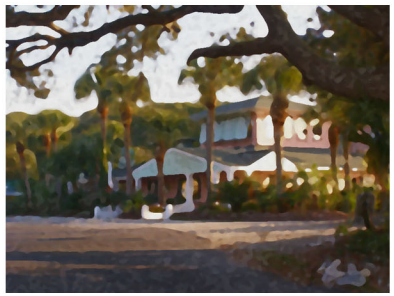
Sunset Boulevard Vision Plan

Sunset Beach, NC

Draft: March 2013



Town of Sunset Beach
Celebrating 50 Years
1963 - 2013

hcp Holland Consulting Planners
SageDesign
DAVENPORT

Acknowledgements

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Sunset Beach Planning Board:
Carol Santavicca, Chair Person
Tom Vincenz, Vice Chair Person
William (Bill) McDonald
Leon August
Al Seibert
Sybil Kesterson, ETJ Member
Robert Tone, Alternate ETJ Member

Additionally, Sunset Beach town staff provided valuable assistance throughout the Vision Plan process. The project team would like to thank the following:

Town Staff:
Gary Parker, Town Administrator
Sandy Wood, UDO Administrator & Building Inspector
Lisa Anglin, Town Clerk
Cindy Nelson, Administrative Assistant

The Sunset Boulevard Vision Plan project team was led by Holland Consulting Planners (HCP), with the support of Sage Design and Davenport Transportation Consultants.

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Chapter 1: Introduction

Purpose

Recent construction of the Sunset Beach overpass bridge, the addition of a public boat ramp, and the newly planned waterfront park has vastly changed the conditions and framework for development along the Sunset Beach Boulevard Corridor leading to the Intracoastal Waterway. Because of these changes, the town has established a community-based vision for growth and development in this area.

The completion of this project will result in a coordinated citizen based vision for the study area. Subsequent to adoption of the Vision Plan, the town's Unified Development Ordinance will be amended in an attempt to fulfill outcomes established through the visioning process.

Process

The visioning process relies on public participation for guidance, input, and the establishment of project goals. Two community visioning meetings took place to determine the "Assets, Issues, and Desires" for the study area. The Sunset Beach Planning Board served as the steering committee during the project process.

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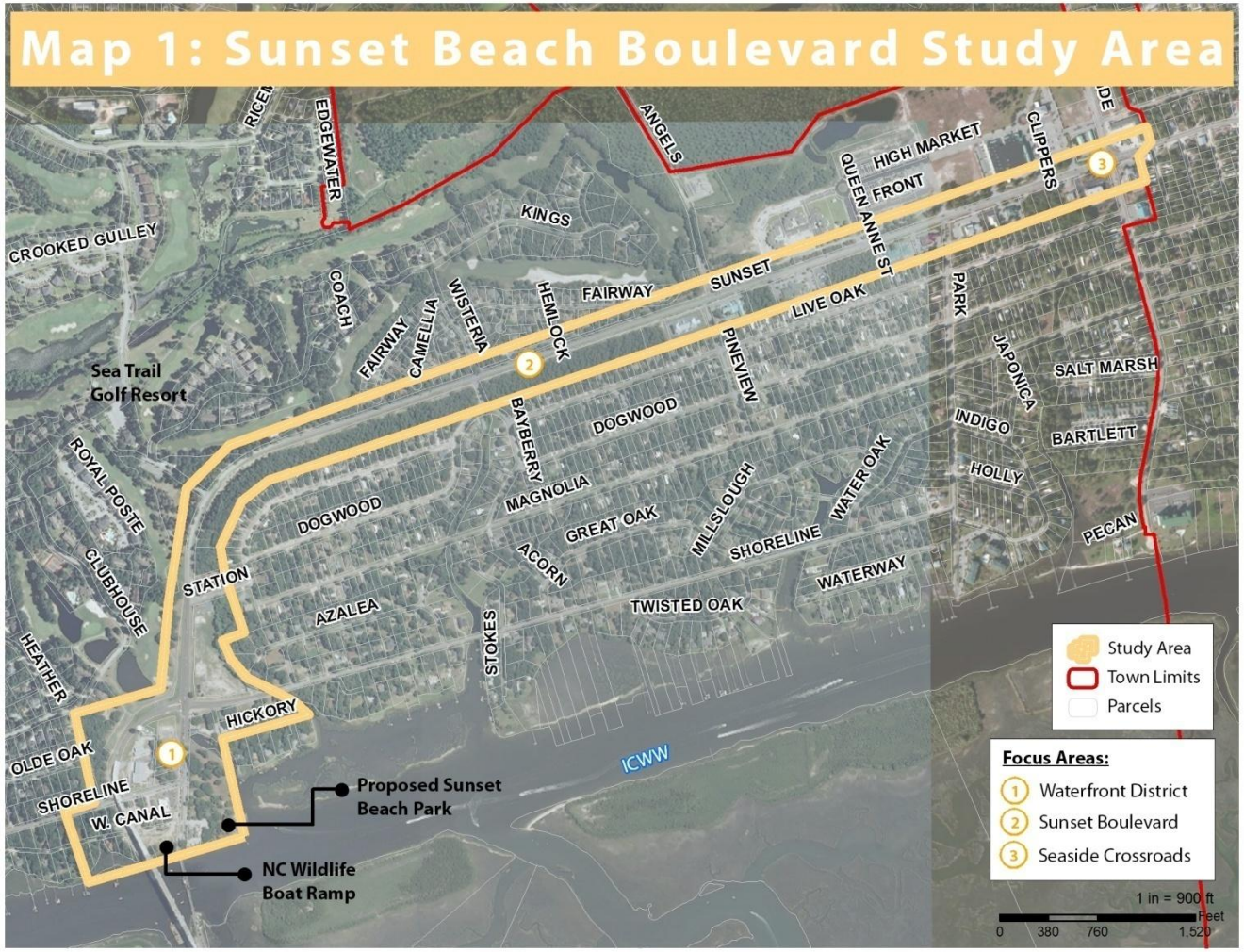
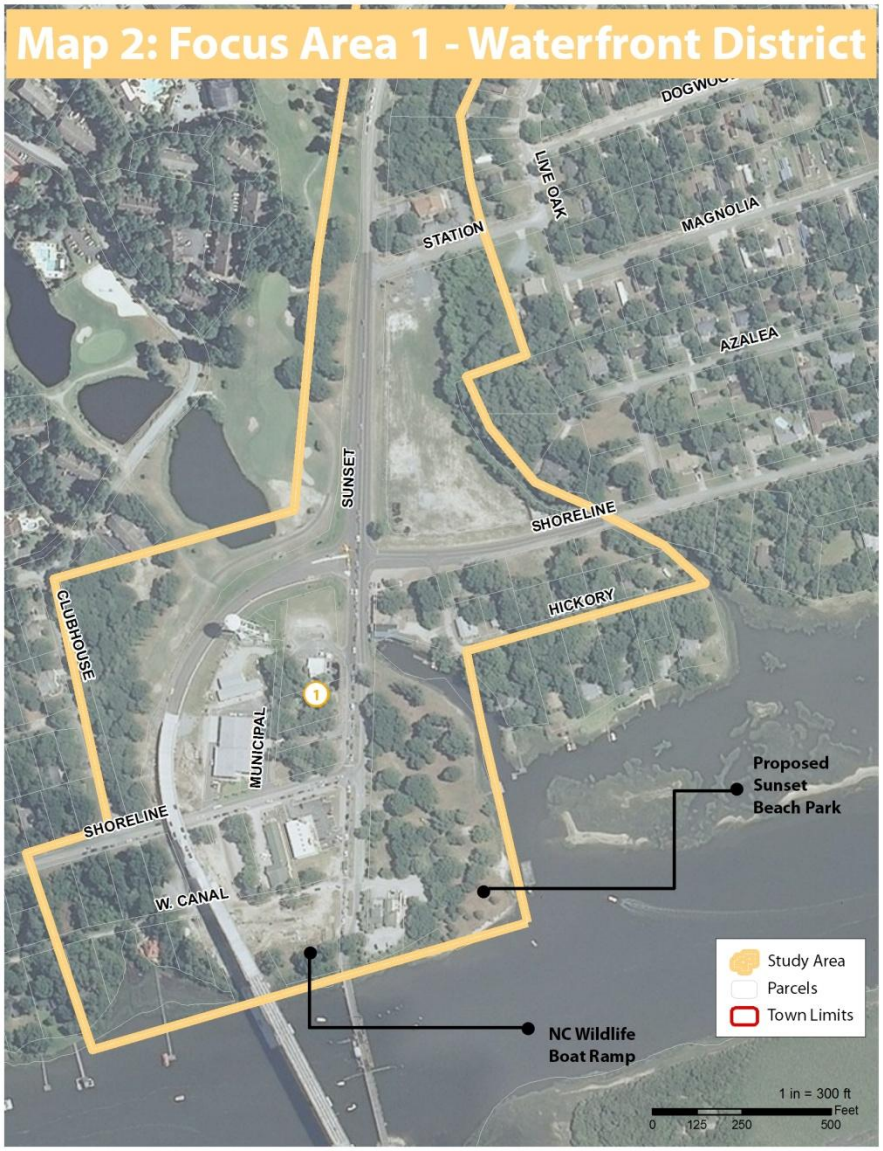


The project study area (see Map 1 above) consists of approximately 125 acres and extends from the NC Wildlife Boat Ramp to the intersection of Seaside Road and Sunset Boulevard. The intersection of Shoreline Drive and Sunset Boulevard is included in the study area, in addition to the area around the new high arc bridge. The study area is comprised of three separate focus areas: 1 – Waterfront District, 2 – Sunset Boulevard, 3 – Seaside Crossroads.

The focus area receiving the greatest level of analysis and project support is the **Waterfront District** (see Map 2). Significant issues, assets, and community desires make the area the most important for establishing a vision for growth and development. Parking, transportation flow, urban form, and natural systems were all analyzed as part of the process.

The **Sunset Boulevard** focus area is intended to create a conceptual basis for aesthetic improvement, access management, and transportation flow. Visioning in this focus area will result in a gateway improvement scenario for Sunset Beach residents and visitors.

The **Seaside Crossroads** focus area includes basic concepts for urban form, transportation enhancements, and signage.



Vision Plan Components

The following items will be addressed and included in the final project document:

1. Existing Conditions and Key Issues Identification
    - Public Input identifying key issues
    - Land Use and Transportation Systems
    - Natural Systems
    - SWOT Analysis
2. Conceptual Alternatives
    - Design Recommendations
    - Policy Recommendations
3. Implementation
    - Vision Plan Goals
    - Implementation Strategy

Public Involvement

Two community visioning meetings took place to establish input for the project study area. During the meetings exercises took place to determine the most viable option for creating an active, walkable, and lively waterfront district area. Utilization of Sunset Boulevard as a gateway and non-motorized connector were explored in detail. Lastly, an image preference survey was used to gauge citizen opinion on various components of the built environment, including transportation, urban design, and public realm aesthetics.

Meetings with various advisory boards took place throughout the process.

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Chapter 2: Existing Conditions

Introduction

The following section includes discussion on the existing conditions in and in close proximity to the study area. An analysis of demographics, transportation, land use, and natural systems is provided to form a base understanding of the area. A S.W.O.T. Analysis (Strengths, Weaknesses, Opportunities, Threats) is provided as a conclusion and summary to the chapter.

Demographics

Local demographics were analyzed within a mile of the study area. Categories include total population, median age, housing unit age, and median home value. The demographic categories were also analyzed by distance from the study area to include ¼ mile, ½ mile, and 1 mile segments (see Map 3).

