECK TO REDUCE HEAT GAIN.**
4. **THE EXTERIOR FAÇADE CAN INTEGRATE GREEN/ LIVING WALLS OR PHOTOVOLTAIC PANELS CAN BE USED ON THE SOUTHERN FACING WALL TO GENERATE POWER FOR THE GARAGE LIGHTING.**



Parking structures should be designed so that they can be converted into housing or office space when they become obsolete as parking garages.

tools

The tools in this section provide a purpose-based matrix of single elements and design considerations that may be included in all public works projects. The purpose of the tools is to create a cohesive public realm while adhering to sustainable and resilient practices. Tool selection will be based on the applicable **CONTEXT** since they dictate considerations such as materials, aesthetics, and other purpose-based metrics. In some cases, the design solutions will require a set of Tools to solve for issues.

ASSEMBLIES

page 134

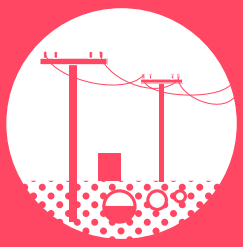
TRAFFIC CALMING
page 136

BICYCLE FACILITIES
page 148

PEDESTRIAN FACILITIES
page 162

ELEMENTS

page 168

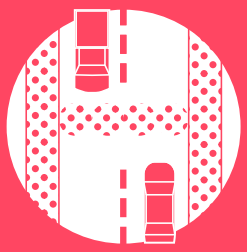


UTILITIES
page 172

SIGNAGE + WAYFINDING
page 188

LANDSCAPE
page 200

LIGHTING
page 176



HARDSCAPE
page 192

FLOODWATER MANAGEMENT
page 248

FURNISHINGS
page 182

PUBLIC ART
page 196

SHORELINE INFRASTRUCTURE
page 260

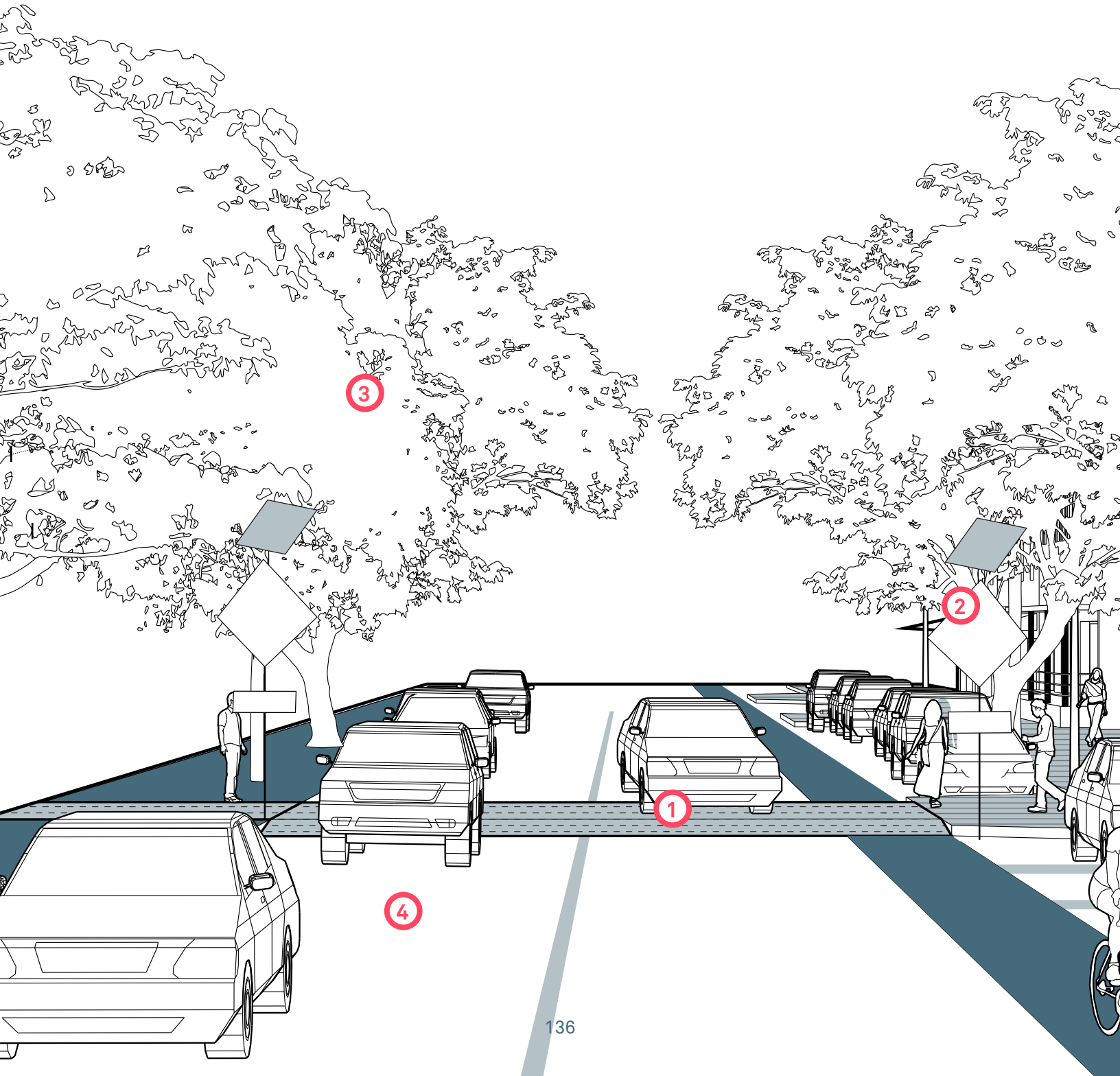
HARD
ARTIFICIAL INFRASTRUCTURE

SOFT
LIVING INFRASTRUCTURE


Slow
Down

assemblies

The tool assemblies provide design elements for traffic calming, bicycle facilities and pedestrian facilities. These tools facilitate a safer public realm for motorists, cyclists and pedestrians alike. Each tool assembly provides levels of performance for safety, and cost.


3
2
1
4

traffic calming

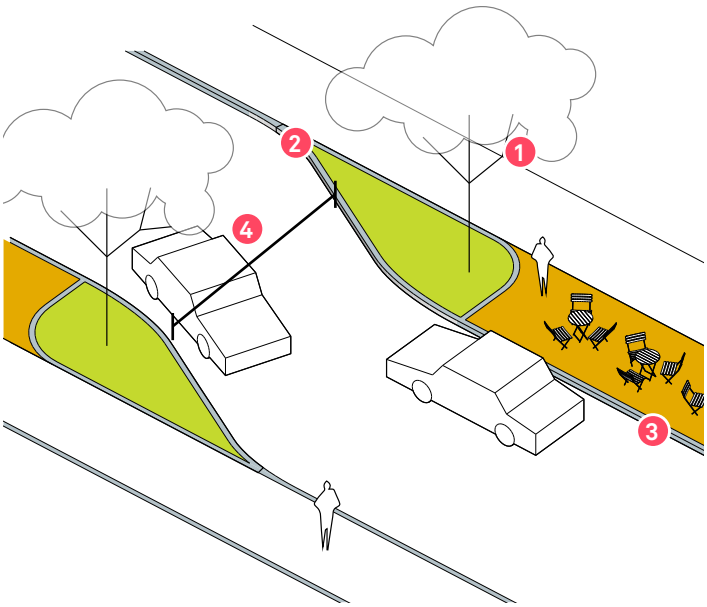
Traffic calming tools provide pedestrian and bicycle safety and encourage drivers to be more aware of their surroundings. Traffic calming tool assemblies utilize tool elements, such as signage, hardscape, and landscape, or a combination of all, to create driver awareness and reduce traffic speeds.

1. Utilizing raised crossings can improve visibility of crossing pedestrians while acting as a speed hump when not in use by pedestrians.

2. Signage should be included at all raised crossings. These signs may or may not include flashing LED lights that are activated by the pedestrian. See pedestrian facilities for signage options.

3. Planting trees with large canopies narrows the field of vision for drivers and has proven to act as a traffic-calming device.

4. Narrowing the street can also calm traffic by putting drivers closer to each other and also providing more space for non-auto uses, such as bicycle and pedestrian facilities or landscape.



1. TREE PLACEMENT IS CRITICAL IN RELATIONSHIP TO THE CURB AND POURED-IN-PLACE SURFACES, SEE LANDSCAPE P200
2. DEFLECTION ANGLE RANGE: MINIMUM OF 45 DEGREES, DEPENDING ON TRAFFIC SPEED
3. CHICANES MAY HAVE CURBS OR BE CURBLESS. FOR CURB DETAILS, SEE FLOODWATER TOOLS P248
4. MINIMUM/MAXIMUM WIDTHS: 20 -22 FT

chicane

Chicanes are artificial curves in the roadway, using curb extensions or islands to slow down motorists as they navigate through the street.

●●●● LEVEL OF SAFETY
○○○● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE

CONSIDERATIONS

Chicanes provide opportunities for additional sidewalk width, landscaping, bicycle parking, furniture, and drainage. On-street parking may be used to create a chicanes by alternating parking spaces from one side of the road to the other. Low-growing vegetation and trees that don't have low-hanging canopies are recommended to preserve visibility.

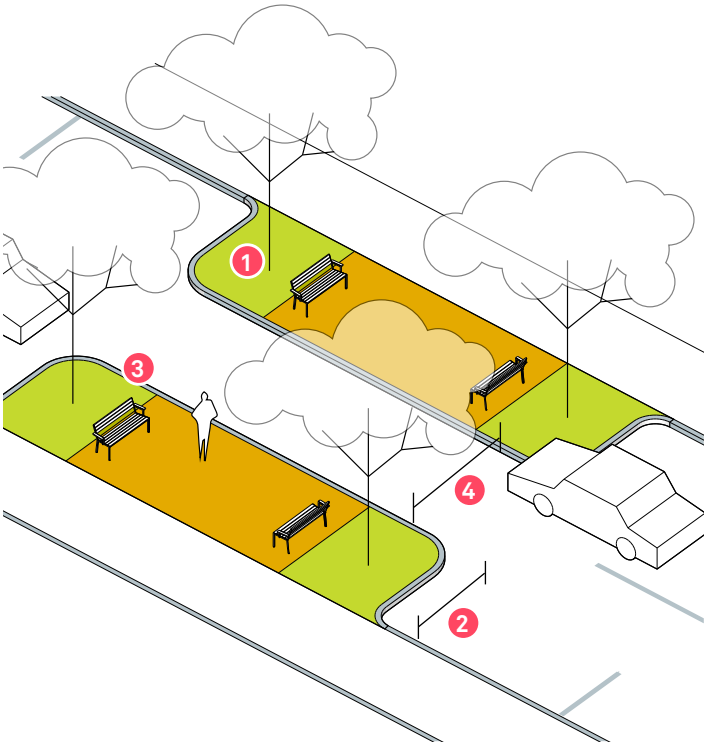
IMPLEMENTATION

Chicanes are recommended for local streets with a posted speed limit of 35 mph or lower. Use chicanes on two-way streets with single lanes in each direction, or use on one-way streets with single or double lane only.

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER STREET
- COMMERCIAL STREET
- RESIDENTIAL STREET

TOOL ELEMENTS THAT MAY BE INCORPORATED:



1. TREE PLACEMENT IS CRITICAL IN RELATIONSHIP TO THE CURB AND POURED-IN-PLACE SURFACES. SEE LANDSCAPE P200
2. CURBS SHOULD BE EXTENDED A MINIMUM OF 8 FT TO ACCOMMODATE ON-STREET PARKING
3. CHOKERS MAY HAVE CURBS OR BE CURBLESS. FOR CURB DETAILS. SEE FLOODWATER TOOLS P248
4. MINIMUM/MAXIMUM WIDTHS: 20 -22 FT

pinch point

Pinch points narrow the roadway mid-block by using curb extensions to slow down motorists, as they are required to yield to each other or maneuver through the area.

○○●● LEVEL OF SAFETY
○○○● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE

CONSIDERATIONS

Pinch points provide opportunities for landscaping, bicycle parking, furniture and drainage. These extensions also provide the opportunity for mid-block crossing, especially along longer blocks. Low-growing vegetation and trees that don't have low-hanging canopies are recommended to preserve visibility for motorists and sight lines for crossing pedestrians.

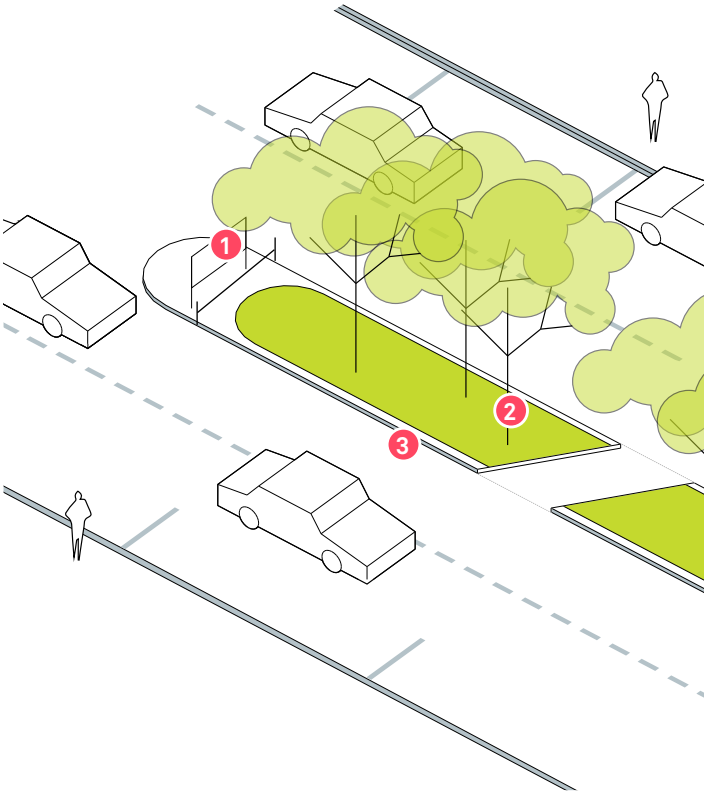
IMPLEMENTATION

Pinch points are recommended for local streets with a posted speed limit of 35 mph or lower that serve between 450 and 3,500 vehicles per day. Use chokers on two-way streets with single lanes in each direction, or use on one-way streets with single or double lane only.

TOOL ELEMENTS THAT MAY BE INCORPORATED:

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER STREET
- COMMERCIAL STREET
- RESIDENTIAL STREET



1. MINIMUM/MAXIMUM WIDTHS: 3 -12 FT
2. TREE PLACEMENT IS CRITICAL IN RELATIONSHIP TO THE CURB AND POURED-IN-PLACE SURFACES, SEE LANDSCAPE P200.
3. MEDIAN ISLANDS MAY HAVE CURBS OR BE CURBLESS. FOR CURB DETAILS. SEE FLOODWATER TOOLS P248

entryway islands

Entryway islands separate opposing directions of traffic and narrow the roadway to reduce traffic speeds and cut-through traffic. Entryway islands occur at the beginning of a neighborhood or where the number of lanes are reduced.

○●●● LEVEL OF SAFETY
○○●● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE

CONSIDERATIONS

The islands provide opportunities for landscape and stormwater management, while improving pedestrian safety. When a pedestrian crosswalk cuts through an island, orient it diagonally to encourage pedestrians to face oncoming traffic before crossing the second set of lanes.

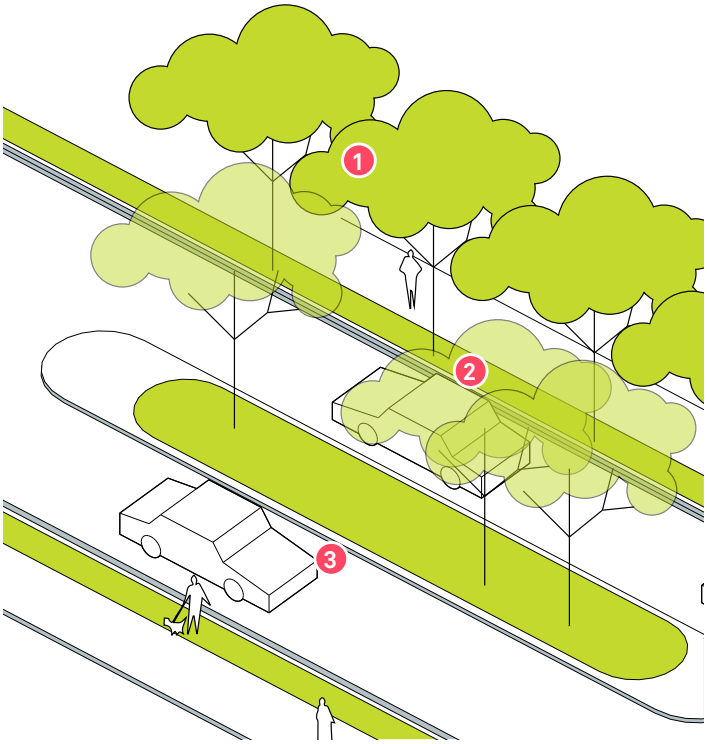
IMPLEMENTATION

Median islands can be used on all street typologies with greater than 450 vehicles per day. Space should not be taken from sidewalks or bike lanes for islands. Instead, reduce the number of lanes. If floodwater management tools are incorporated, see **Floodwater Management p248** for minimum widths of swales and planters.

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- BEACH THOROUGHFARE

TOOL ELEMENTS THAT MAY BE INCORPORATED:



mid-block islands

Mid-block islands are fragmented medians with landscape, furniture, or parking, that act as a traffic-calming device and a pedestrian refuge. Mid-block islands should not be confused with continuous medians.

CONSIDERATIONS

Roots and branches need to be considered when implementing street trees, since they may damage the pavement or extend into the travel lanes. Narrowing the field of vision can provide human scale on a street and can give character to the area.

IMPLEMENTATION

Mid-block islands are appropriate for local streets with a posted speed limit of 35 mph or lower and a traffic volume of 450 vehicles per day or greater. Emergency vehicles should have clearance, and objects should not impede sight lines of pedestrians.

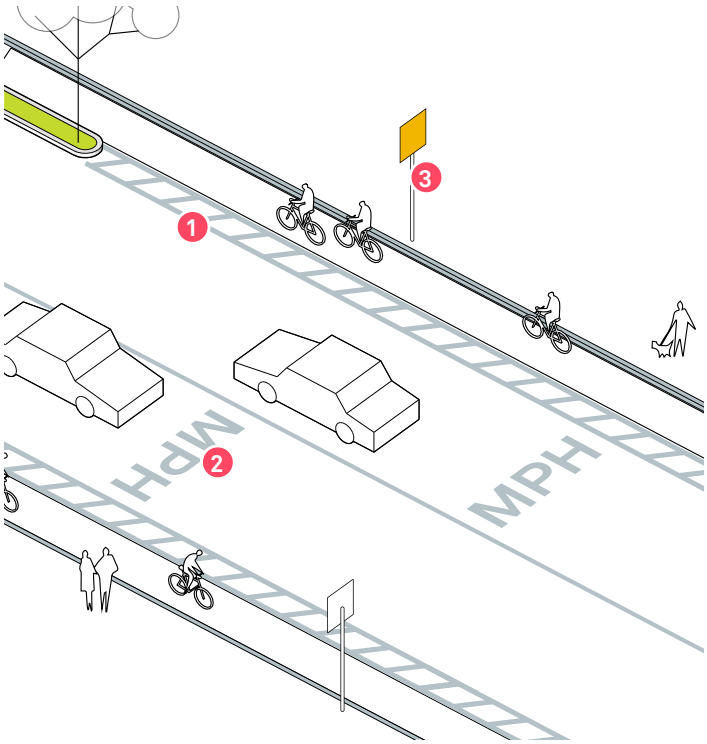
1. **TREE PLACEMENT IS CRITICAL IN RELATIONSHIP TO THE CURB AND POURED-IN-PLACE SURFACES, SEE LANDSCAPE P200.**
2. **STREETS MAY HAVE CURBS OR BE CURBLESS, WHEN INCORPORATING FLOODWATER MANAGEMENT, USE CURB.**
3. **TREE CANOPIES SLOW DOWN TRAFFIC DUE TO A NARROWER FIELD OF VISION**

○●●● **LEVEL OF SAFETY**
○●●● **UPFRONT AFFORDABILITY**
○○●● **COST EFFECTIVE LIFE CYCLE**

TOOL ELEMENTS THAT MAY BE INCORPORATED:

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- BEACH THOROUGHFARE



pavement markings + signage

Pavement markings and signage are visual cues or signals intended to alert drivers to slow down, give awareness of surroundings, or inform them of certain conditions.

1. PAINT CAN PROVIDE A VISUAL BUFFER BETWEEN VEHICULAR TRAFFIC AND BICYCLE TRAFFIC
2. SPEED LIMITS PAINTED IN THE VEHICULAR LANE CAN INDICATE IMPORTANCE OF SPEED
3. SIGNAGE MAY BE USED FOR ALL OR ANY OF THE ABOVE REASONS

○○●● LEVEL OF SAFETY
●●●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

CONSIDERATIONS

Markings should be easy to understand and legible. When possible, the markings may contain pigment that is reflective to increase visibility. Areas that require low or minimal lighting (turtle safe areas) should consider using glow in the dark or luminescent paint. Consider smart signs in flood sensitive areas to warn motorists of conditions.

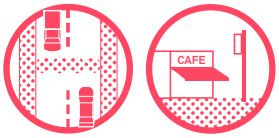
IMPLEMENTATION

Pavement markings and signage are recommended on all roads. Refer to **Hardscapes p192** when applying pavement markings for appropriate type and application.

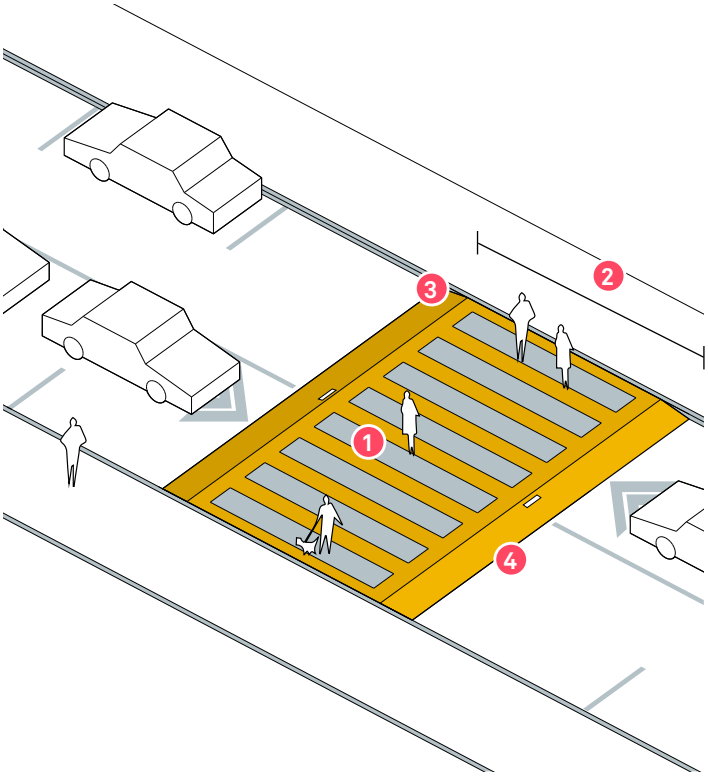
APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- BEACH THOROUGHFARE

TOOL ELEMENTS THAT MAY BE INCORPORATED:



HARDSCAPE SIGNAGE + WAYFINDING



mid-block raised crossing

The crossing area is raised (usually to the height of the sidewalk), creating a table to reduce traffic speeds and increase pedestrian awareness at the mid-block.

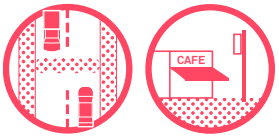
CONSIDERATIONS

Raised crossings may be implemented at areas of importance, such as civic locations. They may also be implemented at areas with increased pedestrian traffic, such as commercial areas, educational institutes, or transit locations. Raised crossings may function as gateways for neighborhoods. Raised crossings may affect drainage.

IMPLEMENTATION

Typically, raised crossings are implemented at mid-block crossing areas to reduce speeds along long streets. Raised crossings are recommended on local streets with posted speed limits of 35 mph or lower and at least 450 vehicles per day. In areas that require low or minimal light sources, use integrated LED's or reflectors to warn motorists.

TOOL ELEMENTS THAT MAY BE INCORPORATED:



HARDSCAPE SIGNAGE + WAYFINDING

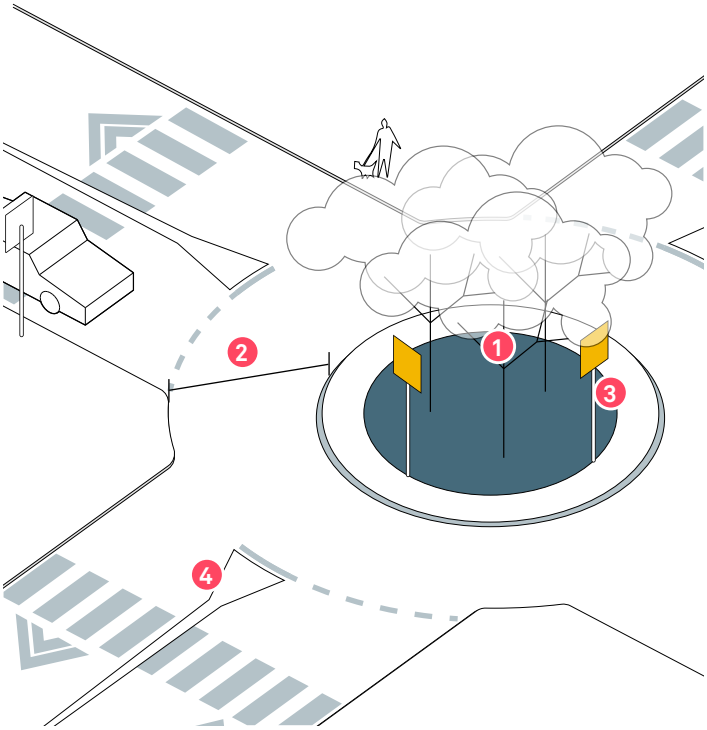
1. RAISED CROSSINGS MAY ALSO BE PAINTED OR USE PAVERS
2. MINIMUM WIDTH: 5 FT
3. MAXIMUM HEIGHT: 6 IN
4. MINIMUM/MAXIMUM SLOPE: 6-10%

○●●● LEVEL OF SAFETY
○○●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

APPROPRIATE FOR THESE STREET TYPES:

- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- BEACH THOROUGHFARE

1. ROUNDABOUTS MAY INCLUDE LANDSCAPING OR PUBLIC ART AT THE CENTER. LARGER DESIGN VEHICLES OR FIRE TRUCKS MAY NEED TO CROSS OVER THE INSIDE GUTTER PAN AND MOUNT THE TRUCK APRON.
2. ROUNDABOUTS ARE TYPICALLY DESIGNED TO ACCOMMODATE A COMMERCIAL TRUCK DESIGN VEHICLE FOR THE THROUGH MOVEMENTS. A SMALLER DESIGN VEHICLE MAY BE APPROPRIATE FOR TURNING MOVEMENTS ON LOCAL OR COLLECTOR ROADS. MINIMUM WIDTH: 15 FT
3. SIGNAGE INDICATE DIRECTION OF TRAVEL
4. A SPLITTER ISLAND LESS THAN 100 FT IN LENGTH, BUT NOT LESS THAN 50 FT, MAY BE CONSIDERED FOR ROUNDABOUTS LOCATED ON ROADS WITH A DESIGN SPEED OF 35 MPH OR LESS. HIGHER DESIGN SPEEDS MAY REQUIRE SPLITTER ISLANDS OF 100 FT OR MORE WITH A WIDTH OF 6 FT AT PEDESTRIAN CROSSINGS.



roundabout

Roundabouts contain small circular islands in the center of an intersection that slow traffic while allowing for a continuous flow in a single direction around the island.

○○●● LEVEL OF SAFETY
○○○● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

CONSIDERATIONS

Roundabouts provide opportunities for neighborhood gateways and placemaking. Depending on the size of the island, landscape or public art can be incorporated at the center. If size, sight lines or accessibility for emergency vehicles are an issue, pavers or painted surfaces can be incorporated instead of plants and raised curbs. Access to utility lines may influence the design of the roundabout. *Review Chapter 213 of the FDOT Design Manual.*

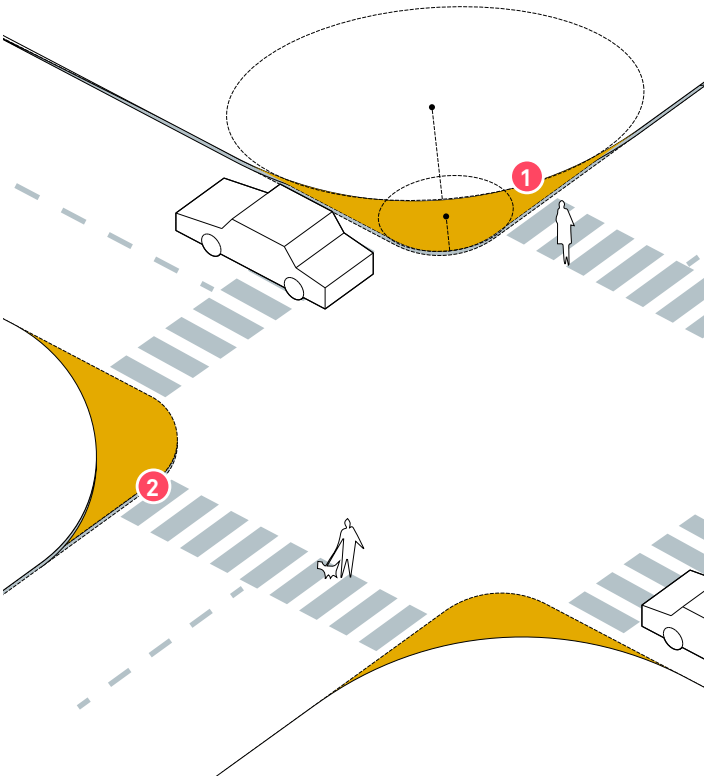
IMPLEMENTATION

Roundabouts may be used in all street typologies with a posted speed limit of 35 mph or less and 450 vehicles or greater per day. Lane markings and signage are needed to inform motorists of roundabouts.

APPROPRIATE FOR THESE STREET TYPES:

- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- SHARED STREET

TOOL ELEMENTS THAT MAY BE INCORPORATED:



1 STANDARD CORNER RADIUS, 10-15 FT

2 REDUCED CORNER RADIUS, BASED ON DESIGN VEHICLE P73.

corner radii

A reduced corner radius reduces the speed of vehicles that are turning, while shortening the distance for pedestrians crossing at the intersection.

CONSIDERATIONS

In areas with larger freight vehicles, smaller corner radii may be problematic. A narrower corner radius can be combined with curb extensions to reduce pedestrian crossing distance and increase their safety.

IMPLEMENTATION

Corner radii reduction can be used on all road typologies. Vehicle sizes should be considered when reducing corner radii; streets with bus routes should accommodate turning radius of buses. Crosswalks within an intersection corner should meet accessibility requirements.

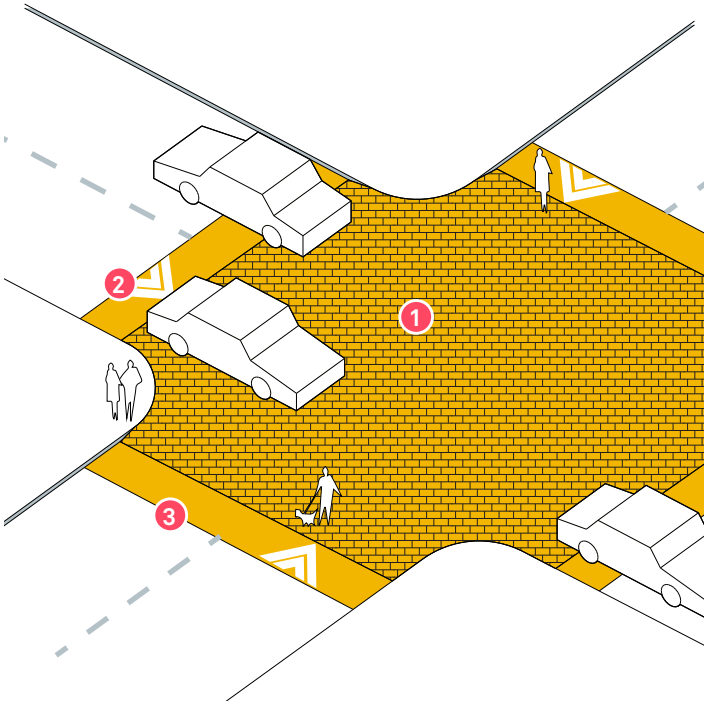
○●●● LEVEL OF SAFETY
○●●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

TOOL ELEMENTS THAT MAY BE INCORPORATED:

HARDSCAPE

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- BEACH THOROUGHFARE



1. RAISED INTERSECTIONS MAY HAVE STAMPED PAVEMENT OR PAINTED SURFACES
2. ARROWS ARE TO BE USED PRIOR TO ENTERING A RAISED INTERSECTION
3. MINIMUM/MAXIMUM SLOPE: 6-10%

○●●● LEVEL OF SAFETY
○○●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

raised intersection

An intersection is raised to the height of the sidewalks creating awareness for drivers; the vertical change reduces traffic speeds at areas where pedestrians cross the road.

CONSIDERATIONS

Raised intersections should provide road markings for vehicles that indicate raised crossing. Material change, such as pavers, can indicate raised crossing and demarcate areas for pedestrian/sidewalk space. Raised crossings can be used for gateways or indicate special areas or neighborhoods. Raised intersections may affect drainage and require additional design. Since the intersection is level with the sidewalk, it can provide accessibility for the visually impaired and people with mobility issues.

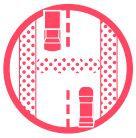
IMPLEMENTATION

Raised intersections are appropriate for local streets with a posted speed limit of 35 mph or lower and a traffic volume of 450 vehicles per day or greater.

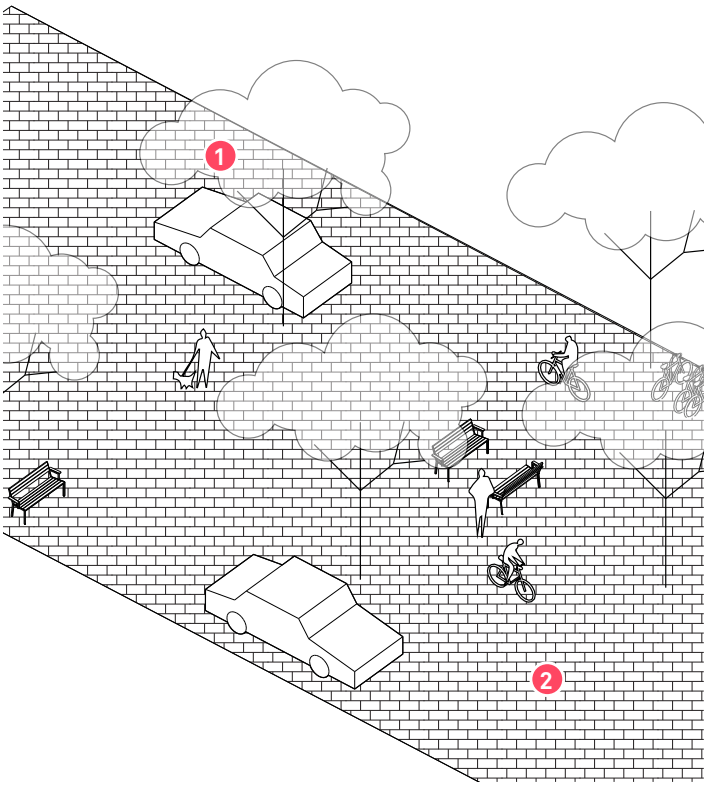
APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- BEACH THOROUGHFARE

TOOL ELEMENTS THAT MAY BE INCORPORATED:



HARDSCAPE



curbless street

Treating the right-of-way as a space where everyone is equal breaks down the barriers between motorists, cyclists, and pedestrians. Drivers are obligated to slow down since they are sharing the space with cyclists and pedestrians.

CONSIDERATIONS

Curbless streets are often incorporated on main streets to encourage safety and walkability. Stormwater management and drainage can be integrated into the design of the street without curb limitations.

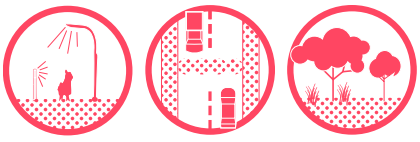
IMPLEMENTATION

Curbless streets are appropriate for local streets with a posted speed limit of 35 mph or lower and a traffic volume between 450 to 3,500 vehicles per day.

1. FOR APPROPRIATE VEGETATION SEE LANDSCAPE P200
2. FOR APPROPRIATE SURFACE TREATMENT SEE HARDSCAPE P192

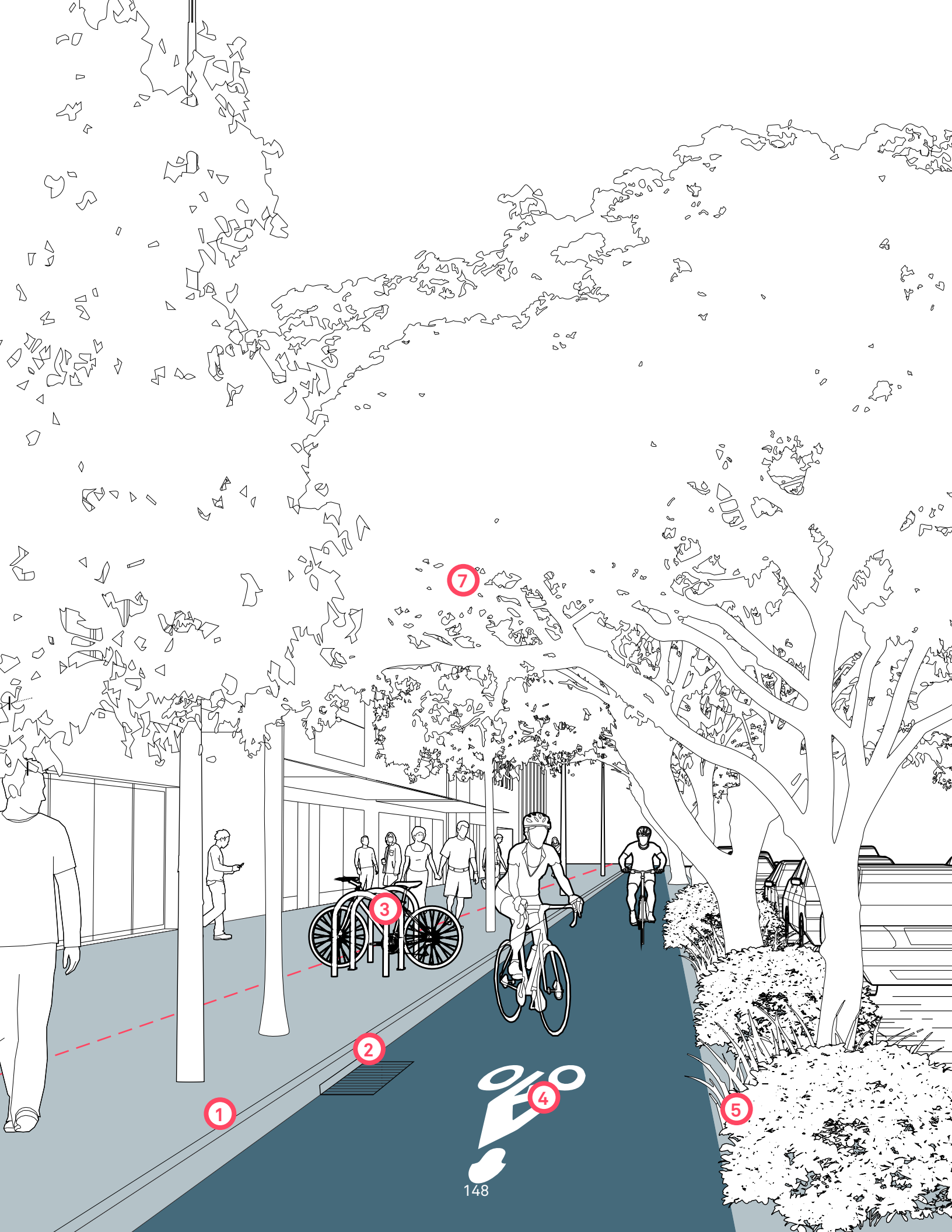
●●●● LEVEL OF SAFETY
○○○● UPFRONT AFFORDABILITY
○○○● COST EFFECTIVE LIFE CYCLE

TOOL ELEMENTS THAT MAY BE INCORPORATED:



APPROPRIATE FOR THESE STREET TYPES:

- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- BEACH THOROUGHFARE
- SHARED STREET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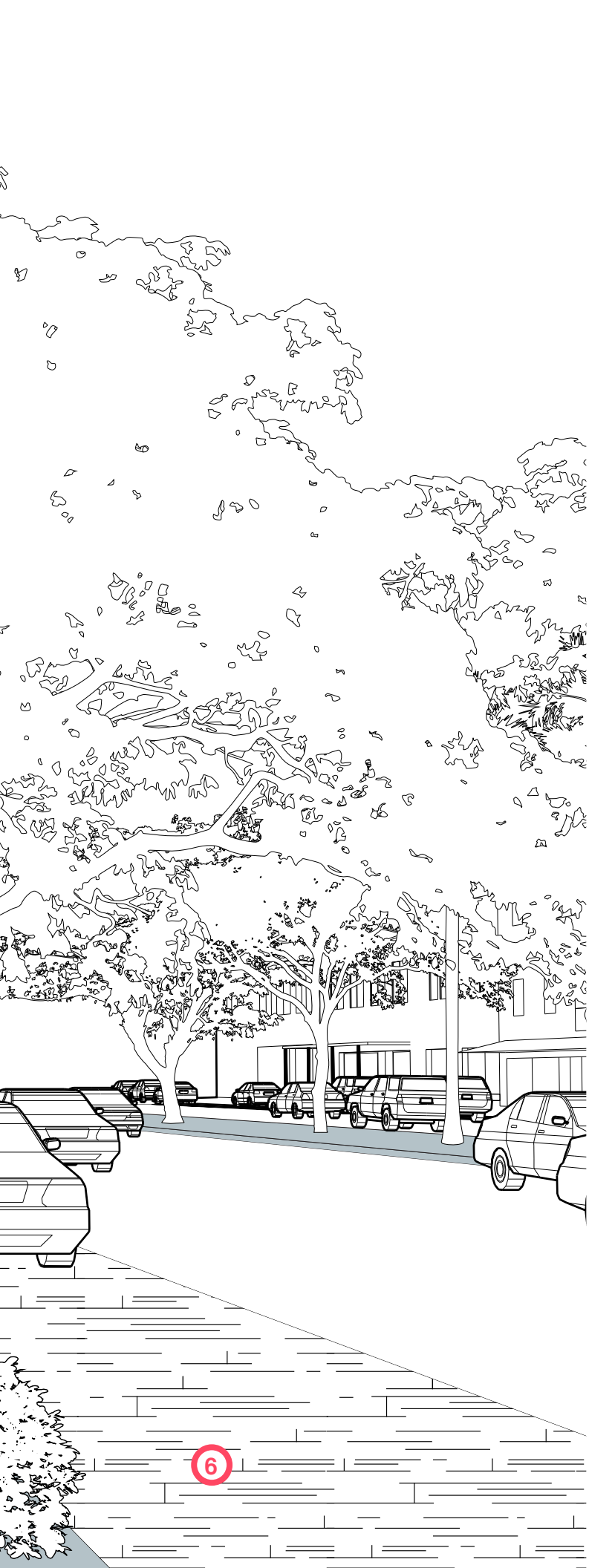
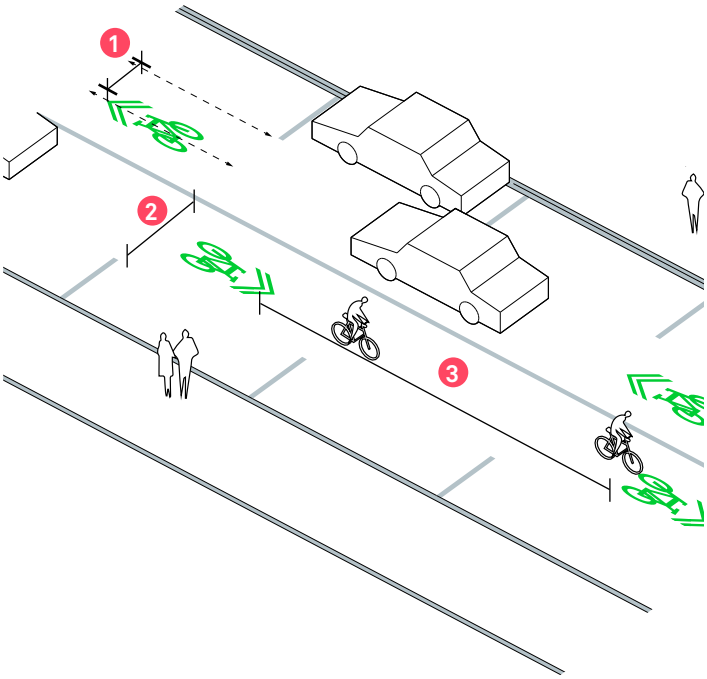


bicycle facilities

Bike lanes can be shared spaces or spaces designated specifically for cyclists separate from vehicular lanes. They are created to provide a safe alternative means of travel that helps promote healthy and active lifestyles and reduces the City's greenhouse gas emissions. These networks can provide convenient bicycle connections to residences, work places, and other destinations.

1. Curb edge will divide bike lane from sidewalk, maintaining pedestrian and cyclist safety.
2. Bike safe drains and/or drain covers should be used to reduce the risk of bicycle accidents.
3. Bike share or bike racks should be close to bike lanes and clear of pedestrian zone on sidewalks.
4. Clear path for cyclists should be provided with smooth surfaces.
5. A vegetated buffer can be used instead of bollards, allowing safety for cyclist and clearance for car doors to open. The vegetated buffer can also aid in stormwater management.
6. On-street parking with adequate clearance for door swings can also function as a buffer between cyclists and motorists.
7. Shade trees can increase comfort and utilization of the public realm for bicyclists and pedestrians while also helping with stormwater management.



1. PLACE SHARROW AT THE CENTER OF THE TRAVEL LANE.
2. MINIMUM/MAXIMUM WIDTHS: 10-11 FT
3. MAXIMUM SPACING OF 250 FT

○○○● LEVEL OF SAFETY
●●●● UPFRONT AFFORDABILITY
●●●● COST EFFECTIVE LIFE CYCLE

sharrow

Sharrows are road markings used to indicate a shared lane environment for bicycles and automobiles.

CONSIDERATIONS

Sharrows improve cyclists positioning within the roadway, while informing motorists of their presence. Sharrows do not provide a dedicated lane for bicyclists within roadway. Designers may consider a lack of driver awareness and education on meaning and purpose of this bicycle facility.

IMPLEMENTATION

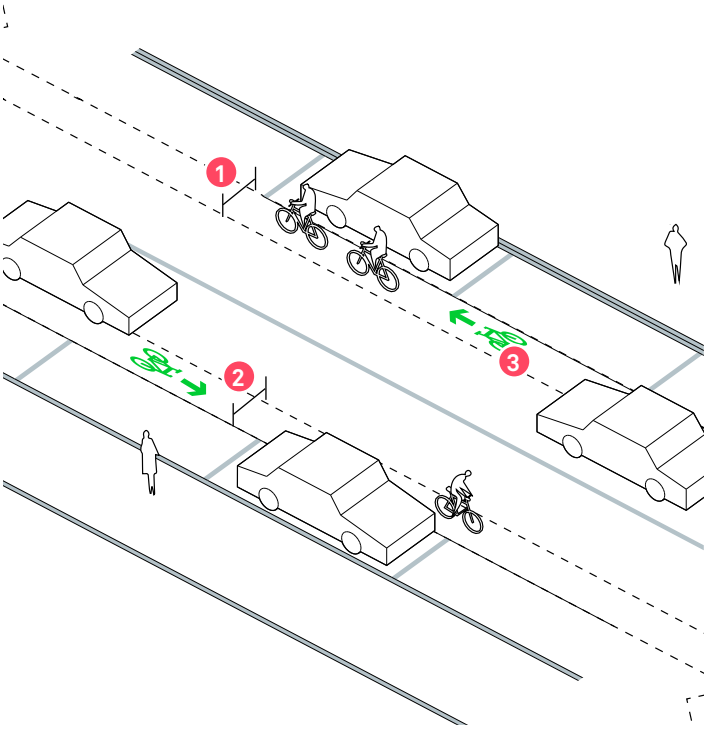
Sharrows are recommended for use on local streets only with a speed limit of 25 MPH or less. Place Sharrows in the center of the travel lane. This placement provides guidance to bicyclists to “command the lane” which discourages motorists from passing too closely. This placement also informs drivers that cyclists are entitled to ride in the center of the lane for their safety. Place Sharrows immediately after intersections and at a maximum spacing of 250 ft.

APPROPRIATE FOR THESE STREET TYPES:

- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- RESIDENTIAL STREET
- BEACH THOROUGHFARE

TOOL ELEMENTS THAT MAY BE INCORPORATED:

HARDSCAPE



1. BIKE LANES SHOULD BE A MINIMUM OF 6 FT TO PROVIDE CLEARANCE FROM OPEN DOORS
2. MINIMUM WIDTH PREFERRED: 6 FT
3. REFER TO FDOT MANUAL OF UNIFORM MINIMUM STANDARDS FOR DESIGN (GREEN BOOK) FOR FURTHER GUIDANCE.

advisory bike lane

Advisory bike lanes are used where the width of a two-way street is too narrow for a standard bicycle lane and on streets that have low traffic volume.

CONSIDERATIONS

Not having a vertical separation between the vehicle lane and bicycle lane allows cars to easily encroach into bicycle lane. There are potential conflict points with right turning traffic. To assist unfamiliar drivers with new infrastructure/ lanes/roadway design., consider using road signage (e.g., SHARE THE ROAD).

IMPLEMENTATION

Advisory bike lanes are recommended on local streets with a posted speed limit of 25 mph or lower and less than 5,000 vehicles per day. Use colored pavement or markings to highlight where bicycle lanes intersect with vehicular traffic.

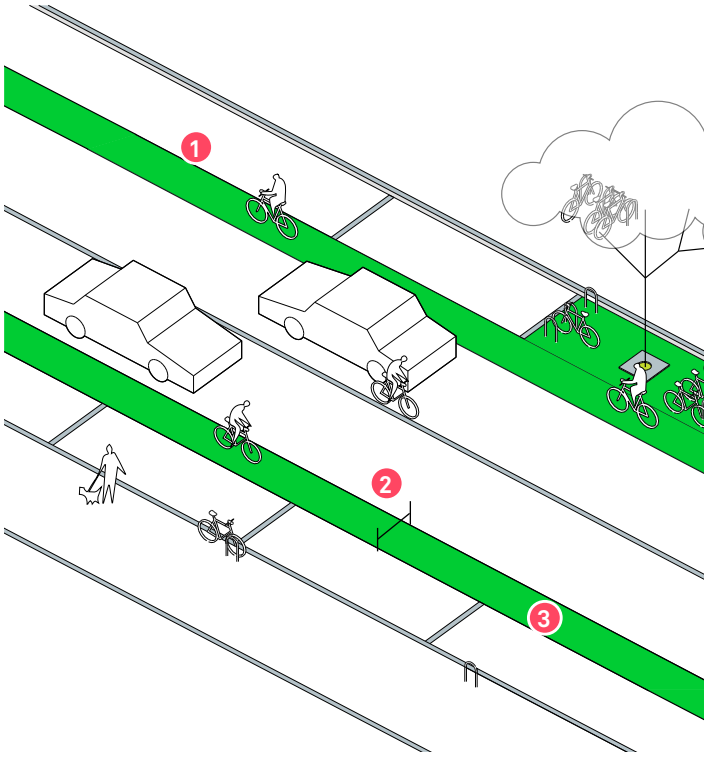
○○○● LEVEL OF SAFETY
●●●● UPFRONT AFFORDABILITY
●●●● COST EFFECTIVE LIFE CYCLE

TOOL ELEMENTS THAT MAY BE INCORPORATED:

HARDSCAPE

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER STREET
- COMMERCIAL STREET
- RESIDENTIAL STREET
- INDUSTRIAL THOROUGHFARE



1. FOR APPROPRIATE SURFACE TREATMENT SEE HARDSCAPE P192
2. BIKE LANES SHOULD BE A MINIMUM OF 6 FT TO PROVIDE CLEARANCE FROM OPEN DOORS
3. REFER TO FDOT MANUAL OF UNIFORM MINIMUM STANDARDS FOR DESIGN (GREEN BOOK) FOR FURTHER GUIDANCE.

○○●● LEVEL OF SAFETY
○●●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

bike lane

Bike lanes are dedicated for bicycles only, adjacent to vehicular travel lanes identified with lines, markings and symbols on the road. Bike lanes are typically on the right side of the street for one-way travel.

CONSIDERATIONS

Cars may easily encroach into bicycle lanes without a curb. There are potential conflict points with right turning traffic.

IMPLEMENTATION

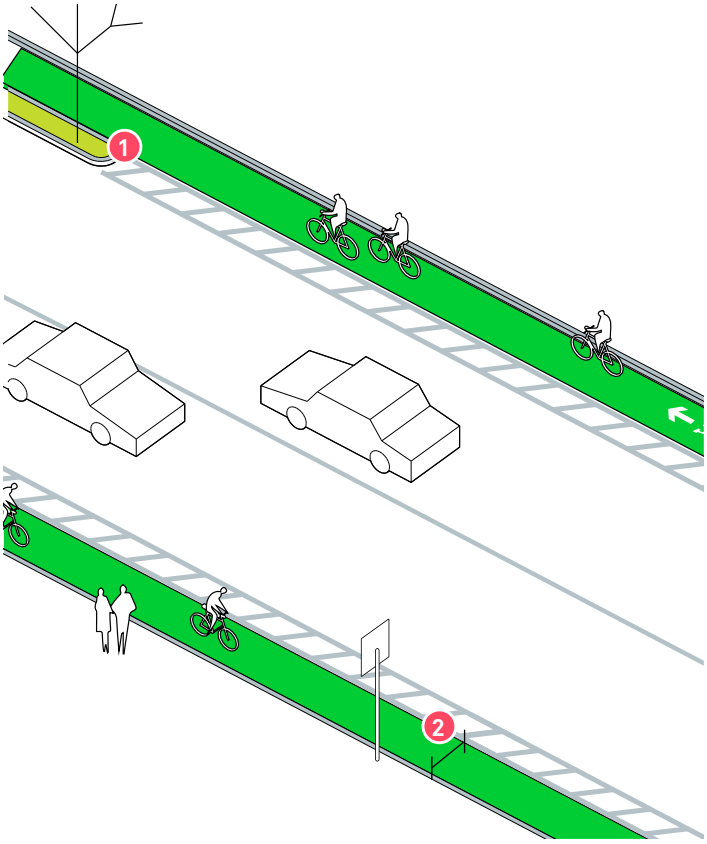
Bike lanes are recommended on commercial streets. Bike lanes can be used on one-way, two-way and multi-lane roads and can be adjacent to on-street parking or against sidewalk curb. When implemented next to on-street parking, include clearance for car doors to open. When implementing bike lanes, space should not be taken from sidewalks; instead, reduce the number of lanes or use a road diet. Indicate where vehicular traffic intersects with bicycle traffic.

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- BEACH THOROUGHFARE
- INDUSTRIAL THOROUGHFARE

TOOL ELEMENTS THAT MAY BE INCORPORATED:

HARDSCAPE



1. FIXED OR TEMPORARY PLANTERS MAY BE USED TO SEPARATE THE BIKE LANE FROM TRAFFIC
2. MINIMUM WIDTH: 6 FT

separated bike lane

Separated bicycle lanes are one or two-way lanes that are separated from the vehicle lane using bollards, parked cars, flexible delineators, potted plants, etc. There may also be a vertical separation from moving vehicles using a curb.

CONSIDERATIONS

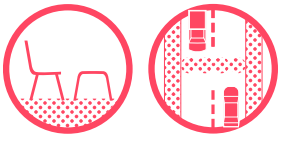
Separated bike lanes provide increased comfort for cyclists due to the additional separation. Separated bike lanes require more space than a traditional bike lane. Cyclists may experience sight line issues if bi-directional. Motorists may also have sight line issues with cyclists on separated facilities on main line and side streets.

IMPLEMENTATION

Separated bike lanes can be used for all street typologies except for local streets.

○●●● LEVEL OF SAFETY
○○●● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE

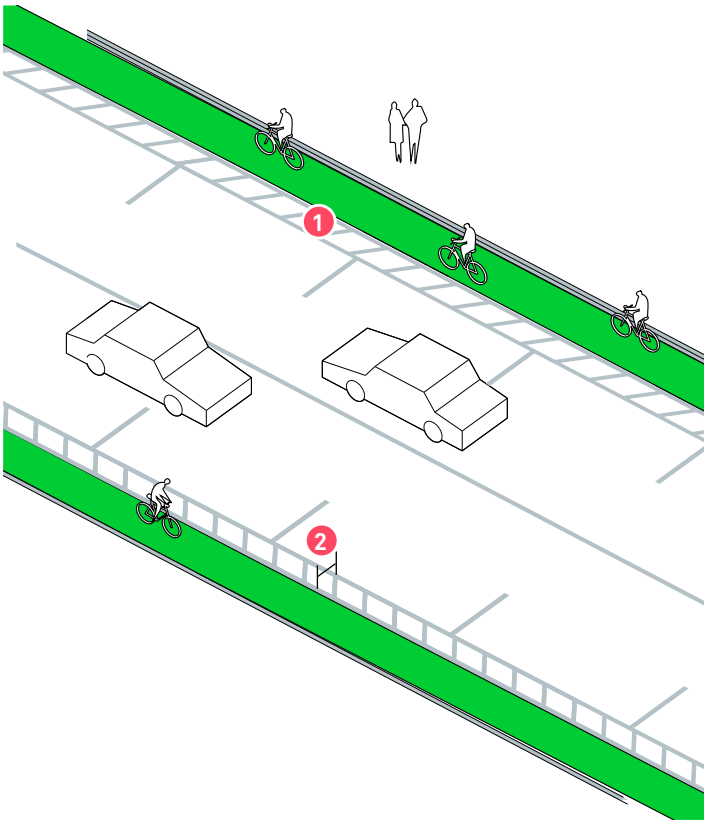
TOOL ELEMENTS THAT MAY BE INCORPORATED:



FURNISHING HARDSCAPE

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET
- BEACH THOROUGHFARE



1. FOR APPROPRIATE SURFACE TREATMENT SEE HARDSCAPE P192
2. MINIMUM BUFFER WIDTH: 2 FT

○●●● LEVEL OF SAFETY
○○●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

buffered bike lane

Buffered bike lanes are bicycle lanes that are separated from the travel lane using a 2 ft or greater buffer. This allows for more separation between moving vehicles and cyclists and improves the overall safety for cyclists.

CONSIDERATIONS

Not having a vertical separation between the vehicle lane and bicycle lane allows cars to easily encroach into the buffered bike lane. There are potential conflict points with right turning traffic.

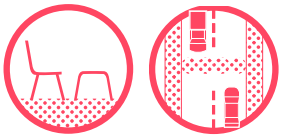
IMPLEMENTATION

Buffered bike lanes are appropriate for all street typologies except for local streets.

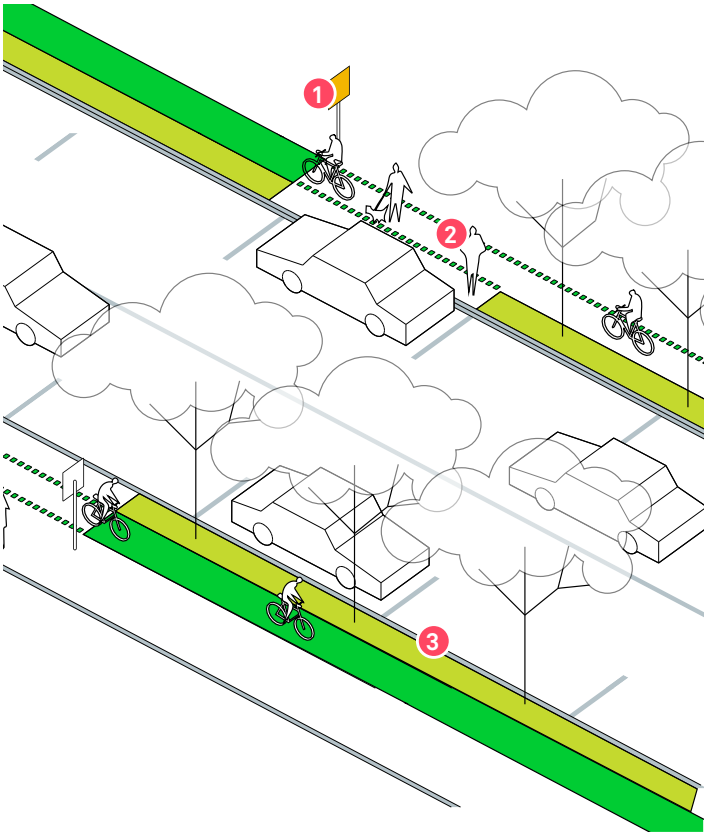
APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- BEACH THOROUGHFARE

TOOL ELEMENTS THAT MAY BE INCORPORATED:



FURNISHING HARDSCAPE



1. SIGNS INDICATE DESIGNATED BIKE PATH TO REDUCE CONFUSION BETWEEN SIDEWALK AND BIKE PATH.
2. AREAS WHERE PEDESTRIANS CROSS THE SIDE PATH SHOULD BE INDICATED TO BOTH CYCLISTS AND PEDESTRIANS TO MAINTAIN A SAFE ENVIRONMENT.
3. BUFFERS MAY BE USED FOR FURNISHING OR LANDSCAPE.

side path

Side paths are marked for bicycle use, adjacent to the roadway with a small or no buffer. The increased separation between bicyclists and motorists provides another level of safety.

CONSIDERATIONS

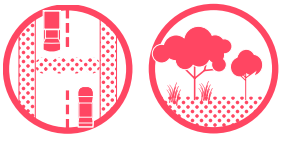
Side paths may require additional improvements at intersections for increased safety.

IMPLEMENTATION

There may be a high cost associated with implementation for additional right-of-way acquisition.

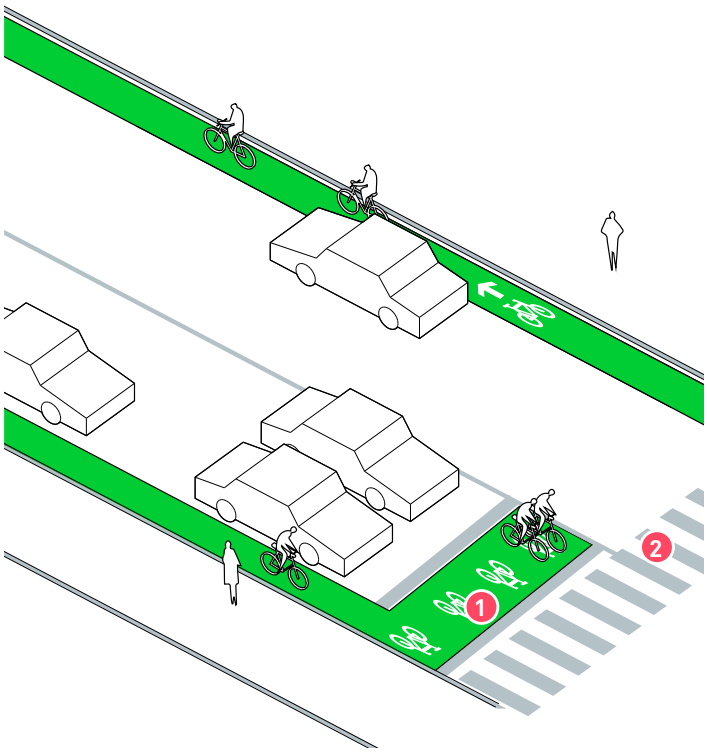
●●●● LEVEL OF SAFETY
○○○● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE

TOOL ELEMENTS THAT MAY BE INCORPORATED:



APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- BEACH THOROUGHFARE



1. PLACE SEVERAL BICYCLE LANE MARKINGS IN THE BIKE BOX FOR DRIVER AWARENESS.
2. PEDESTRIANS CROSS IN FRONT OF BIKE BOX AND VEHICULAR TRAFFIC.

○●●● LEVEL OF SAFETY
○●●● UPFRONT AFFORDABILITY
●●●● COST EFFECTIVE LIFE CYCLE

bike box

Bike boxes are designated areas at the front of intersections allowing bicyclists to advance in front of queuing traffic during the red signal phase. This increases the visibility of cyclists on the road and facilitates bicyclist left-turn position at intersections. Bike boxes also help prevent 'right-hook' conflicts with turning motorists.

CONSIDERATIONS

There may be a lack of driver awareness and education on how bike boxes operate. Consider using signage for drivers.

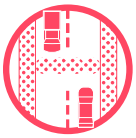
IMPLEMENTATION

Bike boxes are recommended on street typologies of minor collector and above.

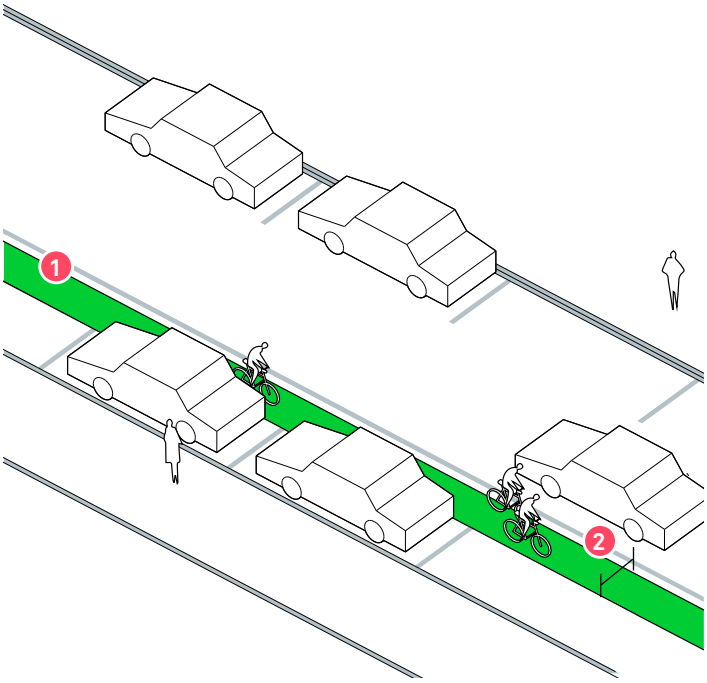
APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- BEACH THOROUGHFARE

TOOL ELEMENTS THAT MAY BE INCORPORATED:



HARDSCAPE



contraflow bike lane

Contraflow bike lanes provide bicyclists dedicated space to ride by converting one-way traffic into a two-way street with one lane for motorists and one lane for bicyclists.

CONSIDERATIONS

Contraflow bike lanes provide increased connectivity and a safer solution to wrong-way riding by dedicating space to ride in the opposite direction of motorized traffic. The bike lanes introduce additional conflict points as motorists may not expect on-coming bicyclists at intersections.

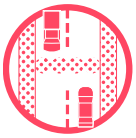
IMPLEMENTATION

Contraflow bike lanes are recommended for collector streets and lower.

1. FOR APPROPRIATE SURFACE TREATMENT SEE HARDSCAPE TOOL.
2. CONTRAFLOW BIKE LANES SHOULD BE A MINIMUM OF 4 FT WITHOUT A BUFFER.

○●●● LEVEL OF SAFETY
○●●● UPFRONT AFFORDABILITY
●●●● COST EFFECTIVE LIFE CYCLE

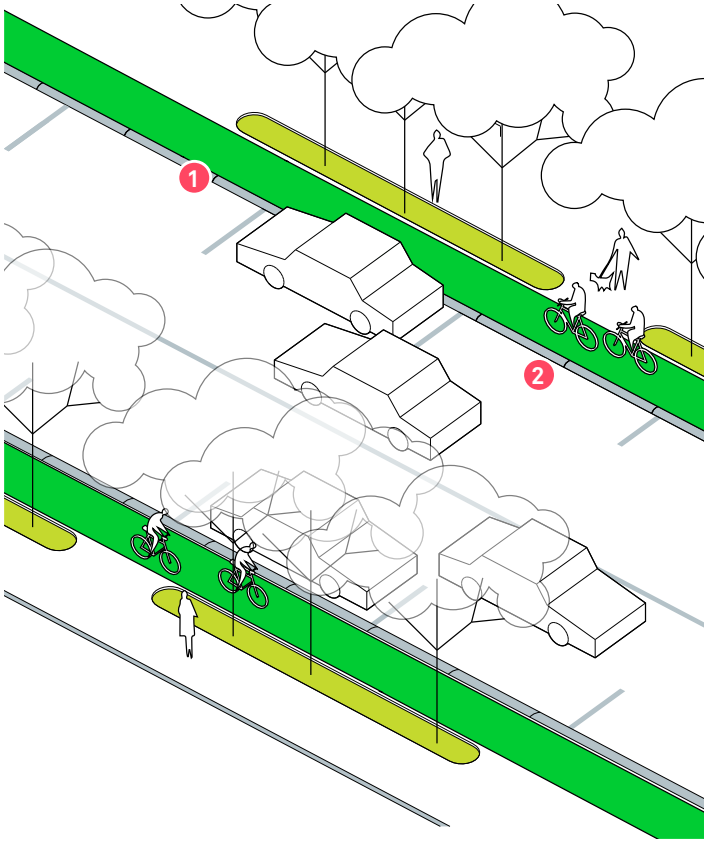
TOOL ELEMENTS THAT MAY BE INCORPORATED:



HARDSCAPE

APPROPRIATE FOR THESE STREET TYPES:

- COMMERCIAL AVENUE
- RESIDENTIAL AVENUE
- CITY CENTER STREET
- COMMERCIAL STREET



1. RAISED BIKE LANES MAY BE SOLID GREEN OR MAY USE ONLY BICYCLE LANE MARKINGS
2. USE MOUNTABLE CURBS TO ALLOW ACCESS TO DRIVEWAYS.

●●●● LEVEL OF SAFETY
○○○● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

raised bike lane

Raised bike lanes provide the convenience of riding on the street with some physical separation. This is accomplished by elevating the bicycle lane surface 2 to 4 in above the street level, while providing a traversable curb to separate the bikeway from the adjacent motor vehicle travel lane.

CONSIDERATIONS

Extra costs are associated with raising a paved surface. Curb should be designed to avoid trip hazards.

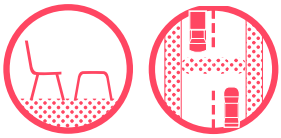
IMPLEMENTATION

Raised bike lanes are typically located along streets with higher speeds and few driveways and cross streets. Raised bike lanes can be implemented within a furniture zone, if space provides for it. When placed adjacent to a travel lane, one-way raised cycle tracks may be configured with a mountable curb for entry and exit.

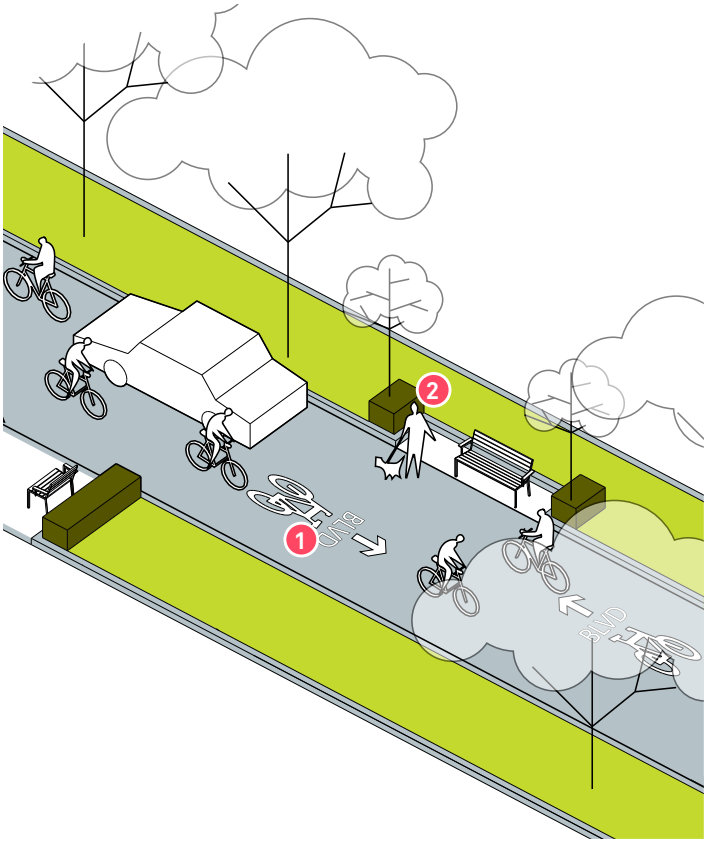
APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- RESIDENTIAL BOULEVARD
- CITY CENTER AVENUE
- COMMERCIAL AVENUE
- BEACH THOROUGHFARE

TOOL ELEMENTS THAT MAY BE INCORPORATED:



FURNISHING HARDSCAPE



1. SPECIAL MARKINGS SHOULD BE USED TO INDICATE THAT CYCLISTS HAVE PRIORITY.
2. PROVIDE A REST STOP ALONG BIKE BOULEVARDS.

bike boulevard

Bike boulevards are used on local streets with low traffic volume and speeds and where cyclists are given priority. Striping, signage and diverters are used for creating a safer place for the bicyclists. Special markings are also used on the street for cyclist priority.

CONSIDERATIONS

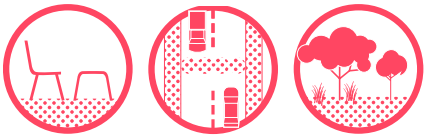
Bike boulevards should only be used on roadways with low-traffic volume, as cyclists will be sharing the street with motorists. The use of diverters will discourage use of the roadway by motorists.

IMPLEMENTATION

Bike boulevards should be implemented on local streets with a posted speed limit of 25 mph or lower, or fewer than 1,500 vehicles per day.

○○●● LEVEL OF SAFETY
○●●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

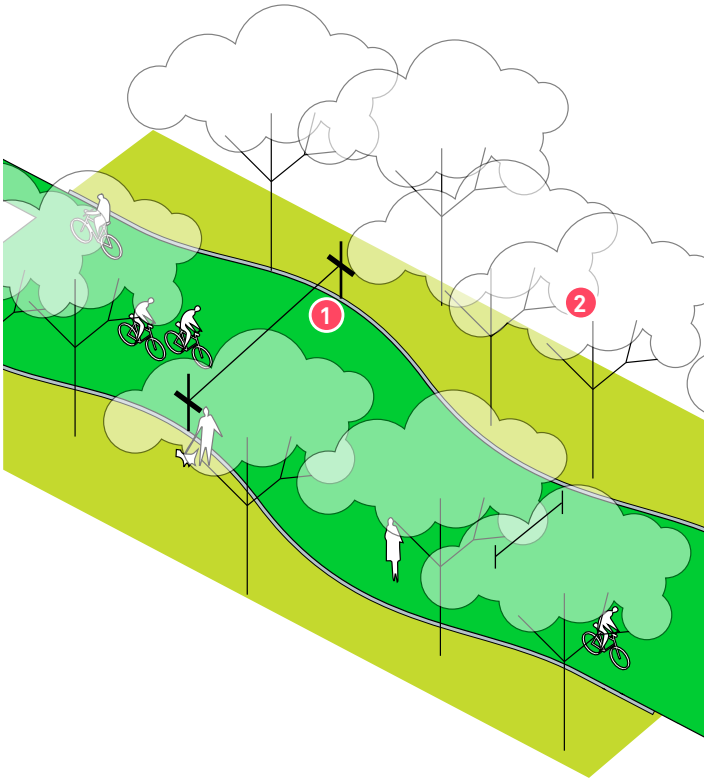
TOOL ELEMENTS THAT MAY BE INCORPORATED:



FURNISHING HARDSCAPE LANDSCAPE

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER STREET
- COMMERCIAL STREET
- RESIDENTIAL STREET



1. SHARED-USE PATHS SHOULD BE A MINIMUM OF 10 FT.
2. LANDSCAPE, INCLUDING TREE CANOPY, SHOULD BE TAKEN INTO CONSIDERATION TO PROVIDE SHADE FOR TRAIL USERS.

●●●● LEVEL OF SAFETY
○○○● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE

trail (shared-use path)

Trails are physically separated lanes outside of a roadway that permit bicycle and pedestrian use only. Trails provide the most comfort and safety for bicyclists and pedestrians.

CONSIDERATIONS

Trails should be much wider than traditional bike paths to accommodate 2-way bike traffic. A pedestrian path may also be attached to the trail or the shared-use path.

IMPLEMENTATION

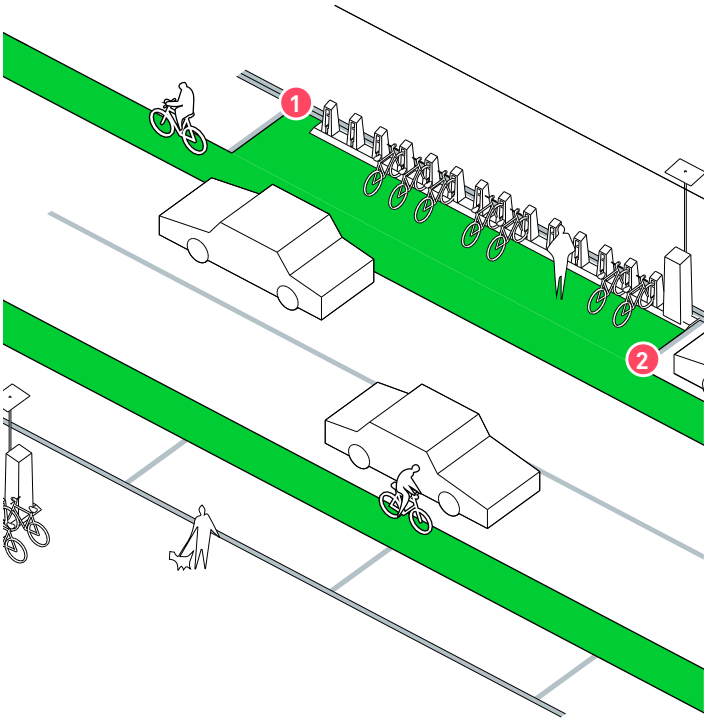
Right-of-way acquisition may be required. If so, there may be a high cost of implementation as a result of purchasing the right-of-way and maintenance.

APPROPRIATE FOR THESE STREET TYPES:

- RIGHT-OF-WAY ACQUISITION REQUIRED

TOOL ELEMENTS THAT MAY BE INCORPORATED:

HARDSCAPE LANDSCAPE



1. BIKE PARKING MAY BE PAINTED TO MATCH THE COLOR OF THE BIKE PATH OR USE ART.
2. PROVIDE DIRECT ACCESS FROM THE BIKE PATH TO PREVENT CYCLISTS FROM CARRYING BICYCLES OVER A CURB.

bike parking

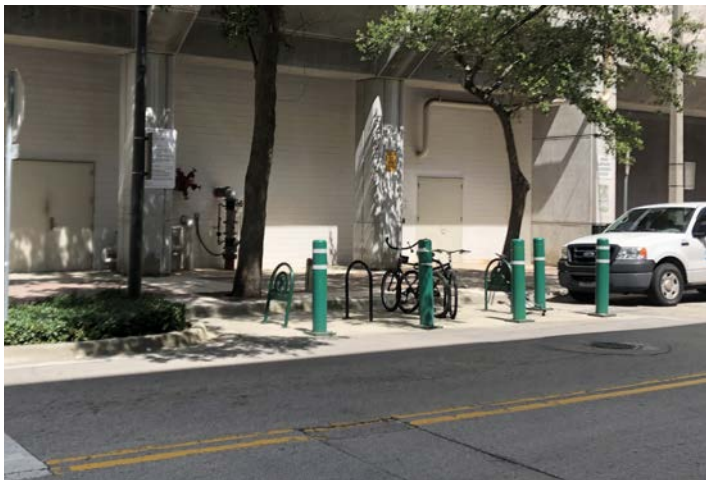
Bike parking is an important "end of trip" facility that helps make bicycling a more viable transportation option.

CONSIDERATIONS

An ample supply of bike parking can increase the number of cyclists on the road; bicycle parking must be provided with most new developments.

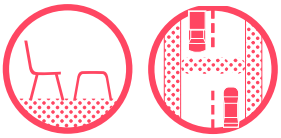
IMPLEMENTATION

Bike parking should be located near commerce and adjacent to transit stops and structured parking lots.



○○●● LEVEL OF SAFETY
○●●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

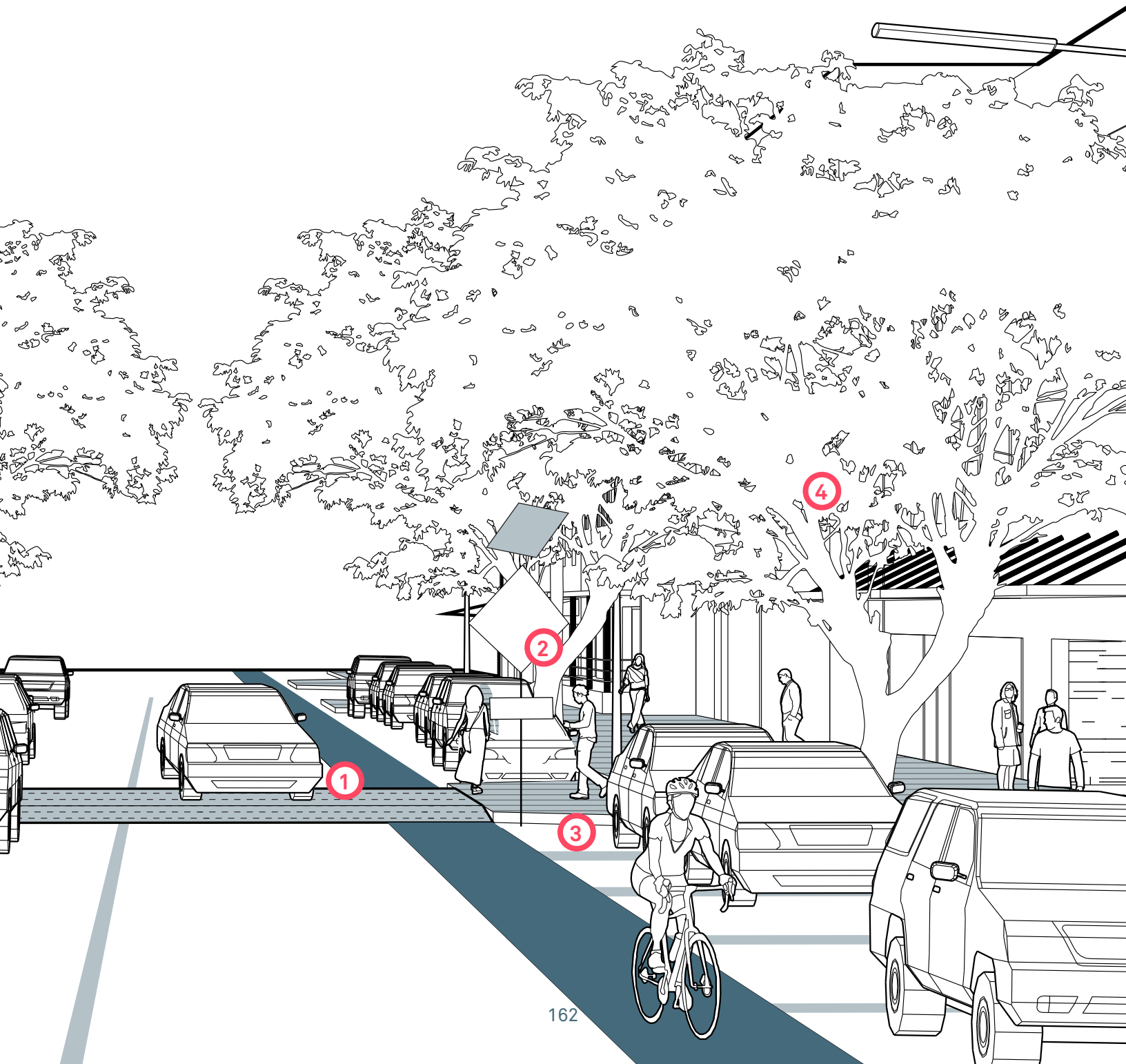
TOOL ELEMENTS THAT MAY BE INCORPORATED:



FURNISHING HARDSCAPE

APPROPRIATE FOR THESE STREET TYPES:

- CITY CENTER BOULEVARD
- COMMERCIAL BOULEVARD
- CITY CENTER AVENUE
- CITY CENTER STREET
- BEACH THOROUGHFARE


1
2
3
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pedestrian facilities

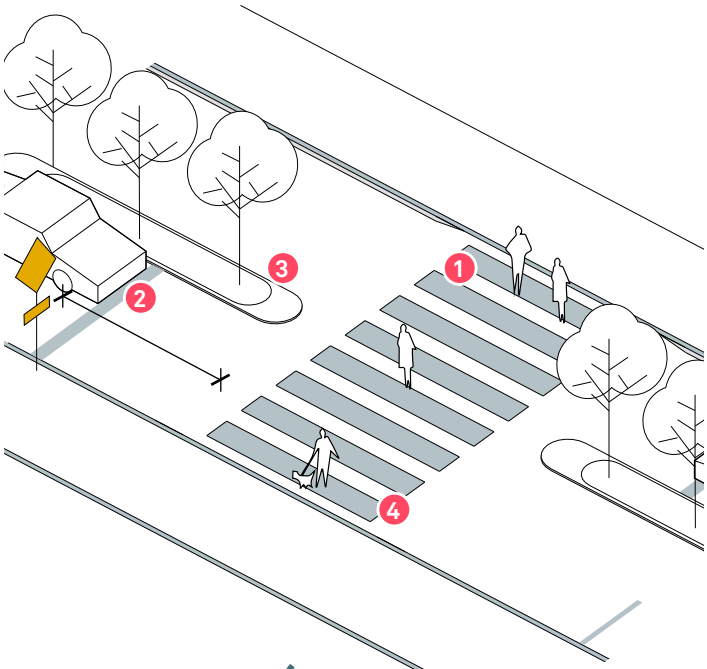
Pedestrian facilities are tool assemblies that provide a level of safety for pedestrians when crossing the street. It is important to implement pedestrian facilities on to streets, as they not only provide direct safety for street crossing, but also act as a form of traffic calming.

1. When crosswalks are raised, they can act as a traffic calming device.

2. Crosswalks may or may not be signalized. Crossing signs with signals that flash create driver awareness while pedestrians are crossing.

3. Curb extensions can be found at mid-block or at the corner of a block. These curb extensions provide a shorter distance for pedestrians to cross the road. Curbs should not extend into the bicycle facilities.

4. Landscaping where pedestrians cross acts as a threshold or a gateway, indicating that drivers should slow down.



crosswalk (unsignalized intersection/mid-block)

Crosswalks are designated spaces for pedestrians to cross the road safely. The spaces are highlighted either at intersections or mid-block locations when intersections are too far apart.

1. FOR APPROPRIATE SURFACE TREATMENT, SEE HARDSCAPE P192.
2. STOP BARS SHOULD BE SET BACK A MINIMUM OF 20 FT FROM CROSSWALK.
3. UNSIGNALIZED CROSSWALKS MAY BE USED IF OTHER TRAFFIC CALMING TOOL ASSEMBLIES, SUCH AS MID-BLOCK ISLANDS, ARE IN PLACE.
4. ALL CROSSWALKS AND PEDESTRIAN PATHS SHOULD MEET THE REQUIREMENTS OF THE FDOT MANUAL OF UNIFORM MINIMUM STANDARDS FOR DESIGN (GREEN BOOK).

○●●● LEVEL OF SAFETY
●●●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

APPROPRIATE FOR THESE STREET TYPES:

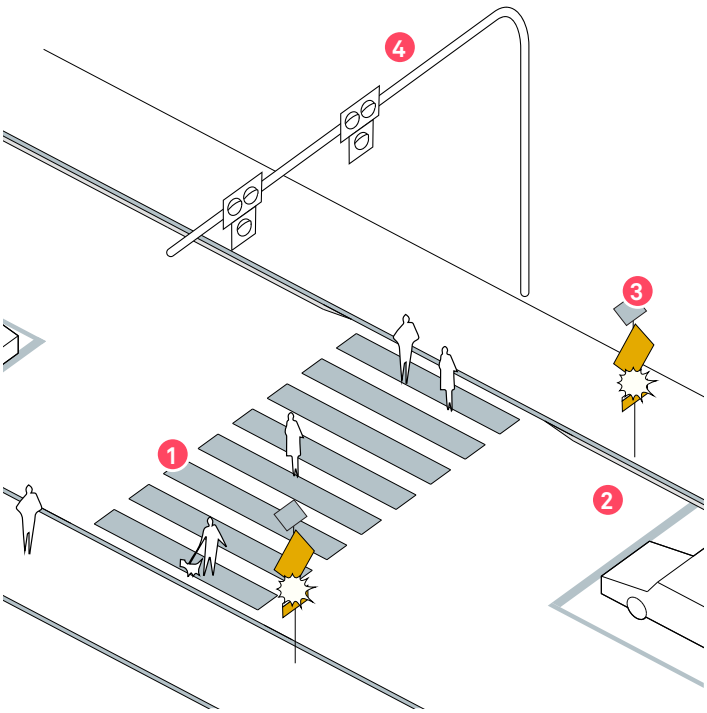
- ALL STREET TYPES

CONSIDERATIONS

Crosswalks should be implemented in areas where pedestrian traffic is encouraged or anticipated; more crosswalks will create a more walkable city. To increase safety, crosswalks can be paired with other traffic calming tools, such as mid-block curb extensions and median islands. Integrate in-ground LED's along the edges to increase driver awareness. Crosswalks should align with the pedestrian through zone, to be as efficient as possible. Crossing stripes should be wider than the walkway and curb ramp to ensure pedestrians can pass each other safely when in the crosswalk.

IMPLEMENTATION

Crosswalks can be implemented on all street typologies. Crosswalks should be at grade, and ADA standards should be used when curb ramps are added. A stop bar perpendicular to the travel lane should be added at least eight feet ahead of crosswalks.



1. FOR APPROPRIATE SURFACE TREATMENT, SEE HARDSCAPE P192.
2. STOP BARS SHOULD BE SET BACK A MINIMUM OF 20 FT FROM CROSSWALK.
3. SIGNAGE USES SOLAR PANELS TO POWER SIGNAL.
4. HAWK SIGNAL OPTIONAL.

crosswalk (signalized)

Signalized crosswalks can use either a Rectangular Rapid Flashing Beacon (RRFB) with pedestrian warning signs, HAWK signals as well as in-ground LED lights. Driver awareness is increased due to high-visibility-strobe-like warning when the crossing button is pressed by pedestrian.

CONSIDERATIONS

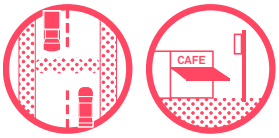
Signalized mid-block crossing should be used when there is more than one lane in each direction with a median refuge. Flashing lights may be bothersome to nearby homes.

IMPLEMENTATION

Crosswalks can be implemented on all street typologies.

●●●● LEVEL OF SAFETY
○○●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE

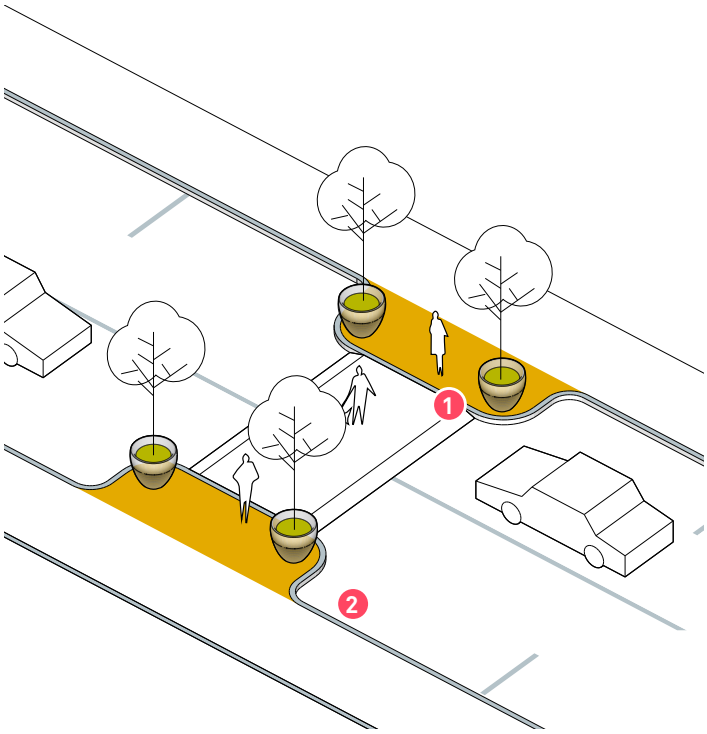
TOOL ELEMENTS THAT MAY BE INCORPORATED:



HARDSCAPE SIGNAGE + WAYFINDING

APPROPRIATE FOR THESE STREET TYPES:

- ALL STREET TYPES



1. IMPLEMENT RAISED CROSSWALKS AT MID-BLOCK CURB EXTENSIONS IN AREAS WITH HIGH PEDESTRIAN ACTIVITY
2. CURBS SHOULD BE EXTENDED AT LEAST 8 FT IF ON-STREET PARKING IS INCLUDED IN THE STREET DESIGN

●●●● LEVEL OF SAFETY
○○●● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE

mid-block curb extensions

A mid-block curb extension extends into the adjacent roadway, physically and visually narrowing the roadway while creating shorter and safer crossings for pedestrians.

CONSIDERATIONS

On-street parking and existing roadway drainage may be impacted. Planters or other landscaping can be implemented within curb extensions. The landscaping used must not hinder sight lines for either pedestrians or motorists.