Table 1: Study Area Proximity Population

Population 1980-2022	Quarter Mile	Half Mile	One Mile	Total
1980 Population	273	317	295	885
1990 Population	497	543	509	1,549
2000 Population	763	878	828	2,469
2010 Population	957	1,085	994	3,036
2022 Projection	1,179	1,337	1,225	3,741
Growth 2010 - 2022	222	252	232	705

Source: 2010 US Census & Applied Geographic Solutions

Population within a mile of the study area (see Map 3) increased significantly from 1980 to 2010, growing by over 240% during that time. The population is projected to grow by an additional 705 residents, or 23.2%, by 2022. Important to note is the number of individuals within walking and cycling distance to the study area. With just over 3,000 full time residents within a 5-minute bicycle ride, the study area is primed for land uses that cater to the non-motorized traveler. *Note – this figure does not include seasonal residents.*

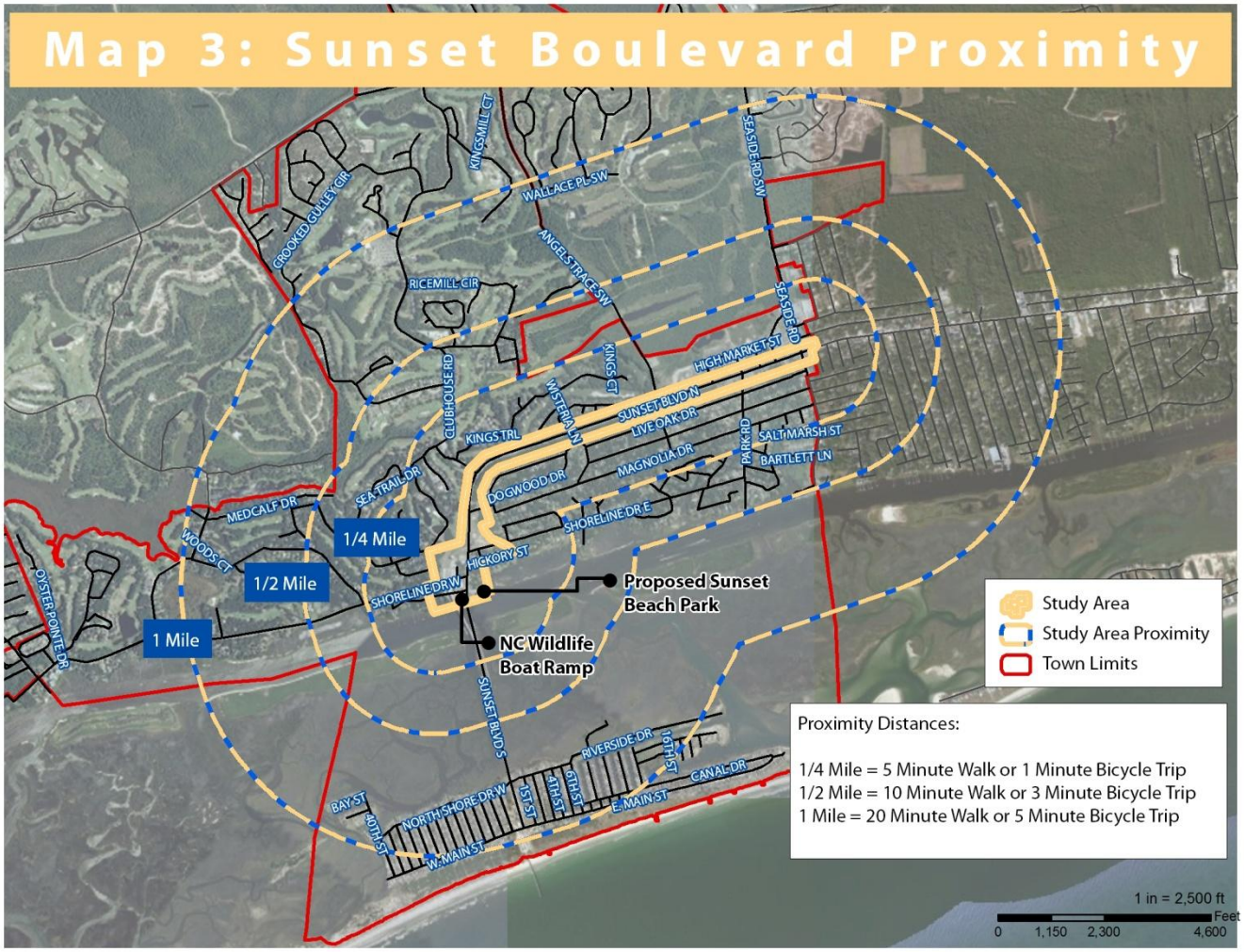
Other key demographic figures for the study area and the immediate proximity include the following:

- The median age of residents in the study area proximity is 59.3; the median age in North Carolina is 37.4.
- 78% of housing units (1,186 of 1,508) within a mile of the study area were built since 1980; in Brunswick County, 74% of housing units were built since 1980.
- The median value of owner occupied housing units within a mile of the study area is $254,412; the median value of owner occupied housing units in Brunswick County is $190,500.

Source: 2010 US Census

In general, the population in close proximity to the study area tends to be older and more affluent than residents in Brunswick County and the state as a whole.

Lastly, land in the study area is well suited to be developed to accommodate the needs of the full time residents in close proximity. More importantly, nearly 1,000 residents are located within a 5 minute walk of the study area and over 3,000 are within a 5 minute bike ride.



Vehicular travel along Sunset Boulevard from the intersection of Seaside Road to Shoreline Drive moves at a posted speed of 45 miles per hour. South of the intersection of Sunset Boulevard and Shoreline Drive, the posted speed limit is 35 miles per hour.

Annual Average Daily Traffic (AADT) counts in the study area range from 4,440 vehicles per day to 7,600 vehicles per day. These figures do not account for peak volumes experienced during the summer months.

In August of 2012, Davenport Transportation Consultants conducted a traffic count at the intersection of Shoreline Drive and Sunset Boulevard North (pictured above). Over the course of thirteen hours, 10,420 vehicles traversed that particular intersection (see Figure 1). The result shows that peak summer traffic volumes can be more than twice the Annual Average Daily Traffic volumes reported by NCDOT.

Transportation

Motorized

Sunset Boulevard is the primary corridor for visitors and residents seeking to access the Sunset Beach barrier island. A recently constructed high arc bridge carries individuals from the mainland to the island. The bridge is outfitted with five-foot paved shoulders for individuals traversing the structure by foot or bicycle.

Figure 1: The intersection of Sunset Boulevard and Shoreline Drive East; Traffic Volume August 2, 2012: 10,420 (Image Source: Google Maps).

Figure 1 above shows the intersection of Sunset Boulevard North and Shoreline Drive East. NCDOT has proposed a roundabout facility for this intersection. Vehicular traffic traveling to Calabash from the study area utilizes Shoreline Drive West (see Figure 2). Delivery trucks, school buses, and fire trucks regularly traverse Shoreline Drive West. Continuing south on Sunset Boulevard leads to a dead-end at a NC Wildlife Boat Ramp and the Intracoastal Waterway (ICWW).

Figure 2: The intersection of Sunset Boulevard North and Shoreline Drive West – AADT: 5,300 (Image Source: Google Maps).

Vehicles with boats in tow will increase throughout the summer, creating a potentially precarious situation at this intersection. Currently, the intersection is not signalized and maintains a stop sign on Shoreline Drive West for vehicles traversing the intersection heading east.

Parking

The availability of parking and the parking requirement in the Unified Development Ordinance (UDO) will continue to be an ongoing issue in the study area for site specific development due to lot size, depth, and stormwater requirements. The Waterfront District, in particular, experiences significant trip generation from summer tourists traveling from the island to retail and commercial establishments in the area. The addition of the proposed park will only increase the number of these trips.

Figure 3: Supply/delivery truck traveling west on Shoreline Drive West (Image Source: HCP).

Non-Motorized

Non-motorized transportation includes travel by foot or bicycle. Non-motorized travel can contribute to the local economy by supporting tourism and quality development. Pedestrian-friendly conditions improve the commercial and cultural vibrancy of communities. According to the Policy on Geometric Design of Highways and Streets, a primary roadway design guide used by transportation engineers, accommodations for non-motorized travel are vital to lively commercial districts:

> "Pedestrians are a part of every roadway environment, and attention must be paid to their presence in rural as well as urban areas…Because of the demands of vehicular traffic in congested urban areas, it is often extremely difficult to make adequate provisions for pedestrians. Yet this must be done, because pedestrians are the lifeblood of our urban areas, especially in the downtown and other retail areas. In general, the most successful shopping sections are those that provide the most comfort and pleasure for pedestrians."[1]

Currently, facilities do exist for non-motorized travel in portions of the study area. Sidewalks and a multi-use path are present along Sunset Boulevard from the intersection of Seaside Road spanning west for approximately ½ mile (see Figure 4 and Map 4).

Figure 4: Existing 10' multi-use path running adjacent to the northern edge of Sunset Boulevard North. (Image Source: HCP).

[1] *Policy on Geometric Design of Highways and Streets*, American Association of State Highway and Transportation Officials, 1994, p. 97.

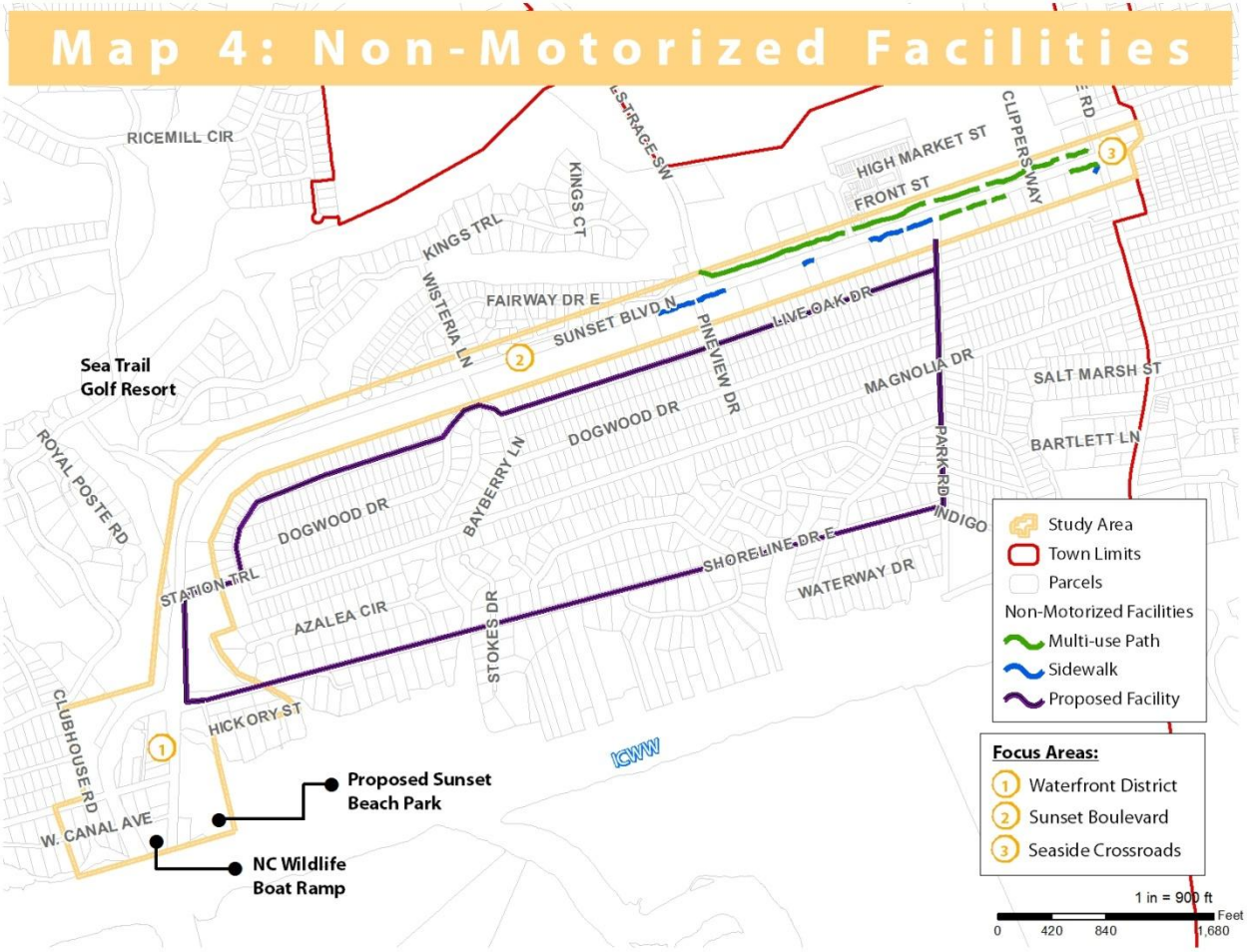


Figure 5: Existing 5' sidewalk running adjacent to the southern edge of Sunset Boulevard North. (Image Source: HCP).

The multi-use path facility that currently exists in the study area is approximately 3,643 feet long. The facility is an off-street separated facility, delineated by a green line on Map 4. There is also an off-street multi-use path on portions of the south side of Sunset Boulevard, from Park Road to Seaside Road.

Sidewalks (5') are present on the south side of Sunset Boulevard from Park Road to Pineview Drive, delineated by a blue line on Map 4. There are 1,206 feet of sidewalk facility in the study area.

No other non-motorized facilities currently exist in the study area. Additionally, there are no pedestrian safety accommodations such as crosswalks, pedestrian signals, or signage. However, the town is in the preliminary stages of completing a bicycle network. Land uses in the Waterfront District, the proposed park in particular, will create a need for non-motorized travel in the future. Further, a proposed roundabout for the intersection for Shoreline Drive East and Sunset Boulevard should be designed to accommodate potential need for non-motorized users prior to the design and construction of the facility.

Figure 6: A lack of non-motorized facilities in the study area may deter bicyclists and pedestrians and create potential conflict between motorists (Image Source: HCP).

Land Use

All land has an inherent utilization that can be classified to better understand the existing conditions and makeup of a given jurisdiction or small area. A complete description of each existing land use category used in the Vision Plan study area is provided below. Images depicting four land use categories are provided in Figure 7.

Seven land use categories were used to create the existing land use map. They are as follows:

- Commercial – retail, service, and shopping establishments
- Office and Institutional – government, public service, and offices
- Mixed Use – Parcel(s) with two or more uses present, such as residential and commercial
- Multi-family Residential – Properties with two or more residential units
- Single-Family Residential – All single-family residential properties
- Recreation – Land dedicated to public use for recreational purposes
- Unimproved – Uninhabited properties with no significant structures; land may be cleared or simply dormant vegetation

Figure 7: Four existing land use categories are shown above (Image Source: HCP).