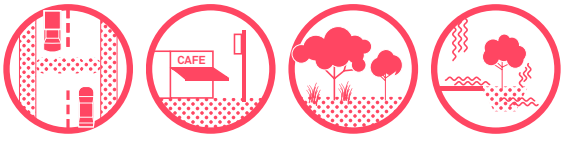
IMPLEMENTATION

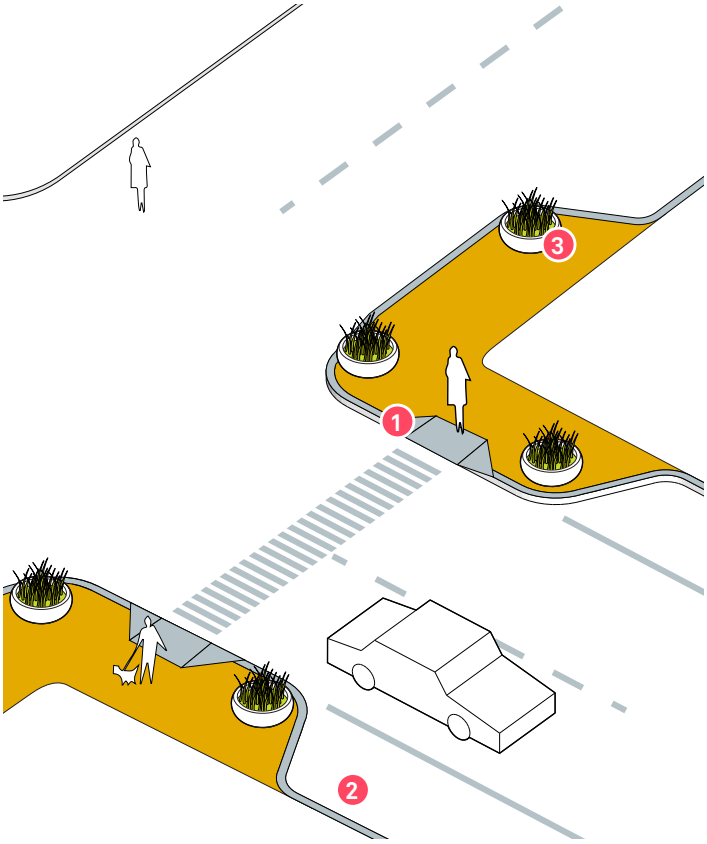
Bulb-outs or curb extensions can be implemented on all street typologies. In some cases, adequate width is needed for emergency vehicles and narrowing the road could impede them.

APPROPRIATE FOR THESE STREET TYPES:

- ALL STREET TYPES

TOOL ELEMENTS THAT MAY BE INCORPORATED:





1. CORNER CURB EXTENSIONS MUST INCORPORATE CURB RAMPS FOR PEDESTRIAN CROSSING
2. OPPORTUNITY FOR ON-STREET PARKING
3. INCORPORATE LANDSCAPE USING PLANTERS, SHRUBS OR GRASSES WITHIN THE CORNER CURB EXTENSION

corner curb extensions

A corner curb extension extends into the adjacent roadway, physically and visually narrowing the roadway, while creating shorter and safer crossings for pedestrians.

CONSIDERATIONS

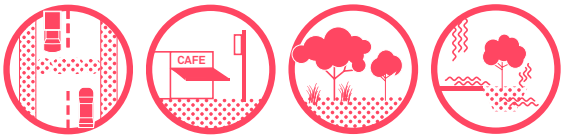
On-street parking and existing roadway drainage may be impacted. Planters or other landscaping can be implemented within curb extensions. The landscaping used must not hinder sight lines for either pedestrians or motorists.

IMPLEMENTATION

Bulb-outs or curb extensions can be implemented on all street typologies. Ensure that adequate width is maintained for emergency vehicles, narrowing the road could impede them.

●●●● LEVEL OF SAFETY
○●●● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE

TOOL ELEMENTS THAT MAY BE INCORPORATED:



HARDSCAPE | SIGNAGE + WAYFINDING | LANDSCAPE | FLOODWATER MANAGEMENT

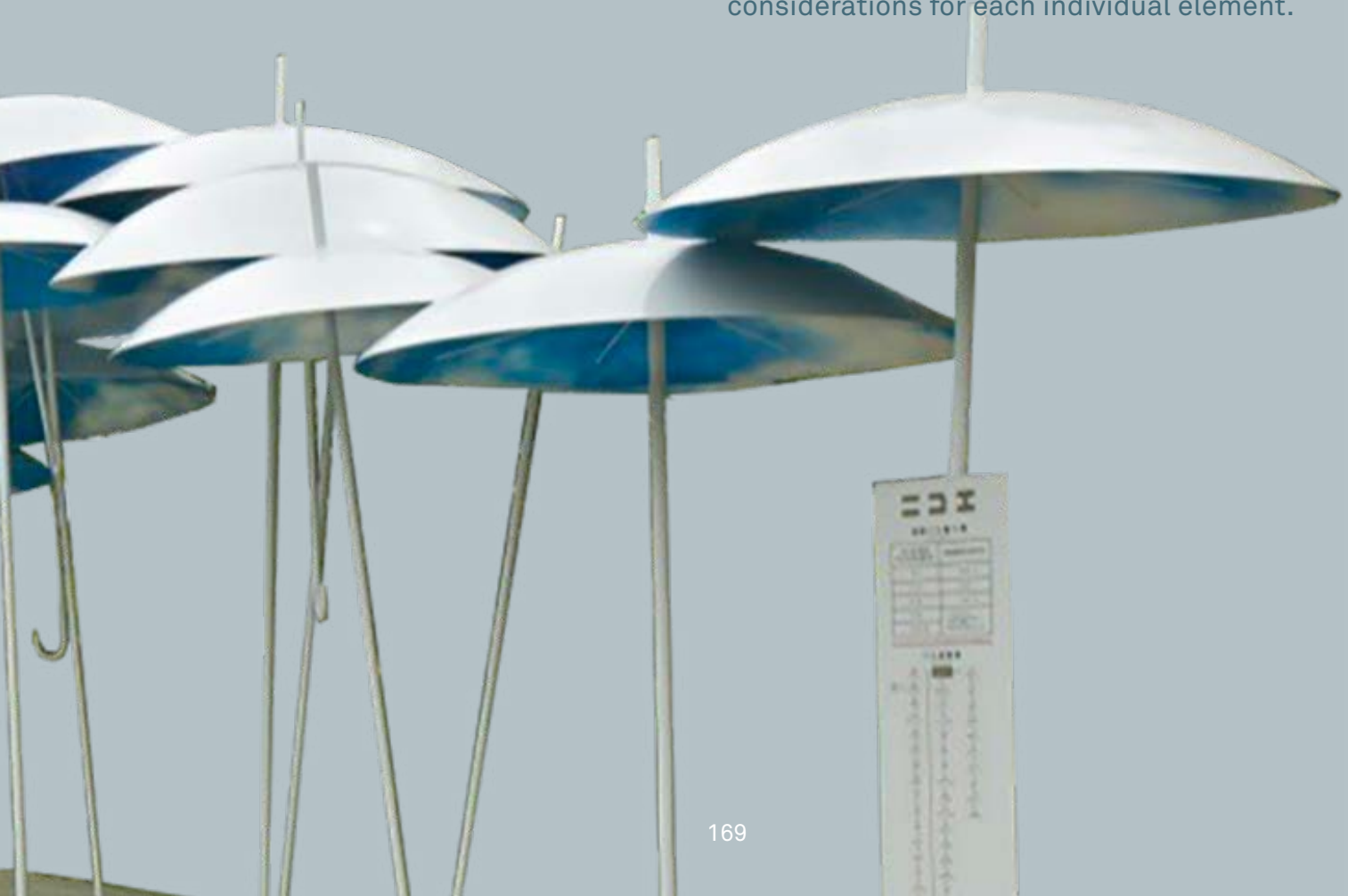
APPROPRIATE FOR THESE STREET TYPES:

- ALL STREET TYPES


#Back
yard
Experi
ment
FREE

elements

The elements section provides guidance for the various elements that are found within the public realm. Each tool breaks down the various element options and provides details, specifications, and considerations for each individual element.



CONCRETE

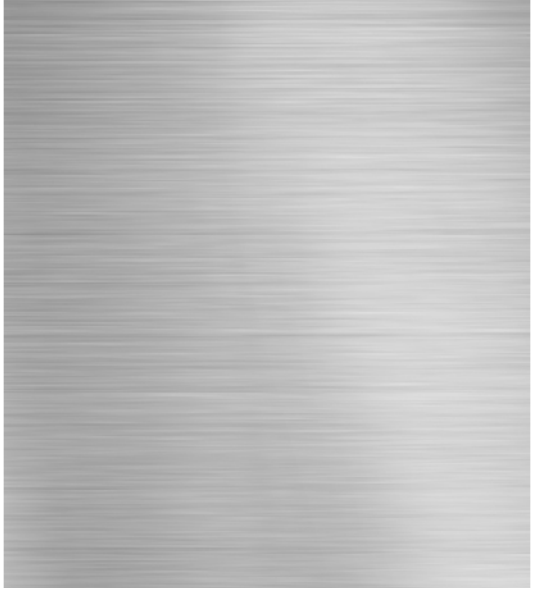
Concrete is a material that can be designed with on many scales, from a block module to a large sidewalk. Concrete has many variables and applications and should take the information below into consideration when chosen as a material.

○○○● LEVEL OF SUSTAINABILITY
○○●● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE
○○●● EASE OF MAINTENANCE
●●●● DURABILITY

○○○● CORROSION RESISTANCE
○●●● SUN EXPOSURE
○○○● RESISTANCE TO VANDALISM

USEFULNESS FOR:

●●●● FURNITURE
●●●● UTILITIES
●●●● HARDSCAPES



STAINLESS STEEL

Stainless steel has many applications, from structural connections to finishes. This material comes in the form of sheets, plates, bars, wire and tubing.

○●●● LEVEL OF SUSTAINABILITY
○○○● UPFRONT AFFORDABILITY
●●●● COST EFFECTIVE LIFE CYCLE
●●●● EASE OF MAINTENANCE
●●●● DURABILITY

○○●● CORROSION RESISTANCE
○●●● SUN EXPOSURE
○○●● RESISTANCE TO VANDALISM

USEFULNESS FOR:

●●●● FURNITURE
○○●● UTILITIES
○○○○ HARDSCAPES

ALUMINUM

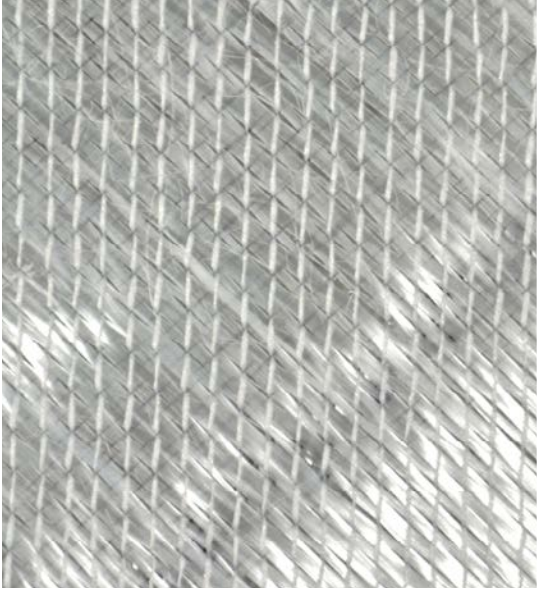
Aluminum is a non-magnetic and ductile metal that has a range of applications from structural tubes to finishes. Aluminum is most widely known for its low density and corrosion resistance.

●●●● LEVEL OF SUSTAINABILITY
○○●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE
○○●● EASE OF MAINTENANCE
○○●● DURABILITY

●●●● CORROSION RESISTANCE
○●●● SUN EXPOSURE
○○●● RESISTANCE TO VANDALISM

USEFULNESS FOR:

○●●● FURNITURE
○○○● UTILITIES
○○○○ HARDSCAPES



FIBERGLASS

Fiberglass is a type of fiber-reinforced plastic that uses glass fibers. The fibers may either be randomly arranged or woven into fabric. It is stronger and cheaper than many metals by weight, and can be molded in to complex shapes.

○●●● LEVEL OF SUSTAINABILITY
○○●● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE
○●●● EASE OF MAINTENANCE
○○●● DURABILITY

●●●● CORROSION RESISTANCE
○●●● SUN EXPOSURE
○○○● RESISTANCE TO VANDALISM

USEFULNESS FOR:

●●●● FURNITURE
○○○● UTILITIES
○●●● HARDSCAPES

WOOD/WOOD COMPOSITE

Wood is a sustainable material that can be used both structurally and for finishes. It is porous and fibrous and comes in a large variety of different species depending on application.

●●●● LEVEL OF SUSTAINABILITY
○●●● UPFRONT AFFORDABILITY
○○●● COST EFFECTIVE LIFE CYCLE
○○○● EASE OF MAINTENANCE
○○●● DURABILITY

○○●● CORROSION RESISTANCE
○○●● SUN EXPOSURE
○○○○ RESISTANCE TO VANDALISM

USEFULNESS FOR:

○○○● FURNITURE
○○●● UTILITIES
○○●● HARDSCAPES

RECYCLED PLASTIC

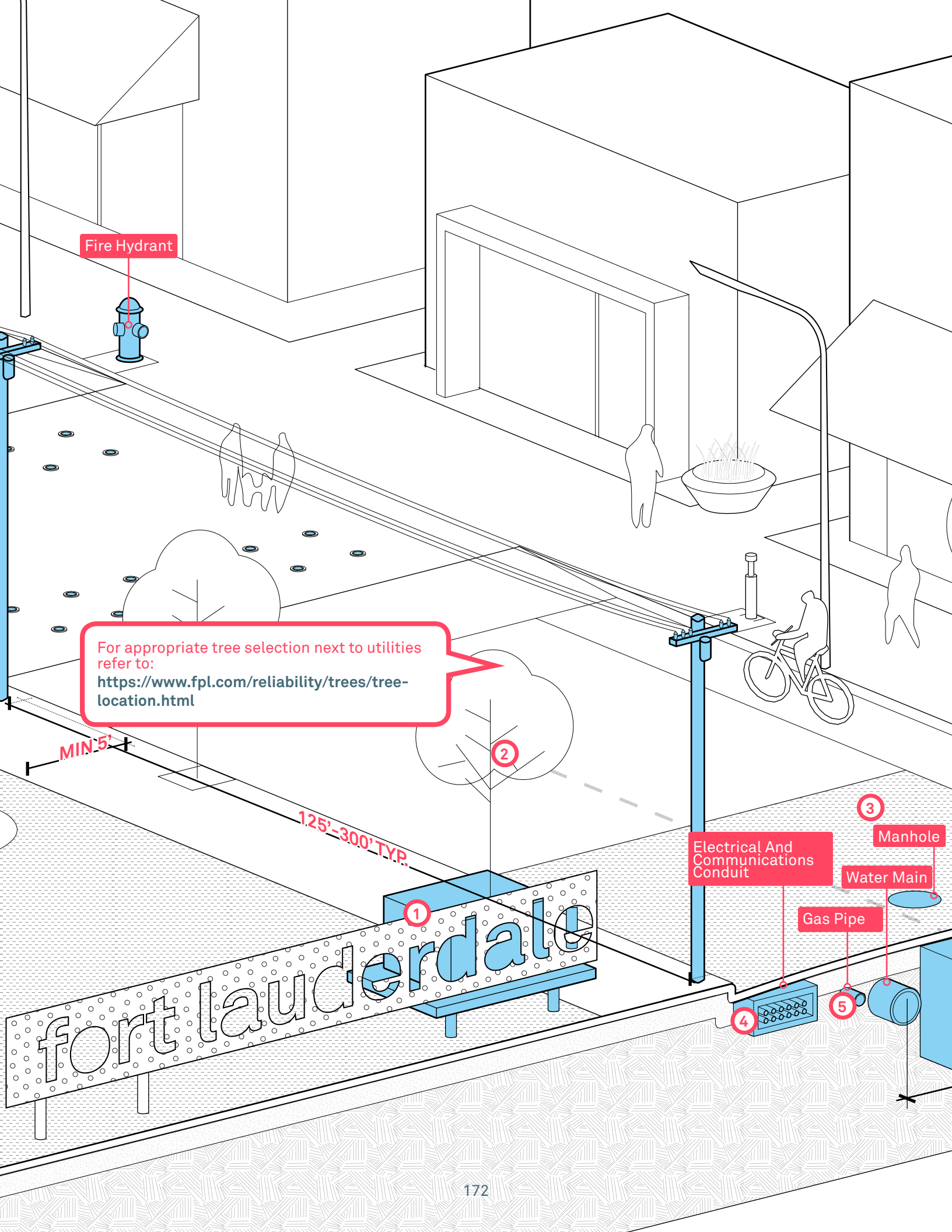
When using plastic for a project material, it is important to always consider using plastic that has been recycled. Recycled plastic can be used for almost any non-structural application including public furniture and architectural finishes.

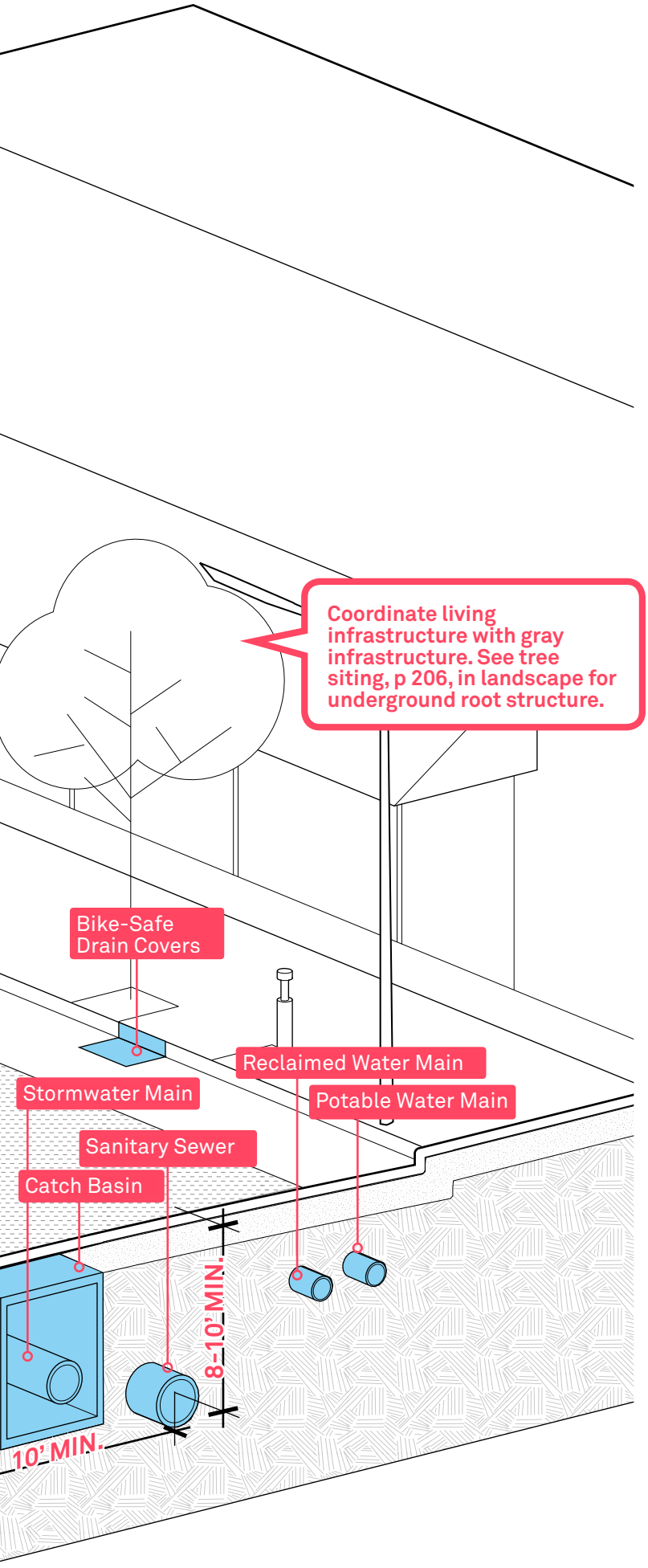
●●●● LEVEL OF SUSTAINABILITY
○○●● UPFRONT AFFORDABILITY
○●●● COST EFFECTIVE LIFE CYCLE
○●●● EASE OF MAINTENANCE
○●●● DURABILITY

○●●● CORROSION RESISTANCE
○○●● SUN EXPOSURE
○○●● RESISTANCE TO VANDALISM

USEFULNESS FOR:

○●●● FURNITURE
○○●● UTILITIES
○●●● HARDSCAPES


Fire Hydrant
For appropriate tree selection next to utilities refer to:
https://www.fpl.com/reliability/trees/tree-location.html
MIN 5'
125'-300' TYP.
1
2
3
Manhole
Electrical And Communications Conduit
Water Main
Gas Pipe
4
5
fort lauderdale

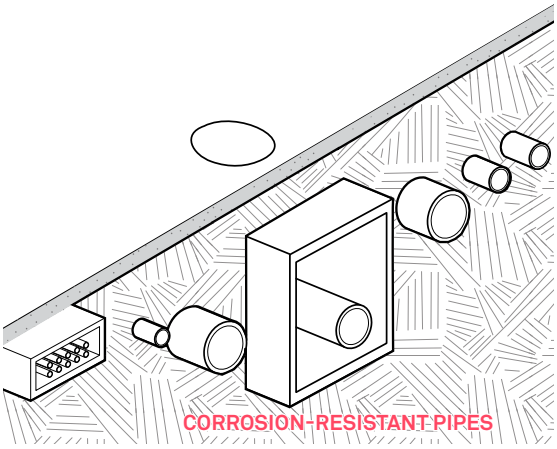


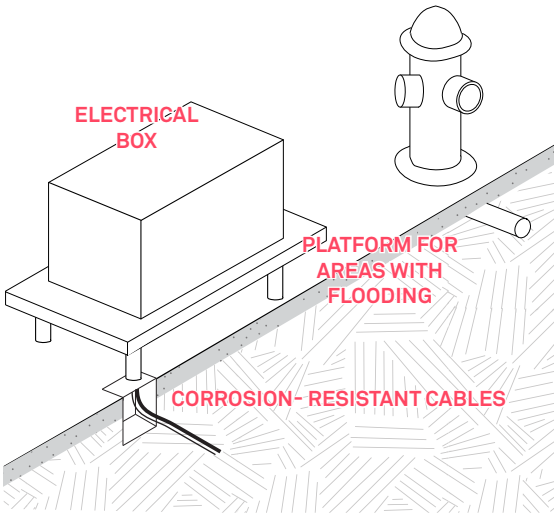
utilities

Utilities and utility networks bolster the social, environmental and economic purposes of today's society. With a growing demand to plug into the infrastructure grid in nearly every city, it is important to take into consideration the evolution of the relationship between urban planning and growth and the increased requirement of existing utility grids.

All utilities can be found underground, aboveground, or mounted on a pole. When locating utilities it is important to consider the design of the public right-of-way, maintenance needs for these utilities, and the potential for future construction activities. In many cases, aboveground utilities, such as fire hydrants and electrical boxes, will be connected to underground utilities so it is important to understand the dynamic interaction of all utility types.

1. Placement and aesthetics should be accounted for, utilizing public art, signage, screening or landscaping to buffer any unsightliness.
2. Coordinate landscape at full maturity with all utilities; refer to FPL Right Tree Right Place for additional set backs and placement: **https://www.fpl.com/reliability/trees/tree-location.html**
3. Consider the use of modulated hardscapes over utilities for easy access for repairs or maintenance.
4. Subaqueous power lines are kept inside PVC pipes that are made to be watertight. But if water manages to enter these pipes, outages can take longer to remedy, because accessing buried infrastructure takes more time.
5. Required clearances around underground utilities can be found on the following page.





underground

Purpose
power supply/water supply/communications network distribution

Placement
See minimum requirements below for placement of underground utilities.

Minimum Requirements
See local codes for clearances around underground utilities.

Typical clearances:
- 2' where **water lines** pass over **sewer lines**
- 10' between **water lines** and **sewer lines**
- 8-10' below ground level for **sewer lines**
- 2-3' below ground for **gas lines**

Considerations
Manholes and drain covers should be bike-safe, especially in areas where **Healthy and Active Lifestyle** is a priority.

In **Flood Protection** areas select appropriate materials that are resistant to saltwater or freshwater depending on the type of flooding. For water mains and sewer mains (water service lines are a different material), the main pipe types are: Ductile Iron Pipe, DIP (Wrap pipe in plastic per manufacturer spec), PVC, HDPE
For Drainage: HDPE, PVC, Concrete, Corrugated Aluminum (CAP) (Don't see much of this anymore due to HDPE cost advantage)

aboveground

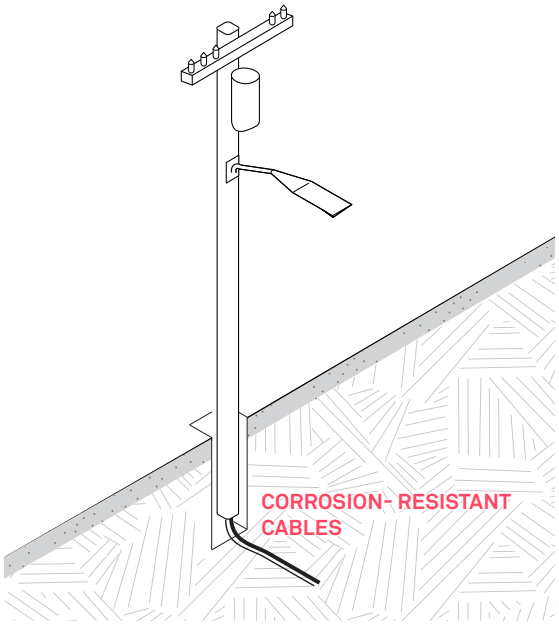
Purpose
power supply/light distribution/fire protection/communications network distribution

Placement
All aboveground utilities should leave a minimum of 5' of clearance for sidewalks. Aboveground utility placement may differ depending on Jurisdiction and Regulation. Coordinate with various agencies to avoid reducing space in the public right-of-way.

Minimum Requirements
- 5' clearance on pedestrian side
- 1' setback from curb
- 3' side clearance for **transformers**
- 10' rear clearance for **transformers**
- max. 400' between **fire hydrants**

Considerations
Where there are goals for **Flood Protection**, consider lifting aboveground utilities to a minimum of 18" above base flood elevation.

In a context that may need a better sense of **Place and Identity**, consider incorporating **public art p196** or **landscaping p200** around aboveground utilities by using paint, wraps, sculpture, or plants to shield.



pole-mounted

Purpose
power supply/light distribution/
communications network distribution

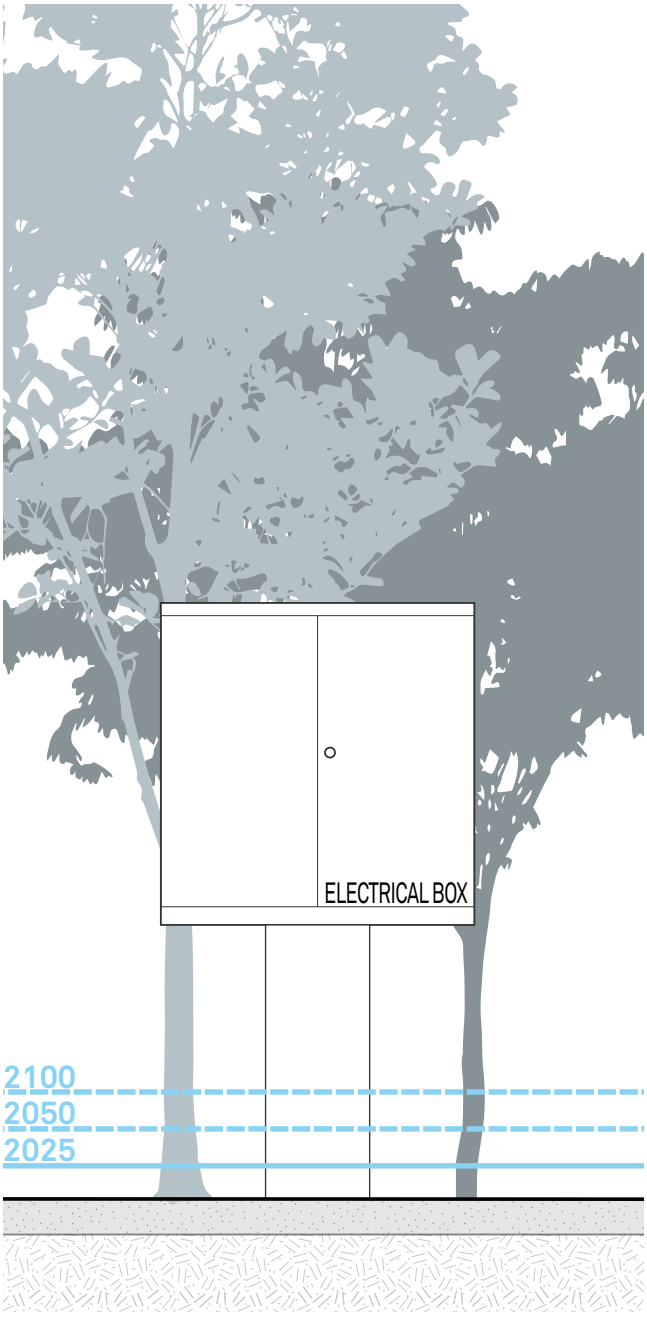
Placement
Utilities that are mounted on poles should take into consideration the proximity to the public right-of-way, leaving a minimum of 5' for a pedestrian zone on sidewalks.

Minimum Requirements
- 125'-300' on center for **electrical poles**
- 5' clearance on pedestrian side
- 1' setback from curb
- 43.5" Pole circumference

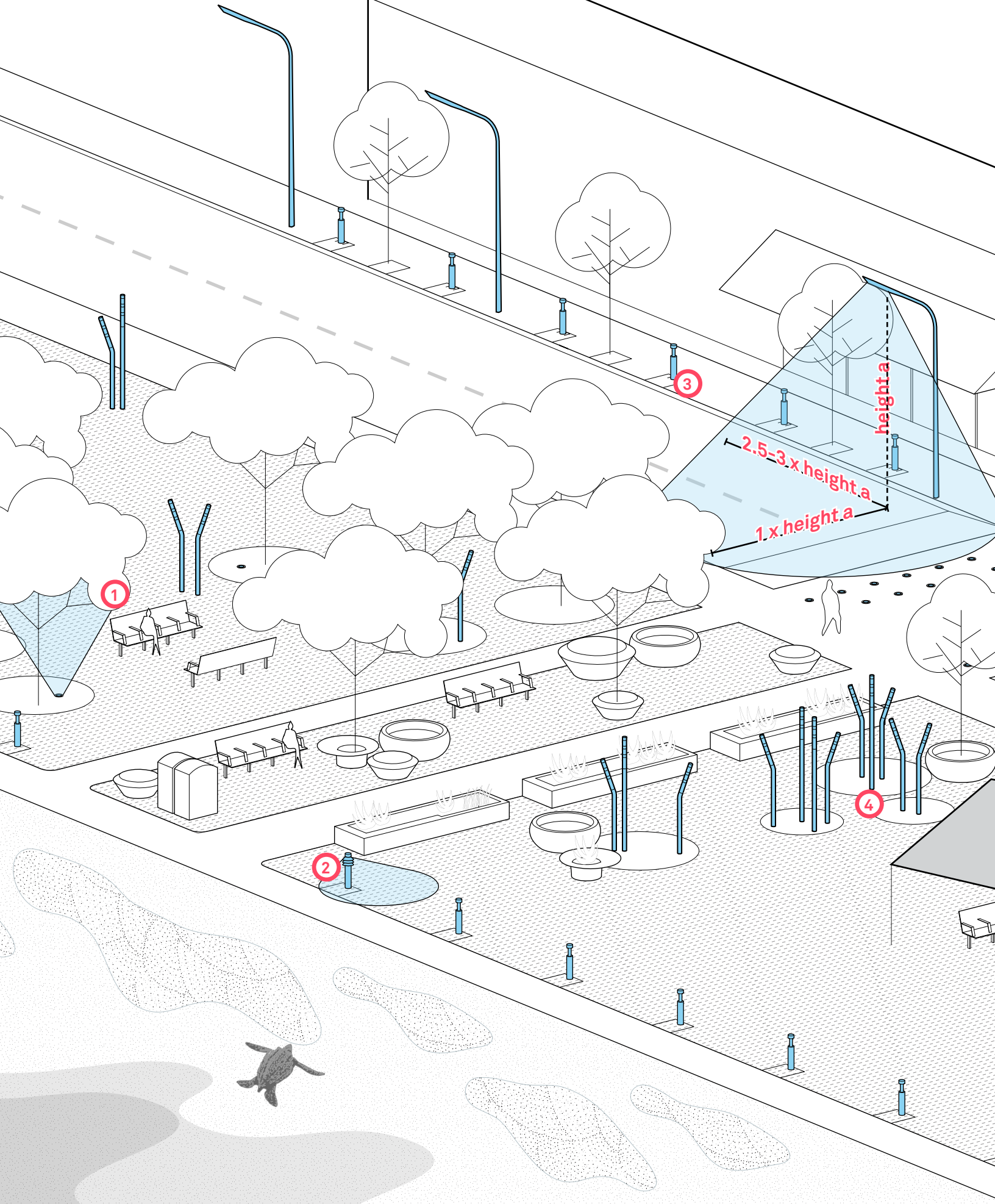
Considerations
Pole-mounted utilities should take the width of pedestrian right-of-way into consideration, while being coordinated with landscape and vegetation at full maturity.

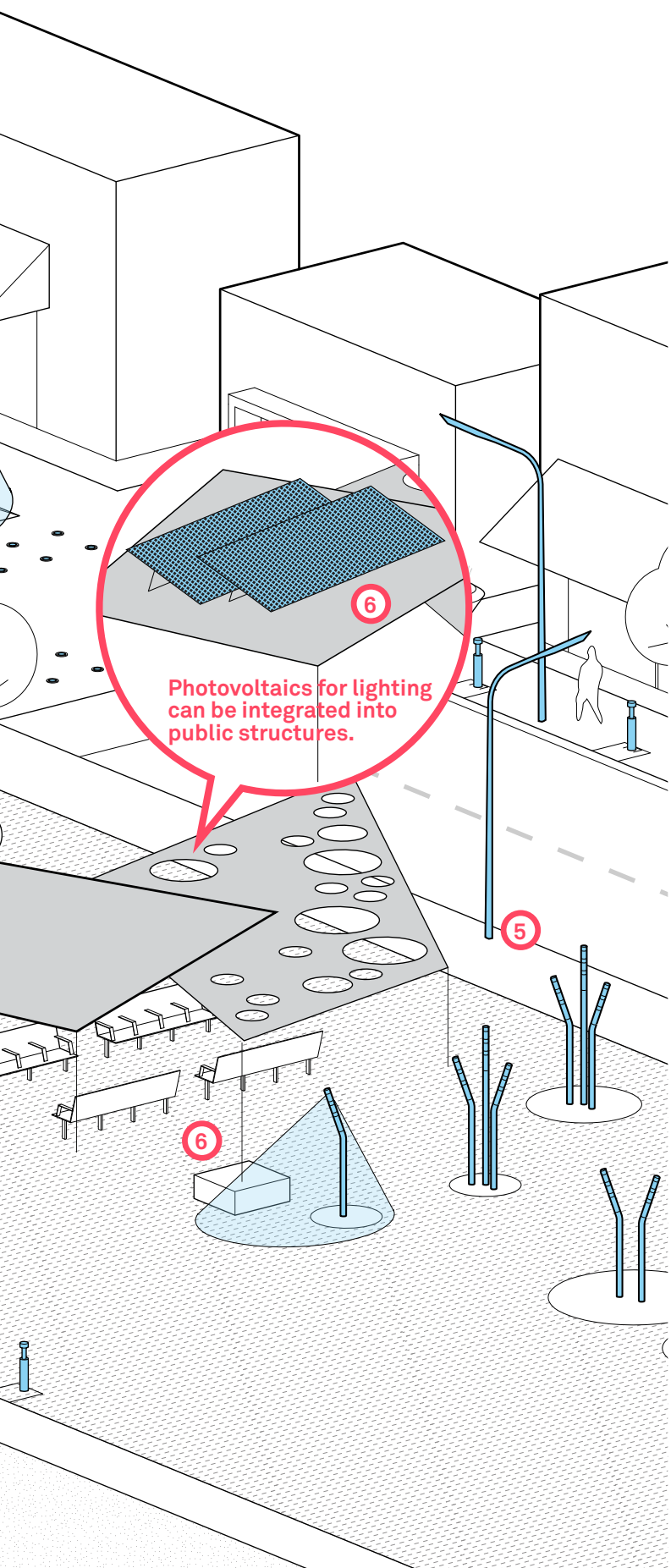
To reduce sidewalk clutter and promote a **Healthy and Active Lifestyle** various utilities should coordinate to use the same poles when possible.

Areas within a **Focused Development** should consider converting pole mounted utilities to subaqueous lines.



Electrical or other utility boxes located in flood vulnerable locations should be raised above the highest projected flood conditions. In other areas that are not as vulnerable the essential components within the box should be moved to the highest point allowable within the utility box to protect against future storm events.


1
2
3
4
height a
2.5–3 x height a
1 x height a



lighting

Lighting is a part of creating a sense of place, consisting of the design of the fixture and the atmosphere created by the lighting condition. Lighting can facilitate safe traffic movement and provide a sense of safety for pedestrians and cyclists. Sustainable materials and smart technologies should be used that can monitor and adjust energy use, as well as extend the useful life and reduce maintenance requirements of the lighting fixture and poles.

1. Accent lighting may utilize landscape or furniture to reflect light from the surfaces of these objects.

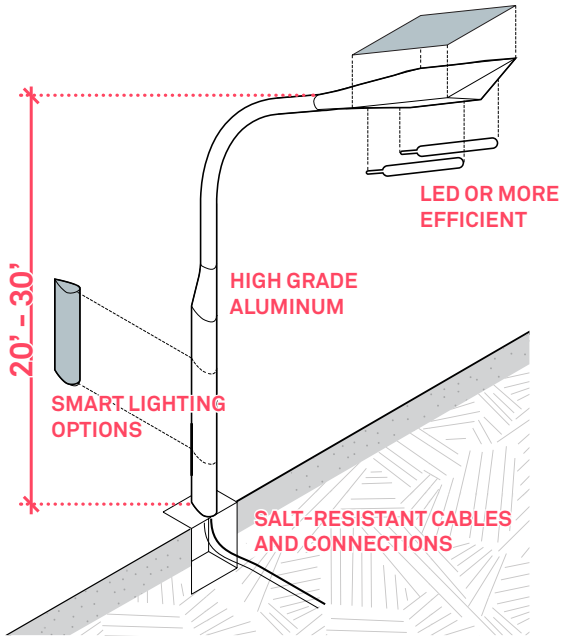
2. For turtle nesting areas, reduce the height of light fixtures and direct light down and away from the shoreline. Exterior fixtures located along shorelines should be shielded from shining toward the ocean. Use amber LED lights.

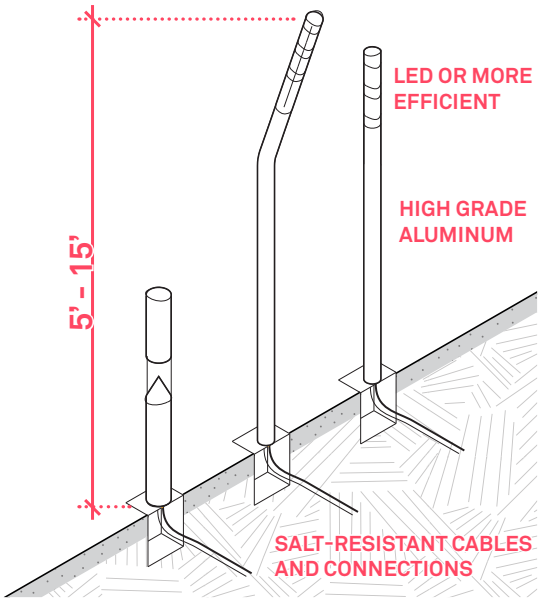
3. Pedestrian lighting should be used when tree canopies block illumination from street lights, or where larger beam spreads are not necessary. Whenever possible, pedestrian lights should share poles with street lights to reduce clutter and cost, unless uniformity, light levels, or neighborhood character dictates otherwise.

4. Lighting may be configured in lightscapes or clusters of pedestrian lighting as a form of public art.

5. Street lights aligning a street reinforce directional travel. A staggered arrangement of street lights along both sides of the street allows for fewer lights, reducing the use and cost of energy.

6. Photovoltaics need storage for unused energy during daylight hours if they are not net-metered or grid-tied. This storage should be incorporated into furnishings, out of the pedestrian zone. Consolidating photovoltaic panels to a centralized location streamlines the process when checking for lights that need replacement.





street lights

Purpose
street and area lighting/energy efficiency

Placement
a variety of conditions from large urban boulevards to residential streets, areas of traffic and pedestrian movement, within furniture zone

Minimum Requirements
- 20' - 30' in height
- 1 sf footprint
- 1' setback from curb
- 15' minimum distance from tree canopy
- must be dark-sky compliant
- 95% of light is directed toward the ground
- light source: LED (minimum luminaire efficacy - 70 lumen/watt)
- luminaire cut off/international dark-sky compliant
- spacing: 2.5-3 times the height of the light

Specifications
- 20' and under: less than 25,000 lumens
- 20' to 25': less than 30,000 lumens
- 25' and higher: nothing over 40,000 lumens

All specifications, including light temperature, will vary based on application.

Considerations
If smart technology is not within budget, install hardware for future connection.

pedestrian lights

Purpose
street and area lighting/energy efficiency

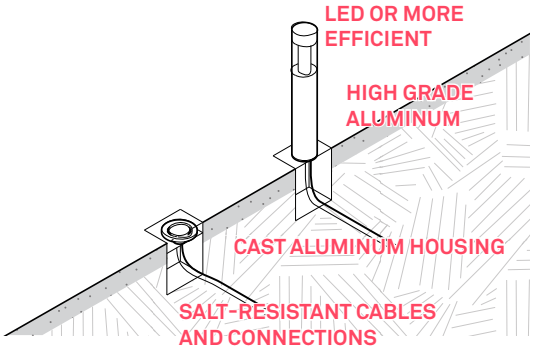
Placement
streets with high pedestrian volume and streets with pedestrian safety concerns, such as freeway underpasses, alleys and pedestrian pathways

Minimum Requirements
- 10' -15' vertical clearance
- 13" x 17" footprint
- 1.5' setback from face of curb
- light source: LED or better
- spacing: 2.5-3 times the height of the light

Specifications
- 12,000 lumens and below

All specifications, including light temperature, will vary based on application.

Considerations
If incorporating smart technology is not within budget, install hardware for future connection.



accent lights

Purpose
additional or accent lighting/increased visibility/identify or highlight/atmospheric and ambient lighting conditions

Placement
in conjunction with street or pedestrian lighting, high pedestrian traffic areas, areas with elements requiring display or ambiance

Minimum Requirements
- 5' vertical clearance
- 1 sf footprint
- 1.5' setback from face of curb
- light source: LED or better
- spacing: 2.5-3 times the height of the light

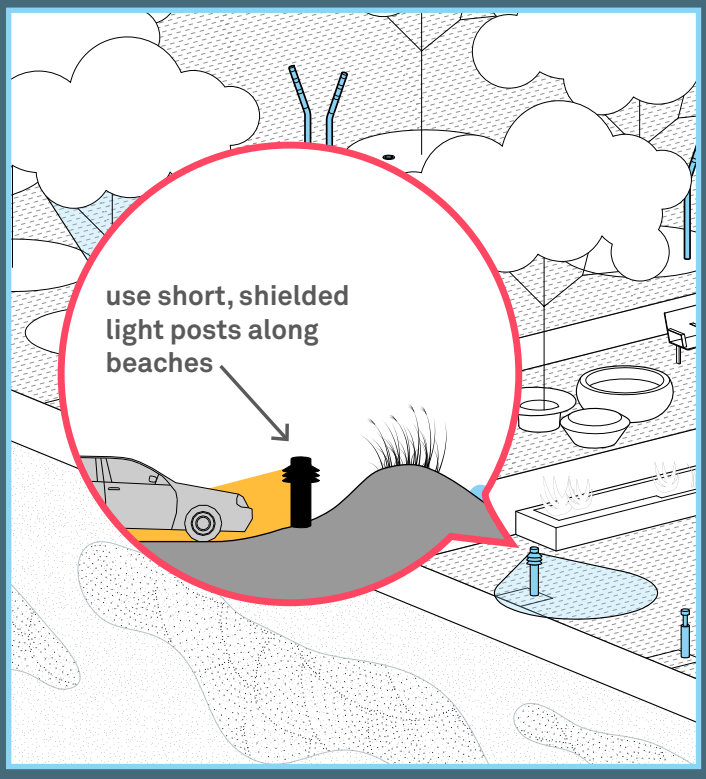
Specifications
- low-level 6000 lumens and below
- high-level 30,000 lumens and below

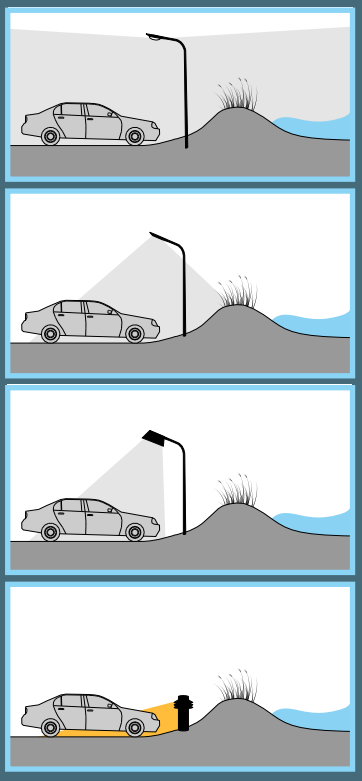
All specifications, including light temperature, will vary based on application.

Considerations
In-ground lighting is not optimal in areas where there is flooding. Consider using aboveground accent lights and non-corrosive, salt-resistant materials in areas with frequent flooding.

ENVIRONMENTAL CONSIDERATIONS

LIGHTING FOR SEA TURTLES





Poor

Poorly directed parking lot lighting can cause problems on sea turtle nesting beaches.

Better

Fixtures with 90 degree cut off angles can reduce the amount of stray light reaching the beach.

Much Better

Fully hooded floods can direct light accurately and reduce stray light even more.

Best

Low-mounted, louvered bollard fixtures are the best way to light parking lots near nesting beaches.

Well-lit spaces along the beachfront should be designed according to lighting codes in order to be sea turtle friendly.

From April to October of every year, hundreds of turtles nest their eggs on the City's beaches. With a growing coastal population, streets along the beaches have become more developed, requiring more lighting. Because all species of sea turtles are either threatened or endangered, it is important to be aware of how humans can affect the natural life cycle patterns of these animals.

Several guidelines for designing lighting along sea turtle nesting areas have been created throughout the state of Florida. The following information for designing lighting along these areas have been provided by the FWC Sea Turtle Lighting Guidelines:

THREE GOLDEN RULES:

1. **Keep it low.** Fixtures must be as low as possible.

2. **Keep it shielded.** Fixtures must be downward-directed.

3. **Keep it long.** Bulbs must produce only long wavelength light (560 nm or greater, which is amber, orange, or red).

ACCEPTABLE LAMPS/BULBS:

- low pressure sodium: 18W, 35W
- red, orange or amber LED (not filters)
- true red neon
- other light sources that produce light of 560nm or greater

SMART SENSING TECHNOLOGIES

Lighting may incorporate sensors that can lead the City towards smarter energy usage.