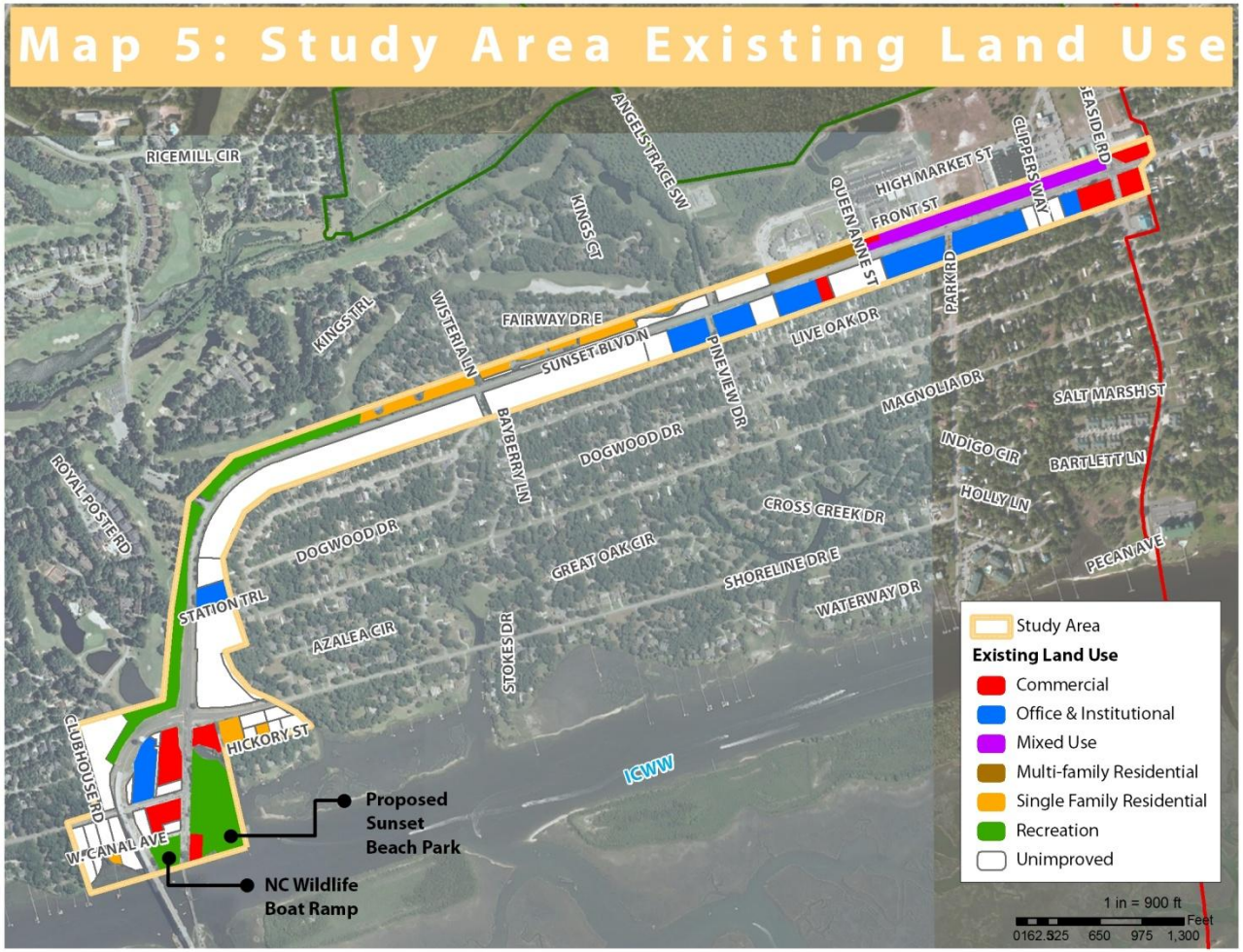


Table 2: Study Area Existing Land Use		
Land Use	Acres	% of Total
Commercial	7.85	6.27%
Office & Institutional	12.62	10.09%
Mixed Use	5.32	4.26%
Multi-family Residential	2.06	1.65%
Single Family Residential	5.44	4.35%
Recreation	14.81	11.84%
Unimproved	**41.89**	**33.49%**
Right-of-Way	35.10	28.06%
Total	125.09	100.00%

Source: HCP & Brunswick County GIS

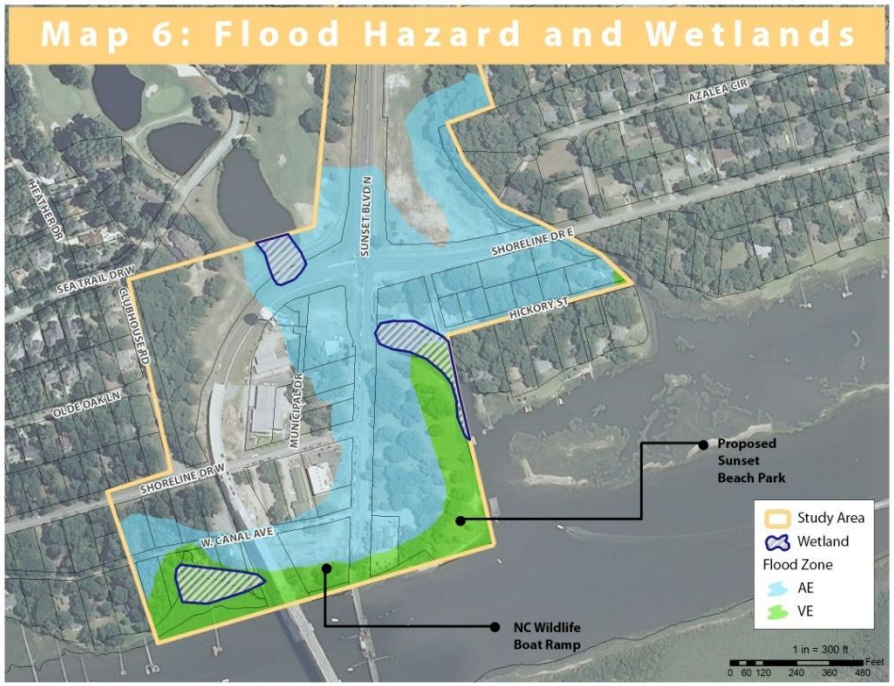
The majority of the unimproved lands are zoned MB-2 and MB-1, which are commercial districts that allow for retail uses.

A small portion of the study area is dedicated to single-family residential uses; however, land just outside study area boundary consists primarily of single-family residential land uses.

Unimproved lands occupy the most significant amount of acreage in the study area, with just over 33% of the total acreage, or 41.89 acres. Unimproved lands are shown as white on Map 5 above. Right-of-way is not shown on the map, but is considered the acreage that occupies the roadways and immediate vicinity.

Natural Systems

For the purposes of this vision plan, natural systems refer to acreage prone to natural hazards or ecologically significant lands in the study area, more specifically, flood hazard areas and wetlands. Both environmental components were minimal in the study area. The only portion of the study area affected by either flood hazard areas of wetlands is the Waterfront District.



Flood Hazard

Floodplains are divisible into areas expected to be inundated by spillovers from stream flow levels associated with specific flood-return frequencies. The National Flood Insurance Program (NFIP) uses flood zone designations to indicate the magnitude of flood hazards in specific areas. Zones AE and ZE are Special Flood Hazard Areas (SFHA), which are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. Floods in the Zone VE may be subject to an event with additional hazards due to storm-induced velocity wave action. There are approximately 23.4 acres in Zone AE and 6.67 acres in Zone VE within the study area.

Wetlands

Wetlands provide a multitude of ecological, economic and social benefits. They provide habitat for fish, wildlife, and a variety of plants. Wetlands are nurseries for many saltwater and freshwater fishes, and shellfish of commercial and recreational importance.

Wetlands are also important landscape features because they hold and slowly release flood water, recharge groundwater, recycle nutrients, and provide recreation and wildlife viewing opportunities for millions of people.

The federal regulations implementing Section 404 of the Clean Water Act define wetlands as:

> "Those areas that are inundated or saturated by surface or ground water (hydrology) at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation (hydrophytes) typically adapted for life in saturated soil conditions (hydric soils). Wetlands generally include swamps, marshes, bogs, and similar areas (40 CFR 232.2(r))."

Within the study area there are only 1.96 acres of wetlands (see Map 6).

S.W.O.T. Analysis

An analysis of Strengths (S), Weaknesses (W), Opportunities (O), and Threats (T) was conducted to obtain a thorough understanding of the study area. S.W.O.T. analysis is a tool most consistently used for corporate planning, but can be used across multiple disciplines. The goal of any S.W.O.T. analysis is to identify the key internal and external factors that are important to achieving the objective.

The S.W.O.T analysis provided represents a summary of findings in the study area.

Strengths

Sunset Beach has much to offer residents and visitors on its mainland. The Intracoastal Waterway (ICWW) is a scenic draw for tourists, residents, and aquatic recreation enthusiasts. The NC Wildlife Boat Ramp and proposed Sunset Beach Town Park will only strengthen the allure of the Waterfront District in the coming years. These resources, coupled with retail establishments, make the area one the most unique and inviting places in Southeastern NC.

Around the study area, median home values and household income figures are generally higher than in other areas of Brunswick County. This fact highlights the availability of purchasing power and customer base for retail establishments in the study area. Additionally, 78% of the housing within a mile of the study area was constructed in the last 30 years. Further, the population within a mile of the study area is projected to increase by close to 25% over the next ten years.

In terms of transportation, the existing multi-use path facility – though not currently part of a complete network – is a superbly designed facility. The facility has adequate separation from the roadway and offers shade and visual interest to users.

Figure 8 & 9: The ICWW offers incredible view and lures visitors and residents to the area. The NC Wildlife Ramp will be a catalyst for year round visitation (Image Source: HCP).

Figure 10: The existing 10' multi-use path on Sunset Boulevard is an excellent amenity for area residents (Image Source: HCP).

Weaknesses

Transportation –motorized and non-motorized – is an overriding concern in the study area as a whole. In the Waterfront District in particular, lot size and parking requirements may limit the future businesses from locating in the area. No on-street parking currently exists in the study area.

Vehicular speeds in the study area and Waterfront District may deter non-motorized users and create safety hazards for pedestrians and cyclists. Further, no accommodations currently exist for pedestrians or cyclists in the Waterfront District.

Conflicting uses are also present in the Waterfront District. The NC Wildlife Ramp, while an amenity, will generate vehicular traffic volume that may conflict with the parking area adjacent the Twin Lakes Restaurant. During the summer months, both the restaurant and boat ramp will generate significant vehicular traffic.

Figure 11: Twin Lakes customers choosing to utilize this parking facility may conflict with vehicular traffic exiting the NC Wildlife Boat Ramp (Image Source: HCP).

Lastly, the flood hazard areas in the Waterfront District may constrain development due to additional costs of building elevation and reinforcement.

Opportunities

A significant opportunity exists to more fully utilize the Intracoastal Waterway as a draw for tourists and year-round residents. The creation of a walkable, waterfront commercial district will bolster the customer base and solidify the Sunset Beach area as a regional destination year-round. The consideration of sidewalk café seating for existing and future establishments should be explored by the town.

To embrace a walkable and bikeable commercial district, the town will have to coordinate with existing and future business owners to prioritize capital improvements for the area. Streamlining the development review process in the study area, as result of the Vision Plan findings, may catalyze long-term growth and the creation of the envisioned Waterfront District. Lessening or removing on-site parking requirements, through a shared parking strategy made possible by on-street parking or town-owned lots, may allow development interests to focus more wholly on urban form.

A complete network of trails of off-street paths will encourage pedestrians and cyclists to visit the study area. Some commercial districts find that non-motorized transport increases business activity. Non-motorized transport land requirements for roads and parking, and commercial destinations can be located in closer proximity to one another. This allows for both greater site flexibility and efficiency, and generates financial savings from reduced parking requirements. Accordingly, a study in Bern, Switzerland found that cyclists spend far more money per area of commercial land than motorists.[2]

Figure 12 – Sunset Boulevard: Continuation of an off-street multi-use path along Sunset Boulevard will provide non-motorized connectivity and create a complete network for bicyclists and pedestrians (Image Source: HCP).

[2] *Cycling The Way Ahead For Towns And Cities*, European Community, 1999.

In the Waterfront District there is adequate space in the existing right-of-way to accommodate on-street parking facilities. Reducing the lane widths and removing the vegetated median on Sunset Boulevard would allow for on-street parking and sidewalks. Business owners may consider creating an alliance to pool funds for capital improvements in the area.

Figure 13 – Sunset Boulevard: Reducing lanes, lane width, and removal of the median will allow for on-street parking and sidewalks. Currently no facilities exist for bicyclists or pedestrians in the Waterfront District (Image Source: HCP).

Threats

The Sunset Boulevard corridor and Waterfront District will have to accommodate large truck movements. The location of the Sunset Beach Fire Department along Shoreline Drive West (see Figure 2) requires that any improvements to the transportation network must accommodate the turning movements of ladder trucks. The intersection of Shoreline Drive West and Sunset Boulevard may require a turning apron to accommodate large truck radii from ladder trucks, school buses, and supply/delivery trucks.

Figure 14 – Shoreline Drive West: School bus traveling west on Shoreline Drive West. Proposed improvements to study area must accommodate large truck movements (Image Source: HCP).

Reducing on-site parking requirements for commercial establishments may cause conflict among business owners, the town, and residents. Adopting a shared parking policy will lead to inevitable disagreements if not accomplished through a coordinated approach. Future business owners may be reluctant to relinquish on-site parking due to concerns about customer satisfaction and proximity to available parking facilities.

Lastly, investments in non-motorized transportation infrastructure may be viewed as superficial line items not worthy of expenditure. Budgetary constraints faced by the town may deter investment in aesthetic or public realm improvements. In addition, shifting political will and lack of long-term vision often dismantle capital improvement projects without proper support from both the community and business owners.

Figure 15 – Parking conflicts are a threat to the creation of a coordinated and walkable Waterfront District (Image Source: HCP).

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Chapter 3: Public Participation & Conceptual Designs

Introduction

Public participation is a vital component of any visioning plan. During this visioning process, Sunset Beach residents attended two public input meetings. At each meeting, residents were invited to inform the project team of concerns, aspirations, and goals for the study area. This chapter summarizes the public input process and provides the results of exercises completed during the visioning meetings.

Visual Preference Survey

A Visual Preference Survey is a public input technique used by urban designers to enable them to learn of a community's opinion of their existing and envisioned built environment. Simply put, the Visual Preference Survey informs a Vision Plan of components of the built environment – buildings, streets, landscape, etc. – that are either liked or disliked by the community.

For the Sunset Boulevard Vision Plan, the Visual Preference Survey included images primarily from the Sunset Beach area. However, some images from other places were used to determine the likability of built environment components that do not currently exist within the town. The survey was conducted during the first public input meeting. Images were shown at ten second intervals and participants were encouraged to rank each image in terms of favorability based on their "gut reaction." The results are summarized by each category. The highest and lowest rated images from each are provided.

Buildings

Highest Rated: **51** Lowest Rated: **-41**

The highest and lowest rated "Building" images are shown above. The image on the left conveys a coastal village theme, with a tin and pitched roof, and a varied façade. The structure also has a higher level of fenestration (number of openings/windows present on building façade) than the image on the right. The building on the right lacks articulation at regular intervals as the façade remains the same for a long stretch of the structure.

Streets – Thru Zone

For the purposes of this plan, the "Thru Zone" portion of the street is the area dedicated to efficient thru movement, whether by automobile, truck, or bicycle.

Highest Rated: **65** Lowest Rated: **-41**

The highest rated "Street – Thru Zone" image conveys the importance of a corridor framed with vegetation. Alternatively, the lowest rated image, taken at the intersection of Seaside Road and Sunset Boulevard, conveys an automobile oriented environment, offering no vegetation to soften the urban condition. Additionally, overhead utility lines can be seen as a prominent component of this image. Lastly, no facilities are provided to facilitate the movement of bicyclists or pedestrians through the intersection.

Streets – Bicyclist & Pedestrian Zone

Highest Rated: **81** Lowest Rated: **2**

The highest rated image above conveys a walkable and pedestrian friendly environment. The image shows wide sidewalks (10'+), street trees, and options for outdoor seating. Conversely, the image on the right has no facilities for the pedestrian. The paved shoulder does provide an option for the cyclist, but the striping does not indicate it as such nor is it wide enough to comfortably accommodate a cyclist.

Parking

Highest Rated: **58** Lowest Rated: **-12**

There is a vast difference between these two images. The image on the left shows a small parking lot, in which great care was taken to retain a specimen tree. However, the image on the right shows a vast expanse of parking. The lot is sparsely occupied and provides little vegetation to offer respite from the sun and lessen the harsh feel created by the span of asphalt.

Landscape Material

Highest Rated: **97** Lowest Rated: **73**

The Visual Preference images showing landscape material scored the highest, on average, compared to the other categories. In fact, the image showing seasonal color was the highest rated image overall. Both of these images scored highly as did the other images of landscape material.

Visual Preference Summary

There are several takeaway messages from the Visual Preference Survey. The first being that the prevalence of vegetation and plant material are extremely important to Sunset Beach residents. As stated previously, the Landscape Material category scored higher on average than all the other categories. As a result, the town should take all necessary steps to ensure that trees are retained when development occurs and that proper screening and parking lot landscaping are utilized to provide vegetation.

Human Scale Urban Design:

This form of neighborhood and community design creates walkable environments that do not necessarily require automobile travel to access. Architecture that violates the human dimension includes vast smooth facades, large signage, and other features that are designed to cater to individuals traveling in an automobile.

Secondly, buildings and development in general should be designed to cater to the pedestrian. The highest scoring building provides visual interest at the human scale. Parking lots should be limited in their size and expanse, and plant material should either be retained or added when building a surface lot.

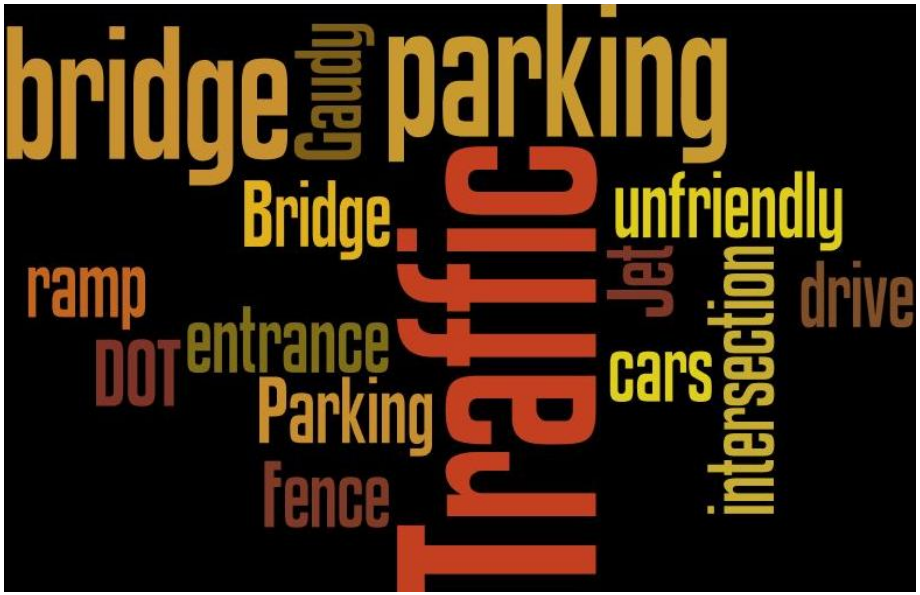
Assets, Issues, and Desires Exercise

This exercise was designed to solicit input from meeting participants based on their opinion of the Assets, Issues, and Desires for the Vision Plan study area. Meeting participants were broken into groups to discuss each of these categories.

Lively discussion took place during the exercise and to conclude the meeting each group presented the results. All of the wording used to describe each group's Assets, Issues, and Desires was used to create word clouds. The more a word or phrase is repeated, the larger it is shown in the word cloud.

Assets

Issues



Desires

Similar to the results of Visual Preference Survey, participants concluded that "greenery" or vegetation was the most important aspect of the study area.

The most significant issue was "traffic." Another issue identified by residents was parking. Residents noted that a lack of parking in the Waterfront District area would continue to be an issue.

Lastly, the overwhelming outcome of this exercise was the desire of residents to envision a "bike path" or multi-use path constructed in the study area. Other desires receiving support include consistent lighting and landscape material.

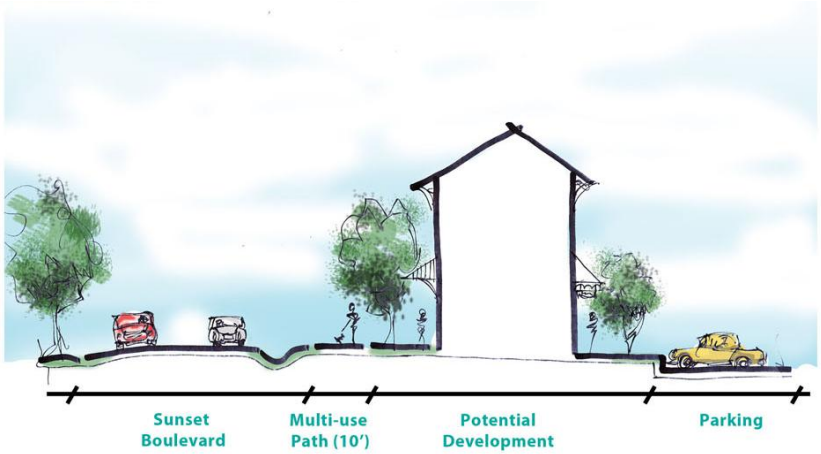
Initial Concepts & Ideas

Based on the results of the first public meeting, the project team was tasked with devising design concepts and ideas to reflect community input. The project team drafted two concepts to reflect differing future conditions for the Sunset Boulevard Vision Plan study area. It is important to note that these ideas and designs are merely conceptual, and are intended to gauge community support for each.

Locations of parking, building siting, streetscape, and non-motorized transportation options were included for each concept.

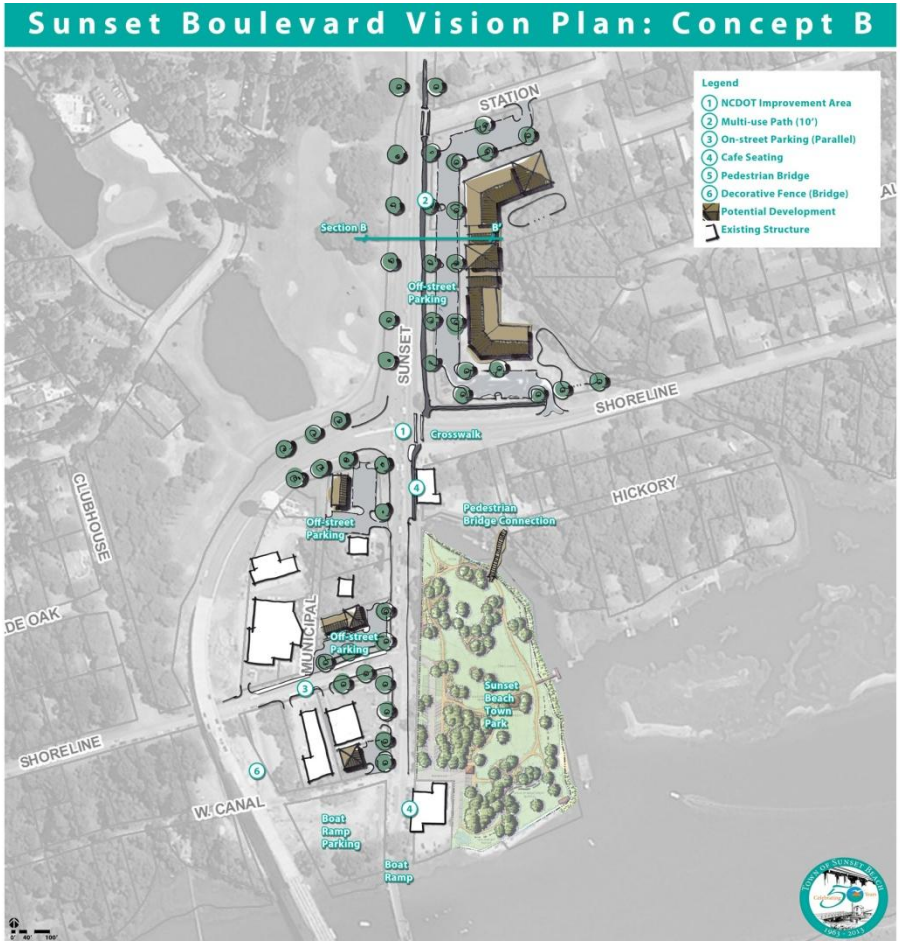
Concept A

Section A – A'



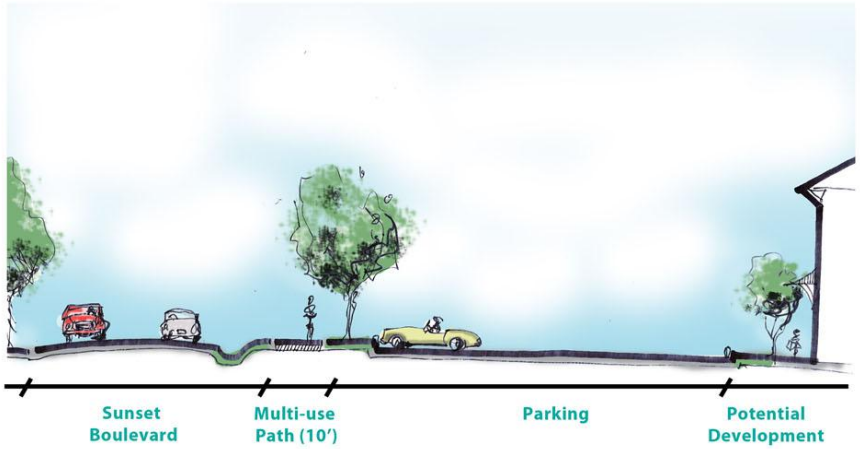
Ideas put forth as a result of Concept A include a multi-use path, the location of parking at the rear of potential development, a green roof atop the fire station, on-street parking, and a boardwalk area adjacent to Mary's Creek.

Potential improvements at the intersection of Sunset Boulevard and Seaside Road included striped crosswalks, curb ramps, mast arm signal poles, and street trees.