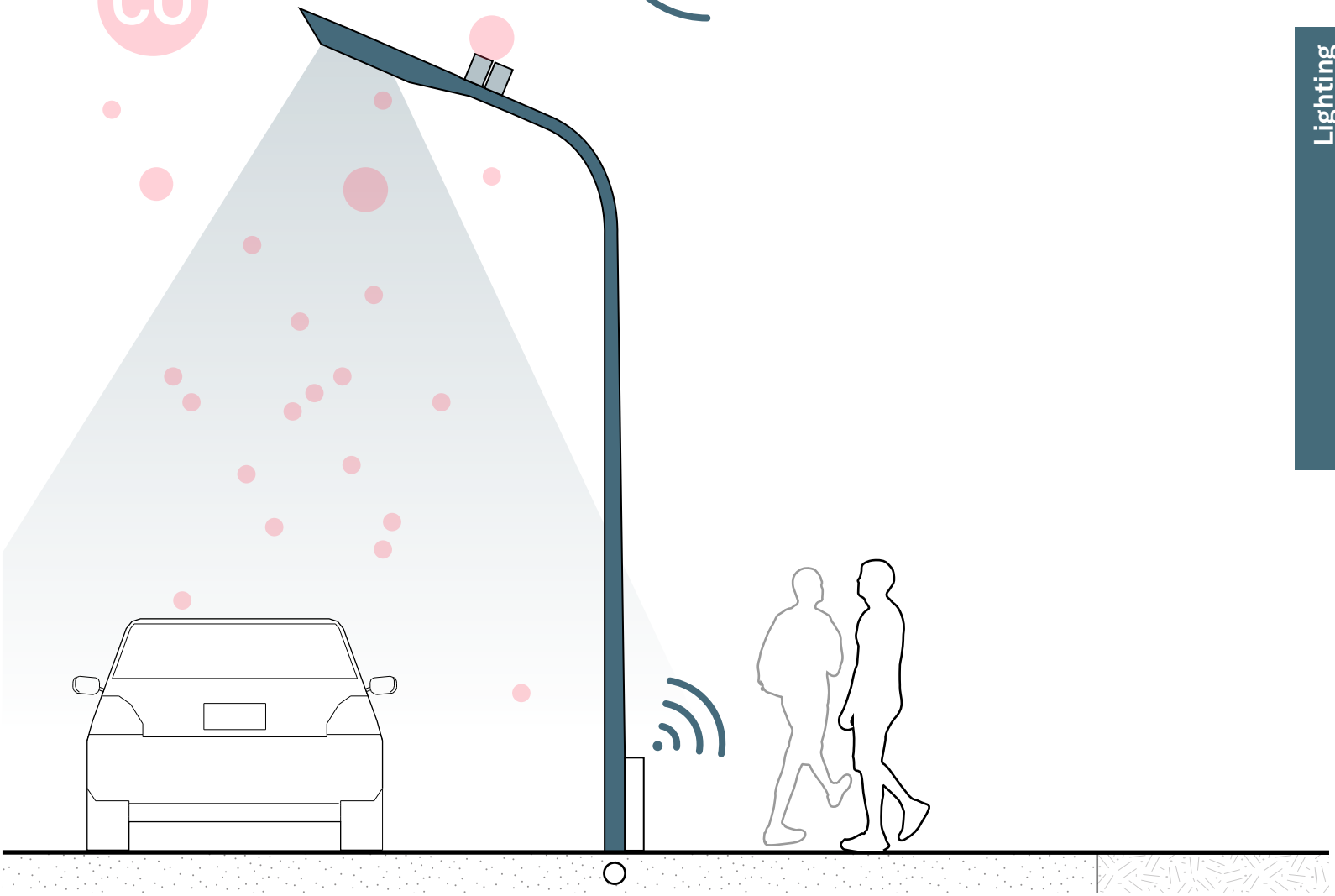
Photocell sensors have the capability of reading ambient light levels and adjusting brightness to provide appropriately lit streets and walkways.

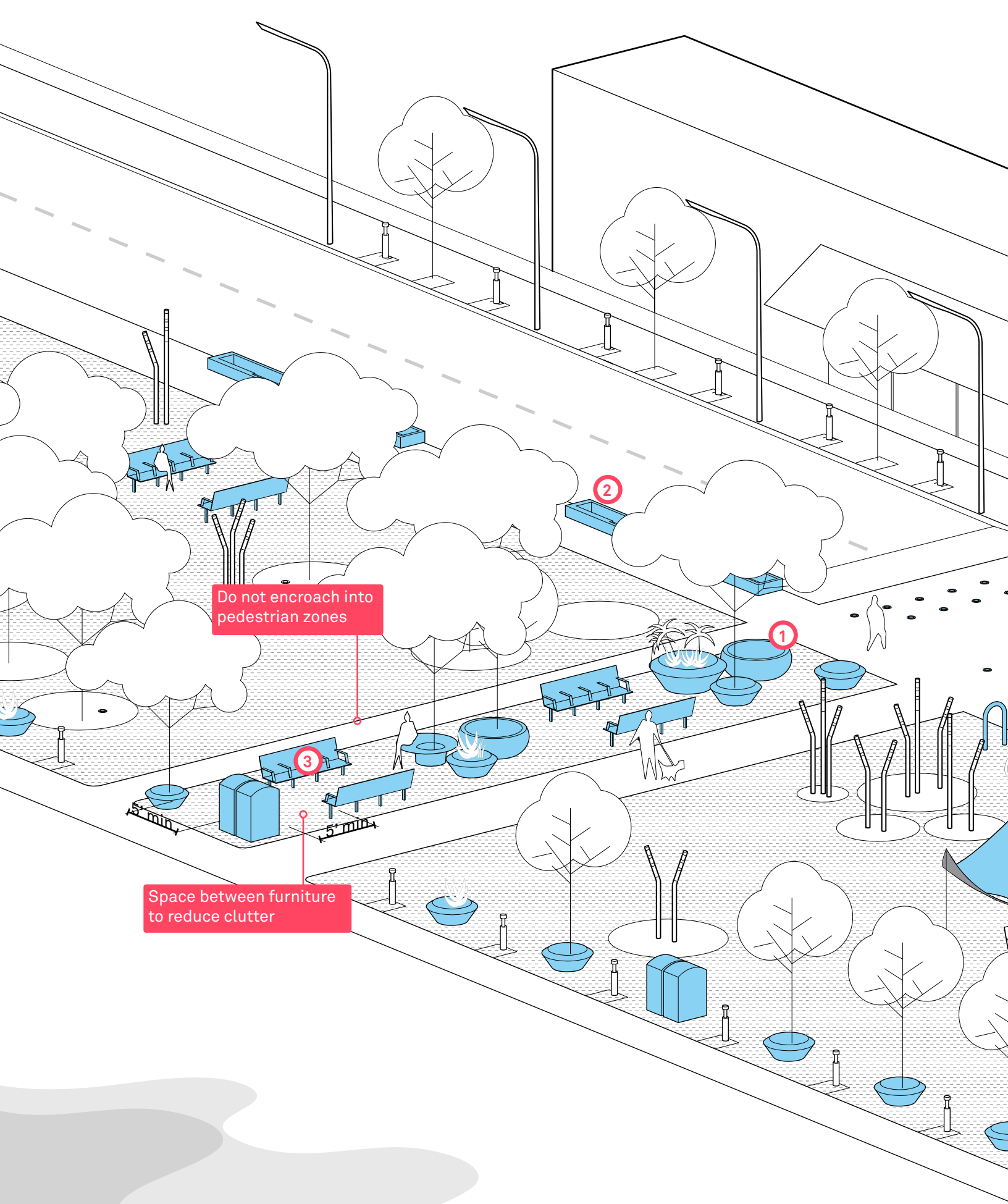
Pressure sensors in parking lots or spaces may activate street lights for safety where cars are parked.

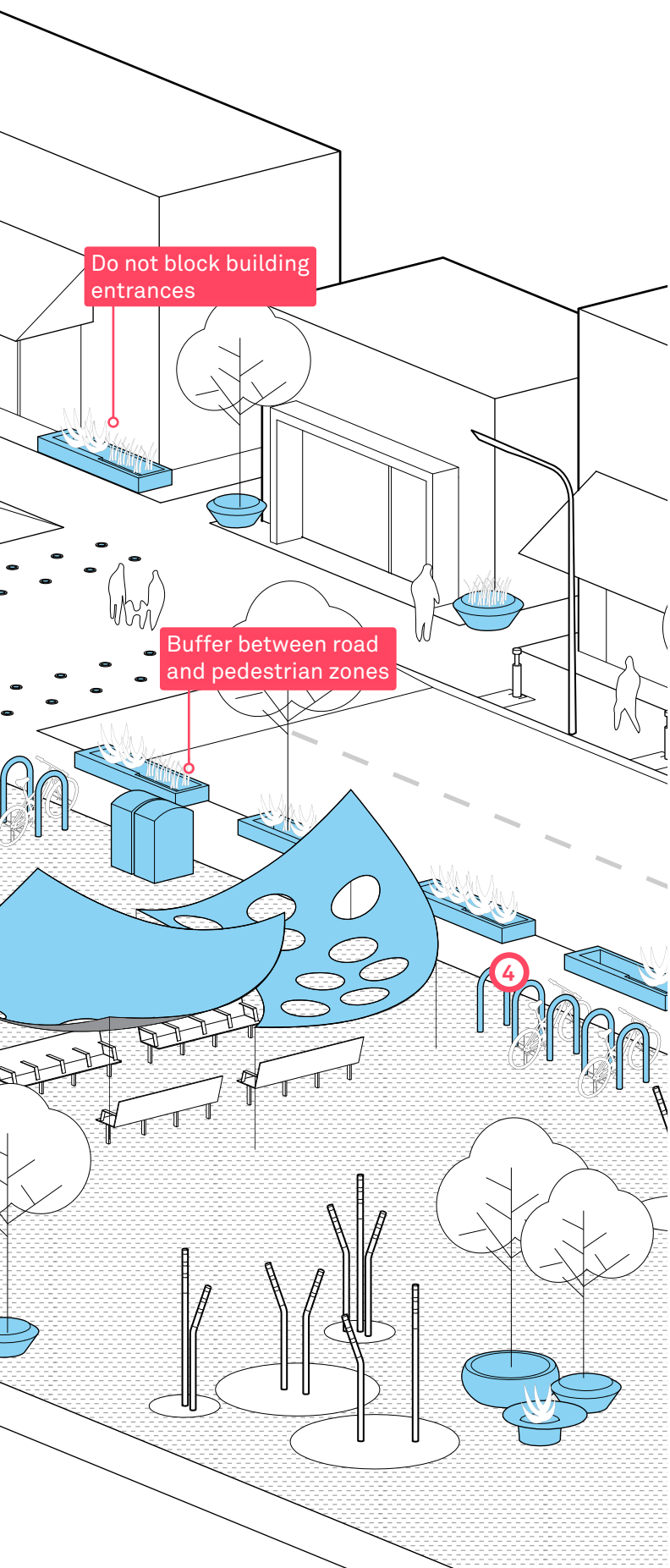
Motion sensors can interpret data from pedestrian traffic volume and either lower or brighten pedestrian lights.

Pollution monitoring devices may also utilize the same network as LED street lights to provide feedback about air pollution.

Remote detection whether lights are functioning or need replacement.




Do not encroach into pedestrian zones
Space between furniture to reduce clutter
5' min.
5' min.
1
2
3



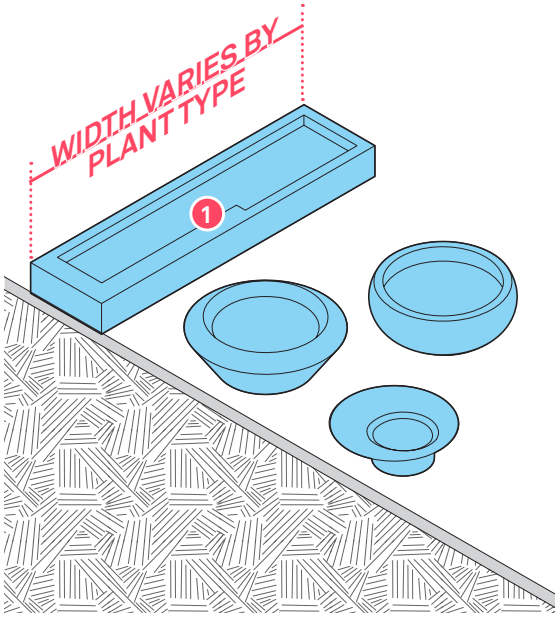
furnishings

Urban furnishings include a multitude of objects: planters, waste receptacles, seating, bike racks, and shading structures, some of which may have more than one function, allowing users to customize a space or use it in many ways. The design of public space must take into consideration safe and comfortable urban furnishings for a diverse group of people, varying in ages and physical abilities. Furnishings may also contribute to safe and comfortable public spaces by buffering pedestrians from vehicular traffic, reducing noise and reducing heat island effects with the use of shading structures and planters. Urban furniture can also be used to mark locations or aid in wayfinding.

1. Planters include movable potted planters, raised planter beds, and other containers for trees and landscaping. It should be noted that aboveground planters require maintenance. Planters can be used to bring landscape to areas where underground utilities may prevent in-ground landscape.
2. Aboveground planters may be appropriate to delineate the edge of sidewalk seating areas or outdoor displays, defining public and private spaces or adding safety for pedestrians.
3. Seating can be integrated into buildings, planters, and street walls. Seating should be provided both with and without armrests. Armrests provide stability for those who require assistance for sitting and standing. They should also be located outside of the front door landing zone and outside of the pedestrian zone.
4. Bike racks should be part of all new development, promoting healthy, active living and reducing congestion and vehicle parking issues. Bike racks as public art can contribute to a sense of place. They can be combined with other furnishings or be near them to cluster amenities.

Furnishing can tell a story about sustainability and environmental issues by upcycling or re-using found objects or waste materials. Bike racks can be made out of recycled partial tires or shading structures can be made out of recycled shipping containers.

Providing a comfortable place to sit is a basic necessity. Seating gives pedestrians a place to rest, wait, or watch and enjoy street life. Providing comfortable, inviting places to sit can transform a sidewalk into a gathering place and enhance its role as a public space and community amenity. Seating should encourage a moment of pause, as longer stays produce livelier sidewalks



planters

Purpose
buffering/wayfinding/protect freshwater vegetation in saltwater inundated locations

Placement
between streets and sidewalks (furniture zone), can be used in areas where below ground utilities would make it hard for standard living infrastructure, places lacking shade

Minimum Requirements
- 16 cubic feet of space for plants
- durable materials
- 5' clearance adjacent to pedestrian zone
- 1' set back from face of curb

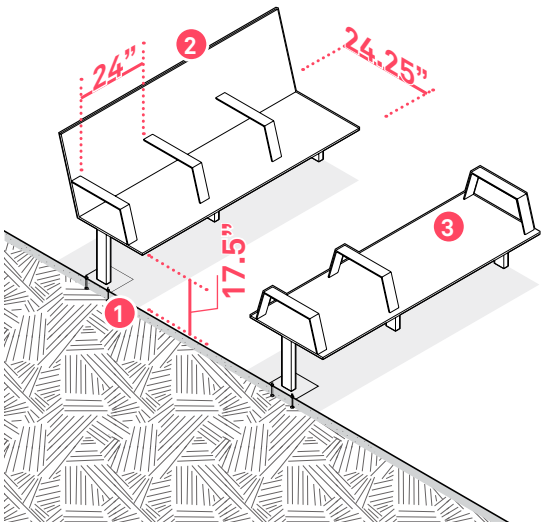
Considerations
Planters should be considered secondary to floodwater management tools, since they have more water and maintenance requirements than other types of low impact development.

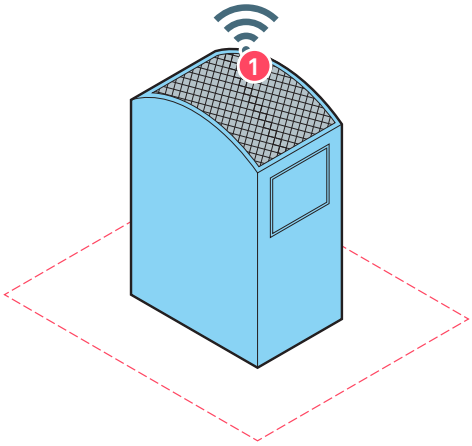
Planters make a good wayfinding tool and add character in context scenarios that may need a better sense of **Place and Identity**.

Consider using planters for plants and trees in areas that are inundated by salt water due to flooding, especially in areas lacking shade.

Notes:

1 **INCORPORATE SEATING WHEN POSSIBLE. 14-18 IN ABOVE GRADE FOR SEAT HEIGHT.**





seating

Purpose
provide a place for rest

Placement
locations that allow for resting or waiting for transit, should not interfere with pedestrian movement or other public realm infrastructure (fire hydrants, loading zones, entrances, etc)

Minimum Requirements
- seating space for two people
- affixed to sidewalk, unless otherwise noted
- >4' long, provide armrests or dividers

Considerations
Seating can be incorporated into other furniture such as planters to save on additional maintenance, material and installation costs.

Providing benches encourages activity on the street and pedestrians to walk farther or use outdoor public spaces, for a **Healthy and Active Lifestyle**.

Street furniture is important in areas with **Focused Development**, having greater population density and more frequent public transit stops.

Notes:

1. **CORROSIVE RESISTANT CONNECTIONS.**
2. **NON-CORROSIVE MATERIALS.**
3. **ARMREST WHEN MORE THAN 4 FT LONG.**

waste receptacles

Purpose
recycling/garbage disposal

Placement
near entertainment districts or active commercial areas, transit

Minimum Requirements
- durable materials
- provide receptacles for recyclable and non-recyclable waste

Frequency and spacing depends on land use and population density. In downtown areas, 2-4 waste receptacles are typical per block.

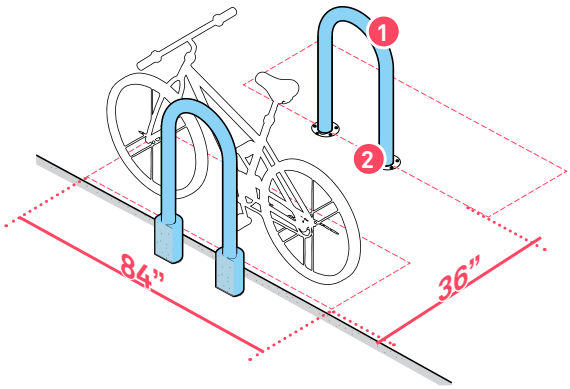
Considerations
Having recycling and trash in the same location will allow for ease of maintenance, and increase the use of the proper receptacle.

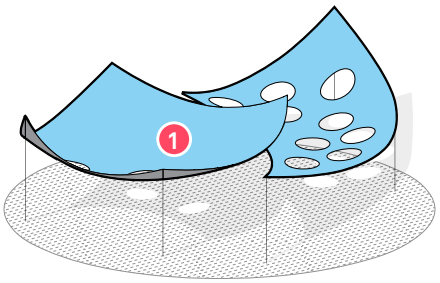
Trash can be fun! Waste receptacles can be artistic or informative (for example showing data on recycling at each location). This can provide a memorable experience and contribute to a sense of **Place and Identity**.

Water and garbage don't mix well. Know where flooding occurs, and if **Flood Protection** is a project goal based on current flooding issues. Flooding may influence choice of material or location of receptacles.

Notes:

1. **WHEN POSSIBLE, INTEGRATE SOLAR POWER AND SMART TECHNOLOGY.**





bike racks

Purpose
bike parking

Placement
along bike routes, near major destinations/ active commercial areas, transit hubs

Minimum Requirements
- 7’ x 3’ typical for one bike
- space requirements vary based on bike rack design
- non-corrosive materials, see page 166

Considerations
Bike racks can be fun, designed by local artists. This will allow for local involvement in public art and contribute to an overall sense of **Place and Identity.**

Biking is a part of the shift toward a multi-modal city and providing ample, well-designed bicycle parking is part of that strategy. Bike racks provide **Healthy and Active Lifestyle** options for residents and visitors.

Notes:

1. **CORROSION AND SALT-RESISTANT.**
2. **BOLTED TO PAVEMENT FOR SECURITY.**

shading structures

Purpose
shading/shelter/integrate photo-voltaic panels and battery storage

Placement
areas of refuge and near transit nodes, areas lacking any natural shading, parks and other social destinations

Minimum Requirements
sustainable/resilient materials, see **page 170**
withstand wind loads defined by code

Considerations
Shading structures are architectural pieces that can also function as art while contributing to an overall sense of **Place and Identity.**

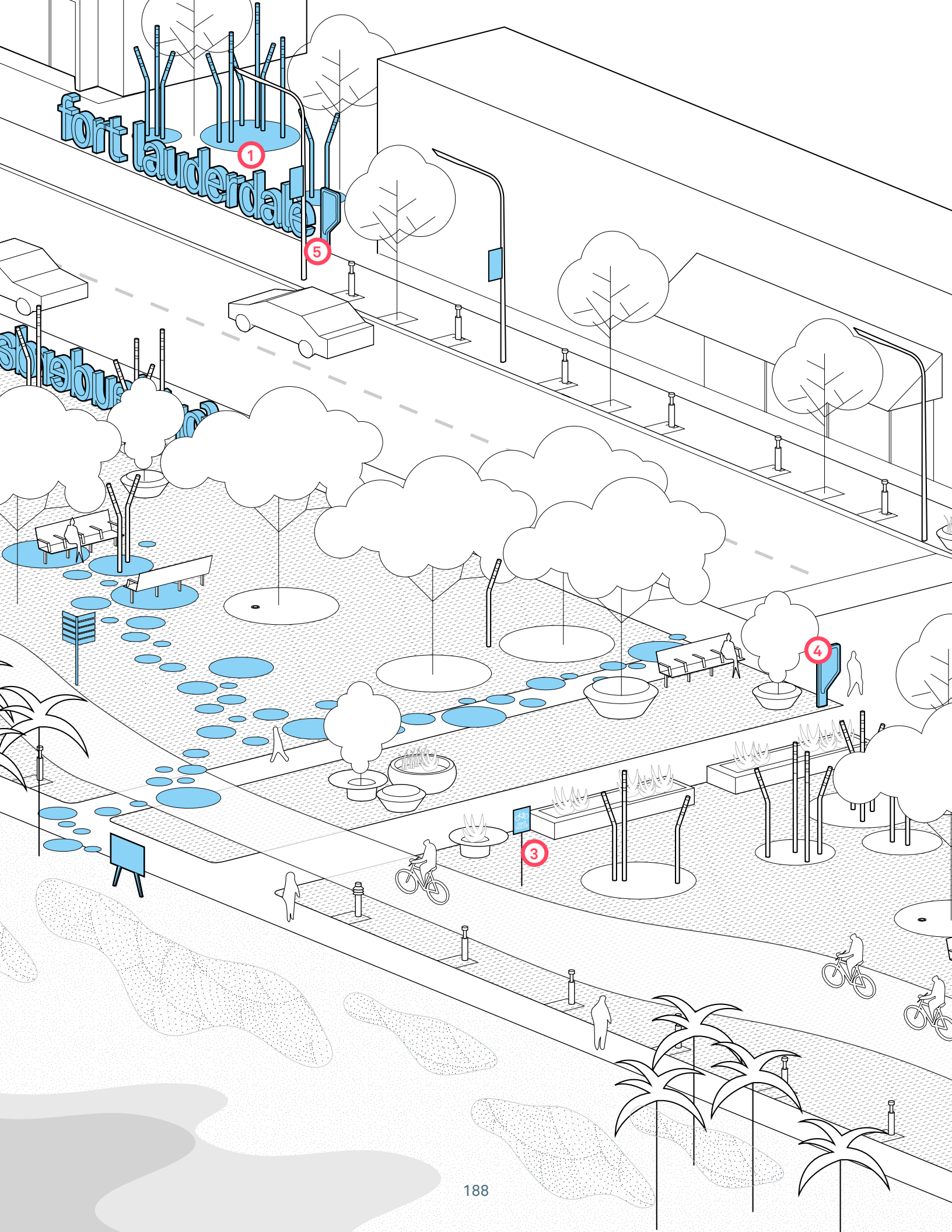
Architectural shading structures may be used in a **Focused Development**, where large volumes of people may congregate outside for an event.

Provide shade structures where trees with a large canopy and roots are not possible.

Notes:

1. **INTEGRATE SOLAR AND BATTERY STORAGE.**


BigBelly
SOLAR COMPACTOR
BigBelly
SOLAR COMPACTOR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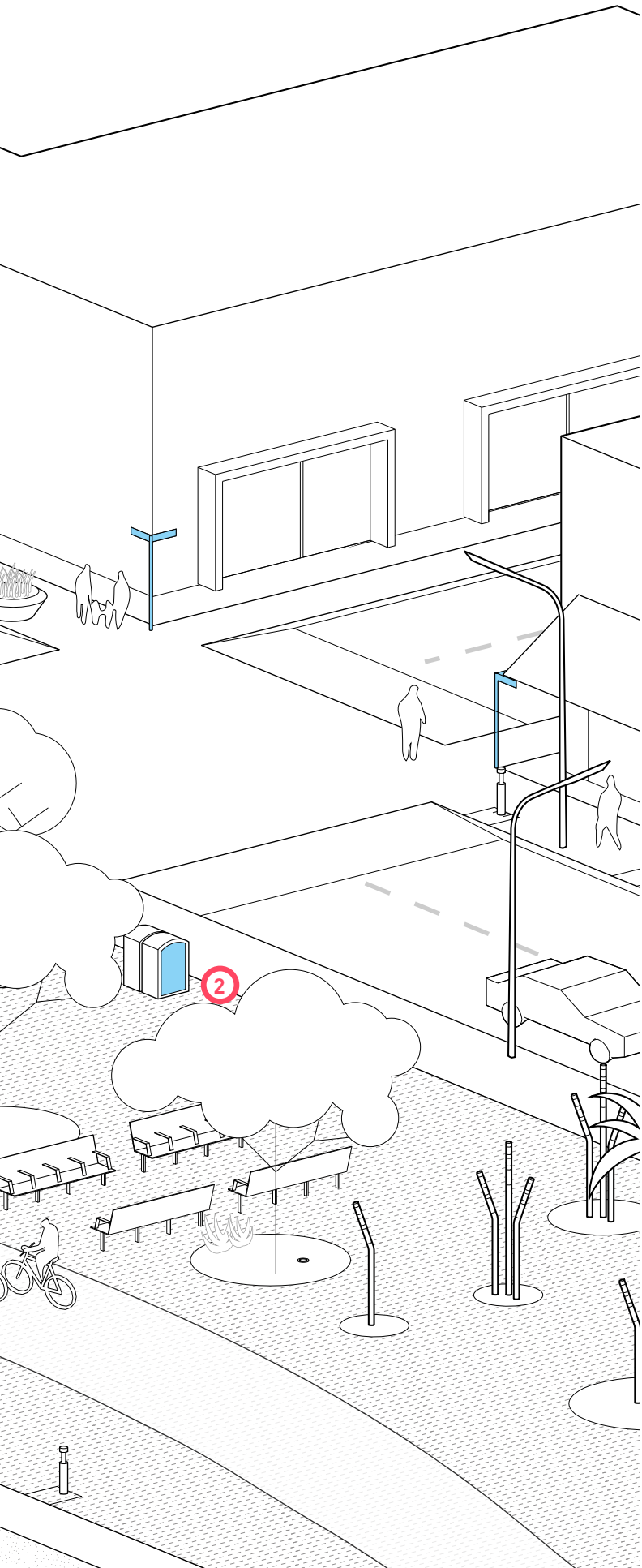


signage + wayfinding

While signage can provide straight-forward messages and maps in order to better navigate cities, other tools, such as region-specific benches or lighting, may be utilized to define a particular area through repetition. Wayfinding tools such as lighting, hardscapes, art and furniture may be used in creative ways to define an edge or a path, or at intersections and gateways. These tools ultimately create a better sense of place, helping residents and visitors alike to find their way.

1. In addition to highlighting a neighborhood or transition between areas, gateway signage can take form as public art or become a branding tool. Landscaping, lighting and other elements can be incorporated into gateway signage to create an experience as people enter.
2. When possible, signage should be integrated with existing poles or other furnishing elements along the travel path.
3. Coordination is required between departments and agencies to provide a less cluttered streetscape and to encourage clear and effective communication.
4. Signage and wayfinding should be strategically located while reducing the number of signs necessary and possible clutter from too many signage systems.
5. A consistent graphic design element should be maintained for an overall cohesive aesthetic for the city or distinct neighborhood character to enhance a sense of place.

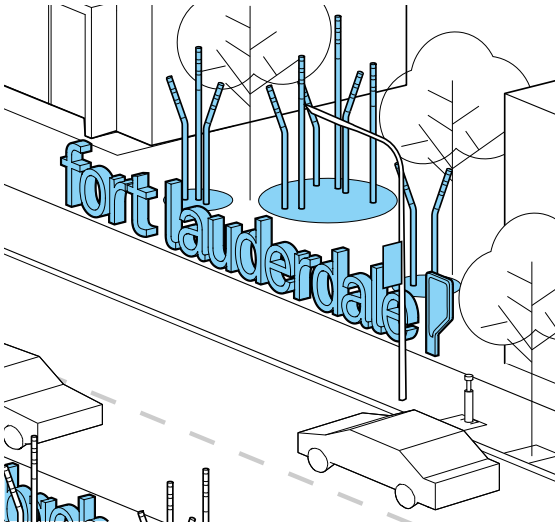
Signage and wayfinding provide information to pedestrians, cyclists and motorists to better navigate or understand a city. It can help to develop an identity for a neighborhood, mark a gateway, or provide contextual information. The placement of signage and wayfinding is as important as the information itself; improper or excessive placement of signage can reduce its effectiveness and clutter the public realm.

Signage plans and criteria should be developed for neighborhoods or specific districts, such as downtown, commercial, tourist-oriented locations, or around large institutions. Areas less traveled and suburbs may still include some informational signs or neighborhood specific signage.

Pedestrian-oriented signage provides for a user that can stop and absorb information, interact with, and obtain more information at a reduced visual scale. Since signage and wayfinding can be more interactive with pedestrians, they can be tactile or integrated into various surfaces such as sidewalks and objects situated along the sidewalk.

Bicycle-oriented signage
Similar to pedestrians, cyclists travel at speeds that can allow them to absorb more information at smaller scales. Wayfinding signage specific to cyclists should be visually distinguishable from vehicle-oriented roadway signage.

Vehicle-oriented signage
Motorists travel at higher speeds and require focus on the road, so signage should be larger in scale to be legible and easily understood. As the rate of speed increases, the scale of the text and signage should as well.



gateway

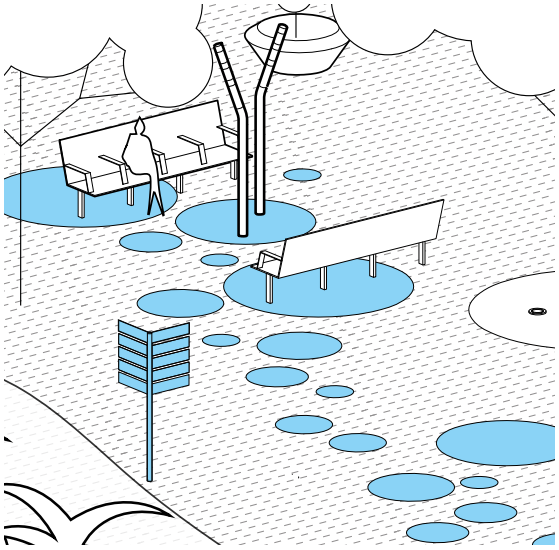
Gateway signage can be a stand alone sign or a broader landscape that incorporates signage, plants and artwork. Gateway signage marks the entrance to a specific neighborhood or district, acting as a transition from one area to the next.

Considerations
Gateway signage should be located at well-defined neighborhood or district entry points or at points of transition, or major entry points into the City.

To better define a gateway, signage should be placed at intersections within a curb extension whenever possible. Gateway signs may also be placed at mid-block curb extensions if appropriate.

These signs should be attractive and expressive of the neighborhoods character.

Smart signage can be incorporated within a gateway sign and inform visitors of events or hazardous conditions, such as flooding.



wayfinding

Wayfinding are elements, including signage, that help residents and visitors navigate a city. Wayfinding should be simple and cohesive and should feature place names and other information such as transit locations and bike routes.

Considerations

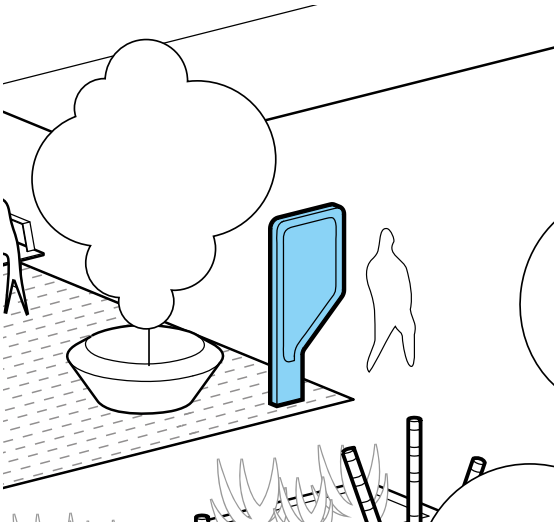
Wayfinding systems should reflect the character of the neighborhood or district to maintain an identity or sense of place.

A design template may be created to maintain a cohesive language across the city and can be used in neighborhoods that have not established wayfinding standards.

Signage should be located in the furnishing zone and close to intersections if possible to be consistent and intuitive.

Wayfinding signage should be provided and appropriately scaled for pedestrians, cyclists and motorists.

Lighting may be required for wayfinding signage in areas that are active at night.



informational

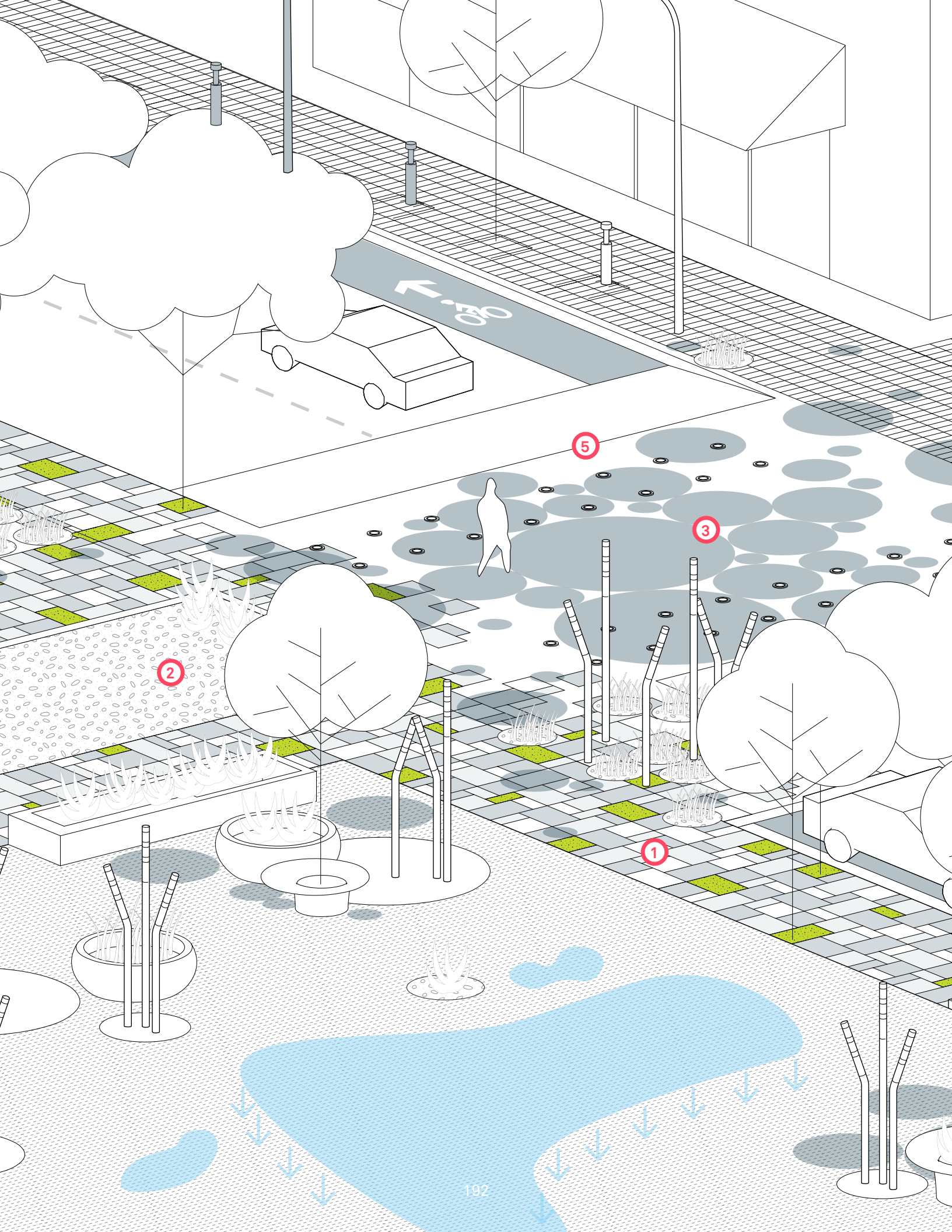
Informational signs can provide historical information or information about a natural preserve or park. They can also be dedicated to historical figures or donors who have helped shape Fort Lauderdale into the city it is today.

Considerations

The signage should reflect the character of the neighborhood or district to maintain an identity or sense of place.

Informational signs should be included in a signage design package.

Informational signs may be coordinated with or implemented into wayfinding signage wherever appropriate.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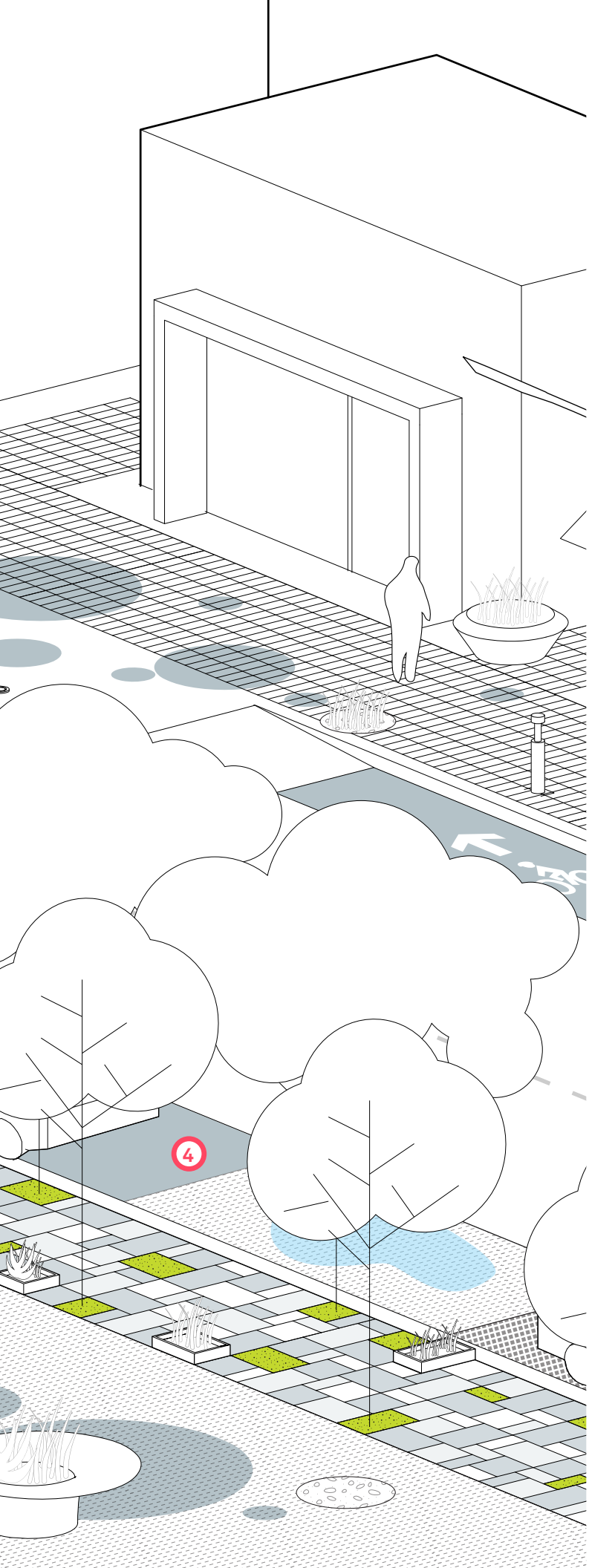
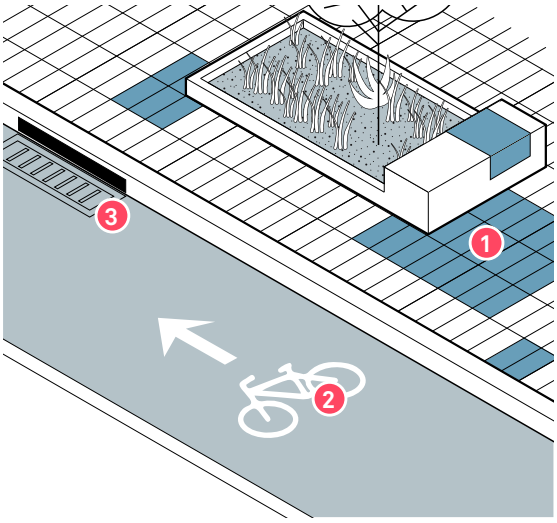
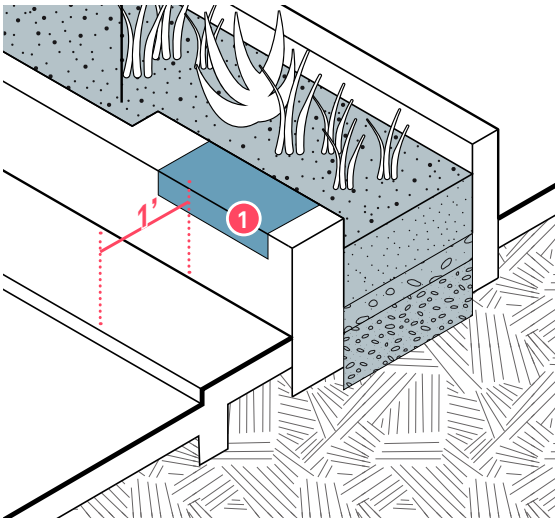


hardscapes

Hardscapes can create a resilient and sustainable environment through low-impact development technologies and use of recycled materials. Hardscape selection needs to be accessible, sustainable, resilient, durable, permeable, and context appropriate; context appropriateness includes aesthetics and considerations for maintenance (e.g., street cleaners). Hardscapes can consist of traditional paving materials such as concrete or brick pavers, or non-traditional materials, such as recycled plastics, used as accents or for resilience in key locations. Some hardscape materials are composed of natural materials derived from quarrying and processing methods that are damaging to the natural environment. However, recycled or reclaimed materials are available and encouraged.

1. Modulated systems allow water to permeate walking surfaces, and can be ideal where underground utilities need maintenance.
2. Aggregates make a suitable hardscape for locating plants, while allowing water to permeate the surface. Consider accessibility and maintenance when using aggregates.
3. Certain types of paint may be applied to modulated or poured-in-place systems.
4. Varied parking surfaces can define parking spaces, as opposed to using painted lines. Use modulated or permeable pavers episodically for parking spaces when implementing pavers throughout an entire street is not within budget.
5. Poured-in-place hardscapes are ideal in areas that require permanence, but not in places where flooding is an issue.
6. Reflective materials or surface treatments can help reduce the urban heat island effect.





surface treatment

Purpose
art/visual buffer/wayfinding/heat-island reduction

Placement
between vehicular lanes and bike lanes or pedestrian paths; pedestrian paths for wayfinding; intersections for gateway marking

Minimum Requirements
- low VOCs
- PAH-free
- solar energy reflective

Considerations
Ensure slip-resistant surface treatments are used in pedestrian areas.

Use high albedo, lightly colored systems or “reflective/cool pavement” to reduce the heat island effect. Asphalt concrete pavement in South Florida, due to the light coloring of the Oolite Limestone used for aggregate, has a solar reflectivity surface similar to concrete surface after 6 months to a year of wear.

Notes:

1. **MODULAR HARDSCAPES MAY BE PAINTED OR SEALED.**
2. **THERMOPLASTIC PAINT PAVEMENT MARKINGS.**
3. **BIKE-SAFE DRAIN COVERS.**

poured-in-place

Purpose
retention/rigid surface

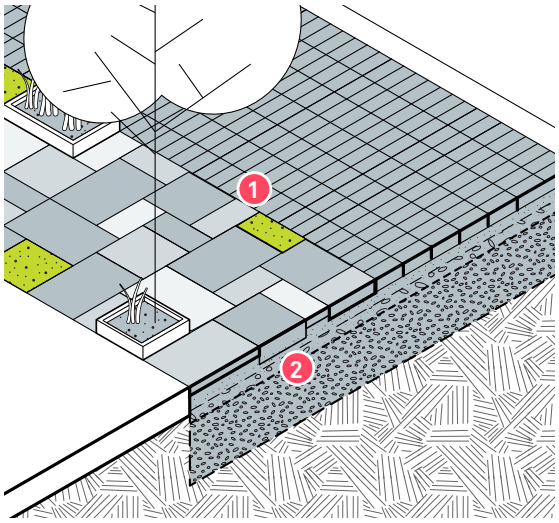
Placement
should be used in areas with high pedestrian traffic volume, areas that do not experience frequent flooding,

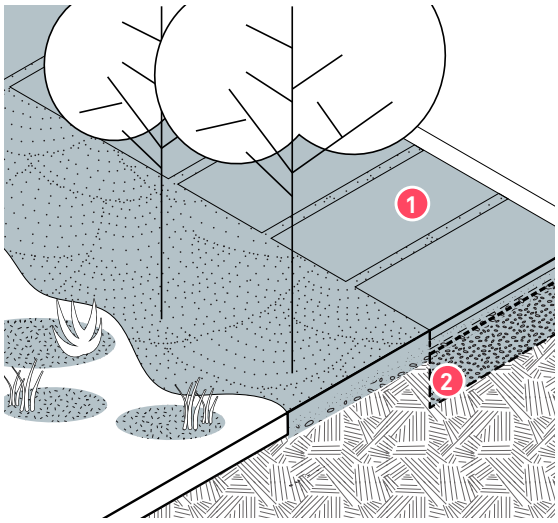
Minimum Requirements
- seal with water-based coating to lower surface temperatures

Considerations
Poured-in-place surfaces may also demarcate districts within a city or better enhance a sense of **Place and Identity.**

Notes:

1. **INTEGRATE FURNITURE INTO POURED-IN-PLACE HARDSCAPES.**





modulated

Purpose
drainage/rigid surface

Placement
flood prone areas, sidewalks

Considerations
Modulated systems are fabricated off site and assembled on site for ease of installation.

This type of hardscape allows for runoff to permeate through the surface in areas where there is a goal for **Flood Protection**, and provides ease of access for utility maintenance.

Modulated systems can be used in places with a high water table to release hydrostatic pressure, or areas with frequent stormwater or saltwater flooding.

Pavers removed during maintenance or repairs should be reused either on-site or on other streetscape projects.