Concept B

Section B – B'

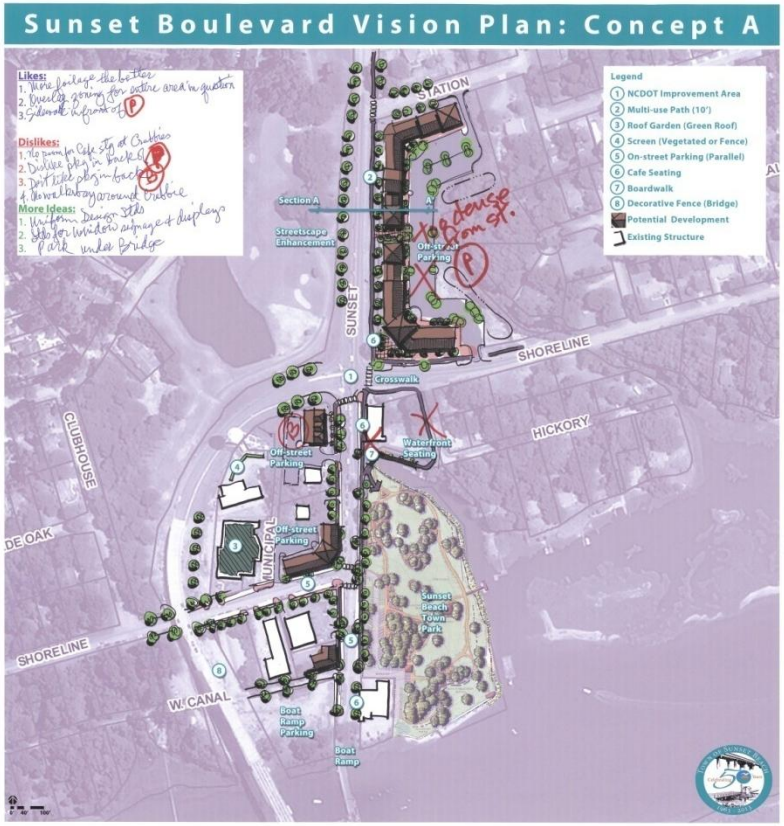


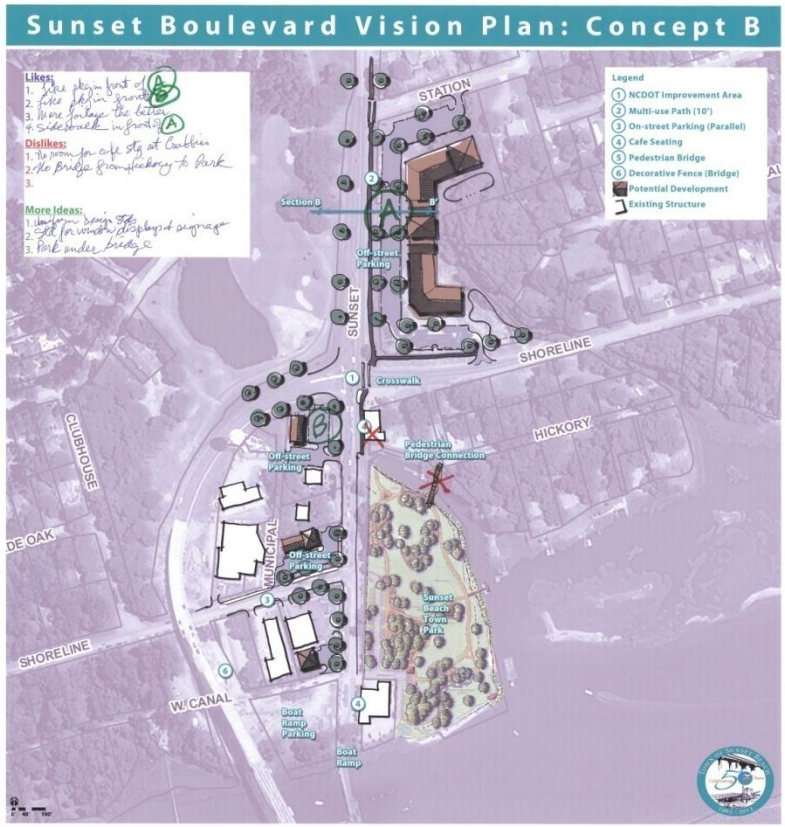
A multi-use path and street trees were also included as ideas in Concept B. This concept sited the buildings with a larger front setback that would house off-street parking. This theme is more consistent with the existing conditions present along the Sunset Boulevard Corridor. Fewer options for on-street parking are provided in this scheme.

Possible improvements at the intersection of Seaside Road and Sunset Boulevard include street trees and continental striping (crosswalk demarcation).

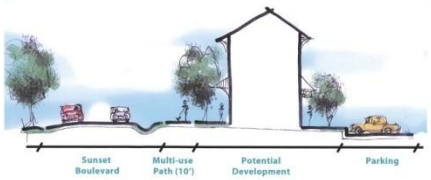
Concept Feedback

Feedback was provided for each concept at a meeting held on March 7, 2013. The concepts shown on the previous pages of the plan were presented and a group exercise was used to gauge community opinion for each. Meeting attendees were broken into groups and asked to discuss their likes, dislikes, and additional ideas for each concept. The image to the right shows an example of a completed group exercise. Attendees were asked to draw and write on the concepts to convey to the project team their various likes and dislikes of each concept.



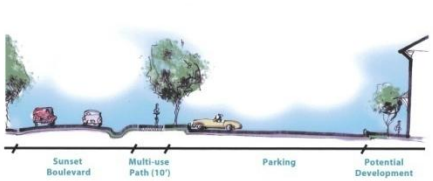


Section A



Sunset Blvd & Seaside Rd

Section B



Sunset Blvd & Seaside Rd

Likes

Each group expressed support for a multi-use path ("bike path") that would run along Sunset Boulevard. Increasing both pedestrian and bicyclist infrastructure in the study area was seen as a positive improvement by meeting attendees. Streetscape enhancements were also supported by meeting attendees as was the potential to increase

vegetation in the study area. The possibility of a green roof at the fire station was viewed favorably by at least one group.

Dislikes

The majority of meeting attendees felt that siting buildings at the front of the lot created several issues. More groups expressed their preference for parking to be located in front of buildings. Other concerns included the density of any potential development in the Waterfront District. Several groups expressed concern with the creation of a "bustling commercial area." Generally, groups expressed more dislike for Concept A than Concept B.

Other big ideas that were disliked by meeting attendees were the creation of a boardwalk adjacent to Mary's Creek and a foot-bridge that would cross over the creek to connect to the proposed Sunset Beach Town Park.

More Ideas

When asked for "More Ideas" for the Vision Plan study area several groups noted the need for uniform design standards that would include consistent lighting, signage, and landscape material. One group requested that any proposed commercial development should provide screening when adjacent to a residential use. Finally, one group stated that "businesses should provide their own parking."

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Chapter 4: Final Concepts & Plan Implementation

Introduction

This chapter provides implementation strategies and also revised concepts based on feedback received from the community during public input meetings. The final concepts are provided to stem discussion for the creation of a potential overlay district or other ordinance revisions that will facilitate a swift and effective implementation process.

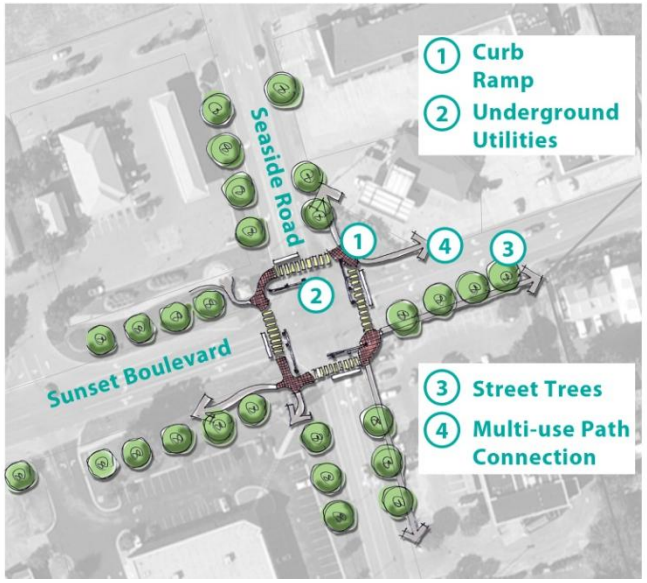
Revised Concepts

The following conceptual designs have been drafted as a result of dialogue with town stakeholders, the community at-large, and input received during the public participation process. These concepts are in no means binding agreements of future capital improvements nor do they have a dedicated funding stream to help realize the vision presented. The concepts should be used as tool for the town to guide capital improvements in the study area for the next five, ten, or twenty years. In addition, components of the plan and conceptual ideas that relate to the private realm should be used in the creation of uniform design standards or the creation of an overlay district. No one concept can capture all the desires of a community, but it can attempt to include the most agreed upon aspects of the community thus far.

Sunset Boulevard & Seaside Road

Potential improvements at this intersection include street trees, uniform lighting, underground utilities (mast arm signal pole), curb ramps, and striping to demarcate a bicycle/pedestrian crossing.

Sunset Blvd & Seaside Rd



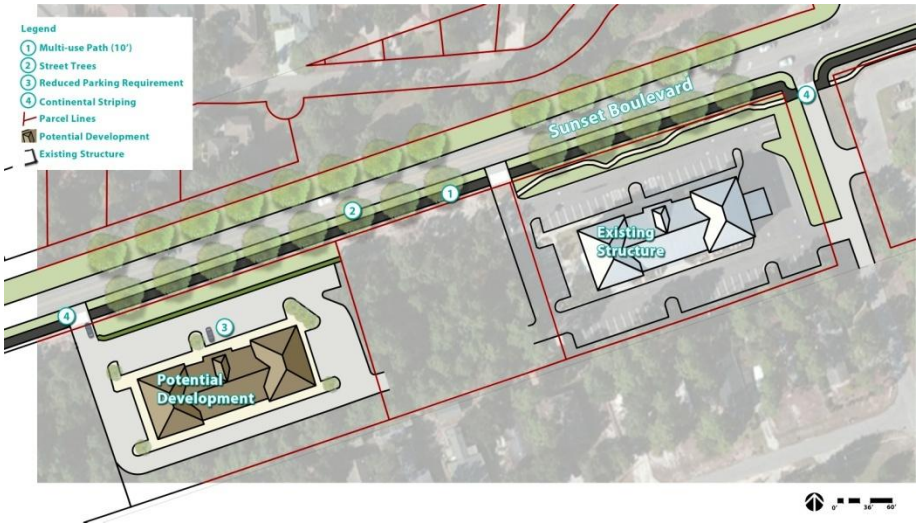
It is important to remember that an existing image (shown above) of this intersection scored the lowest out of the "Streets – Thru Zone" category in the Visual Preference Survey, signaling the need for improvements.

Sunset Boulevard

One of the focus areas of the Vision Plan is the cross section of Sunset Boulevard. In particular, the areas zoned MB-2. Difficulties exist in developing land in this area due to the required parking, setbacks, and presence of a 20' utility easement. In addition, this stretch of the Sunset Boulevard corridor is the gateway to the island for visitors and residents alike. As a result, the community has a strong desire to see Sunset Boulevard developed in a uniform and aesthetically pleasing fashion. Efforts are under way to ensure this desire will become a realization. In fact, a recently developed parcel along the corridor houses a structure that was ranked the highest in the Visual Preference Survey (show below).

Further, language in the recently adopted Unified Development Ordinance states under "General Requirements for All Buildings" that "Adjacent building shall be compatible in regard to spacing, setbacks, proportions, materials, and scale." In keeping with desires of the ordinance, if no further standards for structures were adopted then constructed buildings should convey, in general, the same look and feel as the highest rated visual preference image (shown to the left).

Concept



The concept above depicts a potential development along Sunset Boulevard (a larger copy is provided in the appendix). Suggested improvements within the 75' Sunset Boulevard right-of-way include a 10' multi-use path, street trees, and lighting (see the cross section provided on the next page).

Changes to the Unified Development Ordinance that would allow this potential development include reduced parking requirements, removal of the sidewalk requirement, and the inclusion of a plant material palette to be used for required landscaping.

One of the key outcomes of the vision plan process was the overwhelming need to provide a multi-use path that runs along the corridor (9,438 feet). In the concept above, the multi-use path is located within the Sunset Boulevard right-of-way.

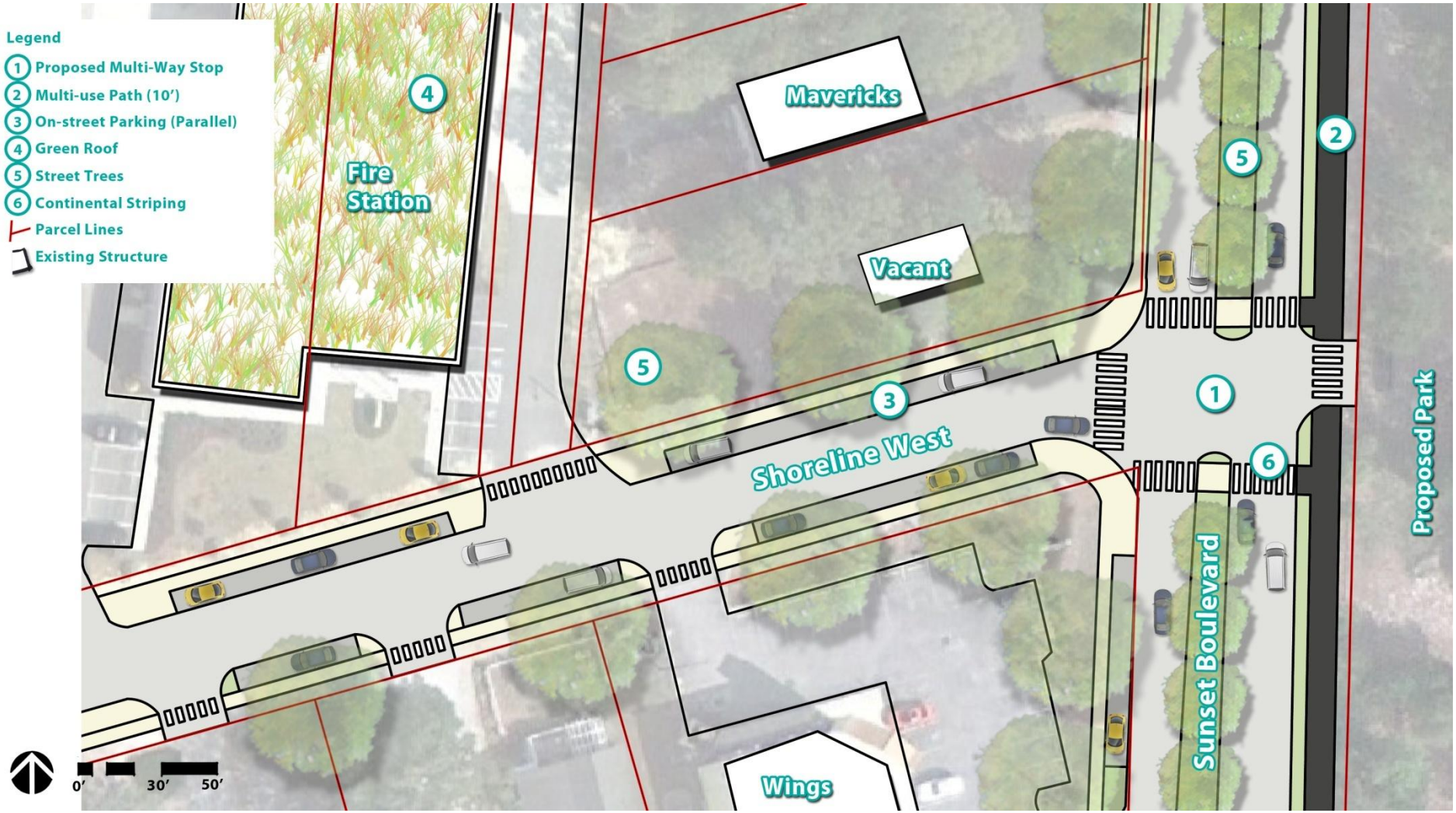
Shoreline Drive West & Sunset Boulevard

The intersection of Shoreline Drive West and Sunset Boulevard was identified during the public participation process as an area in need of traffic calming and safety measures. At present, only vehicles heading east on Shoreline West are required to stop. In addition, no sidewalks or crosswalks are present to facilitate the safe flow of pedestrians.

Other considerations that need to be factored into any proposed changes to the intersection include the need to accommodate turning movements from ladder trucks leaving the fire station, the number of non-motorized trips that will be generated from the proposed park, and lastly the availability of on-street parking. Response from town officials and aerial photos show that vehicles currently choose to park within the right-of-way (on-street) on both Shoreline Drive West and Sunset Boulevard south of the intersection.

Another factor that contributes to the relative safety of any roadway or intersection is the speed limit. Currently, the speed on Sunset Boulevard and Shoreline Drive West is 45 miles per hour. Research has proven that pedestrians are much more likely to be fatally injured when struck by a vehicle travelling at speeds greater than 30 miles per hour. Based on this finding, it is suggested that the speed limit be reduced to 25 miles per hour south of the bridge intersection along Sunset Boulevard. In addition, it is suggested that for the first quarter mile of Shoreline Drive West (heading west) the speed limit be reduced to 25 miles per hour.

A concept is provided on the next page that depicts potential improvements that will serve to calm traffic, provide aesthetic appeal, and increase the availability of parking.



Concept

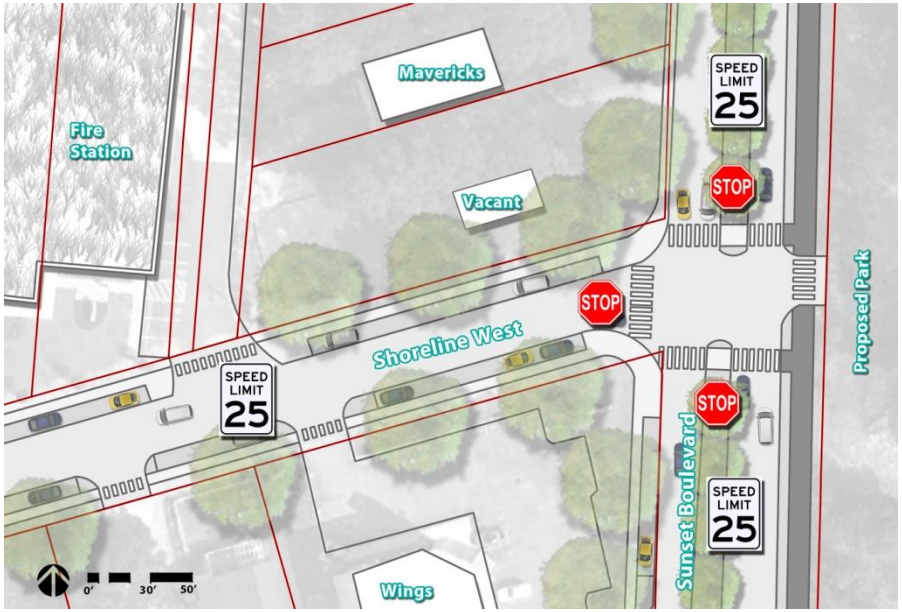
Ideas put forth in the concept above include a multi-use path, crosswalks, on-street parking, street trees, and a multi-way stop. Though on-street parking was viewed unfavorably by some community residents, it remains both a viable option to not only increase the availability of parking, but also to provide a traffic calming treatment. On-street parking also provides a buffer to the pedestrian from vehicular traffic. In the schematic above, it is estimated that approximately 22 on-street parallel parking spaces could be accommodated in the existing Shoreline Drive West right-of-way (60'). Four additional spaces could be provided adjacent to the Wings retail store on Sunset Boulevard. These spaces appear to be located on private property, however. Further, the possibility remains to reconfigure this

portion of Sunset Boulevard to remove the landscaped median and further increase on-street parking.

Street trees and a 10′ multi-use path are also proposed in this concept. Providing street trees was viewed favorably during all public participation meetings, as was the proposed multi-use path. The multi-use path would run along Sunset Boulevard from the intersection of Seaside Road all the way to the southern terminus of the proposed Sunset Beach Town Park.

Continental Striping, a longitudinal high-visibility crosswalk marking, is proposed as both a traffic calming measure and as a solution for increasing the safety of pedestrians.

The existing landscaped medians are also shown repurposed (see below) to function as a refuge island for crossing pedestrians or cyclists. As mentioned previously, it is suggested the speed limit be reduced to 25 mph and that stop signs be installed.



Benefits of Street Trees

For a planting cost of $250-600 (includes first 3 years of maintenance), a single street tree returns over $90,000 of direct benefits (not including aesthetic, social, and natural) in the lifetime of the tree. Additional benefits include:

1. Reduced and more appropriate urban traffic speeds. Urban street trees create vertical walls framing streets, and a defined edge, helping motorists guide their movement and assess their speed (leading to overall speed reductions). Street safety comparisons show a reduction of run-off the-road crashes and overall crash severity when street tree sections are compared with equivalent treeless streets.

2. Create safer walking environments, by forming and framing visual walls and providing distinct edges to sidewalks so that motorists better distinguish between their environment and one shared with people. If a motorist were to significantly err in their urban driving task, street trees can deflect or fully stop a motorist from taking another human life.

3. Increased security. Trees create more pleasant walking environments, bringing about increased walking, talking, pride, care of place, association and therefore, actual ownership and surveillance of homes, blocks, neighborhoods plazas, businesses, and other civic spaces.

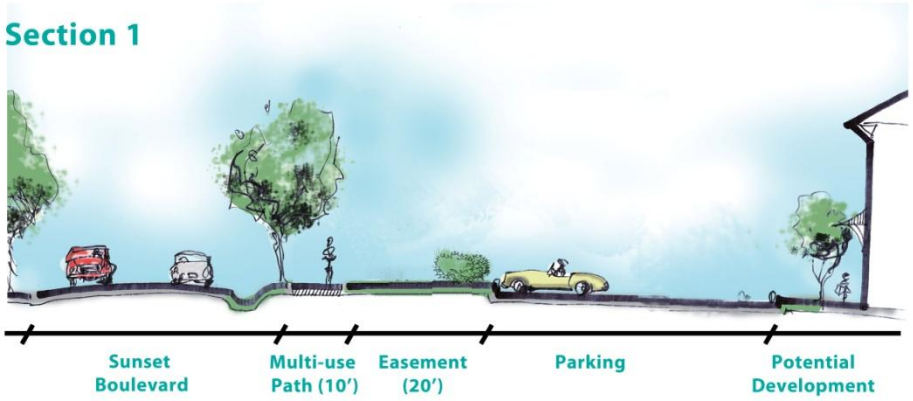
4. Improved business. Businesses on treescaped streets show 20% higher income streams, which is often the essential competitive edge needed for main street store success versus competition from plaza discount store prices.

5. Less drainage infrastructure. Trees absorb the first 30% of most precipitation through their leaf system, allowing evaporation back into the atmosphere. This moisture never hits the ground. Another percentage (up to 30%) of precipitation is absorbed back into the ground and taken in and held onto by the root structure, then absorbed and transpired back to the air.

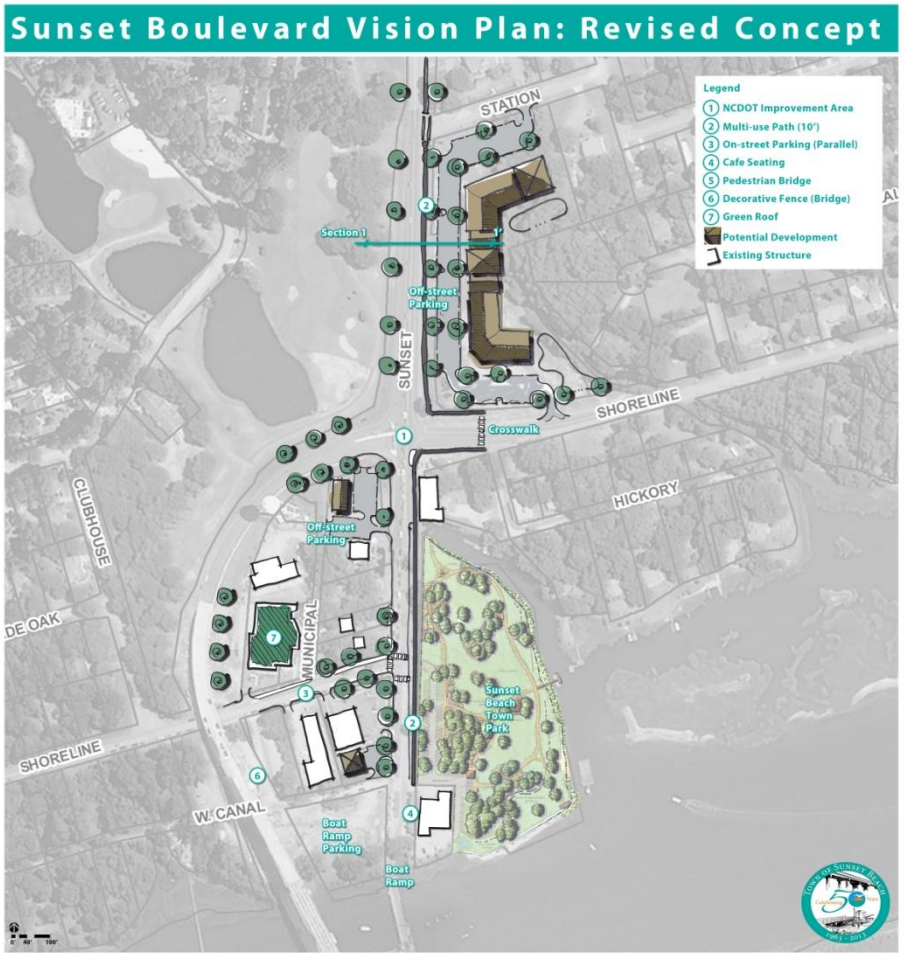
(Source: 22 Benefits of Urban Street Trees by Dan Burden)

Waterfront District

Based on the findings of the "Like, Dislike, and More Ideas" exercise, the initial concept for the Waterfront District was revised. As stated previously, the most vigorously supported component of that concept was the proposed 10' multi-use path. Other ideas receiving support in the Waterfront District concepts include the location of parking in the front of buildings and also street trees. Please note, full page copies of all concepts are provided in Appendix 1.