Notes:

1. **REMOVE MODULES TO ALLOW LANDSCAPE TO GROW THROUGH.**
2. **PROVIDE PROPER SUBSTRATE TO PREVENT DIFFERENTIAL SETTLEMENT.**

aggregates

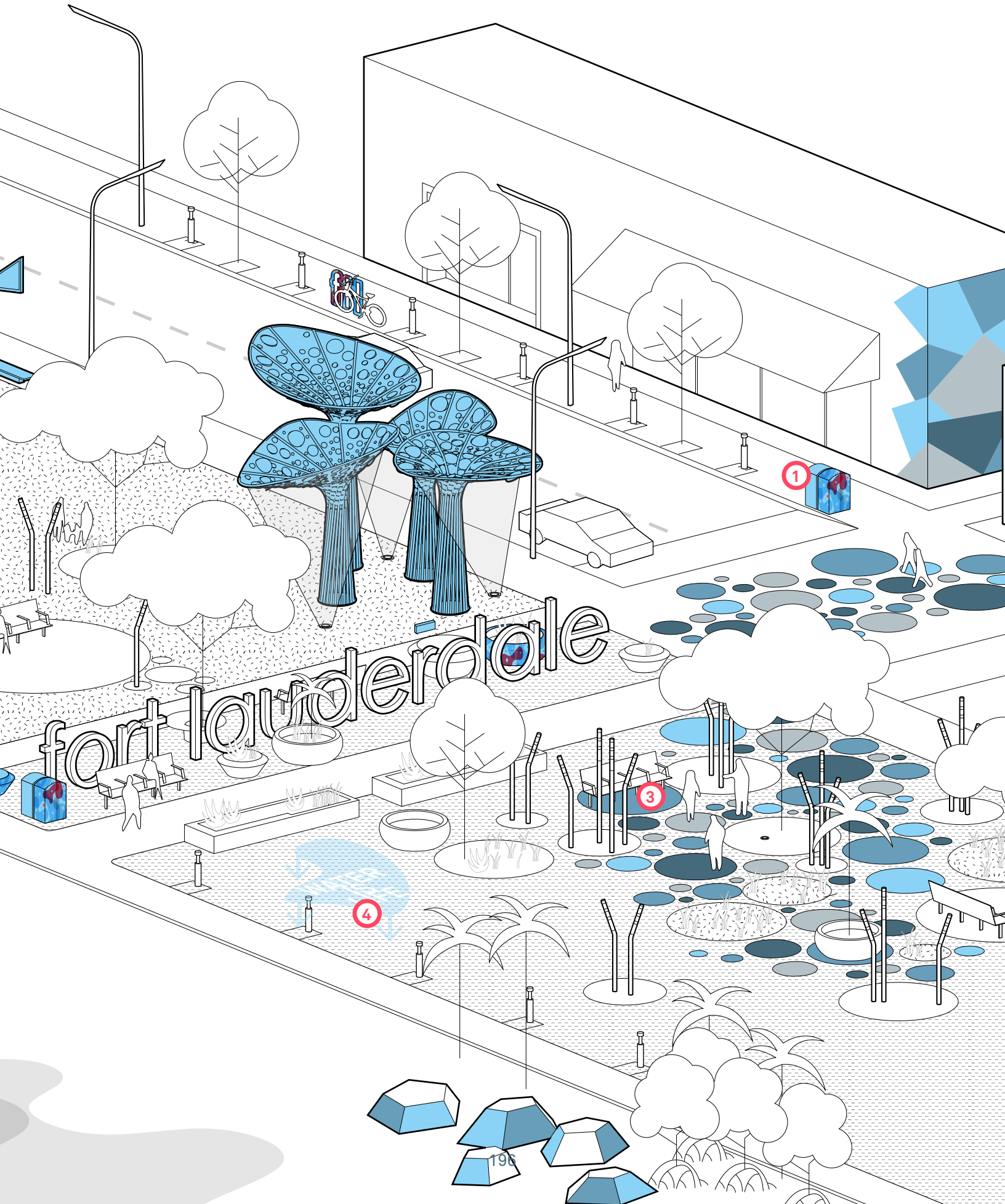
Purpose
drainage/landscaping

Placement
low traffic conditions, flood prone areas, accent and landscape areas

Considerations
Aggregates are the least permanent solution to hardscaping an area. When loosely filled, aggregates allow water to permeate to the soil beneath quickest. Aggregate may also be installed with a binding agent, acting similarly to poured-in-place hardscape systems.

Notes:

1. **RECYCLED SLABS CUT FROM CONCRETE SURFACES CAN BE PLACED WITHIN AGGREGATES TO CREATE WALKABLE SURFACES.**
2. **PROVIDE PROPER SUBSTRATE TO PREVENT GROWTH OF WEEDS.**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public art

Public art is an important aspect of the public realm. On a large scale, public art has the ability to unify a district with a theme or identify a neighborhood with a gateway. At a pedestrian scale, it can provide visual interest for passersby. Public art is not the only element required to create a good urban space, but it can be a supplement to one by adding interest and delight to a peoples' experiences. Public art should not negate from the fact that all streetscape elements should be beautiful and designed to promote pedestrian activity and the use of public space.

Public art may be placed on public lands. Art may be integral to or attached to a public building or structure, detached within or outside a public building or structure, part of a portable exhibition or collection, or loaned or exhibited in other public facilities.

1. Public art can be found in the form of bicycle racks, art wraps or seating. These opportunities can contribute to place and identity by using cohesive artwork throughout an area
2. Public art can be used for wayfinding or creating gateways. When murals are applied to multiple buildings in an area, the overall building scale is broken down and the buildings become the gateway or wayfinding mechanism.
3. Various public art elements can be integrated to allow for a composition while also designating spaces.
4. Use stormwater-activated art on poured-in-place hardscapes to celebrate rainy days and high tides.

Public art can take many forms and occur as a temporary installation or become a permanent marker of the city. Beyond the art itself there are several issues that may need to be considered before implementing an art project. Placement and composition of public art is unique and is to be evaluated on a case-by-case basis and should address the following criteria.

Temporary public art refers to works of art intended as temporary, which may include having an intended lifespan of anything from less than one day to less than several years.

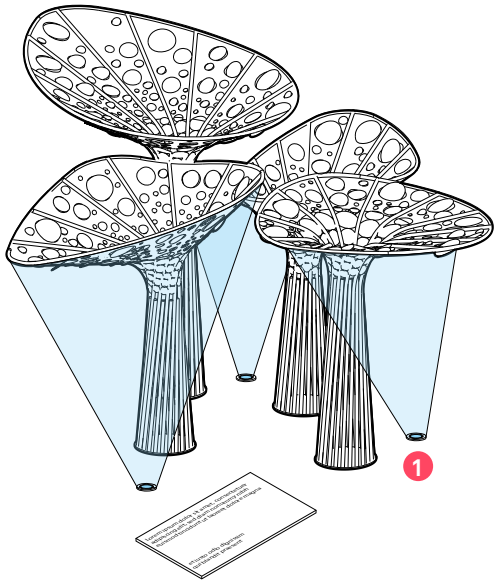
Permanent public art refers to intended interventions as a permanent feature of a place making project in the public realm, an existing public site, or accessible or visible to the public. Permanent art should be constructed with durable materials (sustainable + resilient) and robust fabrication methods for longevity, while requiring little care and maintenance.

Signage is important for identifying the work and recognition of selected artists or donors.

Paintings or murals should be well-lit, and take into consideration the color temperature and the effect that light exposure has on particular types of paint. Utilize the **lighting** section *(p176)* to understand lighting types.

Resilience can be integrated into artwork through materials, qualities, experiences, or integrating technologies such as photovoltaics to achieve self-reliance when lighting the artwork at night.

Maintenance agreement of public art where appropriate should be incorporated into selection/ commission process. Maintenance should be possible in a safe manner without affecting artwork.



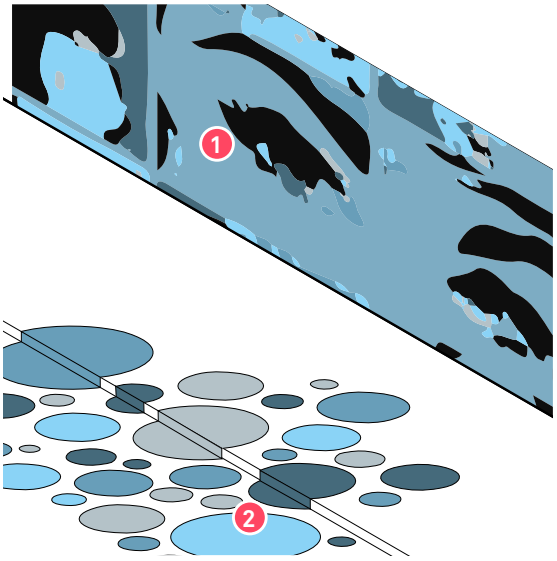
sculptures

Sculptures can have a meaningful and impactful way of communicating an idea to the public. Sculptures can be abstract, created by a local artist and/or historical, telling a story about the City.

Routine maintenance should be taken into consideration when implementing sculptural pieces and includes, but is not limited to: trash and graffiti removal, cleaning, waxing, landscaping, replacing light bulbs, and possible minor mechanical maintenance. Frequency of maintenance will vary by type of artwork, but bi-weekly or monthly checks by staff during the normal course of their rounds is typical.

Notes:

1 **FOR APPROPRIATE LIGHTING SEE LIGHTING TOOLS P176.**



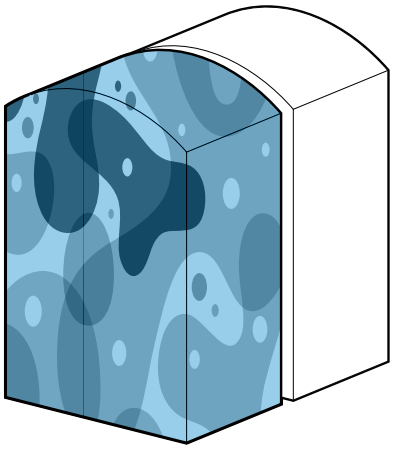
painted surfaces

Paint can turn a blank wall into a wall that is informational or artistic.

Maintenance should be taken into consideration when using paint in the public realm; applying a protective coating will ensure the longevity of a painted surface; touch-ups may still be required if a painted surface is to be permanent.

Notes:

1. **RECOMMEND USING LOW VOC PAINT.**
2. **PAINT ON WALKING SURFACES SHOULD BE SLIP RESISTANT.**



wraps

Wraps are often applied to utility boxes, receptacles, or other public realm objects. The wraps are applied to the metal surfaces of the boxes and can showcase the unique character of the city or neighborhood. They can serve as wayfinding, informational, storytelling, or art pieces to create a visual pedestrian experience. Additionally, the wraps help reduce blight and discourage graffiti, posters, stickers and vandalism.

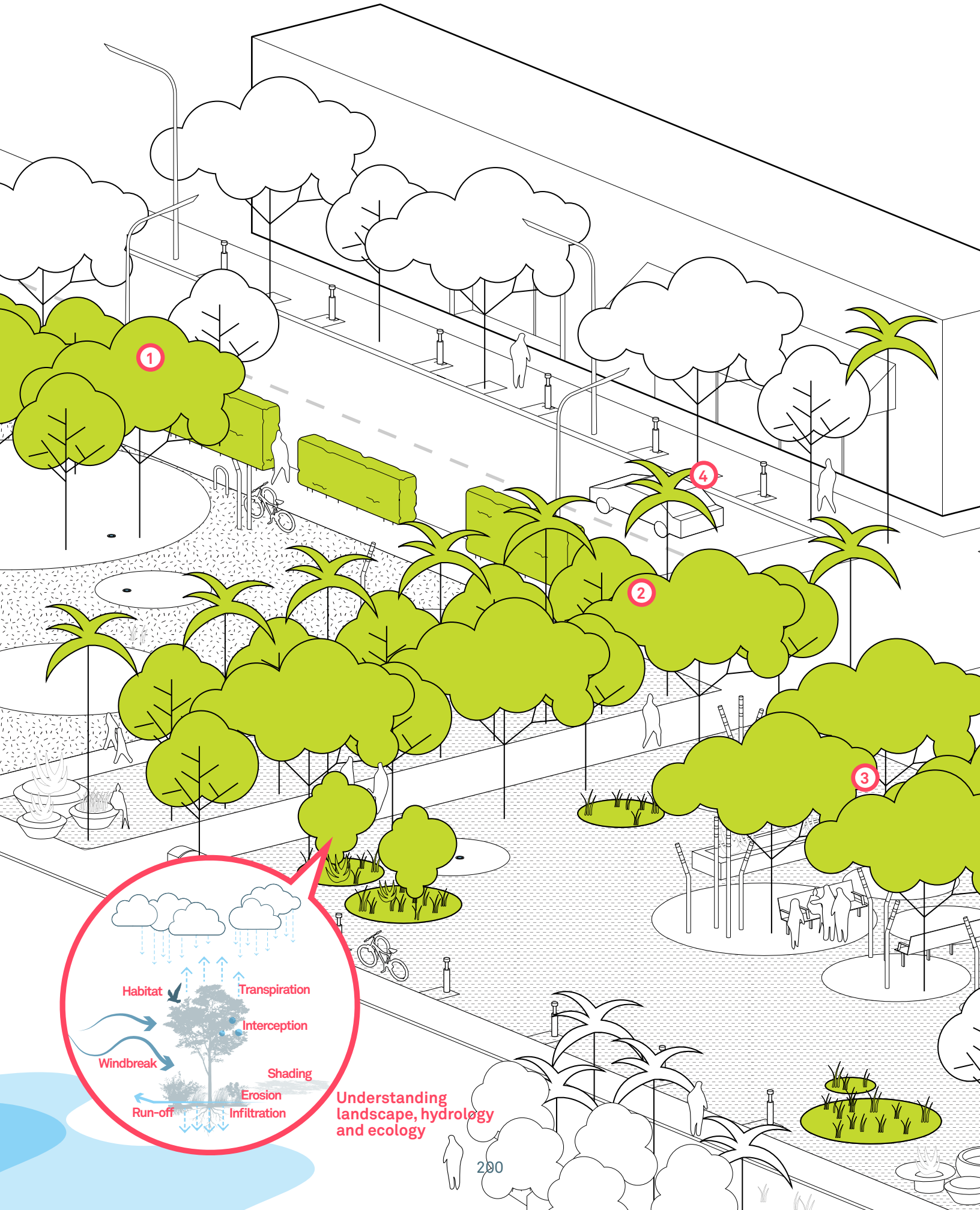
These wraps can be updated periodically or as often as needed. The process of applying and removing is easy and requires little labor.

CONSIDERATIONS

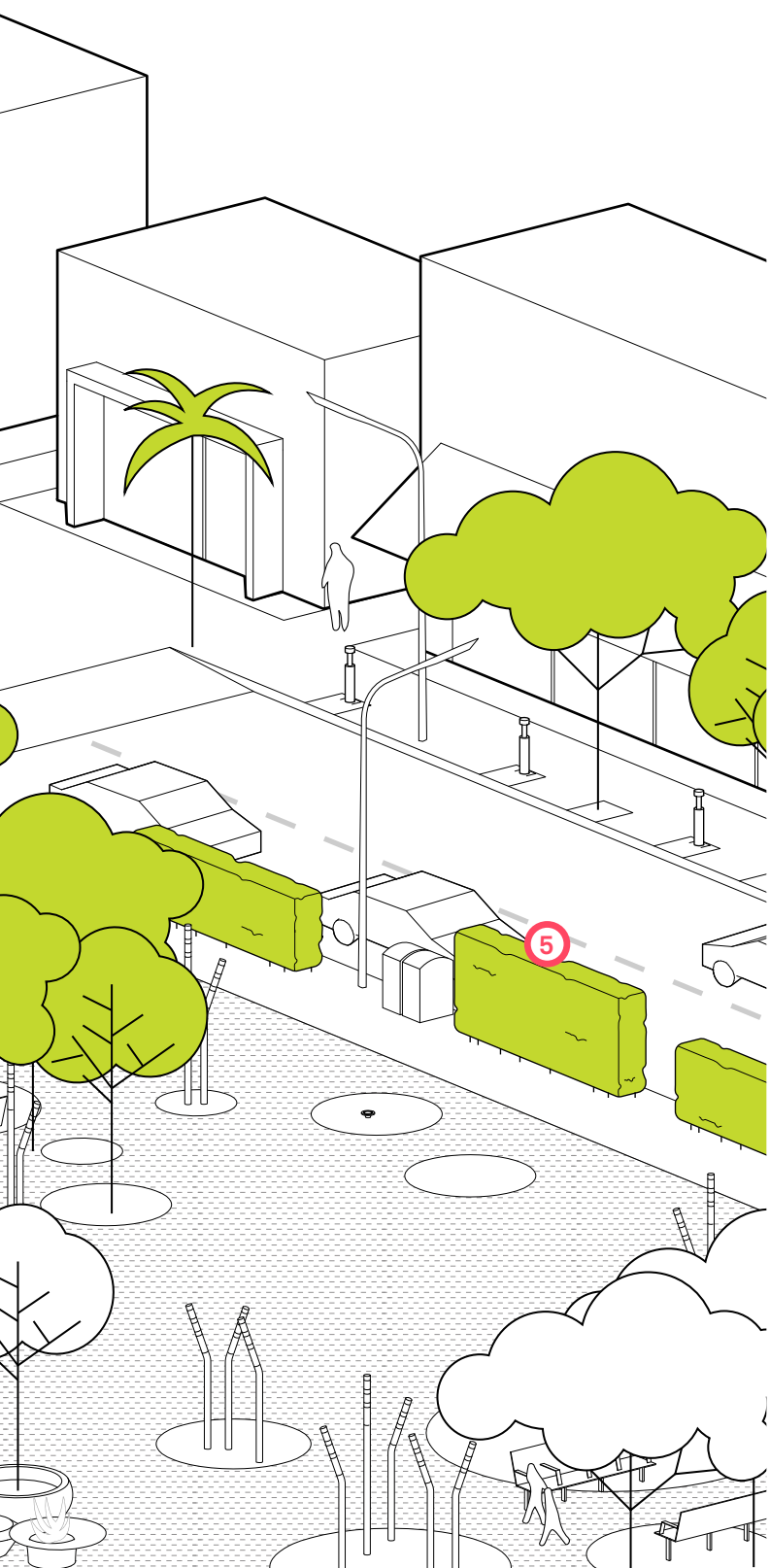
Coordinate wraps to have a consistent/cohesive design across an area or neighborhood to support a placemaking strategy.

The wrap design can also be an extension or support for an existing character or design of an area or neighborhood.

Wayfinding such as maps, or other informational content should be legible for the appropriate viewer. (See wayfinding p188)



Understanding landscape, hydrology and ecology



landscape

Landscape consists of trees, shrubs, grasses, sedges, and ground covers. Landscaping is understood as a type of living infrastructure and contributes to the urban environment through ecosystem services that can result in reducing air pollution and urban heat island effects, improving hydrological conditions, sequestering carbon, contributing to wildlife habitat, and mitigating flooding. Visual characteristics of landscaping (form, color, texture) add greatly to the aesthetics of streets and neighborhoods while enhancing qualities of the public environment. The following section provides general principles that guide how to implement landscape.

1. Planting trees in drifts increases their ability to withstand strong winds. In contrast, planting trees in rows or as single elements will most likely result in tree loss during strong wind events. Preference should be given to bio-diversity in tree species during selection and placement rather than monocultures. Bio-diversity allows for continuation when certain species may be devastated by disease or pests.

2. Trees can be used to create alleys along pedestrian routes. Consideration should include canopy, aesthetics of flowers and foliage during seasons.

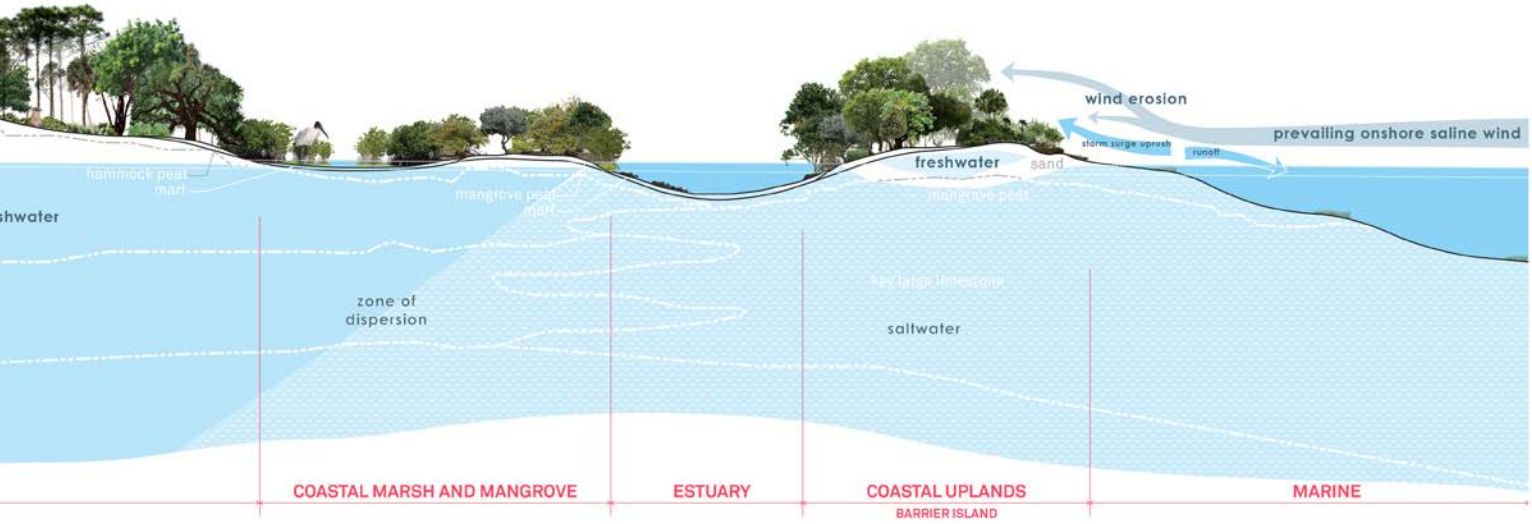
3. Trees can create rooms or spaces that may be spots for gathering or creating buffers.

4. Trees contribute to a sense of place. Masterplans of the City specify trees for various streets or street aspects such as pedestrian crossings.

5. Shrubs can be used to buffer vehicular traffic from pedestrian zones.

forensic ecology

Understanding the ecological transition within the ***historic*** *ecosystem can influence how landscaping can be incorporated in the public realm or how it may need to adapt for future conditions.*


wind erosion
prevailing onshore saline wind
storm surge uprush
runoff
freshwater
sand
hammock peat
marl
mangrove peat
marl
mangrove peat
shwater
zone of
dispersion
key largo limestone
saltwater
COASTAL MARSH AND MANGROVE
ESTUARY
COASTAL UPLANDS
BARRIER ISLAND
MARINE

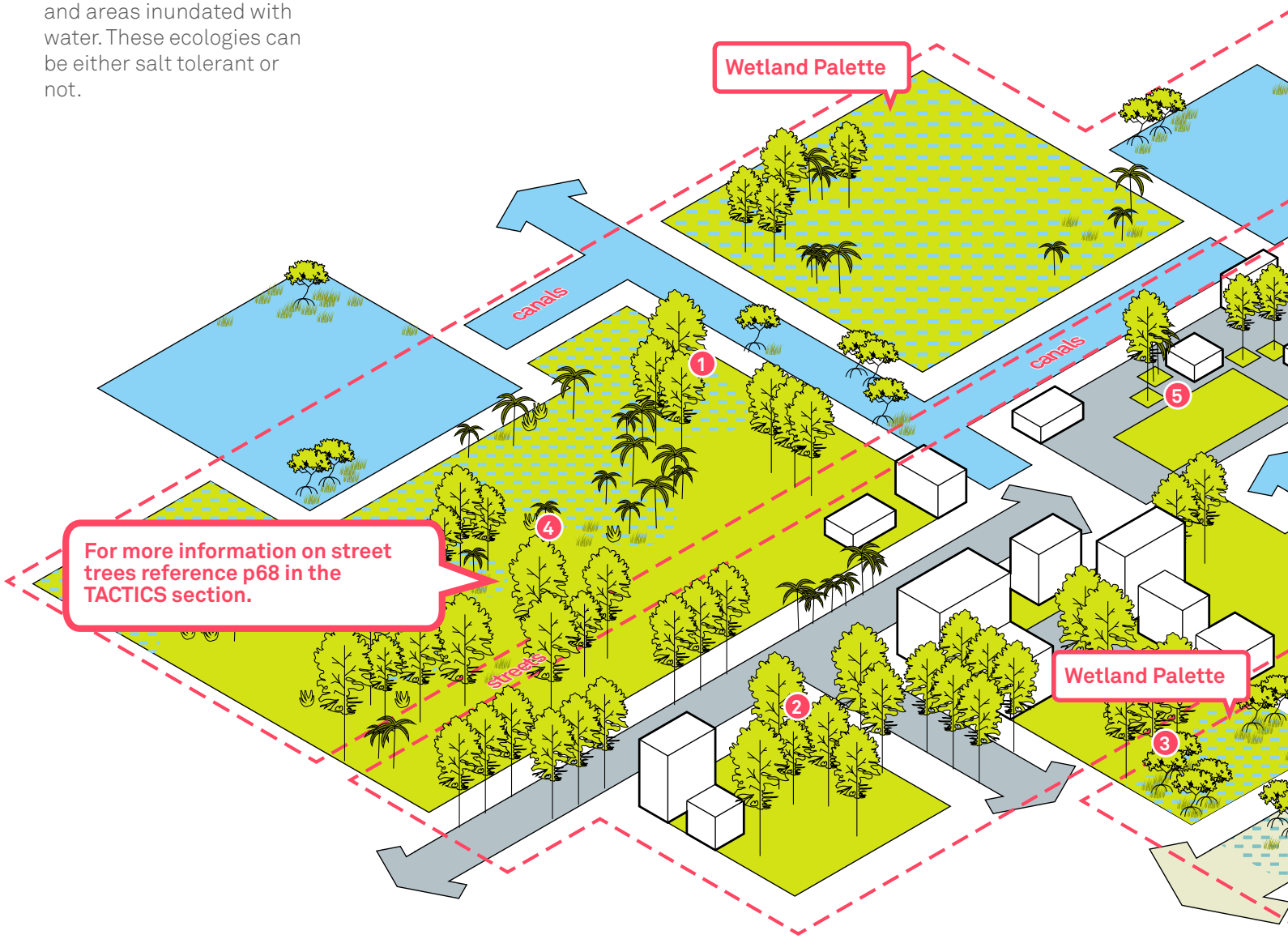
ecology

1 Select the appropriate palette based on either a dune, urban or wetland ecology. The dune ecology primarily runs along the coastline and incorporates vegetation that is salt tolerant and native. The urban ecology can be found throughout the City of Fort Lauderdale and incorporates vegetation that is aesthetic and versed in growing in a urban environment. The wetland ecology can be found along water ways and areas inundated with water. These ecologies can be either salt tolerant or not.

2 Selecting between tree types, shrubs, grasses or ground cover will depend on the environmental conditions and the objective. Trees with large canopies are a first choice when selecting tree types but may have to be substituted if space or other parameters don't permit.

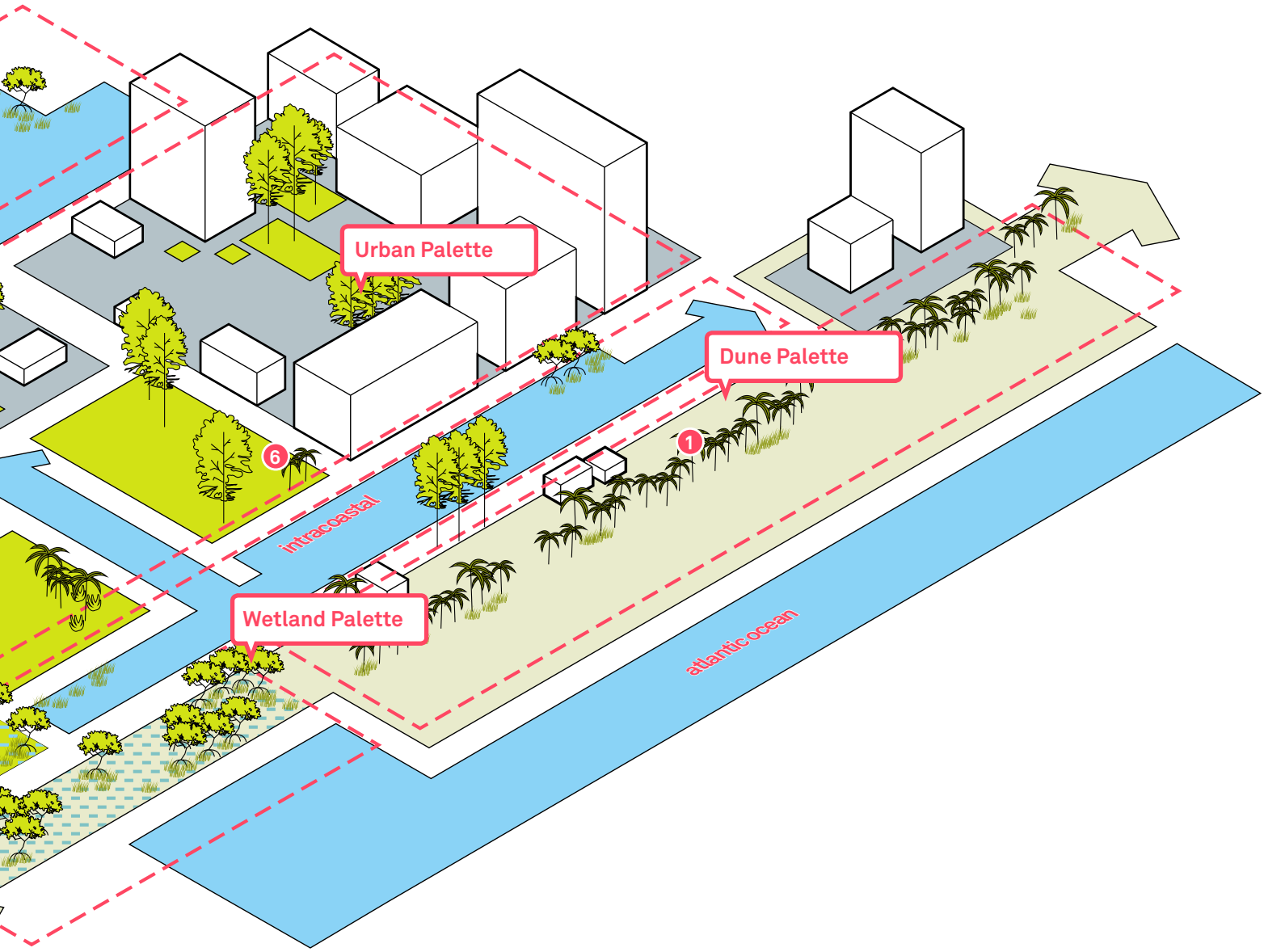
3 In addition to location and space, soil quality and underground water should also be considered when selecting from the palette. Some vegetation can thrive in wet soil condition while others may not. The same can be said for salt content in underground water and should be thought of especially as saltwater intrusion pushes more inland.

4 Diversifying the vegetation when adding landscape can be beneficial. Biodiversity can help maintain an ecology when one type of plant or tree becomes diseased and dies.

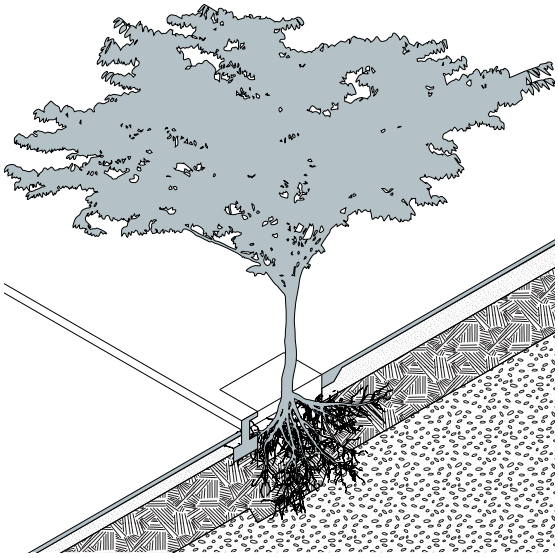


5 In addition to aesthetics landscaping can also be chosen to accomplish certain ecological services such as infiltration, evaporation and cooling effects.

6 When selecting from the palette, it is also important to be aware of any maintenance that may be required. Xeriscape landscaping may require less maintenance and water if properly selected and installed.



Appropriate tree selection, location and design of the planting site will ensure the healthy growth and longevity of trees similar to other infrastructure while enhancing streetscape character and dealing with environmental conditions. Before choosing the right tree, we have to understand the characteristics of the tree, its function or benefits, and the requirements for both the site and tree. The City preference is for canopy trees due to local shade and urban heat island. Palm trees should be chosen due to space constraints or specific aesthetic concerns.



canopy trees

Purpose

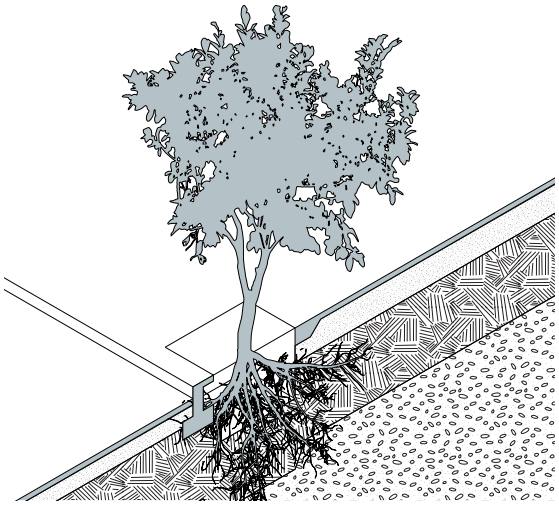
capable of mitigating certain flood conditions/ reducing heat island effects and creating comfortable outdoor conditions/creating streetscape, spacial quality, and defining place or identity/framing or hiding views/ softening urban environment through texture, color, and human scale/identifying pedestrian realm/aiding in traffic calming.

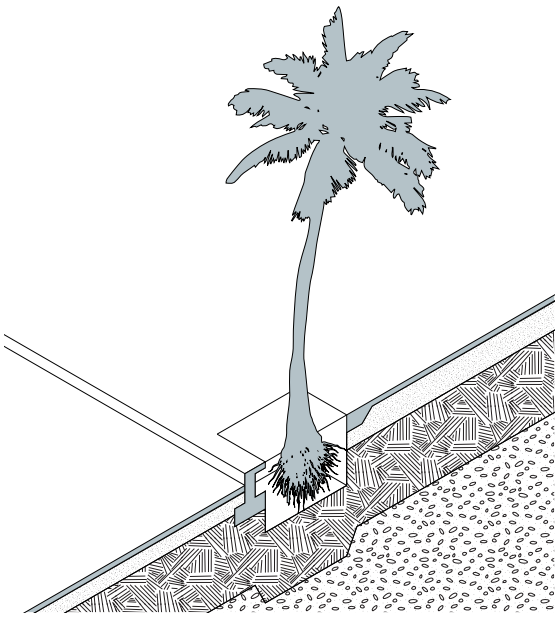
Placement

Canopy trees should be used in compositions that respect the overall street context, local environment, and adjacent land uses. Placement of trees and landscaping should reflect an understanding of local soil and climate conditions. Placement should be able to afford tree basin and canopy.

Minimum Requirements

- based on scale of species
- 4' setback from curb (varies)
- 15' minimum distance from streetlights + utilities
- tree spacing determined by the expected mature size of the tree





understory trees

Purpose

capable of mitigating certain flood conditions/ reducing heat island effects and creating comfortable outdoor conditions/creating streetscape, spacial quality, and defining place or identity/framing or hiding views/ softening urban environment through texture, color, and human scale/identifying pedestrian realm/aiding in traffic calming.

Placement

understory trees are typically placed under tall, mature canopy trees or in areas with low overhead clearance.

Minimum Requirements

- based on scale of species
- 2' setback from curb (varies)
- 15' minimum distance from streetlights + utilities (varies)

*may not apply to all understory trees

palm trees

Purpose

vertical landscape that adds volume and perspective; used to define an edge or a boundary; creates a sense of place when used repetitively in an area; tall palms relate to height of building.

Placement

Palm trees should be used in compositions that respect the overall street context, local environment, and adjacent land uses. Palm trees may be planted next to shorter, understory trees to provide an adequate canopy for shade. Do not plant too close to street lights or pole-mounted utilities.

Minimum Requirements

- based on scale of species
- 2' setback from curb (varies)
- 2' away from any structure
- 15' minimum distance from streetlights + utilities (varies)

tree list

PAGE#	COMMON NAME	BOTANICAL NAME	CONTEXT	HEIGHT	SPREAD
214, 220	**Bald Cypress**	*Taxodium distichum*		60-80ft	25-35ft
211, 219	**Cabbage Palmetto**	*Sabal palmetto*		25-60ft	10-15ft
219	**Christmas Palm**	*Veitchia merrillii*		20-30ft	10-15ft
210, 218	**Coconut Palm**	*Cocos nucifera*		50-100ft	15-36ft
217	**Crape Myrtle**	*Lagerstroemia indica*		10-30ft	15-25ft
218, 221	**Everglades Palm**	*Acoelorrhaphe wrightii*		15-30ft	10-15ft
216	**Golden Trumpet Tree**	*Tabebuia chrysotricha*		25-35ft	25-35ft
214	**Gumbo Limbo**	*Bursera simaruba*		20-50ft	20-40ft
212	**Jacaranda**	*Jacaranda mimosifolia*		25-40ft	45-60ft
215	**Jamaican Dogwood**	*Pisidia piscipula*		30-50ft	30-50ft
214	**Live Oak**	*Quercus virginiana*		60-80ft	60-120ft
214	**Mahogany**	*Swietenia mahagoni*		40-50ft	40-60ft
217	**Paradise Tree**	*Simarouba glauca*		40-50ft	20-30ft
215	**Pigeon Plum**	*Coccoloba diversifolia*		15-25ft	20-30ft
216	**Pink Trumpet Tree**	*Tabebuia heterophylla*		20-30ft	15-25ft
213	**Pitch-apple**	*Clusia rosea*		25-30ft	15-25ft
221	**Pond-apple**	*Annona glabra*		20-40ft	15-20ft
220	**Pond Cypress**	*Taxodium ascendens*		50-60ft	10-15ft
213, 221	**Red Maple**	*Acer rubrum*		35-80ft	25-35ft
212	**Red Mulberry**	*Morus rubra*		30-70ft	10-15ft
218, 221	**Royal Palm**	*Roystonea regia*		50-80ft	15-25ft
213	**Royal Poinciana**	*Delonix regia*		35-40ft	40-60ft
210, 218	**Saw Palmetto**	*Serenoa repens*		3-10ft	4-10ft
215	**Seagrape**	*Coccoloba uvifera*		3-35ft	10-50ft
211	**Seashore Palm**	*Allagoptera arenaria*		4-6ft	6-9ft
213	**Shortleaf Fig**	*Ficus citrifolia*		25-50ft	30-40ft
215	**Silver Buttonwood**	*Conocarpus erectus 'Sericeus'*		5-50ft	15-20ft
219	**Silver Palm**	*Coccothrinax argentata*		3-15ft	6-7ft
216	**Simpson Stopper**	*Myrcianthes fragrans*		20-30ft	15-20ft
217	**Solitaire Palm**	*Ptychosperma elegans*		10-20ft	6-10ft
216	**Spanish Stopper**	*Eugenia foetida*		10-30ft	5-20ft
211	**Thatch Palm**	*Thrinax morrisii*		15-20ft	6-10ft
217	**Wild Tamarind**	*Lysiloma latisiliquum*		15-20ft	6-10ft

REQUIRED LIGHT	SOIL MOISTURE	SALT TOLERANCE	SOIL TYPE	HABITAT
		medium	any	urban/wetland
		high	any	dune/urban
		high	any	urban
		high	any	dune/urban
		low to none	any	urban
		medium	any	urban/wetland
		medium	any	urban
		medium	any	urban
		low to none	any	urban
		high	any	urban
		high	any	urban
		high	any	urban
		high	any	urban
		high	sandy	urban
		medium to high	any	urban
		high	any	urban
		high	any	urban
		medium	any	wetland
		low to none	any	urban/wetland
		high	any	urban
		medium	any	urban
		medium	any	urban/wetland
		high	any	dune/urban
		high	sandy	urban
		high	any	urban
		medium	any	urban
		high	any	urban
		high	any	urban
		high	any	urban
		high	sand/loam	urban
		high	any	urban
		high	any	dune/urban
		high	any	urban

dune
TREES

saw palmetto
Serenoa repens

high any h

3 to 10 feet
4 to 10 feet
slow

routinely grown with, or trainable to be grown with, multiple trunks;

Pruning requirement: needs little pruning to develop strong structure; remove brown or yellow fronds

coconut palm
Cocos nucifera

high any h

50 to 100 feet
15 to 36 feet
moderate

Pruning requirement: remove brown or yellow fronds

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

seashore palm

Allagoptera arenaria

medium any h

Pruning requirement: remove brown or yellow fronds

4 to 6 feet
6 to 9 feet
slow

cabbage palmetto

Sabal palmetto

high any h

Pruning requirement: remove brown or yellow fronds

25 to 60 feet
10 to 15 feet
slow

thatch palm

Thrinax morrisii

high any h

Pruning requirement: remove brown or yellow fronds

15 to 20 feet
6 to 10 feet
slow

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

urban
TREES

jacaranda
Jacaranda mimosifolia

high any l/n

25 to 40 feet
45 to 60 feet
fast

bark is easily damaged; droop as the tree grows, and showy trunk; should be grown with a single leader; no thorns

Pruning requirement: requires pruning to develop strong structure; will require pruning for vehicular or pedestrian clearance

red mulberry
Morus rubra

low any h

30 to 70 feet
10 to 15 feet
fast

Pruning requirement: remove any diseased, broken or dead branches

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

red maple

Acer rubrum

medium any l/n

35 to 80 feet
25 to 35 feet
fast

bark is easily damaged; droop as the tree grows, and showy trunk; should be grown with a single leader; no thorns

Pruning requirement: requires pruning to develop strong structure; will require pruning for vehicular or pedestrian clearance

shortleaf fig

Ficus citrifolia

high any m

25 to 50 feet
30 to 40 feet
fast

bark is easily damaged; droop as the tree grows, and showy trunk; should be grown with a single leader; no thorns

Pruning requirement: requires pruning to develop strong structure; will require pruning for vehicular or pedestrian clearance

royal poinciana

Delonix regia

high any m

35 to 40 feet
40 to 60 feet
fast

branches droop as the tree grows; trainable to be grown with, multiple trunks; not showy; no thorns

Pruning requirement: requires pruning to develop strong structure; requires pruning for vehicular or pedestrian clearance beneath the canopy;

pitch-apple

Clusia rosea

high any h

25 to 30 feet
15 to 25 feet
moderate

branches droop as the tree grows;

Pruning requirement: requires pruning to develop strong structure; required for vehicular or pedestrian clearance below canopy

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

mahogany

Swietenia mahagoni

high any h

40 to 50 feet
40 to 60 feet
fast

droop as the tree grows, and will require pruning for vehicular or pedestrian clearance beneath the canopy; not particularly showy; should be grown with a single leader; no thorns

Pruning requirement: requires pruning to develop strong structure

live oak

Quercus virginiana

high any h

60 to 80 feet
60 to 120 feet
moderate

branches droop; showy; typically one trunk; thorns

Pruning requirement: needed for strong structure

gumbo limbo

Bursera simaruba

high any m

20 to 50 feet
20 to 40 feet

bark is thin and easily damaged from mechanical impact

Pruning requirement: minimal pruning; remove branches that cross or rub against one another to prevent damage to the branch

bald cypress

Taxodium distichum

high any m

60 to 80 feet
25 to 35 feet
fast

branches droop; showy; typically one trunk; thorns

Pruning requirement: little required

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

pigeon plum

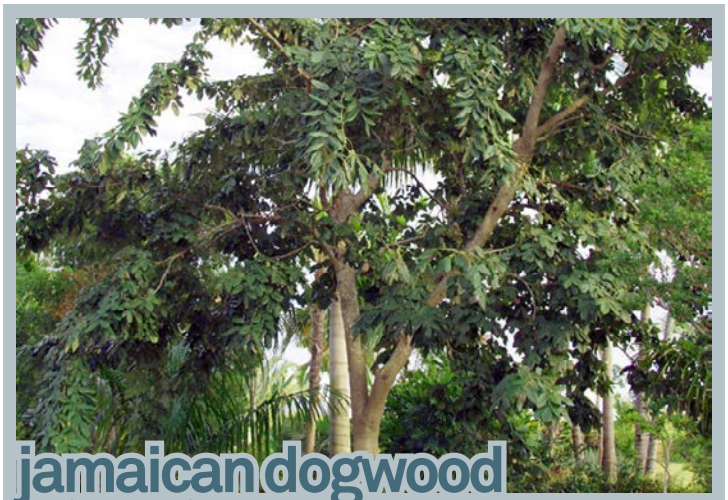
Coccoloba diversifolia

high s h

15 to 25 feet
20 to 30 feet
moderate

branches don't droop; very showy; typically multi-trunked; thorns

Pruning requirement:
needed for strong structure



jamaican dogwood

Pisidia piscipula

high any h

30 to 50 feet
30 to 50 feet
moderate to fast

Pruning requirement:
prune to maintain a dominant leader by removing competing leaders; do not allow branches with bark to grow too large

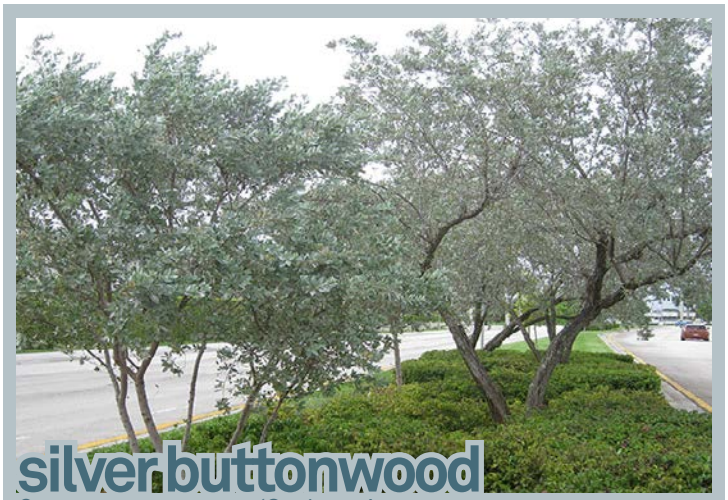
seagrape

Coccoloba uvifera

high s h

35 to 40 feet
40 to 60 feet
moderate

Pruning requirement:
Prune the seagrape in late spring or early summer to control its size and to encourage it to grow in shrub form or as a hedge.



silver buttonwood

Conocarpus erectus 'Sericeus'

high any h

5 to 50 feet
15 to 20 feet
moderate

Pruning requirement:
Trim to shape as needed, but avoid doing a hard pruning of more than 1/3 of the plant.