In order to facilitate the movement of non-motorized traffic at the intersection of Shoreline Drive East and Sunset Boulevard (commonly referred to as the "bridge intersection"), it is proposed that the multi-use path crossing be pulled to the east by approximately 200 feet. In addition, any proposed improvements to this intersection must also accommodate non-motorized traffic exiting the bridge.



Plan Implementation

For Sunset Beach to realize the Vision set forth through this process, the town must revise certain regulatory requirements to facilitate the capital improvement process. The responsibility for some capital improvement recommendations fall fully on the town and must be prioritized over the next five, ten, or twenty years to come to fruition. Those include providing an enhanced streetscape and the pursuit of funds to construct a multi-use path. Once this plan is adopted, it can be utilized as a tool to pursue said funding.

Suggested policy recommendations include changes to the parking standards, landscape standards, and lighting requirements. The creation of an Overlay District is another vehicle by which regulatory standards may be revised to achieve some of the desires set forth in the Vision Plan.

Please note that these recommendations should be formalized through dialogue with the town's planning board prior to undergoing the text amendment process.

Lastly, the town should work through this process to allow for development to take place in certain areas that may be constrained due to lot size or depth.

Parking Standards

It is suggested that parking standards in the MB-2 zoning district be reduced to better accommodate future businesses. The construction of a multi-use path along these properties will provide an alternative means of travel to and from establishments in this zoning district. Percent reductions or changes in the requirements for square footage may be used as solutions.

Bicycle parking should also be included for certain areas and future uses along the Sunset Boulevard corridor.

Landscape & Lighting Standards

A plant and lighting pallet should be created that can be used in the creation of a uniform look and feel for the public realm in the study area.

Below is a list of trees with qualities that would provide aesthetic qualities that are championed by the town. In addition, many of these species are salt and drought tolerant.

BOTANICAL NAME	COMMON NAME
LARGER TREES AND SHADE TREES	
MAGNOLIA GRANDIFLORA	SOUTHERN MAGNNOLIA
PINUS PALUSTRIS	LONG LEAF PINE
QUERCUS PHELLOS	WILLOW OAK
QUERCUS VIRGINIANA	LIVE OAK
TAXODIUM DISTICHUM	BALD CYPRESS
UNDERSTORY TREES	
CERCIS CANADENSIS	REDBUD
CORNUS FLORIDA	FLOWERING DOGWOOD
ILEX 'NELLIE STEVENS'	NELLIE STEVENS HOLLY
ILEX OPACA	AMERICAN HOLLY
LAGERSTROEMIA HYBRIDS	CRAPE MYRTLE HYBRIDS
MAGNOLIA SOULANGIANA	SAUCER MAGNOLIA
MAGNOLIA VIRGINIANA	SWEET BAY MAGNOLIA

Below are images of several species provided on the list in the previous page.

Live Oak & Redbud

Southern Magnolia & Longleaf Pine

Bald Cypress & Saucer Magnolia

Crape Myrtle & Willow Oak

Below are samples of Brunswick Electric's outdoor lighting products.

Implementation Strategy

The following strategies are listed by short and long-term strategies. Cost estimates for capital improvements can be found in Appendix 4. Each implementation action is given an approximate timeline and responsible party. It is anticipated that an outside consultant may be necessary to accomplish several strategies. Consultants from varying disciplines may be considered including those with expertise in landscape architecture, engineering, or urban design.

Short Term Strategies: 1 – 5 years			
Description	**Responsible Party**	**Estimated Timeline**	**Priority**
Ordinance revisions drafted to establish either an overlay district or regulatory standards that reflect the findings of the vision plan. Uniform lighting and landscape standards included as part of ordinance revisions.	Planning Board; Town Council.	1 year	High
Parking study conducted for Waterfront District to determine approximate number of spaces needed to accommodate average seasonal traffic.	Planning Board; Town Council; Consultant.	1-3 years	Low
Sunset Boulevard multi-use path design and construction (approximately 9,438 feet in length). This will include landscape and lighting.	NCDOT; Town Council; Consultant.	1-3 years	High
Speed limit reduction on Sunset Boulevard (south of bridge intersection) and Shoreline Drive West.	NCDOT; Planning Board; Town Council.	1-2 years	Medium
Multi-way stop installation at the intersection of Shoreline Drive West and Sunset Boulevard.	NCDOT; Town Council.	1-2 years	Medium
Continental striping and pedestrian refuge island installed at the intersection of Shoreline Drive West and Sunset Boulevard.	NCDOT; Town Council.	1-3 years	Medium
Bicyclist/pedestrian crossing installed at the intersection of Angel Trace Road and Sunset Boulevard.	NCDOT; Town Council.	3 - 5 years	Medium

Long Term Strategies: 5 – 10 years			
Description	**Responsible Party**	**Estimated Timeline**	**Priority**
Branding strategy and signage for Waterfront District and/or Sunset Boulevard.	Planning Board; Town Council; Consultant.	5 - 7 years	Low
Pedestrian crossing with signal, curb ramps, and continental striping installed at the intersection of Seaside Road and Sunset Boulevard.	NCDOT; Town Council.	5 - 7 years	Medium
Installation of street trees along Sunset Boulevard.	NCDOT; Planning Board; Town Council; Consultant.	7 - 10 years	High
Shoreline Drive West streetscape design and construction to include sidewalks, street trees, and on-street parking.	NCDOT; Planning Board; Town Council; Consultant.	7 - 10 years	Medium
Mast arm signal pole installed at the intersection of Seaside Road and Sunset Boulevard.	NCDOT; Town Council.	7 - 10 years	Medium
Street trees and signage installed along Seaside Road as gateway treatment or entrance improvements to Town of Sunset Beach.	NCDOT; Town Council; Consultant.	7 - 10 years	High
Vegetated roof (green roof) installed atop the Fire Station.	Town Council; Consultant.	7 - 10 years	Low

Next Steps

This Vision Plan should be used as a guide for the town that contains the wants, needs, and desires of residents. Details that relate to specific ordinance revisions should be finalized through dialogue with residents, stakeholders, and town leadership.

This plan was created to understand the desires of the community. These desires are now included as part of the plan and have been formally recognized through the Visual Preference Survey, public input meetings, and feedback received from the presentation of design concepts.

Town leaders and governing boards should work together to ensure that the visions and aspirations developed because of this plan are realized in the years to come.

Sunset Boulevard Vision Plan: Concept A

Legend

1. NCDOT Improvement Area
2. Multi-use Path (10’)
3. Roof Garden (Green Roof)
4. Screen (Vegetated or Fence)
5. On-street Parking (Parallel)
6. Cafe Seating
7. Boardwalk
8. Decorative Fence (Bridge)

Potential Development

Existing Structure

STATION

Section A

A’

Streetscape Enhancement

Off-street Parking

SUNSET

SHORELINE

Crosswalk

CLUBHOUSE

HICKORY

Waterfront Seating

Off-street Parking

MUNICIPAL

Off-street Parking

Sunset Beach Town Park

SHORELINE

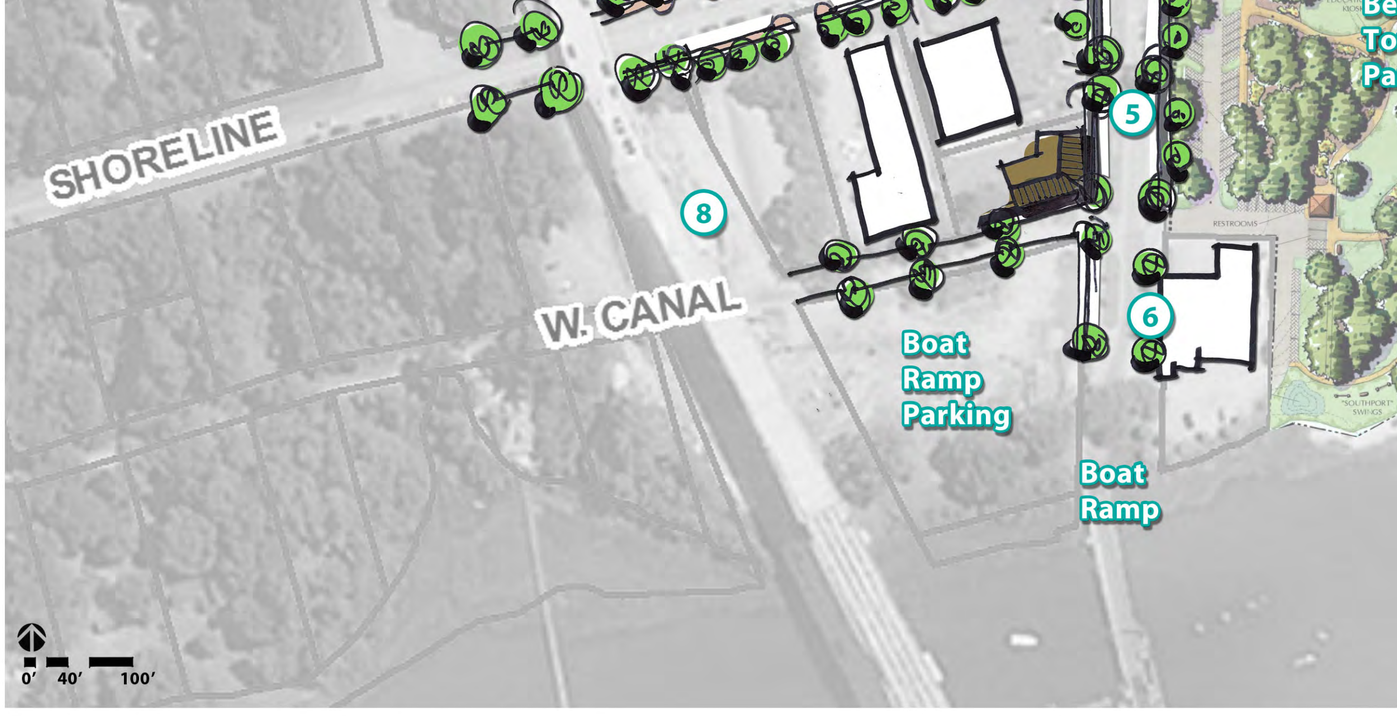
W. CANAL

Boat Ramp Parking

Boat Ramp

0’ 40’ 100’