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

spanish stopper

Eugenia foetida

high any h

10 to 30 feet
5 to 20 feet
moderate

Pruning requirement:
Remove some branches so they will not touch each other. Remove some secondary branches from main branches (especially those toward the end of the main branches) if main branches have included bark.

simpson stopper

Myrcianthes fragrans

high any m

20 to 30 feet
15 to 20 feet
slow

Pruning requirement:
Keep this plant evenly sheared as a hedge shrub, lightly prune it occasionally for shape and size, or do no trimming at all.

pink trumpet tree

Tabebuia heterophylla

high any m-h

20 to 30 feet
15 to 25 feet
moderate

Pruning requirement:
requires pruning to develop strong structure

golden trumpet tree

Tabebuia chrysotricha

medium any m

25 to 35 feet
25 to 35 feet

Pruning requirement:
requires pruning to develop strong structure

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

paradise tree

Simarouba glauca

high any h

40 to 50 feet
25 to 30 feet
fast

Pruning requirement:
requires pruning to develop strong structure

wild tamarind

Lysiloma latisiliquum

high any h

30 to 60 feet
30 to 50 feet
fast

Pruning requirement:
requires pruning to develop strong structure

crape myrtle

Lagerstroemia indica

high any m

10 to 30 feet
15 to 25 feet
moderate

Pruning requirement:
prune to improve plant structure; may need little or no pruning if planted in full sun away from walkways and roads and in areas with room for plant growth

solitaire palm

Ptychosperma elegans

high s/l l-n

10 to 20 feet
6 to 10 feet
slow

Pruning requirement:
needs little pruning; requires regular watering

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

everglades palm

Acoelorrhaphe wrightii

medium any m

15 to 30 feet
10 to 15 feet
slow

routinely grown with, or trainable to be grown with, multiple trunks;

Pruning requirement:
needs little pruning to develop strong structure

saw palmetto

Serenoa repens

high any h

3 to 10 feet
4 to 10 feet
slow

routinely grown with, or trainable to be grown with, multiple trunks;

Pruning requirement:
needs little pruning to develop strong structure; remove brown or yellow fronds

royal palm

Roystonea regia

medium any m

50 to 80 feet
15 to 25 feet
slow

Pruning requirement:
remove brown or yellow fronds

coconut palm

Cocos nucifera

high any h

50 to 100 feet
15 to 36 feet
moderate

Pruning requirement:
remove brown or yellow fronds

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

thatch palm

Thrinax morrisii

high any h

15 to 20 feet
6 to 10 feet
slow

Pruning requirement:
remove brown or yellow fronds

silver palm

Coccothrinax argentata

high any h

3 to 15 feet
6 to 7 feet
fast

grow mostly upright and will not droop; not particularly showy; should be grown with a single leader; no thorns

Pruning requirement:
needs little pruning to develop a strong structure

cabbage palmetto

Sabal palmetto

high any h

25 to 60 feet
10 to 15 feet
slow

Pruning requirement:
remove brown or yellow fronds

christmas palm

Veitchia merrillii

medium any m

20 to 30 feet
10 to 15 feet
moderate

Pruning requirement:
no pruning required; clean up fronds that have shed

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

wetland
TREES

bald cypress
Taxodium distichum

high any m

60 to 80 feet
25 to 35 feet
fast

branches droop; showy; typically one trunk; thorns

Pruning requirement:
little required

pond cypress
Taxodium ascendens

high any m

50 to 60 feet
10 to 15 feet
fast

branches don't droop; showy; typically one trunk; thorns

Pruning requirement:
little required

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

red maple

Acer rubrum

medium any l/n

35 to 80 feet
25 to 35 feet
fast

bark is easily damaged; droop as the tree grows, and showy trunk; should be grown with a single leader; no thorns

Pruning requirement: requires pruning to develop strong structure; will require pruning for vehicular or pedestrian clearance

everglades palm

Acoelorrhaphe wrightii

medium any m

15 to 30 feet
10 to 15 feet
slow

routinely grown with, or trainable to be grown with, multiple trunks;

Pruning requirement: needs little pruning to develop strong structure

pond-apple

Annona glabra

low any h

20 to 40 feet
15 to 20 feet
fast

requires rich organic soils for optimal growth

Pruning requirement: no pruning requirement

royal palm

Roystonea regia

medium any m

50 to 80 feet
15 to 25 feet
slow

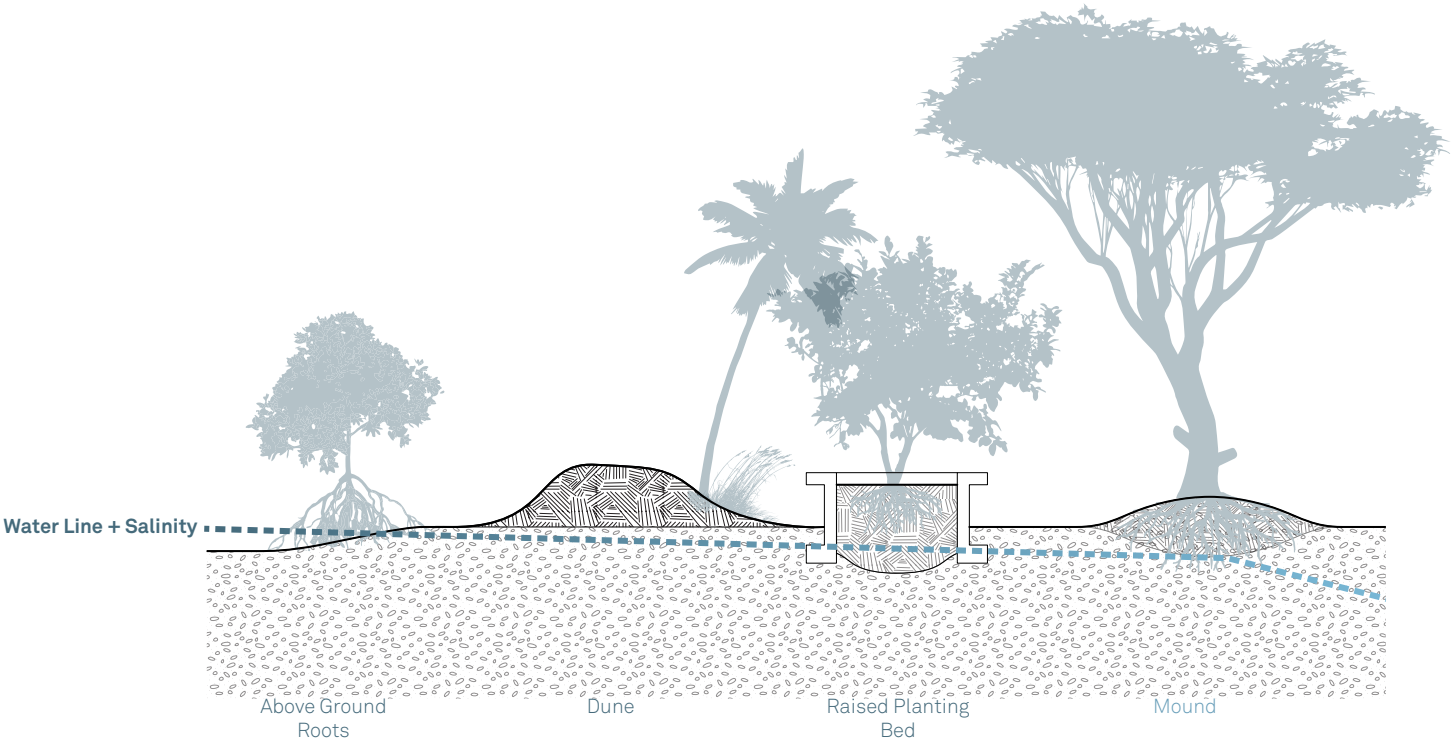
Pruning requirement: remove brown or yellow fronds

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

tree siting

Trees contribute significantly to stormwater management. It is important to understand the requirements of trees prior to design implementation. While a tree's presence is mostly aboveground, trees have complex root systems below ground that need special consideration.

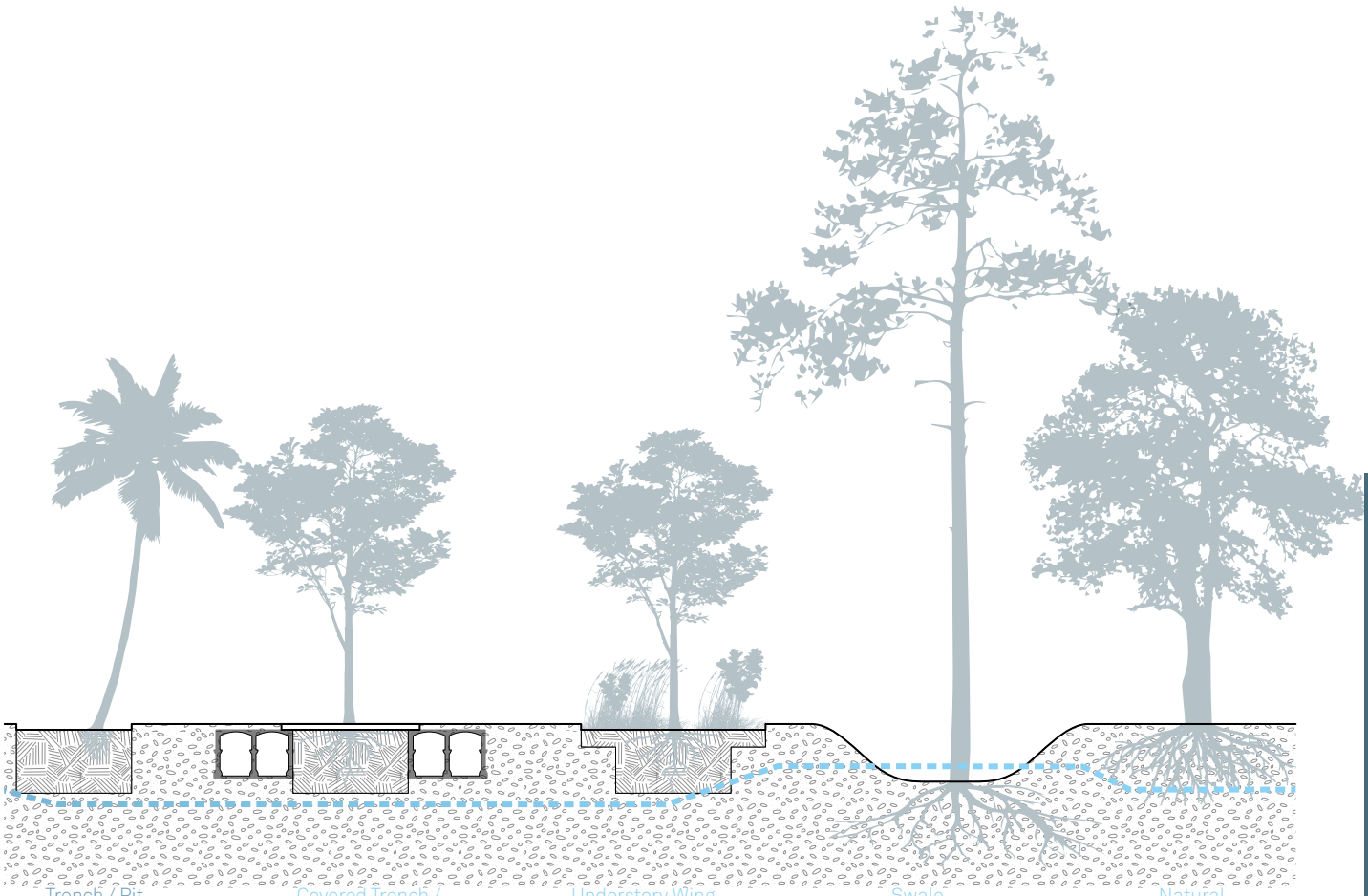


Above ground roots enable plants to breathe air in habitats with waterlogged soil.

Dunes are stabilized by the root systems of particular types of grasses, shrubs and trees.

Raised planting beds are ideal for bringing plants above underground water intrusion.

Mounds are ideal for bringing plants with wider root systems above underground water intrusion.



Trenches provide protection from underground salt water intrusion into roots that may not be able to handle salt.

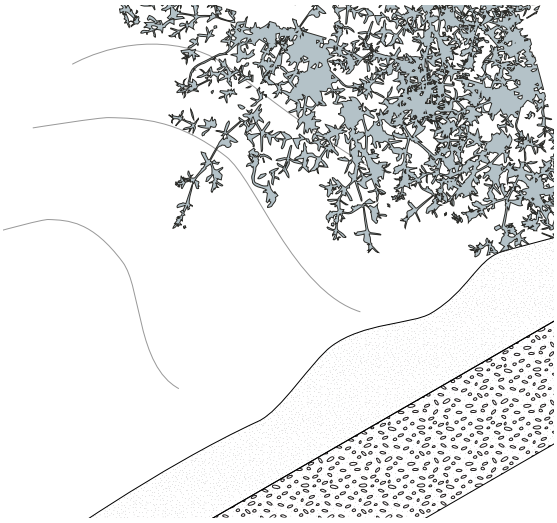
Covered trenches may sometimes be accompanied with a subsurface structure to allow for root growth and support the surface above.

Understory wings provide enough depth for tree roots to grow with shallower beds for grasses at the sides.

Swales provide a depression in the landscape to gather stormwater runoff before discharging to a conveyance system.

Natural tree siting exists where the ground level and soils remain as found.

Shrubs, grasses and groundcover adds green space to sidewalks and other public spaces. Shrubs and groundcover reduces impervious area and surface runoff while providing infiltration and groundwater recharge. In addition to adding aesthetic value and promoting community stewardship, they provide habitats. They also enhance the pedestrian experience by providing a buffer between pedestrian areas and the street and reduce the heat island effect for pedestrians.

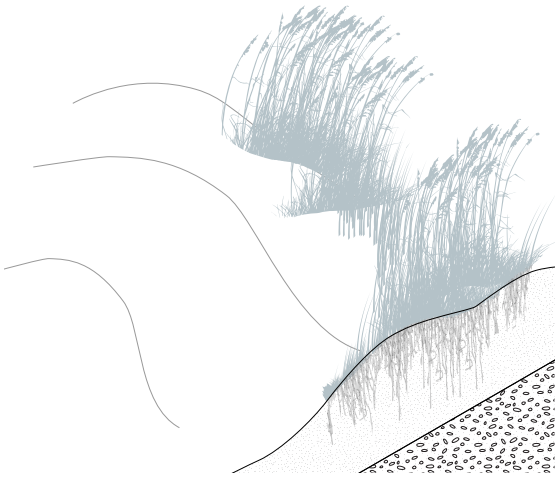


ground cover

Purpose
erosion control; place-making; adding color or texture to landscape

Placement
Ground covers should be used where grass or other plant species do not thrive. May be used in areas that are heavily shaded or on steep slopes.

Minimum Requirements
use native plants whenever possible
all other requirements vary based on type of ground cover species

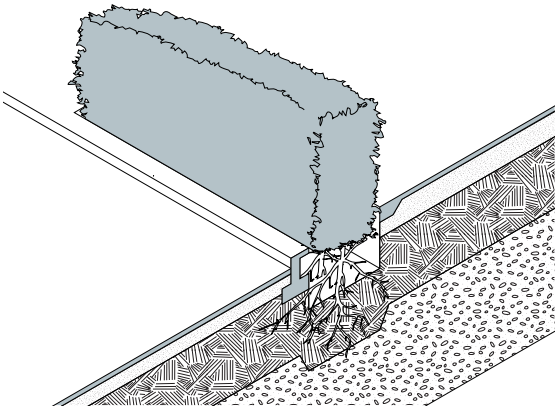


grasses + sedges

Purpose
erosion control; place-making; adding color or texture to landscape

Placement
Utilizing local or native grasses and sedges, in place of turf grass or sod, will provide lower maintenance and the potential to xeriscape.

Minimum Requirements
use grasses + sedges whenever possible
all other requirements vary based on type of grass or sedge



shrubs

Purpose
erosion control; place-making; adding color or texture to landscape; screening unsightly equipment

Placement
Shrubs should be used in areas to define boundaries or create privacy.

Minimum Requirements
use native plants whenever possible
all other requirements vary based on type of shrub

ground cover/grass + sedges/shrubs list

PAGE#	COMMON NAME	BOTANICAL NAME	CONTEXT	HEIGHT	SPREAD
238	**Asiatic Jasmine**	*Trachelospermum asiaticum*	⊗	6-18in	3ft
230	**Bay Cedar**	*Suriana maritima*	≋	6-20ft	6-8ft
231	**Beach Bean**	*Canavalia maritima*	⊗ ≋	varies	varies
237	**Beach Creeper**	*Ernodea littoralis*	⊗ ≋	1-3ft	varies
243	**Black Needlerush**	*Juncus roemerianus*	≋	1-3ft	3-6ft
244	**Black-eyed Susan**	*Rudbeckia hirta*	⊗	2-3ft	1-2ft
232	**Blanket Flower**	*Gaillardia pulchella*	⊗	1-2ft	2-3ft
245	**Blue-eyed Grass**	*Sisyrinchium angustifolium*	⊗	0-1ft	0-1ft
238	**Boston Fern**	*Nephrolepis exaltata*	⊗	1-2ft	1-2ft
235	**Butterfly Sage**	*Varronia globosa*	⊗	2-6ft	2-4ft
234	**Cocoplum**	*Chrysobalanus icaco*	⊗	10-30ft	10-20ft
237	**Coontie Palm**	*Zamia floridana*	⊗	1-5ft	1-5ft
239	**Crinum Lily**	*Crinum asiastium*	⊗	4-10ft	4-8ft
236, 244	**Dixie Iris**	*Iris hexagona*	⊗ ≋	3-4ft	1-2ft
233, 244	**Dune Sunflower**	*Helianthus debilis*	⊗	2-4ft	2-4ft
240	**Firebush**	*Hamelia patens*	⊗	6-12ft	5-8ft
236	**Florida Gama Grass**	*Tripsacum dactyloides*	⊗ ≋	3-4ft	3-4ft
239	**Florida Privet**	*Forestiera segregata*	⊗	3-5ft	3-5ft
236	**Green Buttonwood**	*Conocarpus erectus*	⊗ 🚶	30-45ft	20-30ft
235	**Green Island Ficus**	*Ficus microcarpa*	⊗	8-10ft	3-4ft
243	**Gulfcoast Spikerush**	*Eleocharis cellulosa*	⊗ ≋	2-3ft	varies
231	**Inkberry**	*Scaevola plumieri*	⊗	2-4ft	3-8ft
238	**Jamaican Caper**	*Capparis cynophallophora*	⊗	6-15ft	8-12ft
240	**Juniper**	*Juniperus chinensis*	⊗	1-2ft	1-2ft
235	**Lantana**	*Lantana involucrata*	⊗	2-5ft	1-5ft
242	**Leather Fern**	*Acrostichum danaeifolium*	⊗ ≋	8-10ft	8-10ft
246	**Meadow Beauty**	*Rhexia virginica*	⊗ ≋	1-3ft	varies
245	**Mistflower**	*Conoclinium coelestinum*	⊗ ≋	1-2ft	varies
237	**Muhly Grass**	*Muhlenbergia capillaris*	⊗ ≋	2-5ft	2-3ft
234	**Natal Plum**	*Carissa macrocarpa*	⊗	8-20ft	10-15ft
239	**Perennial Peanut**	*Arachis glabrata*	⊗	10-30ft	5-20ft
233	**Railroad Vine**	*Ipomoea pes-caprae*	⊗	<1ft	varies
237	**Rain Lily**	*Zephyranthes spp.*	⊗ ≋	<1ft	.5-1ft
230	**Saltbush**	*Atriplex halimus*	⊗ ≋	3-6ft	6-9ft
233	**Saltmarsh Mallow**	*Kosteletzkya virginica*	⊗ ≋	3-6ft	3-4ft

REQUIRED LIGHT	SOIL MOISTURE	SALT TOLERANCE	SOIL TYPE	HABITAT
		medium	any	urban
		high	sand/loam	dune
		high	sand/loam	dune
		low	sand/clay	urban
		high	clay/loam	wetland
		low to none	sandy	wetland
		high	sand/loam	urban
		low to none	sand/loam	urban
		low to none	clay/loam	urban
		high	sand/loam	urban
		medium	sand/clay	urban
		high	any	urban
		medium	any	urban
		low	clay/loam	urban/wetland
		low	sand	dune/urban
		low to none	any	urban
		medium	sand/loam	urban
		high	sand/loam	urban
		high	any	urban
		high	any	urban
		medium	clay/loam	wetland
		high	sand/loam	dune
		low	sand/loam	urban
		medium	sand	urban
		high	sand/loam	urban
		medium	any	wetland
		low to none	sand/loam	wetland
		low to none	any	wetland
		high	sand	urban
		high	any	urban
		high	any	urban
		high	sand/loam	dune
		medium	any	urban
		high	any	dune
		medium	sand/clay	dune

ground cover/grass + sedges/shrubs list cont'd

PAGE#	COMMON NAME	BOTANICAL NAME	CONTEXT	HEIGHT	SPREAD
232	**Sea Lavender**	*Mallotonia gnaphalodes*	⊗	2-5in	6-20ft
231	**Sea Oats**	*Uniola paniculata*	≋	5-8ft	1-2ft
233	**Sea Oxeye Daisy**	*Borrichia arborescens*	⊗	2-4ft	2-3ft
232	**Sea Purslane**	*Sesuvium portulacastrum*	⊗	.5-1ft	varies
235	**Seacoast Marshelder**	*Iva imbricata*	⊗	2-3ft	varies
244	**Seashore Paspalum**	*Paspalum vaginatum*	⊗	<1ft	varies
233	**Seven Year Apple**	*Casasia clusiifolia*	⊗	8-20ft	8-15ft
235	**Spanish Bayonet**	*Casasia clusiifolia*	⊗	10-15ft	3-5ft
238	**Wild Coffee**	*Psychotria nervosa*	⊗	4-10ft	4-8ft
239	**Yaupon Holly**	*Ilex vomitoria*	⊗	15-25ft	15-20ft

REQUIRED LIGHT	SOIL MOISTURE	SALT TOLERANCE	SOIL TYPE	HABITAT
		high	sand/loam	dune
		high	sand	dune
		high	sand/loam	dune
		high	sand	dune
		high	sand	dune
		high	any	dune
		high	any	dune
		low to none	sand/loam	urban
		medium	any	urban
		high	any	urban

dune

GROUNDCOVER, GRASSES, SHRUBS

baycedar

Suriana maritima

high s/l h

6 to 20 feet
6 to 8 feet
moderate

works well to control erosion on dunes

Pruning requirement: minimal pruning requirements, remove dead branches to ensure hardiness

saltbush

Atriplex halimus

medium any h

3 to 6 feet
6 to 9 feet
moderate

Pruning requirement: prune to remove old growth and ensure hardiness

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

beach bean

Canavalia maritima

high s/l h

varies
varies
fast

Pruning requirement: minimum pruning requirements, used as stabilizer for sandy soils, can climb dense shrubs and tree trunks, prune to control spread

inkberry

Scaevola plumieri

high s/l h

2 to 4 feet
3 to 8 feet
slow

Pruning requirement: needs pruning to keep it dense

seashore paspalum

Paspalum vaginatum

high any h

0 to 1 feet
varies
fast

Pruning requirement: keep mowed at 2 inches, missed mowings will result in scalping of the grass

sea oats

Uniola paniculata

high s high

5 to 8 feet
1 to 2 feet
moderate

drought tolerant plant for stabilizing dunes

Pruning requirement: minimum pruning requirement

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

sea purslane

Sesuvium portulacastrum

high s h

.5 to 1 feet
varies
moderate

Pruning requirement:
minimum pruning requirements

sea lavender

Mallotonia gnaphalodes

high s/l h

2 to 5 feet
6 to 20 feet
slow

Pruning requirement:
utilized in seaside dune planting, full sun keeps foliage dry and maintains plant health, prune to control area

seacoast marshelder

Iva imbricata

high s h

2 to 3 feet
varies
fast

Pruning requirement:
principal sand binder for beach dunes, prune to control spread area

dune sunflower

Helianthus debilis

high s l

2 to 4 feet
2 to 4 feet
fast

Pruning requirement:
minimum pruning required, prune to control spread area

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

railroad vine

Ipomoea pes-caprae

high s/l h

<1 feet
varies
fast

Pruning requirement:
minimal pruning requirements, aggressive spreading, prune to control spread area

seven year apple

Casasia clusiifolia

high any h

8 to 20 feet
8 to 15 feet
slow

Pruning requirement:
prune regularly to control size, form a small, multi-trunk tree by removing lower branches as the plant grows, use as a wind break on the ocean front

saltmarsh mallow

Kosteletzkya virginica

low s/c m

3 to 6 feet
3 to 4 feet
moderate

Pruning requirement:
minimum pruning requirements, short-lived as plant only lives for 5 years

sea oxeye daisy

Borrichia arborescens

medium s/l h

2 to 4 feet
2 to 3 feet
slow

Pruning requirement:
minimum pruning requirements, unless used as hedging, where the plant takes shearing very well to control shape and area of spread

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

urban

GROUNDCOVER, GRASSES, SHRUBS

cocoplum

Chrysobalanus icaco

medium s/c m

10 to 30 feet
10 to 20 feet
moderate, coastal
fast, inland

Pruning requirement:
minimal pruning requirements, remove dead branches to ensure hardiness

natal plum

Carissa macrocarpa

high any h

8 to 20 feet
10 to 15 feet

Pruning requirement:
You can shape natal plum into a tree form or hedge through pruning. Trimming will also prompt the shrub to produce more flowers and fruit. Prune plants that are close to a sidewalk so that pedestrians do not get stuck by the spines.

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

butterfly sage

Varronia globosa

medium s/l h

2 to 6 feet
2 to 4 feet
moderate

Pruning requirement:
prune to remove old growth and ensure hardiness

green island ficus

Ficus microcarpa

high any h

8 to 10 feet
3 to 4 feet
slow

Pruning requirement:
minimal pruning requirement, trim occasionally for shape

lantana

Lantana involucrata

medium s/l h

2 to 5 feet
1 to 5 feet
fast

Pruning requirement:
prune to remove old growth and to ensure hardiness, typically 1 to 3 inches

spanish bayonet

Yucca aloifolia

high s/l m

10 to 15 feet
3 to 5 feet
slow

Pruning requirement:
little pruning required; prune to remove brown or yellow fronds

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

blanket flower

Gaillardia pulchella

high s/l h

1 to 2 feet
2 to 3 feet
moderate

Pruning requirement:
minimum pruning requirements, does well in mass planting spaced two to three feet apart

florida gama grass

Tripsacum dactyloides

medium s/l l

3 to 4 feet
3 to 4 feet
moderate

Pruning requirement:
large groundcover, prune to control area

green buttonwood

Conocarpus erectus

high any h

30 to 45 feet
20 to 30 feet
moderate

Pruning requirement:
pruning required for strong structure

dixie iris

Iris hexagona

medium c/l l

3 to 4 feet
1 to 2 feet
moderate

Pruning requirement:
minimal pruning requirements, remove brown leaves

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

muhly grass

Muhlenbergia capillaris

high s h

2 to 5 feet
2 to 3 feet
moderate

Pruning requirement:
remove brown foliage in the spring by cutting the club back to the ground before new growth emerges

coontie palm

Zamia floridana

high any h

1 to 5 feet
3 to 5 feet
slow

Pruning requirement:
little pruning requirement; remove brown or yellow fronds

rain lily

Zephyranthes spp.

medium any m

.5 to 1 feet
.5 to 1 feet
slow

Pruning requirement:
little pruning required

beach creeper

Ernodea littoralis

high s/c l

1 to 3 feet
varies
moderate

Pruning requirement:
minimal pruning requirements, prune to control area

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

wild coffee

Psychotria nervosa

medium any m

4 to 10 feet
4 to 8 feet
moderate

Pruning requirement:
takes well to clipping, prune as desired

jamaican caper

Capparis cynophallophora

medium s/l l

6 to 15 feet
8 to 12 feet
slow

Pruning requirement:
Train the plant into a tree by removing low, drooping branches, and heading upright branches to thicken their diameter. It can also be clipped into a hedge or tall screen to block an undesirable view.

asiatic jasmine

Trachelospermum asiaticum

medium any m

6 to 18 inches
3 feet
fast

Pruning requirement:
Asiatic jasmine should be mowed and pruned once a year in the spring to keep an attractive appearance and reduce the risk for diseases; it will also keep it controlled.

boston fern

Nephrolepis exaltata

medium c/l l-n

1 to 2 feet
1 to 2 feet
fast

Pruning requirement:
minimal pruning requirements, remove brown leaves

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

florida privet

Forestiera segregata

high s/l h

4 to 15 feet
3 to 12 feet
moderate

Pruning requirement:
For best results, keep the lower portion of the hedge wider than the top. Early training can produce a small tree for planting in home landscapes and other areas requiring a small, multi-trunked tree.

crinum lily

Crinum americanum

medium any m

4 to 10 feet
4 to 8 feet
moderate

Pruning requirement:
Remove old flowers as they begin to droop to keep your plants blooming and looking neat.

perennial peanut

Arachis glabrata

high s h

.5 to 1 feet
4 feet
moderate

Pruning requirement:
Mowing established plants will make them bloom more, but it's not required.

yaupon holly

Ilex vomitoria

high any h

15 to 25 feet
15 to 20 feet
moderate

Pruning requirement:
Cut broken, dead and diseased branches down to the point where they join a larger branch closer to the center whenever you notice them. Look for them in midwinter when you do your annual pruning. Cut parallel to the main trunk of the holly.

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

juniper

Juniperus chinensis

high s m

1 to 2 feet
1 to 2 feet
moderate

Pruning requirement:
prune lightly and regularly, just before new growth begins in spring

firebush

Hamelia patens

medium any l-n

6 to 12 feet
5 to 8 feet
fast

Pruning requirement:
Plants may need to be pruned to keep them to a desired height.

wetland

GROUNDCOVER, GRASSES, SHRUBS

swamp bay

Persea palustris

low any l

20 to 30 feet
20 to 30 feet
moderate

most valuable tree for creating and preserving shorelines in south Florida

Pruning requirement:
responds poorly to pruning

leatherfern

Acrostichum danaeifolium

low any m

8 to 10 feet
8 to 10 feet

Pruning requirement:
little maintenance when kept in moist conditions; remove brown or yellow fronds

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

red mangrove

Rhizophora mangle

medium any h

20 to 40 feet
30 to 40 feet

most valuable tree for creating and preserving shorelines in south Florida

Pruning requirement:
per state guidelines

gulfcoast spikerush

Eleocharis cellulosa

low c/l m

2 to 3 feet
varies
fast

Pruning requirement:
aggressive wetland grass to provide dense cover, prune to control area

black needlerush

Juncus roemerianus

low c/l l-n

1 to 3 feet
3 to 6 feet
fast

Pruning requirement:
weed-like plant with minimal pruning

softrush

Juncus effusus

low c/l m

2 to 4 feet
2 to 4 feet
moderate

Pruning requirement:
old foliage should be cut back in early spring

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

sawgrass

Cladium mariscus

low any m

3 to 9 feet
1 to 2 feet
moderate

Pruning requirement:
dense ground cover, prune or mow to control area

dixie iris

Iris hexagona

medium c/l l

3 to 4 feet
1 to 2 feet
moderate

Pruning requirement:
minimal pruning requirements, remove brown leaves

black-eyed susan

Rudbeckia hirta

medium s l-n

2 to 3 feet
1 to 2 feet
moderate

Pruning requirement:
weed-like plant with minimal pruning

dune sunflower

Helianthus debilis

high s l

2 to 4 feet
2 to 4 feet
fast

Pruning requirement:
minimum pruning required, prune to control spread area

full sun | partial sun | shade | soil moisture tolerance | full height | crown spread | growth rate

blue-eyed grass

Sisyrinchium angustifolium

low s/l l-n

0 to 1 feet
0 to 1 feet

Pruning requirement: mow groundcover to control area

swamp lily

Crinum americanum

moderate any m

1 to 2 feet
1 to 2 feet
moderate

Pruning requirement: minimum pruning requirements

mistflower

Conoclinium coelestinum

high any l-n

1 to 2 feet
varies
fast

Pruning requirement: will spread to form larger patches, prune to control area

swamp milkweed

Asclepias incarnata

medium any l-n

3 to 6 feet
2 to 3 feet
moderate

Pruning requirement: minimum pruning requirements

salt tolerance: **h**=high **m**=medium **l-n**=low to none **u**=unknown
drought tolerance: **high**, **medium**, **low** or none

soil: **c/l**=clay loam **s/l**=sandy/loam **s**=sandy **s/c**=sandy clay **any**=any soil

meadow beauty

Rhexia virginica

medium s, s/l l-n

1 to 3 feet
varies
moderate

Pruning requirement:
minimum pruning requirements

water hyssop

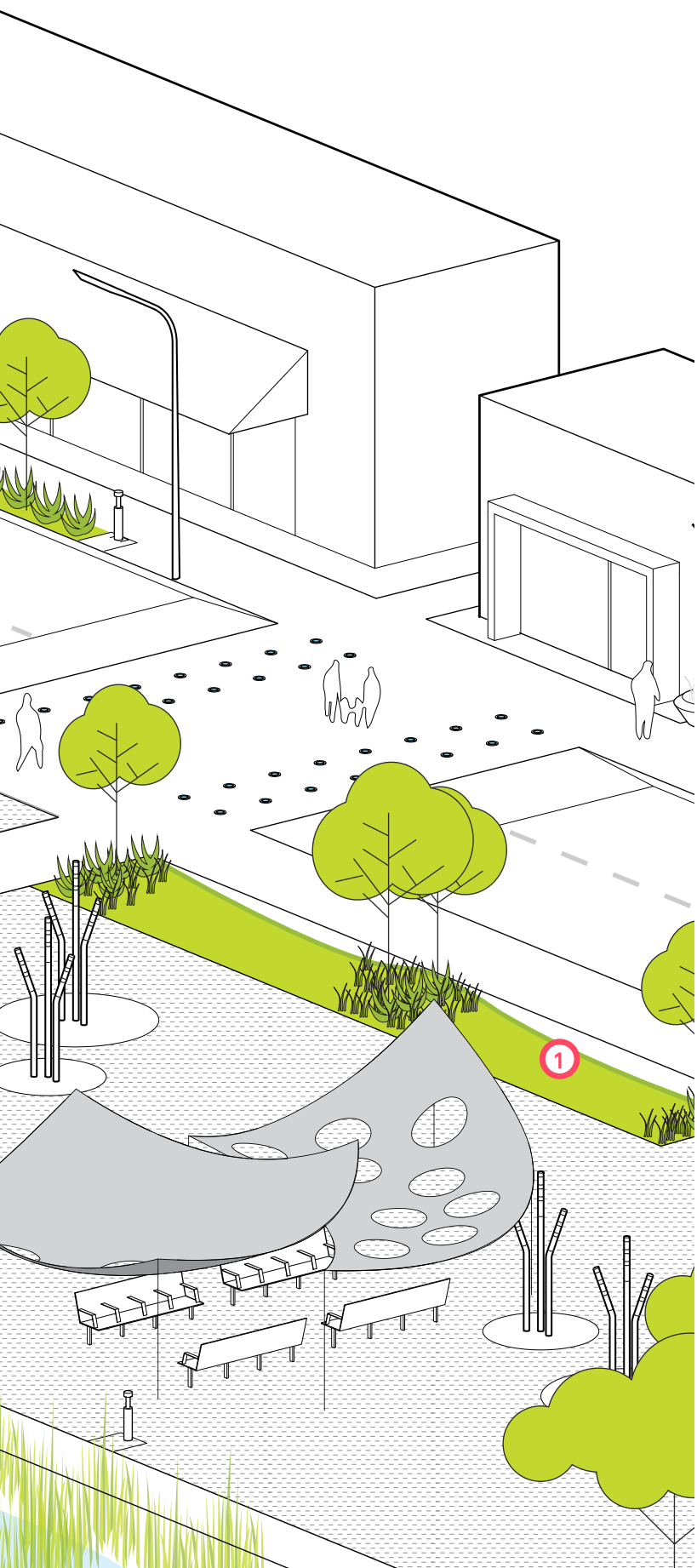
Bacopa monnieri

low any m

<1 feet
varies
moderate to fast

Pruning requirement:
excellent low groundcover, can become somewhat aggressive, prune to control area


2
4
3



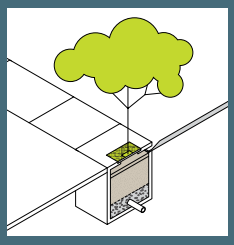
floodwater management

Stormwater challenges are dramatically increased with high amounts of impervious surfaces. Managing floodwater with low-impact development (LID) strategies along streets, sidewalks and public spaces will not only reduce standing water, but it will contribute to groundwater recharge and treat polluted water before reaching waterways. It can also alleviate water flow in the City's stormwater system, saving the City money on upgrades or repairs to existing infrastructure.

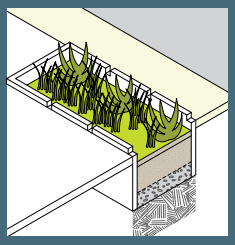
1. Bio-retention swales (p254) are open, gently sloped, vegetated depressions designed to capture, treat, and filter stormwater runoff. They should be placed within the furniture zone and act as a buffer between sidewalks and traffic.
2. Bio-retention planters (p253) are planted depressions with walled sides and a permeable, flat bottom designed to capture and treat stormwater runoff. They should be placed within the furniture zone and allow for pedestrians to pass through every 20 to 40 feet.
3. Stormwater trees (p252) should be spaced according to species used.
4. Planters can collect stormwater runoff from multiple directions if in an open space.

floodwater management tools matrix

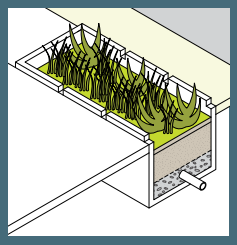
GREEN



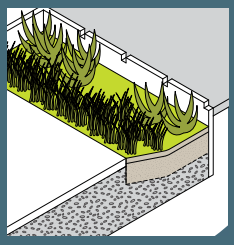
STORMWATER TREE



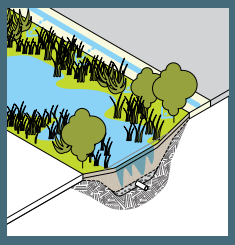
BIO-RETENTION PLANTERS



BIO-FILTRATION PLANTERS

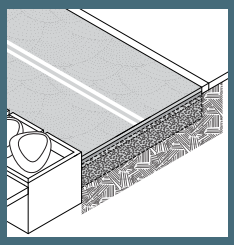


HYBRID BIO-RETENTION PLANTERS

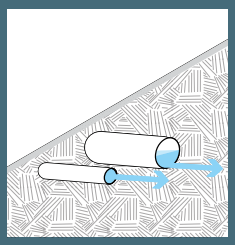


BIO-RETENTION SWALE

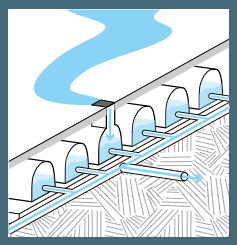
GRAY



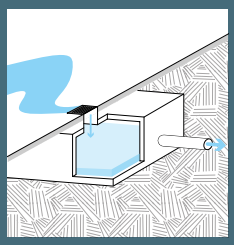
PERMEABLE PAVEMENT



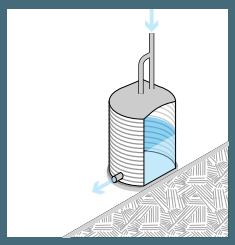
OVERSIZED PIPES



UNDERGROUND DETENTION



WET VAULT



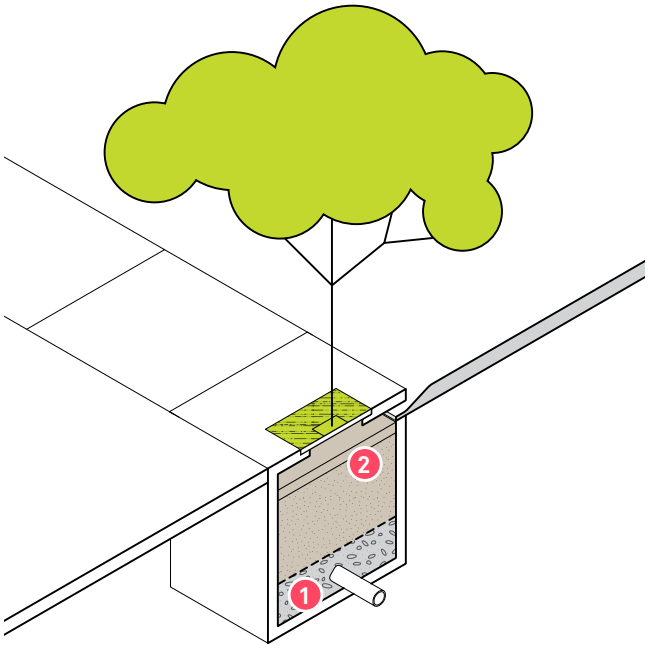
RAINWATER HARVESTING

\- +

AMOUNT OF SPACE REQUIRED

Planters not only have the ability to reduce standing stormwater, but they can also reduce urban heat island effect by replacing heat absorbing hardscapes. In addition, planters can provide habitat, aesthetically enhance the public realm, improve air quality, and increase property values and provide shade. In order to select the appropriate type of planter, it is important to understand the parameters in the following illustrations.

The Stormwater master plan has more detailed schematics and can be referenced for working drawings. In the case where there are any discrepancies the more stringent rule or detail should be followed.



stormwater tree

Purpose
filtration/infiltration

Placement
sidewalk furnishing zone, medians

Minimum Requirements
requirements for substrate and opening sizes will vary depending on the tree species

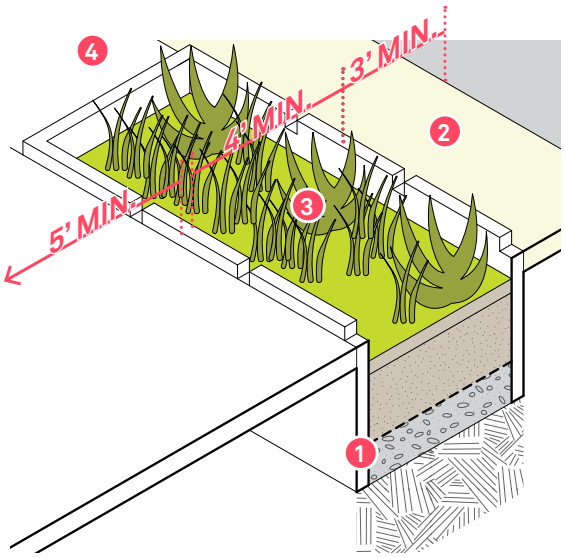
Considerations
See **landscape p200** for proper tree types.

Tree box filters and wells can be incorporated into urban retrofits with the added benefits of water quality improvement and reduction of the urban heat island effect. As with other filtration devices, tree box filters require occasional inspection to remove large debris and/or trash.

Notes:

1. **PROVIDE ENOUGH CLEARANCE FROM THE PERFORATED PIPE TO COLLECT TREATED RUNOFF. PROPER CLEARANCE VARIES BASED ON TREE SPECIES. DEPENDING ON THE SOIL TYPE (PERCOLATION ABILITY) AT THE BASE OF THE TREE BOX THE UNDER-DRAIN PIPE MAY NOT BE REQUIRED.**

2. **120 CUBIC FEET OF SOIL FOR 10 FT CANOPY 500 CUBIC FEET OF SOIL FOR 20 FT CANOPY 1000 CUBIC FEET OF SOIL FOR 30 FT CANOPY**



bio-retention planter

Purpose
filtration/infiltration/treatment

Placement
sidewalk furnishing zone, medians, pedestrian boulevards, along property line

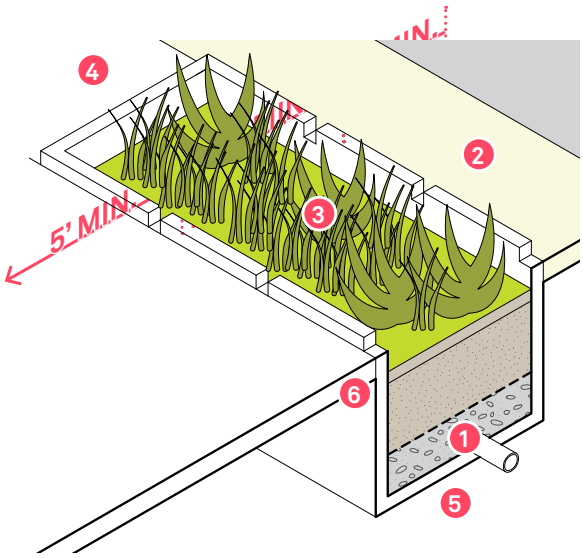
Minimum Requirements
- 4' wide
- cells well-drained within 72 hrs of rain event
- temporary ponding depth 2-12"

Considerations
See **landscape p200** for proper plant types.

New planters often need irrigation during an establishment period of 1-3 years, and are generally low maintenance after that time.

Notes:

1. VERTICAL WALLS ARE TYPICALLY CONCRETE BUT OTHER MATERIALS MAY BE USED.
2. A RAISED DRAIN OR CURB CUT ALLOWS OVERFLOW TO DRAIN BACK IN TO THE GRAYWATER SYSTEM.
3. MAXIMIZE SURFACE FOOTPRINT TO LOWER EROSION RISK.
4. PROVIDE PEDESTRIAN CUT THROUGH EVERY 20-40 FT.



bio-filtration planter

Purpose
stormwater runoff filtration/treatment

Placement
sidewalk furnishing zone, medians, pedestrian boulevards, along property line

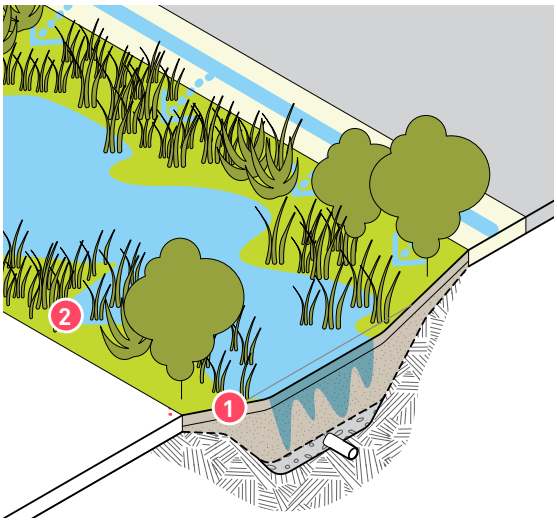
Minimum Requirements
- 4' wide

Considerations
See **landscape p200** for proper plant types.

New planters often need irrigation during an establishment period of 1-3 years, and are generally low maintenance after that time.

Notes:

1. INSTALL PERFORATED PIPE TO COLLECT TREATED RUNOFF.
2. A RAISED DRAIN OR CURB CUT ALLOWS OVERFLOW TO DRAIN BACK IN TO THE GRAYWATER SYSTEM.
3. MAXIMIZE SURFACE FOOTPRINT TO LOWER EROSION RISK.
4. PROVIDE PEDESTRIAN CUT THROUGH EVERY 20-40 FT.
5. BOTTOM OF THE PLANTER CAN BE CONCRETE OR HAVE AN IMPERVIOUS LINER TO PREVENT WATER FROM INFILTRATING.
6. VERTICAL WALLS ARE TYPICALLY CONCRETE BUT OTHER MATERIALS MAY BE USED.



bio-retention swale

Purpose
filtration/infiltration/treatment

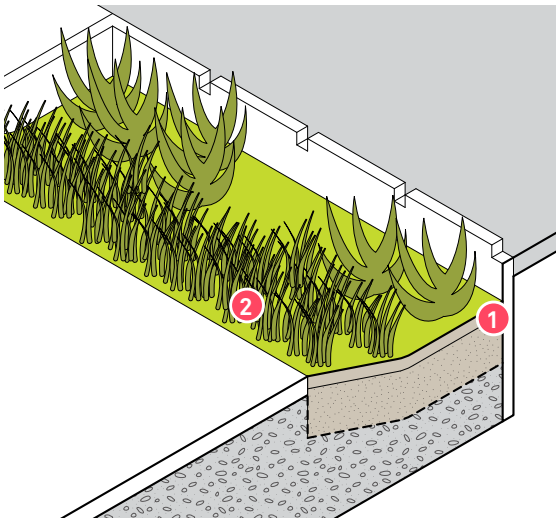
Placement
lower-density areas, residential streets, shared-use paths, medians, roundabouts

Minimum Requirements
- 2-8' overall width
- 1' bottom width minimum, 4'+ for optimal
- 2-4" optimal water depth
- 3H:1V or 4H:1V slopes for areas with lawn

Considerations
Bioswales are usually located along roads, drives, or parking lots where the contributing acreage is less than five acres. Bioswales require curb cuts, gutters or other devices that direct flow to them. They may require an underdrain where soil permeability is limited, as well as an overflow grate for larger storm events.

Notes:

1. THE BOTTOM OF THE BIORETENTION CELL, INCLUDING THE SLOPED SIDES, IS THE INFILTRATION FOOTPRINT OF THE FACILITY. SLOPE DESIGN SHOULD BE SET ACCORDING TO THE POTENTIAL OF EROSION.
2. USE HARDY GROUNDCOVERS NEAR THE EDGE OF SWALE TO DELINEATE THE EDGE OF THE CELL.



hybrid bio-retention planter

Purpose
filtration/infiltration/treatment

Placement
moderate density, low-traffic contexts; planting strips on neighborhood or residential streets

Minimum Requirements
- 3' bottom width

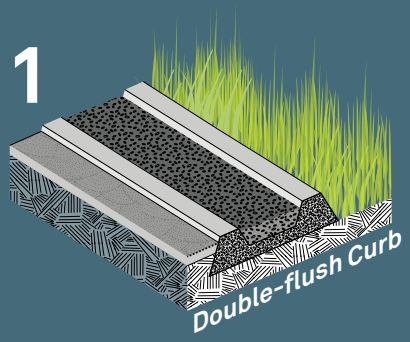
Considerations
Relative to other walled planters, hybrid bio-retention planters have a high capacity to accommodate street trees. Trees should be located on the graded side slope, where the vertical side wall will not interfere with tree growth.

Notes:

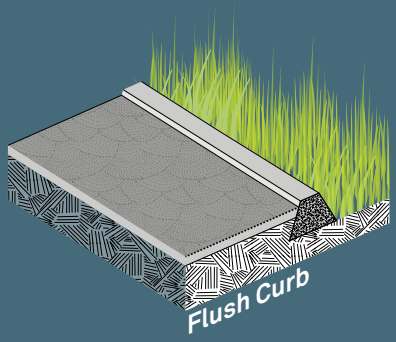
1. WHERE THE VERTICAL WALL IS LOCATED NEAR THE STREET, IT SHOULD BE DESIGNED TO SUPPORT VEHICULAR LOADS.
2. THE GRADED SLOPE IS THE BEST PLACE FOR STREET TREES, PREVENTING VERTICAL WALL FROM HINDERING ROOT GROWTH.

curb types for stormwater runoff:

1



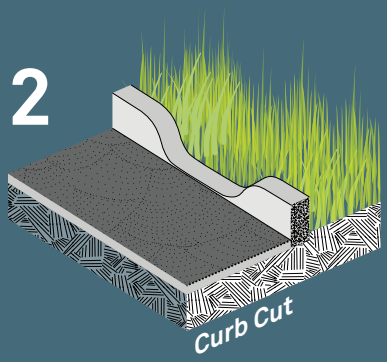
An aggregate trench between flush curbs catching sediment before it reaches treatment facility.



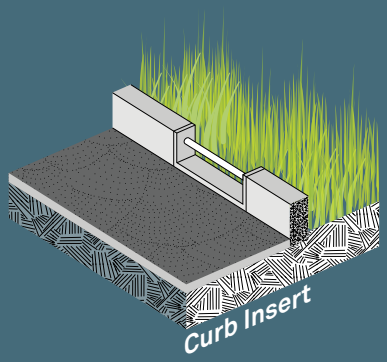
Shallow, half-inch curb catches sediment before it reaches treatment facility.

Pervious pavers filter sediment before reaching treatment and act as a tactile strip for vehicle warning.

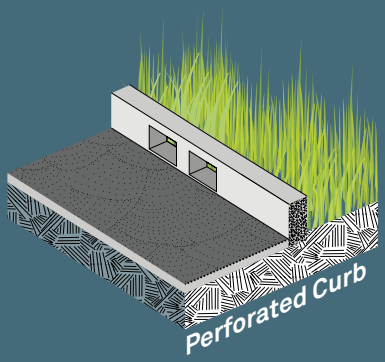
2



Curb cuts can be retrofit or used in new construction, varying in lengths depending on project parameters.

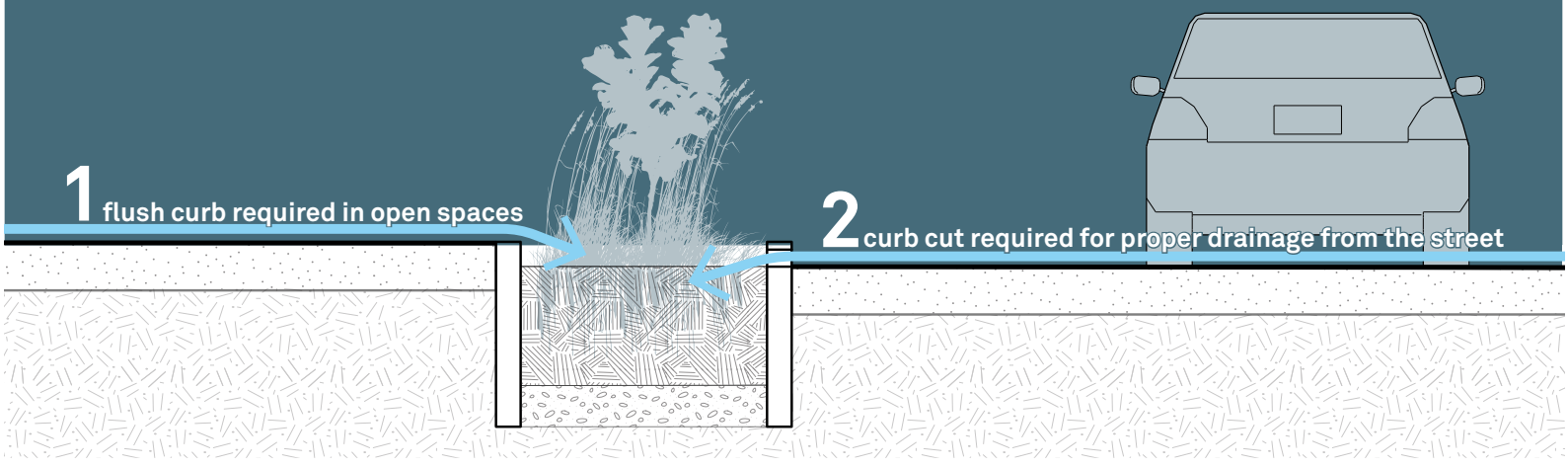


Curb inserts can be retrofit or used in new construction, maintaining structural integrity of the curb.

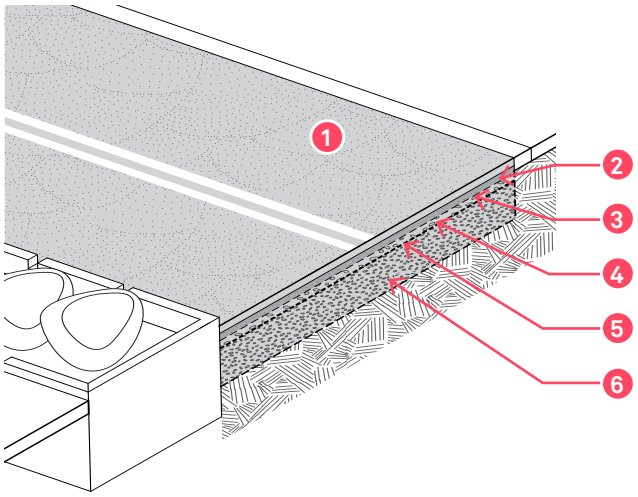


Perforated curbs are pre-cast curbs used in new construction allowing water to flow.

Floodwater Management



Gray infrastructure is just as important to consider as a design tool as green infrastructure. While green infrastructure can help to alleviate the effects of standing water and urban runoff where there is ample surface area to do so, gray infrastructure can mitigate large volumes of water where surfaces are being utilized by buildings or cars, or where impervious surfaces are necessary. When deciding which gray infrastructure floodwater management tool to use, the site and soil should be evaluated for permeability, aboveground storage and amount of stormwater runoff to be anticipated. The following pages contain a list of considerations when selecting the appropriate gray infrastructure tool for floodwater management.



permeable pavement

Purpose
filtration/infiltration/treatment

Placement
low vehicle traffic zones; parking, bike lanes, shared-use paths

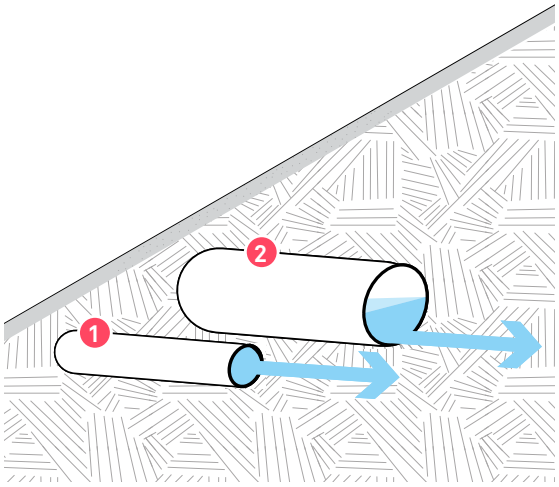
Considerations
Use high albedo, lightly colored systems or "reflective/cool pavement" to reduce the heat island effect. Asphalt concrete pavement in South Florida, due to the light coloring of the Oolite Limestone used for aggregate, has a solar reflectivity surface similar to concrete surface after 6 months to a year of wear.

Large scale vacuums must be used to clean out gravel, paver, and porous systems.

*For permeable pavers, see **hardscapes p192**.

Notes:

1. **PERMEABLE PAVEMENT (CONCRETE OR ASPHALT)**
2. **AGGREGATE BEDDING**
3. **FILTER FABRIC**
4. **OPEN GRADED BASE (DEPTH VARIES BASED ON LOADS)**
5. **REINFORCING GRID FOR HEAVY LOADS**
6. **OPEN GRADED SUB-BASE (DEPTH VARIES BASED ON LOADS)**



oversized pipes

Purpose
flow control

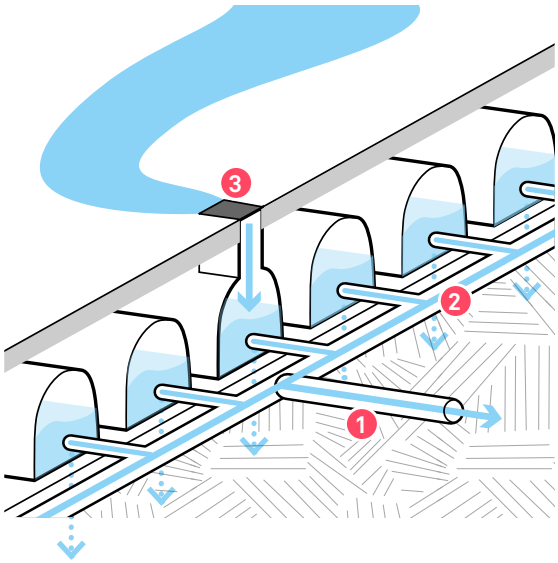
Placement
utilize where piping can not be avoided, under impervious surfaces like driveways and sidewalks

Minimum Requirements
use non-corrosive materials

Considerations
As with any pipe infrastructure, oversized pipes require trash and sediment removal annually.

Notes:

1. PROPERLY-SIZED PIPE
2. OVERSIZED PIPES ELIMINATE LARGER PRESSURE DROPS AND HIGHER VELOCITIES THAT OCCUR IN PROPERLY SIZED PIPES DURING STORM EVENTS.



underground detention

Purpose
detention/infiltration

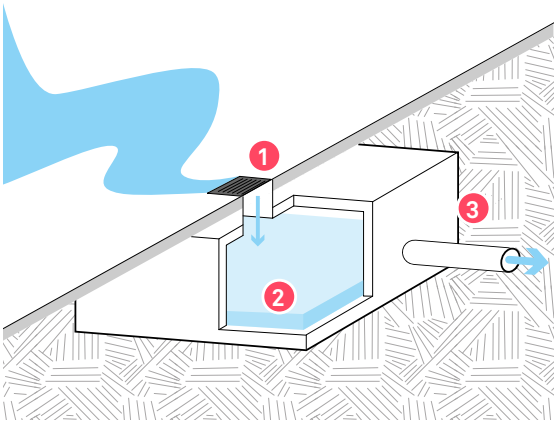
Placement
use in areas where on-grade storage is minimal; optimally placed after filtration facilities to prevent excessive sedimentation

Minimum Requirements
maximum watershed runoff area is 25 acres

Considerations
Though at first costly, underground detention systems are easy to access and maintain.

Notes:

1. RUNOFF MAY INFILTRATE THE GROUND BENEATH IF THE SOIL IS PERMEABLE.
2. OUTLET PIPES FACILITATE THE SLOW RELEASE OF STORMWATER RUNOFF.
3. DRAIN COVERS FOR INLETS SHOULD BE BIKE SAFE.



wet vault

Purpose
retention

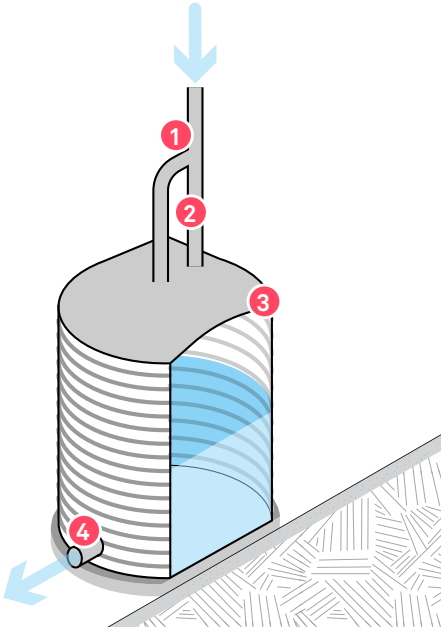
Placement
upstream of overflow basins or outlets and downstream from filtration facilities

Minimum Requirements
sized according to watershed runoff area

Considerations
Wet vaults are typically used where there is limited surface area for LID facilities. Minimal maintenance is required. Periodic inspection of in-flow areas is needed along with removal of large debris, sediment, and settled pollutants.

Notes:

1. DRAIN COVERS FOR INLETS SHOULD BE BIKE SAFE.
2. WET VAULTS REMOVE MORE SEDIMENT THAN OTHER SUBTERRANEAN STORAGE DEVICES DUE TOO LONGER PERIODS OF RETENTION.
3. WET VAULTS RETAIN STORE STORMWATER RUNOFF AND SLOWLY RELEASE IT INTO OTHER STORMWATER FACILITIES.



rainwater harvesting

Purpose
water storage

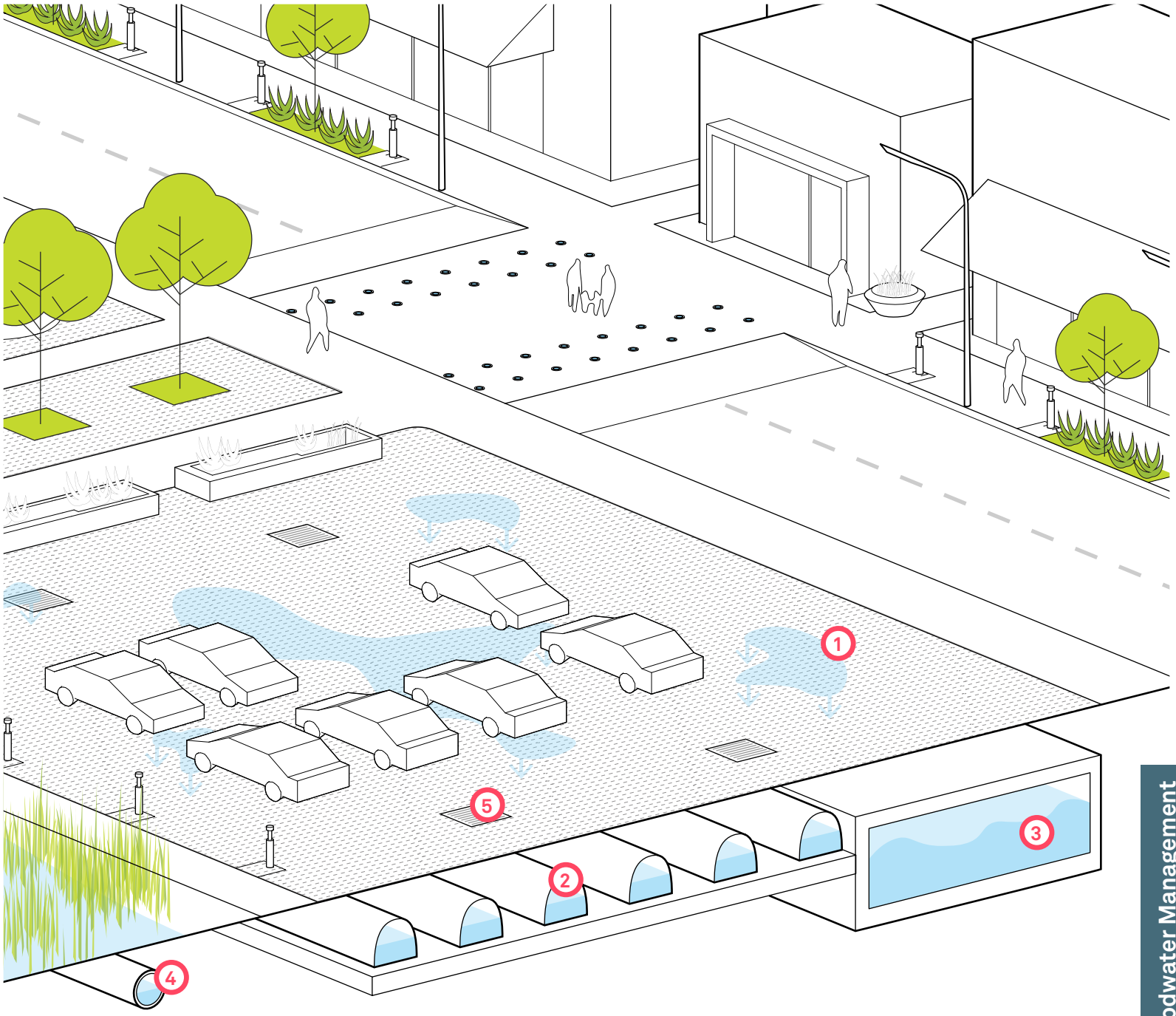
Placement
directly at the source of runoff

Minimum Requirements
sizing based on collection and water demand; water quality treatment depends on use of collected water

Considerations
Buildings contribute a significant amount of urban runoff in to what the streets must mitigate either underground or store aboveground. Stormwater collected from private and public buildings should be used as graywater for flushing toilets and irrigation.

Notes:

1. INLET IS PLACED UNDERNEATH A SHORTENED DOWNSPOUT.
2. OVERFLOW SHOULD BE LOCATED IN THE UPPER 1/3 OF THE STORAGE TANK.
3. A SEALED LID KEEPS INSECTS AND DEBRIS OUT OF THE STORAGE TANK.
4. A CONCRETE PLATFORM PROVIDES MORE CLEARANCE UNDER THE SPIGOT AND INCREASES THE RATE OF FLOW WHEN ATTACHING A HOSE.



1

Permeable pavement (p256) imitates the natural process of soil surfaces, reducing runoff and returning water to underground aquifers. Permeable pavement may consist of porous asphalt, pervious concrete, or permeable interlocking concrete pavers.

2

Underground detention (p257) systems hold stormwater runoff until it is released in to a LID network. Some underground detention systems can infiltrate water to the soil beneath if it is permeable.

3

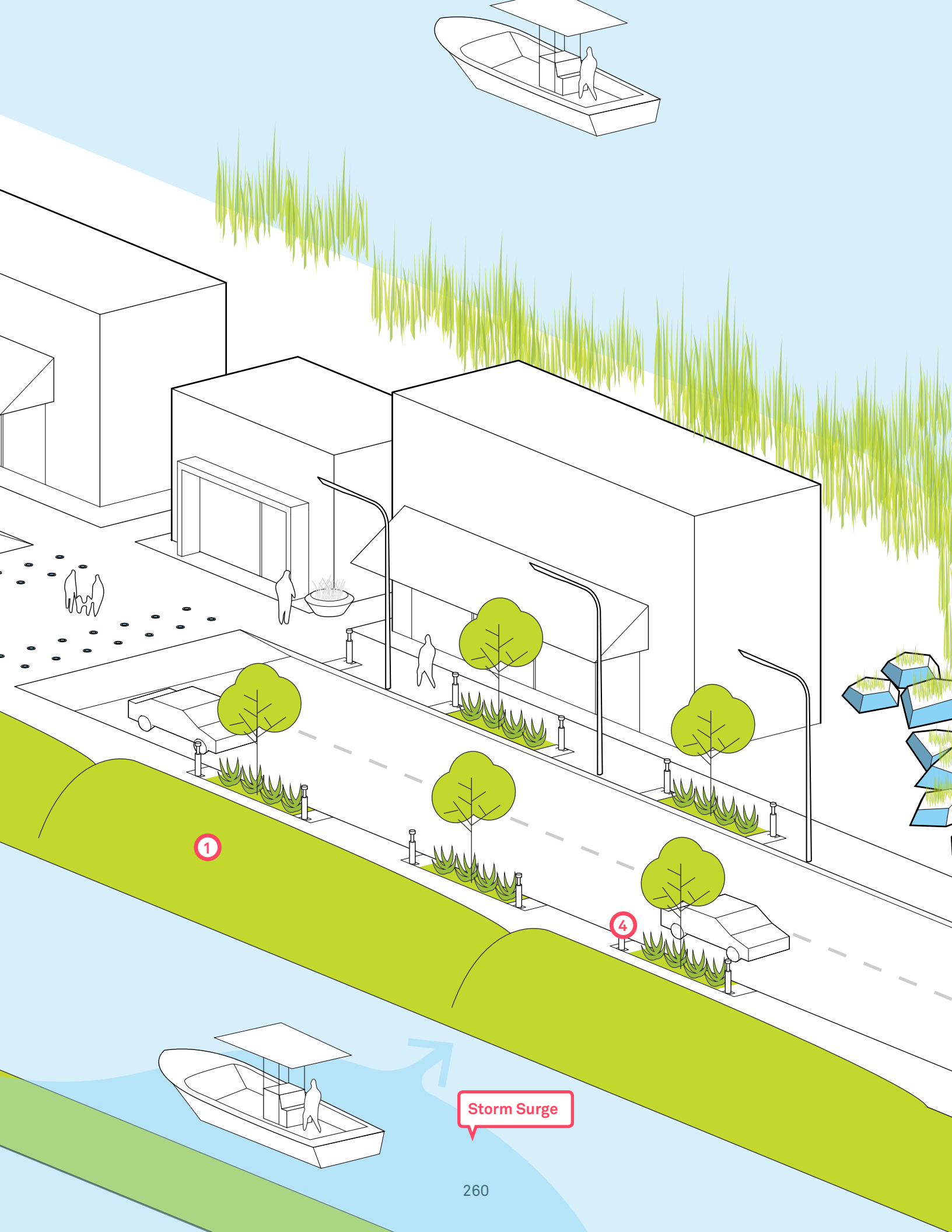
A permanent pool is maintained in a *wet vault (p258)*. Wet vaults are typically used where there is not enough surface area for other LID technologies, such as a dense parking lot.

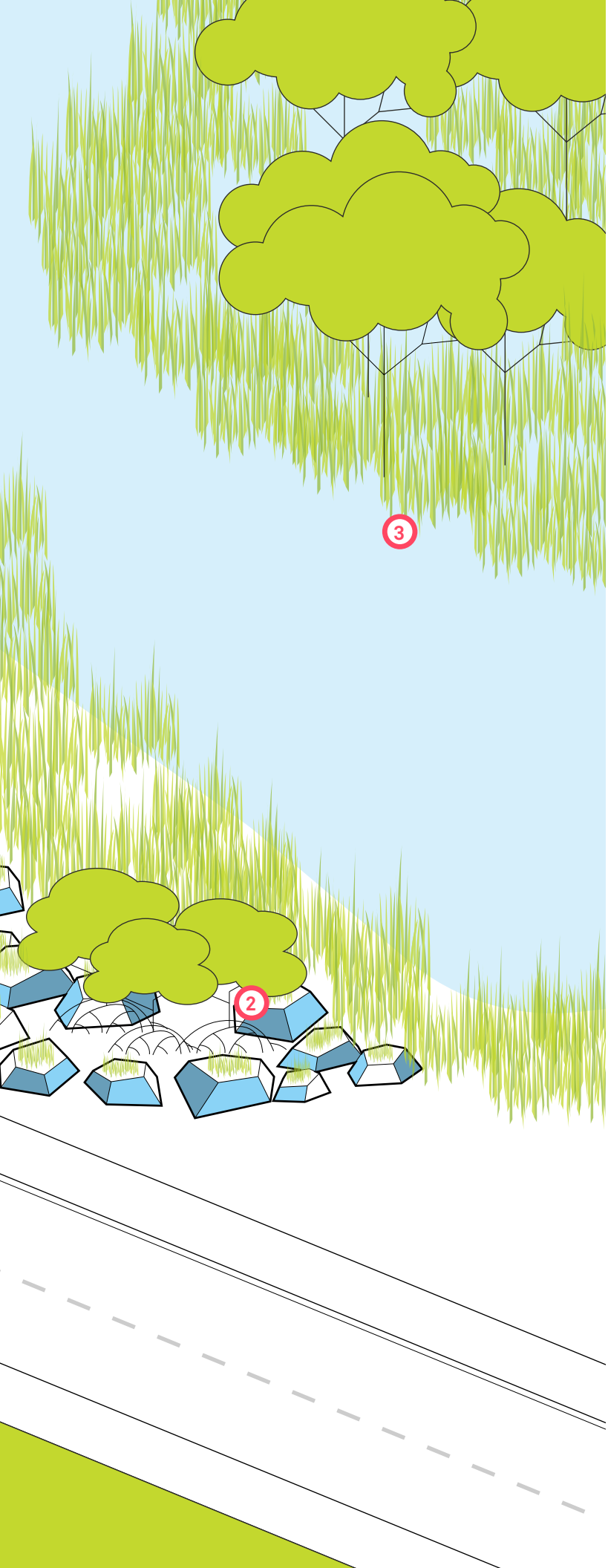
4

Oversized pipes are not influenced by design the parameters of the public realm, but rather the flow rates during storm events. Pipes larger than what is required help to eliminate large pressure drops.

5

Always use bike-safe drain covers when needed for LID technologies.


1
4
Storm Surge



shoreline infrastructure

With sea level rise and beach erosion, shoreline infrastructure is just as important as floodwater management tools. Shoreline infrastructure is the first line of defense against rising seas and storm surge. Shoreline infrastructure includes both conventional shoreline armoring and living infrastructure, such as beach dunes, living shorelines, constructed wetlands, and engineered shorelines.

1. Levees (p265) are ideal for keeping flood waters out of multiple buildings but also keep water in an area, when it may want to be released. Drain pipes may be installed running through the levee to relieve public spaces from floodwater.

2. Engineered shorelines (p269) can utilize a modular art form to enhance the aesthetics of the public realm or create a sense of place. Designers and artists should keep in mind required openings for plants to grow.

3. Constructed wetlands (p265) are built on uplands and outside of flood plains to avoid damage to natural wetlands and habitats. Constructed wetlands should not be installed over areas with permeable soils without a clay liner.

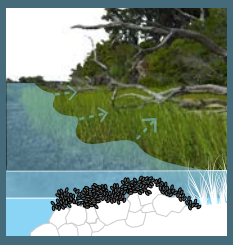
4. Salt-tolerant plant species must be used in planters where storm surge and tidal flooding occurs.

shoreline infrastructure tools matrix

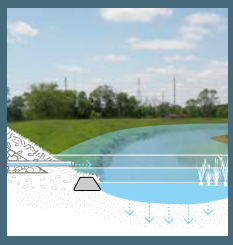
GREEN

GRAY

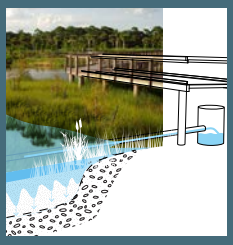
ROOT DUNES



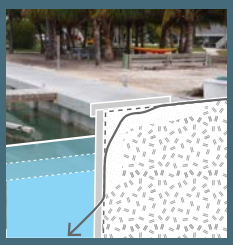
LIVING SHORELINE



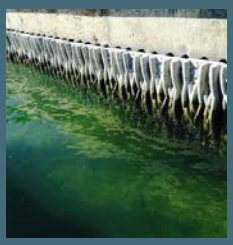
LEVEE



CONSTRUCTED WETLAND

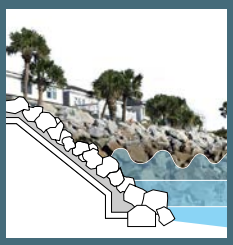


SEAWALL



REEFWALL

ENGINEERED SHORELINE



REVETMENT

-

+

AMOUNT OF SPACE REQUIRED

root dunes

Purpose
armor

Placement
low-lying oceanfront areas

Minimum Requirements
existing sources of sand and sediment transport systems

Considerations
Protection against storms is dependent on the size, width, slope, shape and sand volume of the beach. If adequate, dunes can act as a buffer, absorbing the energy of wave action and wind.

Notes:

1. EVERGREEN WINDSHIELD PROVIDES PROTECTION FROM WIND EROSION AND STORM SURGE; IT ACTS AS A SHIELD FROM URBAN LIGHT POLLUTION ON THE BEACHES AT NIGHT.
2. HERBACEOUS DUNEBUILDERS ARE MOSTLY GRASSES AND GROUNDCOVERS THAT PROVIDE STABILITY FOR THE DUNE WITH THEIR ROOTS.

living shoreline

Purpose
filtration/armor

Placement
shorelines in urban or rural areas; areas where wave action and fast currents are too strong for vegetation alone

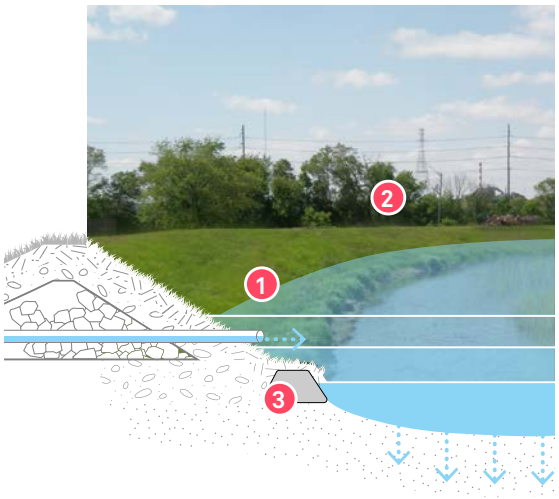
Minimum Requirements
The success of a living shoreline depends on several varying parameters:

- Length and width of project
- Slope (upland | shoreline | offshore)
- Soil type + bearing capacity
- Landscape palette
- Water quality + movement

Considerations
Coordinate with the appropriate agencies. Living shorelines act as barriers against erosion while providing a habitat for coastal species. Living shorelines are better at dealing with storm surge than hard infrastructure.

Notes:

1. OYSTER BREAKWATERS PROVIDE FILTRATION AND ABSORB ENERGY FROM WAVE ACTION DURING STORM EVENTS.
2. ROCK BEDS SERVE AS A HABITAT FOR OYSTERS.
3. TIDAL WETLANDS CONSIST OF GRASSES AND ACT AS A LAYER OF FILTRATION FOR POLLUTANTS. THE ROOT SYSTEMS PROVIDE STABILITY AT THE SHORELINE WHILE ABSORBING ENERGY FROM WAVE ACTION.



levee

Purpose
armor

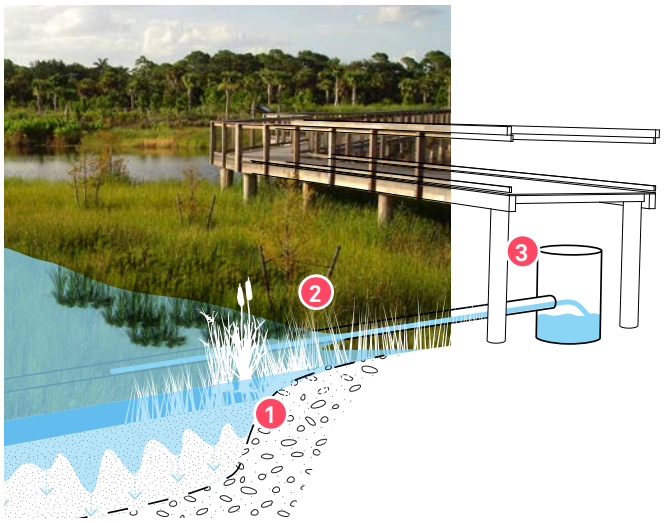
Placement
low-lying inland or coastal areas

Minimum Requirements
- maximum 6' high
- crest 5' wide
- use existing sources of sand and sediment transport systems
- maintain a slope of 1:2.5 on the water side
- maintain a slope of 1:5 on the land side

Considerations
Levees should maintain good sod growth on top to prevent erosion from wind, water and traffic. This will require regular mowing and maintenance.

Notes:

1. FLAP GATES OPEN ON WATER SIDE DURING FLOOD EVENT.
2. KEEP LEVEE CLEAR FROM ANY LARGE ROOTS FROM TREES OR BUSHES. THEY CREATE WEAK POINTS IN THE LEVEE, LEADING TO EROSION.
3. THE DRAINAGE TOE SHOULD BE SIZED ACCORDINGLY AND FILLED WITH SAND CONFORMING TO THE GRADATION OF STANDARD CONCRETE SAND, AS DEFINED BY ASTM STANDARDS.



constructed wetland

Purpose
filtration/retention/treatment

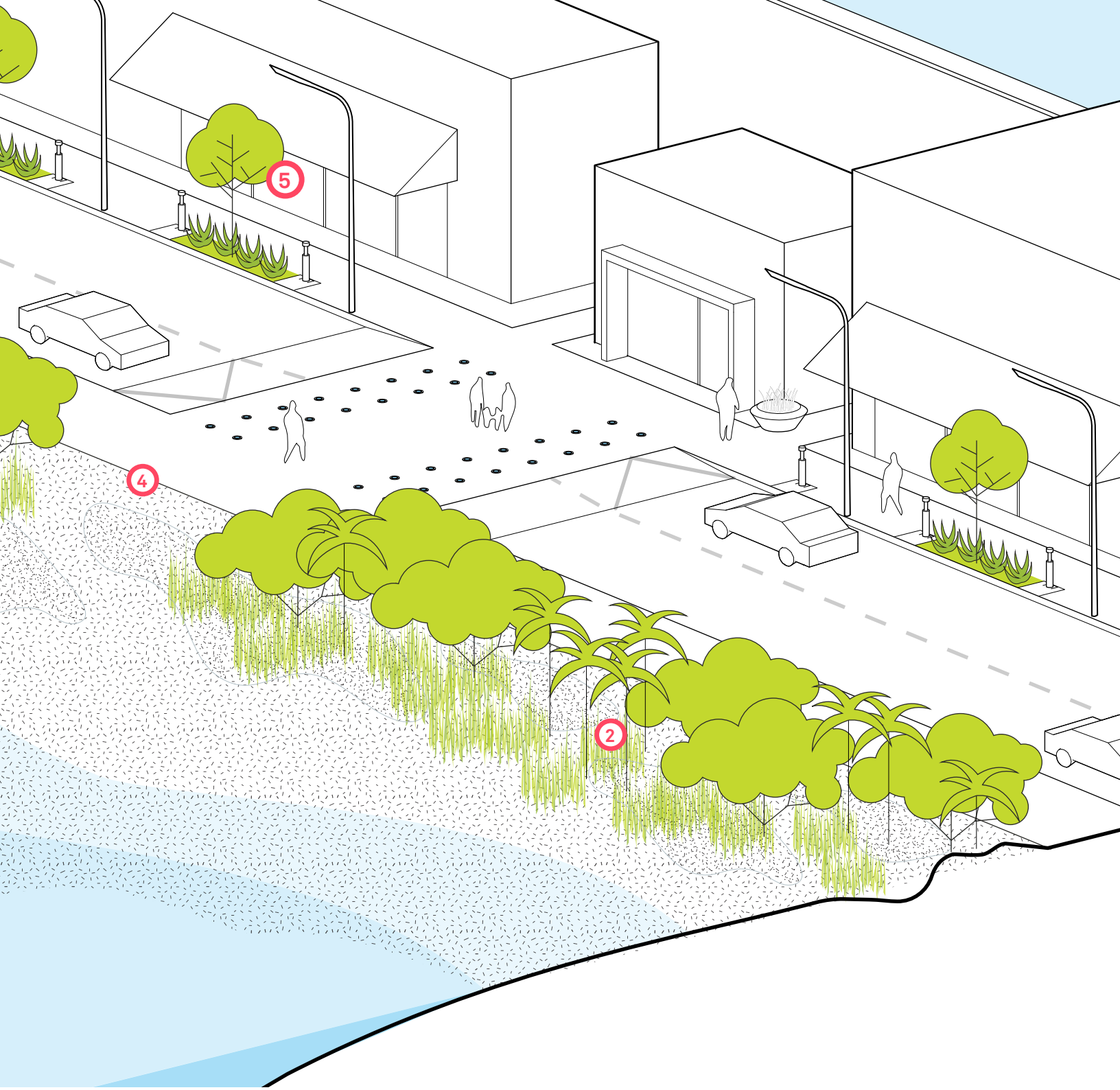
Placement
areas with impervious soils; uplands; outside floodplains

Minimum Requirements
water control devices used; long-term management plan must be followed

Considerations
Constructed wetlands can be cost-effective for treating wastewater, having low operating and maintenance expenses with fluctuating water levels.

Notes:

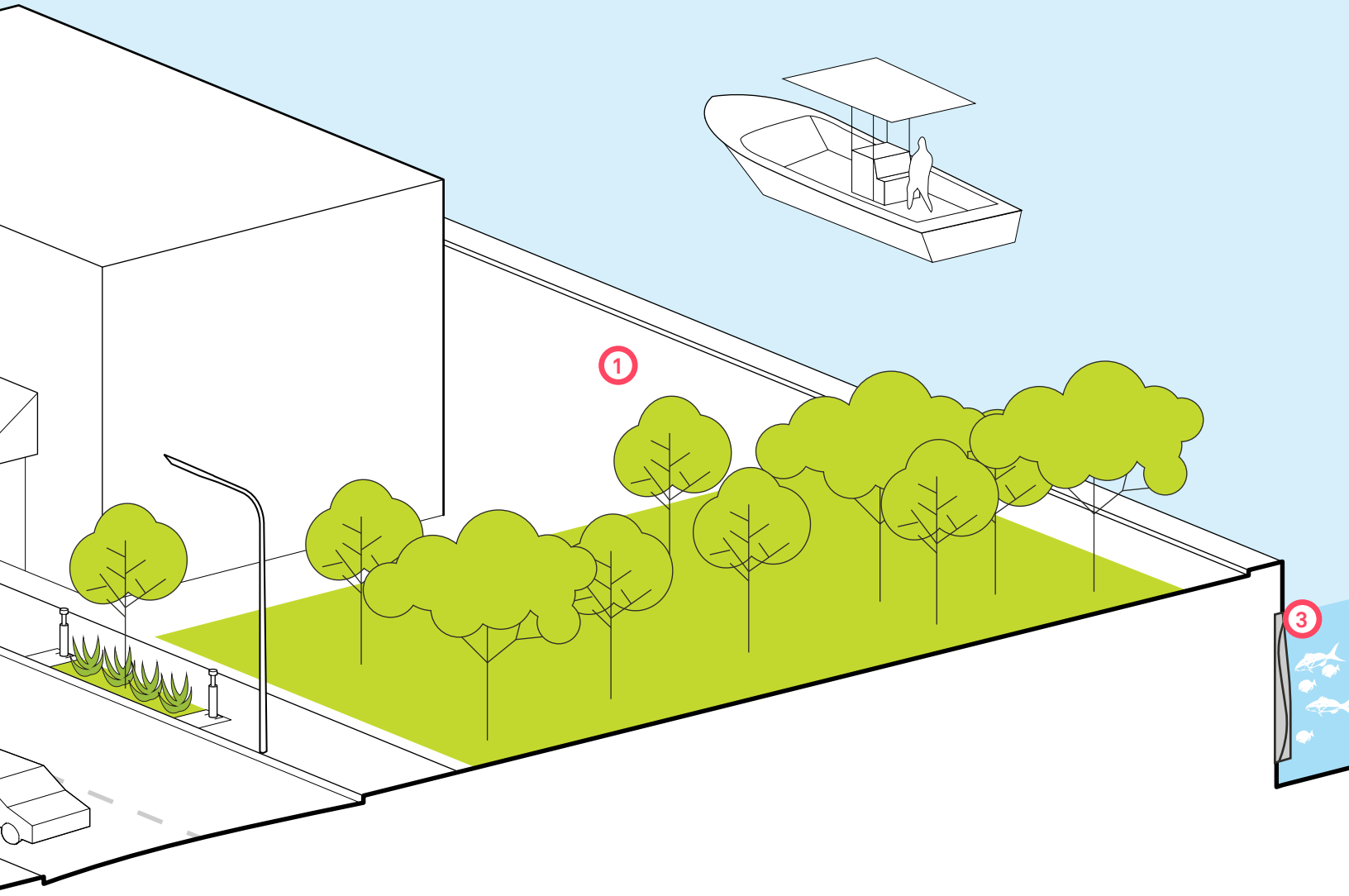
1. USE COMPACTED CLAY LINERS UNDER HIGHLY PERMEABLE SOILS.
2. USE WETLAND PLANTS, SEE LANDSCAPE P200
3. WET WELL



1. *Seawalls (p268)* should maintain a safe distance from building foundations to prevent soil and structural erosion.

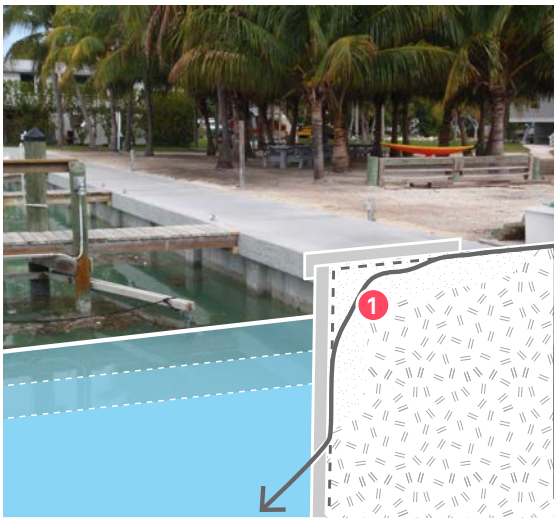
2. *Root dunes (p264)* naturally achieve dynamic stability under wind and wave action. Man-made dunes should be designed as closely as possible to a natural dune, considering placement, vegetation types, height and width.

3. *Reefwalls (p268)* are modular, precast systems that mock mangrove roots. Reefwalls both provide stability for hard shoreline edges, and habitat for marine life that would not exist otherwise with a typical seawall.



4 *Turtle-safe lighting (p180)* should be used along beaches.

5 Consider using a salt tolerant landscape palette along beaches or intra-coastal areas. Landscape may be affect by salt through wind or flooding.



seawall

Purpose
retention/flood control

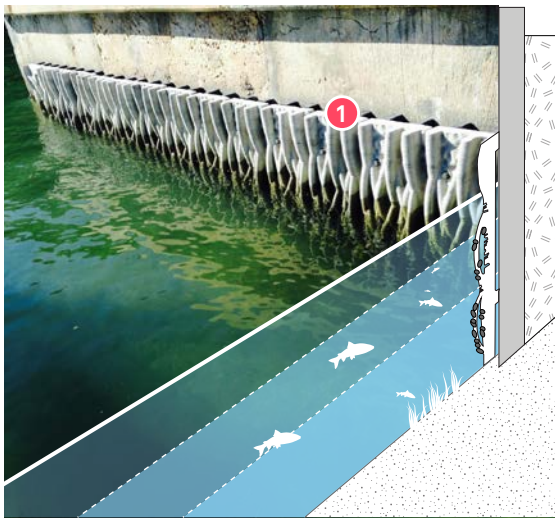
Placement
along canals and areas with space limitations

Minimum Requirements
minimum elevation of 3.9FT NAVD88 and a maximum elevation of 5FT NAVD88 but not exceeding base flood elevation (BFE) as identified in corresponding FEMA Flood Insurance Rate Map (FIRM). (see city ordinance)

Considerations
If constructing a seawall less than 5FT NAVD88 it is strongly encouraged to have the foundation designed to accommodate a future seawall height extension up to a minimum elevation of 5FT NAVD88. Seawalls are often in conflict with the dynamic natural environments which they contain or divide. Wave reflection from the wall may result in scour, lowering sand levels in the fronting beach. They may also accelerate erosion in adjacent unprotected coastal areas.

Notes:

1. **HYDROSTATIC PRESSURE CAN BUILD UP BEHIND SEAWALLS AND CAUSE DETERIORATION OR BREAKAGE. A SOLUTION IS TO INSTALL A ONE-WAY DRAINAGE VALVE TO EQUALIZE WATER PRESSURE BEHIND THE SEAWALL.**



reefwall

Purpose
retention/ filtration/treatment

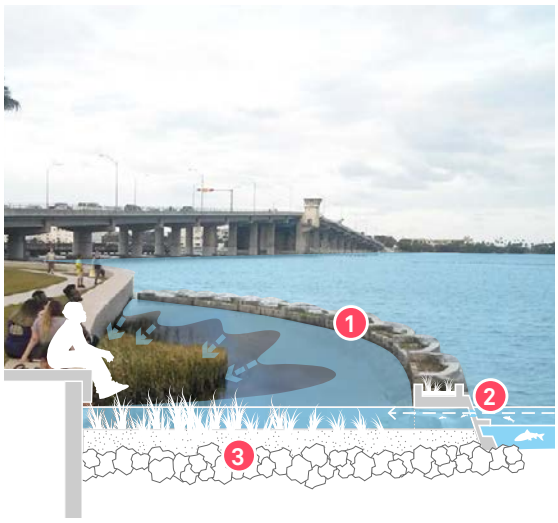
Placement
intracoastal edges in urban or rural areas

Minimum Requirements
existing sources of sand and sediment transport systems

Considerations
Reefwalls imitate natural habitats which attract oysters and soft-bodied species to establish tidal habitats. These habitats and species are able to help filter urban runoff as it enters the waterways and improve water quality along shoreline edges. Additionally the reefwalls can help mitigate wave energy and erosion, increase biodiversity, and visually-enhanced landscapes.

Notes:

1. **REEFWALLS CAN BE RETROFIT ATTACHMENTS OR THEY CAN BE CAST AS PART OF THE SEAWALL.**



engineered shoreline

Purpose
filtration/Infiltration/treatment

Placement
intracoastal edges in urban or rural areas

Minimum Requirements
existing sources of sand and sediment transport systems

Considerations
Concrete modules may incorporate planters elevated above the mean high tide, and provide a buffer between an introduced shallow water ecosystem and deeper water ecosystems.

Engineered shorelines provide a habitat for marine plants and wildlife, as well as protection from mild storms and wave action.

Notes:

1. PLANTERS/RETAINING CELLS CONTAIN VEGETATION. SURFACE AND MATERIAL OF CELLS PROMOTE OYSTER GROWTH.
2. OPENINGS ALLOW FISH AND OTHER CREATURES TO MOVE THROUGH AND MOST IMPORTANTLY IT FLUSHES THE WATER IN THE BASIN.
3. ROCK MATTRESS

revetment

Purpose
retention

Placement
shoreline areas with sloped surfaces

Minimum Requirements
sites with pre-existing hardened shoreline structures

Considerations
Revetments are a low-cost solution in areas that are vulnerable to depletion of the coastline. This technology may be utilized along the banks of freshwater rivers, lakes, and man-made reservoirs.

Notes:

1. ARMOR LAYER
2. FILTER LAYER
3. GEOTEXTILE FABRIC
4. TOE BERM

implementation

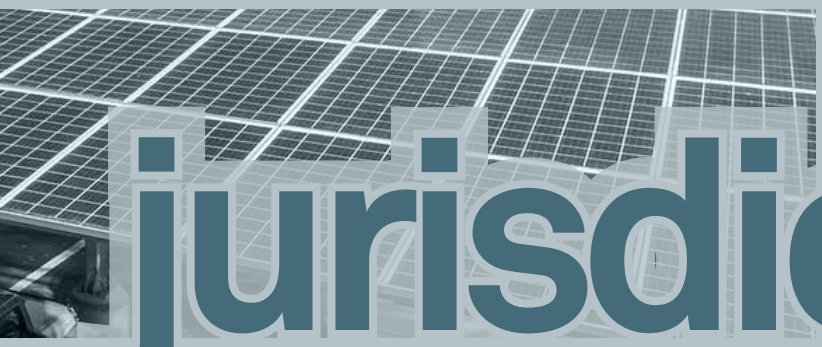
Design and construction implementation in the public realm deals with four primary aspects: jurisdiction and regulation, testing and evaluation, construction practices, and operations and maintenance. Jurisdiction and regulation varies and can complicate the design and construction process. In some instances, new and innovative solutions can be tested and evaluated before navigating jurisdiction and regulation requirements. To support a sustainable and resilient public realm, new construction practices may need to be adopted, and operations and maintenance should be incorporated early into the design and planning process.

JURISDICTION +
REGULATION

TESTING +
EVALUATING

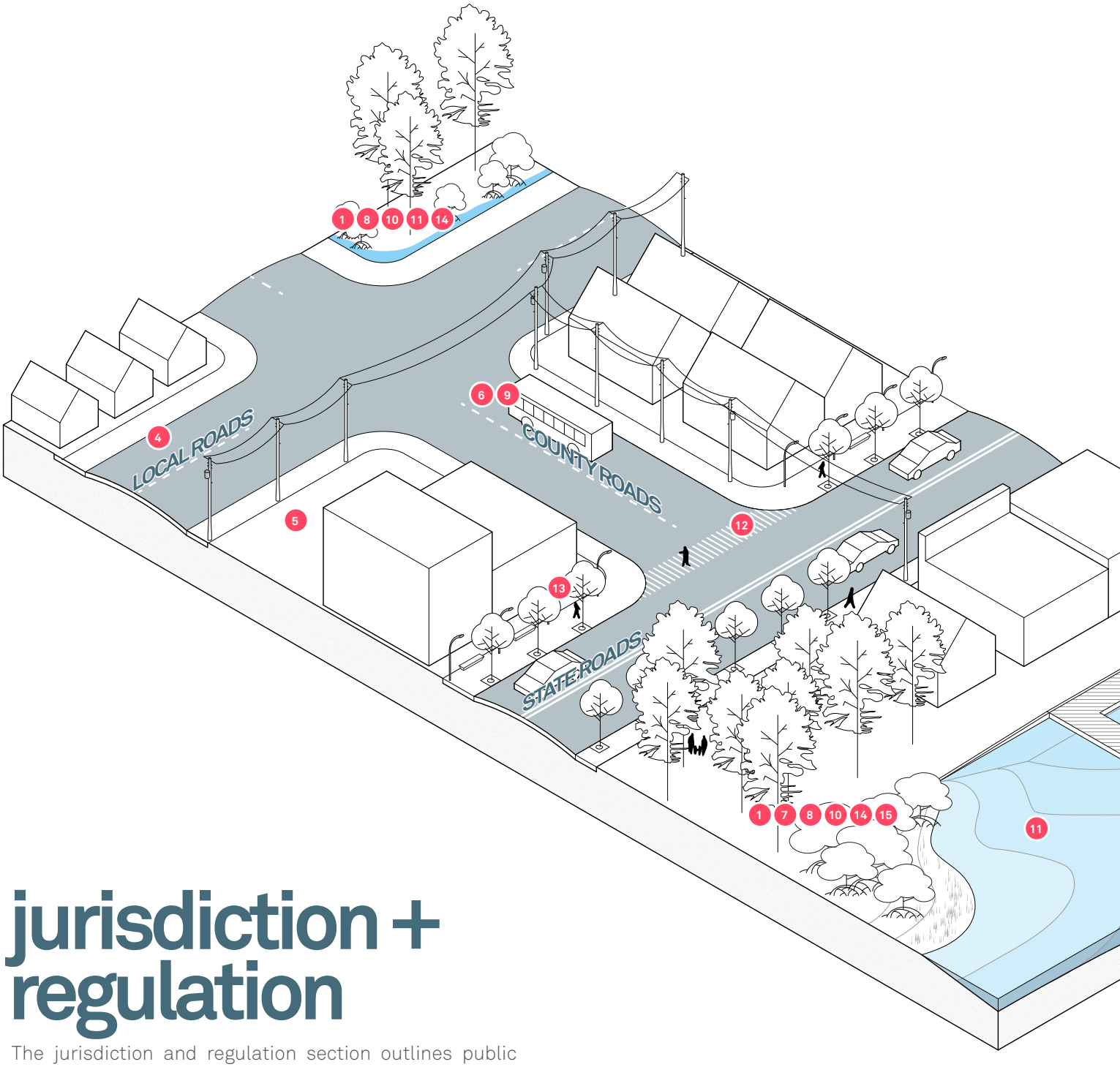
CONSTRUCTION
PRACTICES

OPERATIONS +
MAINTENANCE



jurisdiction + regulation

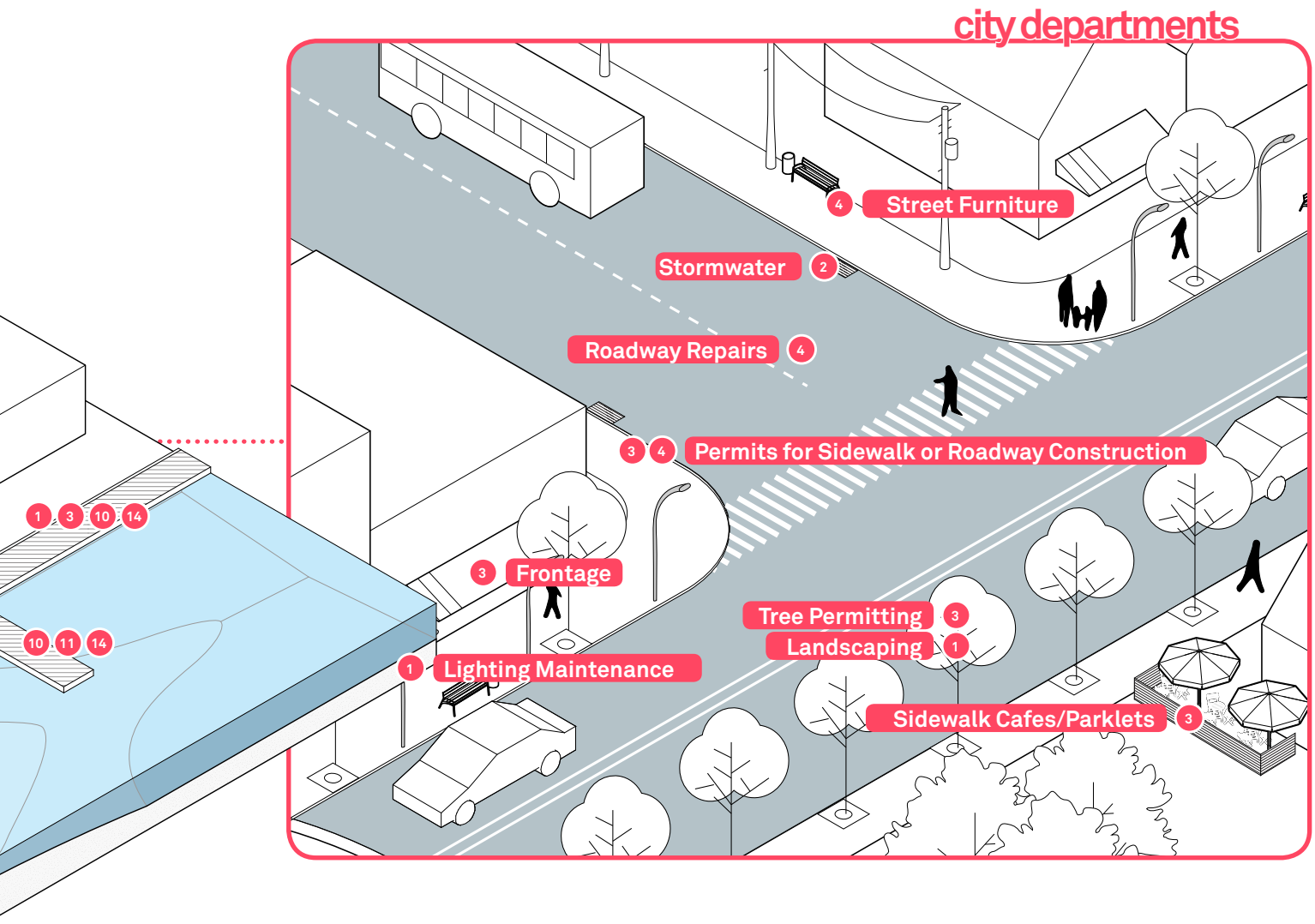
Various jurisdictions and regulations govern within the City of Fort Lauderdale, and they are an important part of the design and construction process. When projects abut a street or property regulated by another jurisdiction, coordination should happen from the beginning of the project in order to resolve any code discrepancies and ensure proper design goals are met.



jurisdiction + regulation

The jurisdiction and regulation section outlines public agencies, authorities, and other organizations that are often involved in the design, ownership and management of the public realm of the City of Fort Lauderdale. This part of the implementation process can be difficult to navigate since several agencies may have jurisdiction over the same area of interest and each with their own regulations; this requires a streamlining process and effective communication by all the agencies involved. Policies and regulations should be merged to effectively communicate what the standards or requirements are across all the agencies. Describing a way to navigate between these agencies can help to establish whose jurisdiction falls where.

The diagram above illustrates the various roles and responsibilities of city departments and other agencies related to the public realm. This drawing is for reference only, and does not include a complete list.



City of Fort Lauderdale

1. PARKS AND RECREATION
2. SUSTAINABLE DEVELOPMENT
3. PUBLIC WORKS
4. TRANSPORTATION AND MOBILITY

Broward County

5. BROWARD COUNTY PLANNING COUNCIL
6. BROWARD COUNTY METROPOLITAN PLANNING ORGANIZATION

Regional Agencies

7. SOUTH FLORIDA REGIONAL PLANNING COUNCIL
8. SOUTH FLORIDA WATER MANAGEMENT DISTRICT
9. SOUTH FLORIDA REGIONAL TRANSPORTATION AUTHORITY
10. DEPARTMENT OF ENVIRONMENTAL REGIONAL MANAGEMENT
11. ARMY CORPS OF ENGINEERS

State Agencies

12. FLORIDA DEPARTMENT OF TRANSPORTATION
13. FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS
14. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

testing + evaluating

Tactical urbanism is low-cost, temporary installations in the public realm intended to improve public spaces or test pilot projects. Funding, regulation and approval can create challenges for implementing projects. Tactical urbanism is a way to deliver some of these projects in a timely manner to communities, or it can be a means to test pilot projects before investing in larger scale projects. Tactical urbanism can also be a way for communities to express some of their ideas or desires, create place-making, or foster buy-in for a future project.

testing + evaluating

Implementing low-cost, temporary changes intended to improve public spaces or test pilot projects can be done through a testing and evaluating process. Funding, regulation or approval can create challenges for implementing new projects. Testing and evaluating is a way to deliver some of these projects in a timely manner to communities, or it can be a means by which to test pilot projects before investing in a larger scale project. These interim strategies can also be a way for communities to express some of their own ideas, create place-making, or foster buy-in for a future project.

Another facet of testing and evaluating is the opportunity to provide a phased strategy for projects. This means that a project or idea can start with minimal costs and temporary solutions. If successful, these temporary installations can become permanent, while testing and evaluating other aspects of the project until completion.

demonstration

The testing and evaluating process can be either sanctioned or not. Interim projects that are unsanctioned are often done by the community, while sanctioned projects are used by the City or private development to test pilot projects or programs. Community-driven placemaking is a big part of testing and evaluating. It allows the community to convey how they want to see and experience the public realm. Testing and evaluating can foster public engagement and help connect neighbors and build a sense of pride for their community. During the testing and evaluating process, data can be gathered to understand the needs of a community.

This data can also be used to track the success of other projects in the City. It can help the City decide where and how to invest in the public realm. Implementing interim projects will determine all of the agencies that will be involved in making a project permanent, and it will help to foster communication channels among these agencies. It can also inspire private developers and business owners to play an active role in shaping the public realm and realize what the community needs. Innovative ideas can be tested or showcased without complicated policy or jurisdiction at a low cost.

phasing

IDEA

Neighbors and local businesses can showcase how they would like their neighborhood to look and function. Projects during this phase are temporary and can exist a few hours or a few weeks. This phase can yield inexpensive and valuable feedback for a project.

INTERIM

The interim phase can provide an opportunity to test a project and or gain support in a project during the design, planning and policy process. This phase can also reveal obstacles that may need to be overcome when implementing a permanent design.

TRANSITION

Transitioning from interim design to final design is easier since stakeholders and decision makers have already become familiar with project ideas and their successes. These successful aspects of the project can be become permanent as funding becomes available.

INVEST

The is the final phase where a project becomes permanent in all its facets. At this stage, the project has been vetted and the unsuccessful aspects have been removed or fixed.

SHORT TERM ACTION -- LONG TERM CHANGE

1 curb activation

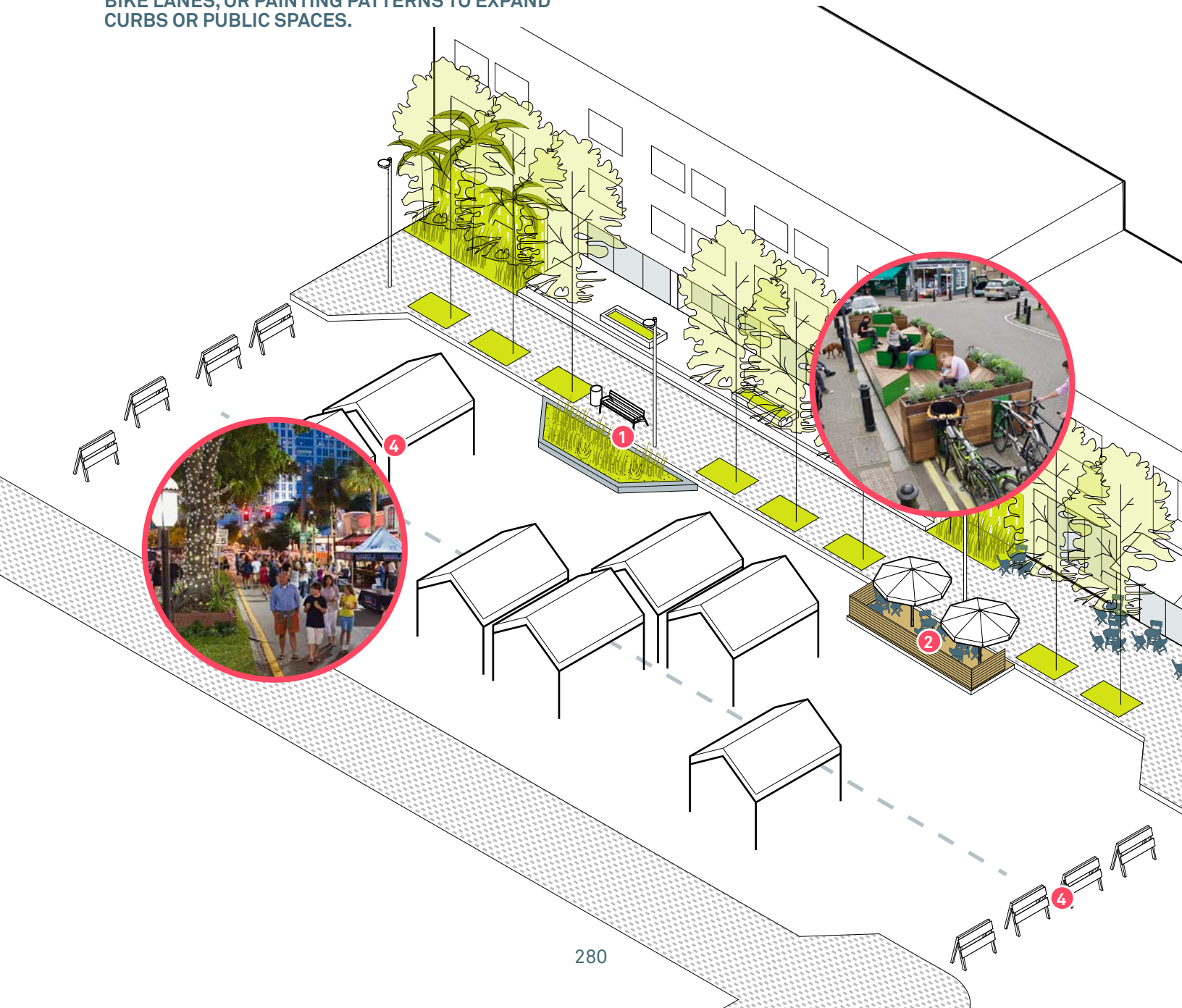
Activating the curb means extending the pedestrian or usable space into the space beyond the edge of the curb. Curb activation is often an easy way to test small projects that can have significant impacts. When space along the curb is on-street parking, the parking division must be consulted.

- **SIDEWALKS CAN BE TEMPORARILY WIDENED BY PLACING PLANTERS OR OTHER OBJECTS IN THE VEHICULAR RIGHT-OF-WAY.**
- **INTERIM PUBLIC SPACES TRANSFORM UNDERUTILIZED OPEN SPACES, STREET SEGMENTS, OR INTERSECTIONS FOR LOCAL RESIDENTS AND BUSINESSES TO USE.**
- **ROADWAY ADJUSTMENTS TEST NEW WAYS OF USING THE RIGHT-OF-WAY. THIS MAY BE DONE BY TEMPORARILY PAINTING NEW STRIPES TO ADD BIKE LANES, OR PAINTING PATTERNS TO EXPAND CURBS OR PUBLIC SPACES.**

2 parklets

Parklets convert on-street parking spaces into vibrant public open spaces. This is a cost-effective strategy that can activate streets, promote economic activity, and add to a sense of place. Parklets are often extensions of businesses that incorporate furniture and shade in areas that lack these amenities. They can also provide places for rest among an active but aging population. They can also incorporate bike storage if the right-of-way is limited.

- **A BARRIER SHOULD PROTECT USERS FROM EXITING DIRECTLY ONTO THE ROADWAY. THESE BARRIERS MAY BE TRANSPARENT MATERIALS, PLANTERS OR LEDGES.**
- **SINCE PARKLETS ARE EXTENSIONS OF THE SIDEWALK, THEY SHOULD BE FLUSH AND LEVEL WITH SIDEWALK. PARKLETS SHOULD BE ACCESSIBLE FOR ALL.**



❸ guerilla gardening

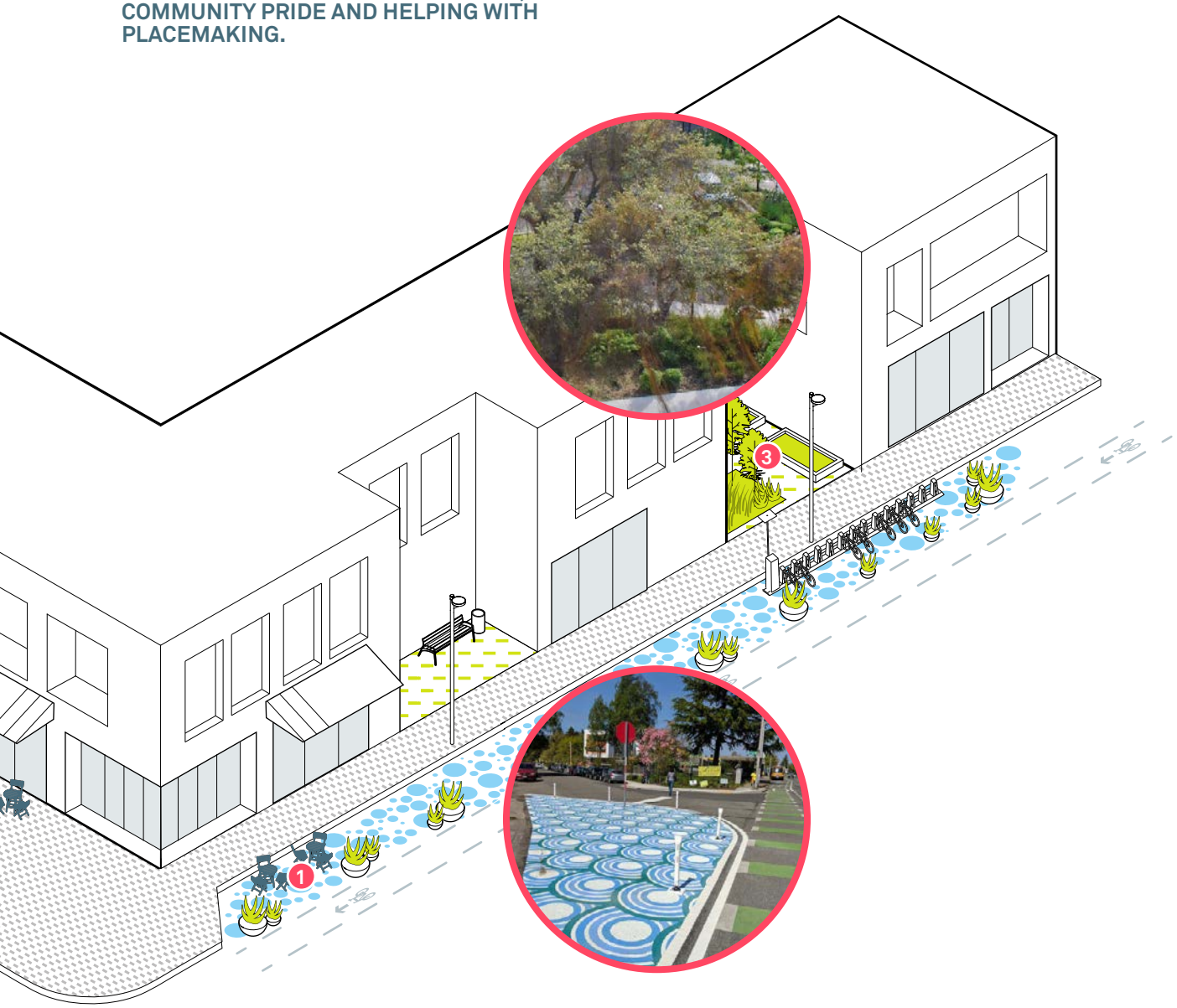
Introducing landscaping in locations that is not landscaped, or repurposing unused lots for community gardens is referred to as guerilla gardening. Green spaces contribute to the health and well-being of the environment and can cool and reduce urban heat island effects.

- **GUERILLA GARDENING CAN SPEED UP THE PROCESS OF INTRODUCING GREEN SPACES WHILE CONTRIBUTING TO PLACEMAKING.**
- **SECTIONS OF UNNECESSARY PAVEMENT CAN BE REMOVED AND CONVERTED INTO GREEN SPACE, HELPING TO BEAUTIFY AN AREA AND ALLOW STORMWATER TO BE ABSORBED.**
- **VACANT LOTS OR UNCARED FOR SIDEWALK LANDSCAPE AREAS CAN BE CONVERTED TO GARDEN SPACES BY THE COMMUNITY, BUILDING COMMUNITY PRIDE AND HELPING WITH PLACEMAKING.**

❹ temporary street closure

Temporary street closures may be weekly or seasonal, activating the street or segments of the street for pedestrians during events. Events or usage can include festivals, recreation, or business. Temporary street closures may also be used to test whether a street would better function as a pedestrian street or public open space instead of a roadway for traffic.

- **SUCCESSFUL STREET CLOSURES ARE OFTEN PROGRAMMED WITH EVENTS OR ACTIVITIES OR ARE ASSOCIATED WITH A CONTEXT SUCH AS STREETS WITH RESTAURANTS AND OTHER ENTERTAINMENT VENUES.**
- **TYPES OF STREET CLOSURES MAY INCLUDE FESTIVAL OR MARKET STREETS, PLAY STREETS, MARKET STREETS, AND PEDESTRIAN STREETS.**




ROAD
CLOSED
DETOUR

construction practices

Incorporating best practices into the construction process can reinforce the City's sustainability goals while minimizing disruption to the public realm. The construction practices lays out opportunities and considerations for improving construction projects by looking at construction in the right-of-way, construction and living infrastructure, and sustainable practices.

construction practices

Developing a new, sustainable, resilient, and cohesive public realm will also require new ways of construction to support these designs and projects. Construction is often the biggest polluter and invasive aspect of a project. The following are some methods and best practices that can be employed to transition to more sustainable and resilient construction practices while also minimizing the impact on public activity. Coordination of construction projects close together and site management can reduce the duration of street closures or diversions. Landscape and water protection can be monitored and maintained during construction to ensure their continued ecological services and health.

construction + public realm

Construction practices within the public realm should minimize disruption of the right-of-way, noise, and duration while providing safe conditions through alternative contracting strategies and unique design and construction solutions.

ACCELERATE PROJECT BY PROVIDING INCENTIVES/ DISINCENTIVES

Consider the use of bonus payments for early completion of construction, or penalties for late completion. Require lane rental fees for contractor when closing sidewalks/ lanes.

COORDINATE CONSTRUCTION SEQUENCE

Involve the construction team as early as possible during design and planning process. Schedule project phases to occur simultaneously whenever possible. Sequence major construction activities to minimize environmental impact and community disruption.

STAGING AND SITE PLANNING

Integrate construction staging and site protection during planning stage. (note: conditions may be different in future when construction starts and should be considered) Clearly mark limits of construction and other relevant areas that may impact community and environment. When design and construction alternatives exist, select the method that minimizes impact to community and environment.

construction + living infrastructure

Landscape is infrastructure and should be protected during construction similar to any other infrastructure. Protection should include but not be limited to the following: soil compaction and disturbance, pollution, damage from construction equipment or materials, and maintenance. Construction plans and processes should also establish, monitor and maintain vegetation protection measures.

PROVIDE PROTECTION THROUGH PLANNING

Include and highlight site protection areas on relevant plans. Discuss tree and vegetation protection plans at the alignment meeting and take necessary steps to coordinate utility work and earthwork to reduce impact. Prohibit construction vehicles from driving or staging on future and current planted areas. Develop and enforce a post-construction mitigation plan.

INCORPORATE SENSITIVE STRATEGIES

Test soils impacted by construction activity prior to planting and amend or remediate impacted soils post construction. To protect roots, use micro-tunneling and other trenchless technologies rather than cut and cover techniques, to install utilities within landscaped areas.

MINIMIZE SITE DISRUPTION

Prohibit construction vehicles from driving or staging on future and current planted areas. Minimize or, if possible, prohibit earthmoving within protected tree or vegetation/ riparian zones. Coordinate soil and planting installation with other construction activities to protect from damage. Specify that under no circumstances shall material, equipment or debris be stockpiled within the protection zones.

construction + sustainability

Projects should incorporate sustainable and resilient strategies during the construction phase. These strategies can include reducing waste, increasing recovery of recyclable materials and incorporating recycled material use.

IMPLEMENT A WASTE MANAGEMENT AND RECYCLING PLAN

Develop a construction and demolition waste management plan that includes a specified percentage of reuse and recycling in the construction process. Provide alternative uses for reusable demolition waste not utilized in construction. (E.g. can other projects use it in their construction? Document construction and demolition waste management efforts. When possible separate materials on-site for better recycling rates or storage. Manage site in accordance with the waste management hierarchy of reuse on-site, recycle on-site, reuse off-site, and recycle off-site. Prevent waste in design and material procurement.

PROTECT RESOURCES

Prevent water pollution by eliminating or reducing hazardous materials/products. Dispose or hold hazardous waste as indicated by manufacturer in accordance with local, state, or federal regulations If applicable, develop a temporary stormwater management plan to reduce, treat or hold runoff.

INCORPORATE ADDITIONAL METHODS

Develop performance goals to maximize the use of local materials. Provide training and education programs for staff and contractors. Implement information initiatives to inform and highlight practices to public. Use equipment with reduced emissions.


UESS

operations + maintenance

Operations and maintenance should be integrated early in the planning and design process. Landscape and stormwater infrastructure can function as planned or improve over time if properly maintained. The life expectancy of public realm elements can also be extended through proper operations and maintenance.

operations + maintenance

Operations and maintenance can sometimes be overlooked during the design process, but it plays a major role in the life span of a design and continuing to deliver what the design may have intended. The success of operations and maintenance may also determine the success of delivering future projects the ability to sustain them.

Operations and maintenance should integrate sustainable and resilient practices such as limiting waste and hazardous substances, using materials and resources efficiently, reducing impacts to the air, water, soil and vegetation, promoting energy efficiency and improving lifecycle and performance

budget + planning

Operations and maintenance should be integrated early in the design process to ensure that it can be maintained and managed effectively by those departments responsible. The maintenance budget should also be integrated early in the process to verify that what is planned can be afforded to be maintained. Integrating operations and maintenance along with the budget early in the process will not suppress the design process but can instead inform it while supporting cost effective upkeep considerations rather than having to change or retrofit the design later.

INTEGRATE OPERATIONS AND MAINTENANCE INTO THE DESIGN PROCESS WITH THE COORDINATION CHECKLIST AND SCHEDULED INTERVIEW AND/OR REVIEW SESSIONS.

SHARE GOALS OF PROJECT INCLUDING SUSTAINABLE OR RESILIENT ASPIRATIONS WITH OPERATIONS AND MAINTENANCE TO DEVELOP APPROPRIATE DESIGN OR BUDGET FOR PROJECTS.

ESTABLISH A MAINTENANCE BUDGET TO ACCOMMODATE MAINTENANCE AND ALIGN WITH DESIGN PROCESS.

DETERMINE MAINTENANCE SCHEDULE AND STANDARDS DURING BUDGET DEVELOPMENT.

warranties + training

Warranties often stipulate protocols and performance of equipment along with a stipulated warranty period. Education and training of operations and maintenance staff should be encouraged to introduce new methods and familiarity with new equipment.

PROVIDE WARRANTIES TO PARTIES RESPONSIBLE FOR OPERATIONS AND MANAGEMENT.

ENSURE WARRANTIES HAVE BEEN INITIATED AND PROTOCOLS ARE FOLLOWED SO AS NOT TO VOID WARRANTIES.

TRAINING ON OPERATIONS AND MAINTENANCE SHOULD BE CONDUCTED BY THE CONTRACTOR OR ITS SUBCONTRACTORS OR SUPPLIERS WHEN INSTALLING NEW EQUIPMENT BEFORE OPERATIONS BEGIN.

roles + responsibilities

Each project should have a clear specification that defines who is responsible for maintenance when the project is complete. This would include various city departments, county, state or property owners. Defining roles and responsibilities can manage maintenance costs and reduce oversight.

ESTABLISH CLEAR ROLES AND RESPONSIBILITIES FOR THE OPERATIONS AND MAINTENANCE OF RESOURCES DURING THE DESIGN PROCESS.

PROVIDE AGREEMENTS TO ENSURE CLEAR DELINEATION OF RESPONSIBILITIES AND IDENTIFIED PARTY, AND CLEARLY DEFINE THE PROCEDURES FOR BOTH ROUTINE AND CORRECTIVE MAINTENANCE.

standards + tracking

The standards of maintenance are established along with the maintenance budget and informs the level of service as well as how it may be tracked. Tracking performance and keeping records allow the City to better track and document costs and actual performance on an individual basis and improve recommendations and budget projections for existing and proposed projects.

ESTABLISH CLEAR STANDARDS FOR ACCEPTABLE VERSUS UNACCEPTABLE LEVEL OF SERVICE FOR MAINTENANCE THAT CAN BE EASILY COMMUNICATED.

PROVIDE PHASED SERVICE STANDARDS WHEN MAINTENANCE STANDARDS NEED TO DIFFERENTIATE BETWEEN AN ESTABLISHMENT AND LONG-TERM PERIOD.

SEASONAL AND CYCLICAL MAINTENANCE WHILE KEEPING EQUIPMENT OPERATING AS INTENDED CAN CONTRIBUTE TO LONG TERM ECONOMIC, ENVIRONMENTAL, AND SOCIAL GOALS.

EVALUATE NEW MAINTENANCE METHODS AND EQUIPMENT AND TRACK PERFORMANCE. ASSET MANAGEMENT OR TRACKING SYSTEMS SHOULD INCLUDE INFORMATION ON WHAT MONITORING AND MAINTENANCE IS REQUIRED FOR A SPECIFIC ELEMENT.

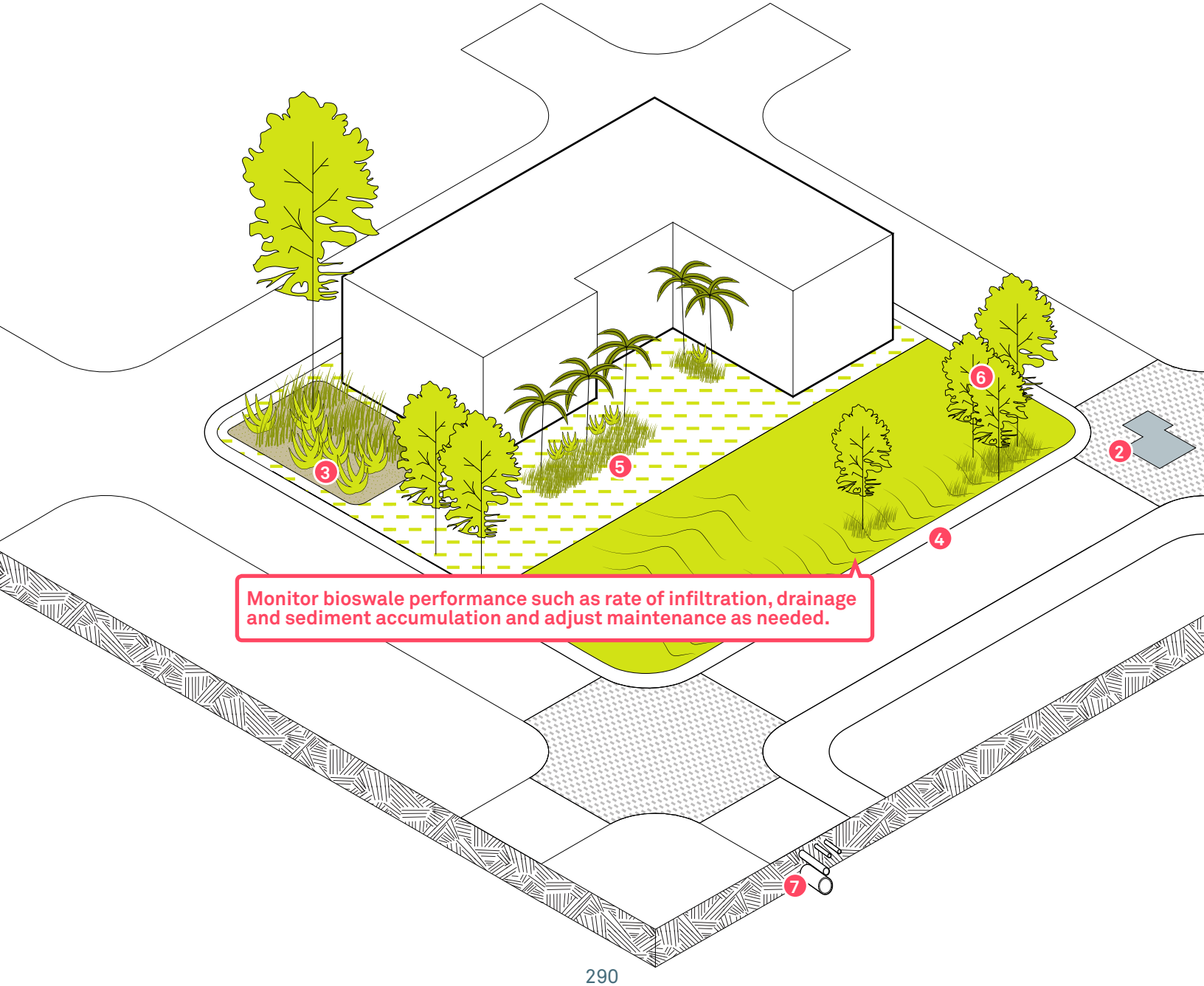
best practices

1 Street sweeping and vactoring should be conducted frequently to ensure that the pores of permeable paving remain open to allow water to drain through. To accommodate current street sweeper equipment an appropriate radius should be followed for corners and an apron should be incorporated to minimize damage to pavers.

2 When using pavers in intersections or at other crossing areas it should be stipulated that when maintenance or repairs occur, they should be removed carefully and replaced to match previous conditions.

3 Minimize deferred maintenance and spend more on routine maintenance rather than on rehabilitation or reconstruction of living infrastructure. Unlike grey infrastructure, plants get better with time and reach their maximum ecological service or performance when they are well established.

4 Landscaping is part of the infrastructure of the city and should be treated like any other infrastructure. Bio-retention swales are part of the stormwater management systems and when they are used as a staging area or dumping location during maintenance, they can be damaged or have their ecological service reduced.

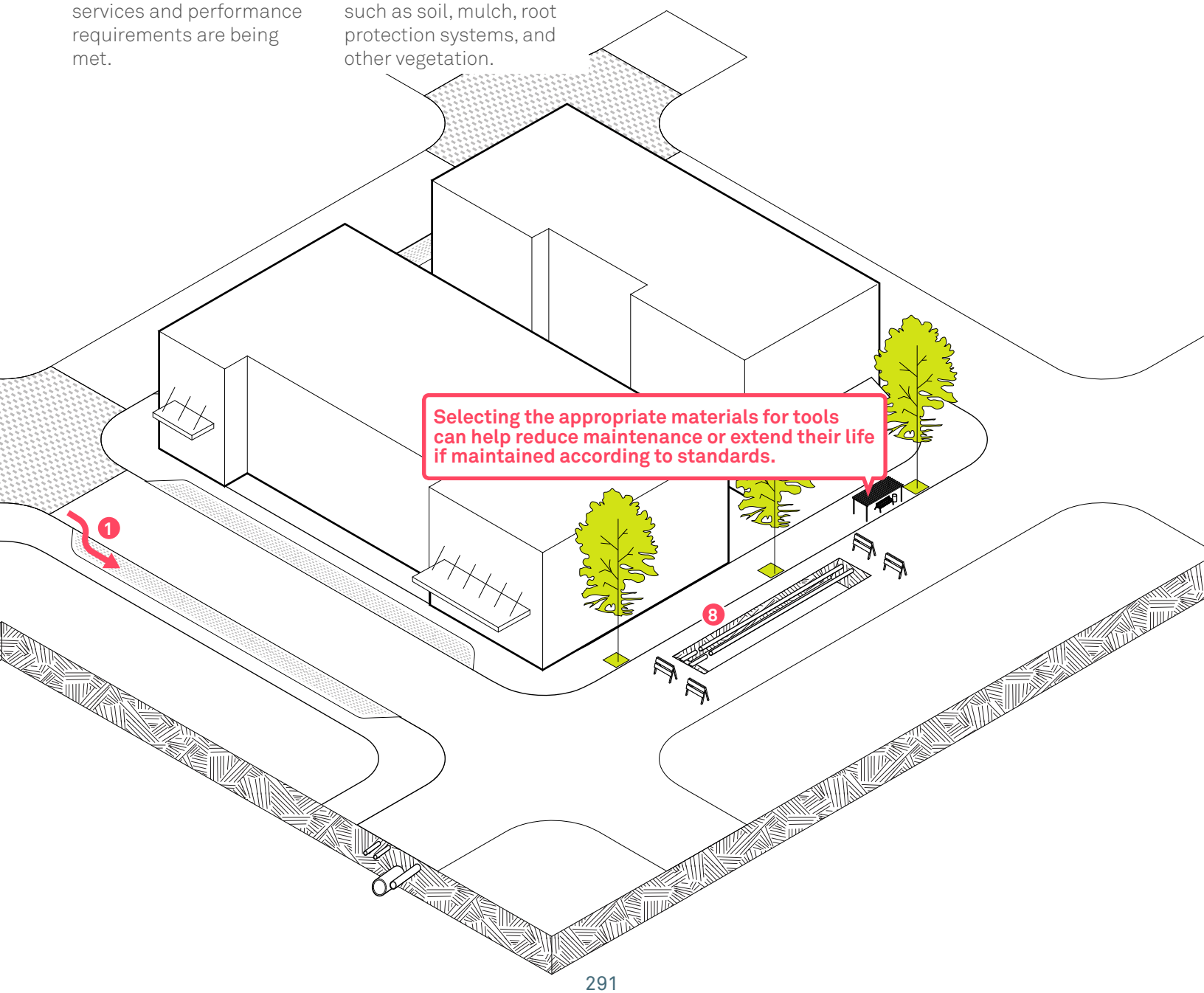


5 During the establishment period of new landscaping systems watering and irrigation is essential. Maintenance and management of landscape infrastructure can vary and may require a checklist or schedule to ensure each facility is maintained or managed properly. This checklist or schedule should incorporate a performance criterion to establish whether ecological services and performance requirements are being met.

6 Like other infrastructure, landscaping also has a lifespan. In order to extend that lifespan regular maintenance can maintain or enhance its ecological performance and aesthetic value. An annual inspection of erosion or pavement repair should occur to ensure the continued service of the vegetation. When it has reached is lifespan it may be necessary to replace important components such as soil, mulch, root protection systems, and other vegetation.

7 Coordinate utility infrastructure to optimize placement and provide easy access. By sharing trenches or utility ducts for multiple utilities it can minimize the impact on living infrastructure such as landscape and minimize impact to the public realm when service or repairs are required.

8 When possible coordinate services, upgrades, and repairs of under ground utilities to reduce the amount of times digging needs to take place. Coordination can also include other projects that may happen in both the public realm and private development.



reference guide

DESIGN WIDTHS

PLACE + IDENTITY

HEALTHY + ACTIVE LIFESTYLE

3’	furniture zone: signage, public art, planters, lighting, aboveground utilities	planters, minimum sidewalk pinch point for all residential street typologies, street trees, utilities
4’	furniture zone: custom seating, wayfinding	minimum functional bike lane width adjacent to buffer, minimum sidewalk pinch point for commercial streets and avenues
5’	furniture zone: custom planter with incorporated seating	recommended bike lane width, minimum clear sidewalk width if set back from curb
6’	minimum sidewalk width if at curb edge	minimum sidewalk width if at curb edge
7’	minimum parallel parking width from the edge of curb	minimum parallel parking width from the edge of curb
8’	entryway islands or mid-block islands furniture zone: seating, (sculptures) public art parklet	bike median
9’	minimum travel lane for avenues and streets	minimum travel lane for avenues and streets
10’ and greater	sculpture or other public art, minimum travel lane for boulevards	shared-use path, bike boulevard including buffers, minimum travel lane for boulevards

FOCUSED DEVELOPMENT	JURISDICTION + REGULATION	REGIONAL FLOODING
furniture zone: lighting, planters, waste receptacles, aboveground utilities	CITY: n/a COUNTY: bike buffer width next to on-street parking STATE: n/a	stormwater trees
minimum functional bike lane width adjacent to buffer	CITY: bike lane adjacent to buffer, sharrow distance from curb COUNTY: door zone next to bike lane, median for access control, bike lane with 2' buffer STATE: landscape for 40-45mph design speed, bike lane	planters (bio-retention, bio-filtration, hybrid)
recommended bike lane width, minimum sidewalk width if set back from curb, minimum sidewalk pinch point on all street typologies	CITY: minimum clear sidewalk, recommended tree belt between street and sidewalk, bike lane next to on-street parking COUNTY: bike lanes on principal arterial streets, bike lane next to on-street parking, local streets sidewalk STATE: sidewalk, bike lane adjacent to guardrail	tree/planter belt, pavered sidewalks
minimum sidewalk width if at curb edge	CITY: n/a COUNTY: preferred bike lane, one-way cycle track, median for access control, pedestrian refuge, trees and lighting, sidewalk width except local streets STATE: bike lanes adjacent to parallel parking, median for pedestrian refuge, sidewalks adjacent to curb	pavered sidewalks
minimum parallel parking width from the edge of curb	CITY: n/a COUNTY: parallel parking for avenues and streets STATE: parallel parking, buffered bike lane	pavered parallel parking
minimum chicane width, minimum width of bio-retention swales, parallel parking width adjacent to bike lane furniture zone: seating, bike racks	CITY: desired on-street parking width, sidewalks in high pedestrian volume areas COUNTY: recommended pedestrian refuge median, shared-use paths, minimum parallel parking STATE: small sections of shared-use paths, minimum parallel parking (C4, C5, C6)	minimum width of bio-retention swale
minimum travel lane for avenues and streets	CITY: n/a COUNTY: min. lane width for local streets and residential avenues and streets STATE: perpendicular parking	minimum travel lane for avenues and streets
chicane, mid-block curb extension furniture zone: shade structures, bike parking, minimum travel lane for boulevards	CITY: crosswalks outside of City Center, median for lefthand turn, shared-use paths COUNTY: lane width for residential collector & above, commercial avenues and streets, boulevard design speeds of 30-35 mph, painted medians, refuge islands STATE: lane width for urban local streets or design speeds of 25-35 mph (C3, C4, C5, C6), sidewalks on C5, shared-use paths	minimum travel lane for boulevards, recommended width of bio-retention swales

FLORIDA STATUTE 62-555.314 SEPARATION CRITERIA BETWEEN WATER MAINS AND OTHER UTILITIES

WATER MAIN SEPARATION FROM OUTSIDE OF:	HORIZONTAL SEPARATION		
	MIN	PREFERRED	EXCEPTION / COMMENT
sanitary sewer gravity	6 ft	10 ft	3 ft min when water main is 6 in above SSG see notes 1 + 2 below
sanitary force main	6 ft	10 ft	see notes 1 + 2 below
sanitary vacuum line	3 ft	10 ft	see notes 1 + 2 below
sanitary sewer treatment system	10 ft		
reclaimed water line *(not per FAC 62-610)*	6 ft	10 ft	see notes 1 + 2 below
reclaimed water line *(per FAC 62-610)*	3 ft		see notes 1 + 2 below
storm sewer	3 ft		see notes 1 + 2 below
stormwater force main	3 ft		see notes 1 + 2 below
stormwater manholes and sanitary sewer manholes	not in contact		see notes 4 below

NOTES:

1 - If less than minimum horizontal separation or where water main joints are less than minimum separation from other pipe joints, use pressure rated pipe for other pipe, and use restrained joints for either of the pipes or use water tight casing pipe or use concrete encasement for one of the pipes.

2 - If less than 3 ft horizontal separation, or less than minimum vertical clearance use DIP for both of the pipes.

3 - Preferable to lay water main above other pipes, center water main one full length of pipe on crossing.

4 - Conflict manholes with sanitary sewer manholes are not allowed. Conflict manholes with storm sewer manholes are highly discouraged; however, there are permit conditions that allow for installation. Must meet permit requirements of Florida Statute 62-55.314.

VERTICAL SEPARATION		
MIN	**PREFERRED**	**EXCEPTION / COMMENT**
6 in above or 12 in below	12 in above	water main joint at least 6 ft from other pipe joint see notes 1,2 + 3 below
12 in above or 12 in below	12 in above	water main joint at least 6 ft from other pipe joint see notes 1,2 + 3 below
6 in above or 12 in below	12 in above	water main joint at least 3 ft from other pipe joint see notes 1,2 + 3 below
12 in above or 12 in below	12 in above	water main joint at least 6 ft from other pipe joint see notes 1,2 + 3 below
12 in above or 12 in below	12 in above	water main joint at least 3 ft from other pipe joint see notes 1,2 + 3 below
6 in above or 12 in below	12 in above	water main joint at least 3 ft from other pipe joint see notes 1,2 + 3 below
12 in above or 12 in below	12 in above	water main joint at least 3 ft from other pipe joint see notes 1,2 + 3 below