Section A



Sunset Blvd & Seaside Rd

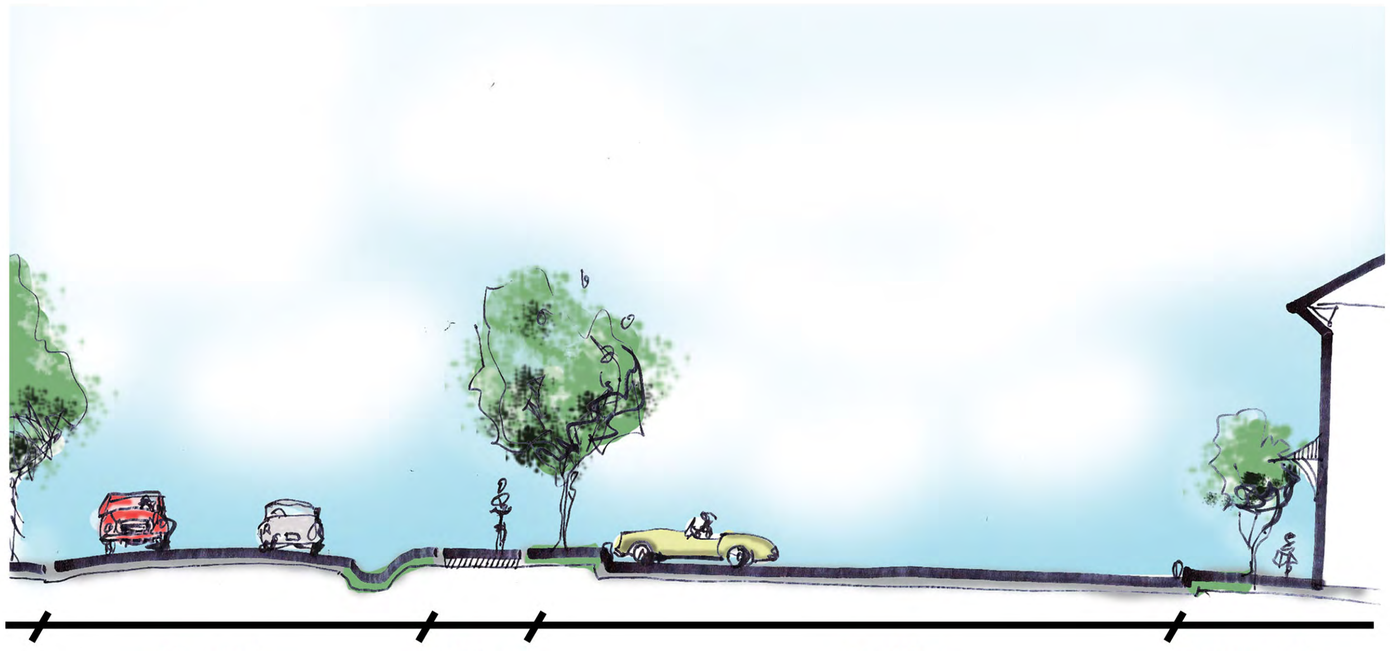
Sunset Boulevard Vision Plan: Concept B

Legend

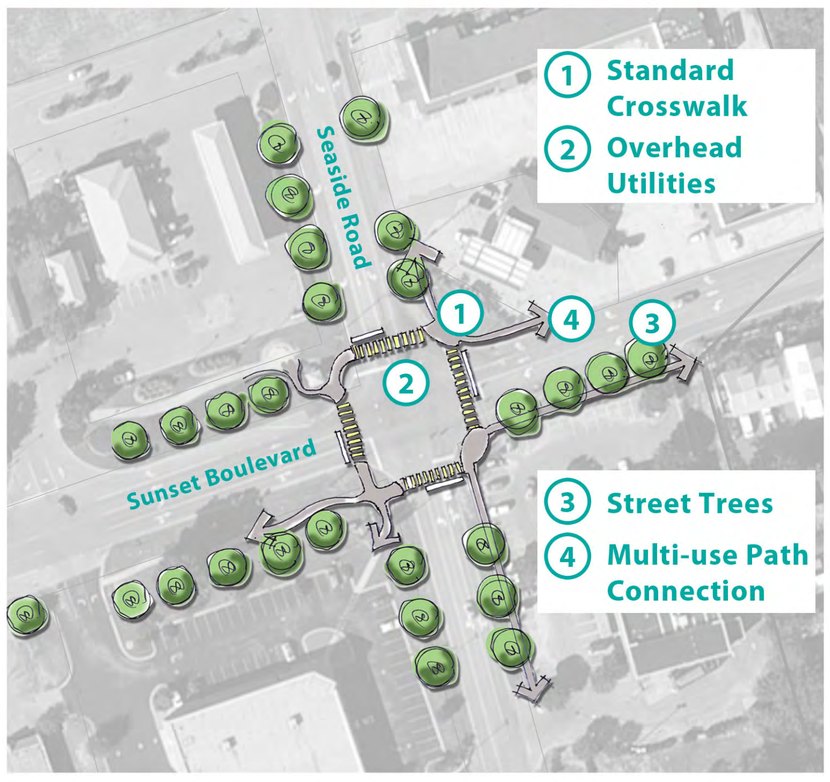
1. NCDOT Improvement Area
2. Multi-use Path (10’)
3. On-street Parking (Parallel)
4. Cafe Seating
5. Pedestrian Bridge
6. Decorative Fence (Bridge)
- Potential Development
- Existing Structure

STATION
Section B
B’
Off-street Parking
SUNSET
SHORELINE
Crosswalk
CLUBHOUSE
HICKORY
Off-street Parking
Pedestrian Bridge Connection
MUNICIPAL
Off-street Parking
Sunset Beach Town Park
SHORELINE
W. CANAL
Boat Ramp Parking
Boat Ramp
0’ 40’ 100’

Section B



Sunset Blvd & Seaside Rd



Legend

1. Multi-use Path (10’)
2. Street Trees
3. Reduced Parking Requirement
4. Continental Striping

Parcel Lines

Potential Development

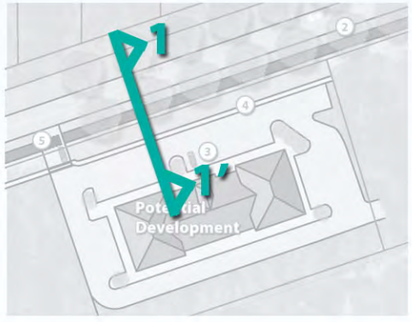
Existing Structure

Sunset Boulevard

Existing Structure

Potential Development

0’ 36’ 60’

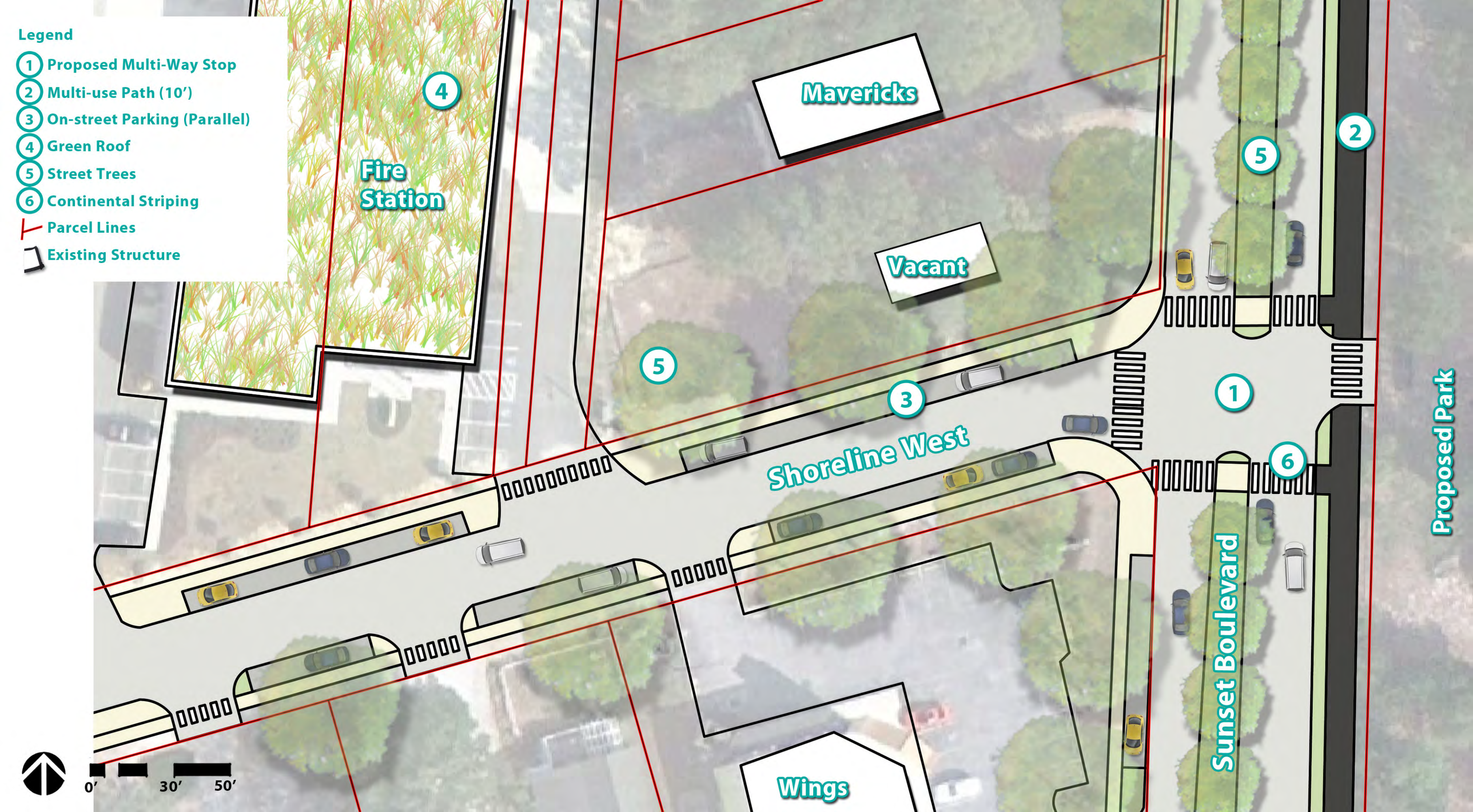


20' Vegetation/Buffer Area | 5' Ditch | 25' Travel Way (Sunset Blvd) | 5' Ditch | 10' Streetscape Area | 10' Multi-use Path | 20' Easement & 15' Greensward | Parking Area

Sunset Boulevard Right-of-Way (75')

MB-2 Parcel Frontage (65')

0' 4' 10'


Legend
1 Proposed Multi-Way Stop
2 Multi-use Path (10’)
3 On-street Parking (Parallel)
4 Green Roof
5 Street Trees
6 Continental Striping
Parcel Lines
Existing Structure
Fire Station
Mavericks
Vacant
Shoreline West
Sunset Boulevard
Wings
Proposed Park
0’
30’
50’

Sunset Boulevard Vision Plan: Revised Concept

Legend

1. NCDOT Improvement Area
2. Multi-use Path (10’)
3. On-street Parking (Parallel)
4. Cafe Seating
5. Pedestrian Bridge
6. Decorative Fence (Bridge)
7. Green Roof

Potential Development

Existing Structure

STATION

Section 1

1’

Off-street Parking

SUNSET

SHORELINE

Crosswalk

HICKORY

CLUBHOUSE

Off-street Parking

MUNICIPAL

DE OAK

SHORELINE

W. CANAL

Boat Ramp Parking

Boat Ramp

Sunset Beach Town Park

0’ 40’ 100’

Section 1

-3: Unfavorable **0: No Preference** **3: Favorable**

Please circle a number below each image based on favorability. No right or wrong answers; go with "gut reaction."

BUILDINGS

Visual Preference - Buildings

1.

-3 -2 -1 0 1 2 3

Visual Preference - Buildings

2.

-3 -2 -1 0 1 2 3

Visual Preference - Buildings

3.

-3 -2 -1 0 1 2 3

Visual Preference - Buildings

4.

-3 -2 -1 0 1 2 3

Visual Preference - Buildings

5.

-3 -2 -1 0 1 2 3

Visual Preference - Buildings

6.

-3 -2 -1 0 1 2 3

-3: Unfavorable **0: No Preference** **3: Favorable**

Please circle a number below each image based on favorability. No right or wrong answers; go with "gut reaction."

Visual Preference - Buildings

7.

-3 -2 -1 0 1 2 3

Visual Preference - Buildings

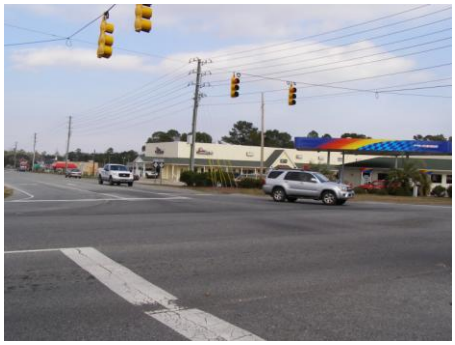
8.

-3 -2 -1 0 1 2 3

STREETS – THRU ZONE

Visual Preference – Streets, Thru Zone

9.



-3 -2 -1 0 1 2 3

Visual Preference – Streets, Thru Zone

10.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Thru Zone

11.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Thru Zone

12.

-3 -2 -1 0 1 2 3

-3: Unfavorable **0: No Preference** **3: Favorable**

Please circle a number below each image based on favorability. No right or wrong answers; go with "gut reaction."

Visual Preference – Streets, Thru Zone

13.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Thru Zone

14.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Thru Zone

15.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Thru Zone

16.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Thru Zone

17.

-3 -2 -1 0 1 2 3

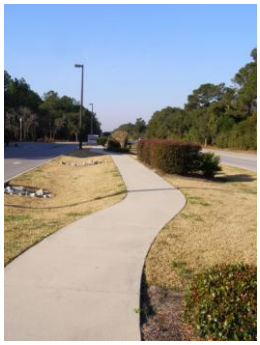
-3: Unfavorable **0: No Preference** **3: Favorable**

Please circle a number below each image based on favorability. No right or wrong answers; go with "gut reaction."

STREETS – PEDESTRIAN/BICYCLIST ZONE

Visual Preference – Streets, Pedestrian/Bicyclist Zone

18.



-3 -2 -1 0 1 2 3

Visual Preference – Streets, Pedestrian/Bicyclist Zone

19.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Pedestrian/Bicyclist Zone

20.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Pedestrian/Bicyclist Zone

21.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Pedestrian/Bicyclist Zone

22.

-3 -2 -1 0 1 2 3

Visual Preference – Streets, Pedestrian/Bicyclist Zone

23.

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-3: Unfavorable **0: No Preference** **3: Favorable**

Please circle a number below each image based on favorability. No right or wrong answers; go with "gut reaction."

PARKING

Visual Preference – Streets, Pedestrian/Bicyclist Zone

24.

-3 -2 -1 0 1 2 3

Visual Preference – Parking

25.

-3 -2 -1 0 1 2 3

Visual Preference – Parking

26.

-3 -2 -1 0 1 2 3

Visual Preference – Parking

27.

-3 -2 -1 0 1 2 3

Visual Preference – Parking

28.

-3 -2 -1 0 1 2 3

Visual Preference – Parking

29.

-3 -2 -1 0 1 2 3

-3: Unfavorable **0: No Preference** **3: Favorable**

Please circle a number below each image based on favorability. No right or wrong answers; go with "gut reaction."

LANDSCAPE MATERIAL

Visual Preference – Landscape Material

30.

-3 -2 -1 0 1 2 3

Visual Preference – Landscape Material

31.

-3 -2 -1 0 1 2 3

Visual Preference – Landscape Material

32.

-3 -2 -1 0 1 2 3

Visual Preference – Landscape Material

33.

-3 -2 -1 0 1 2 3

Visual Preference – Landscape Material

34.

-3 -2 -1 0 1 2 3

THANK YOU!

#4

Sunset Boulevard Vision Plan Study Area

Top 5. Assets, Issues, Desires:

Assets (Blue Marker):
1. WATER
2. TREES
3. BEACH
4.
5.

Issues (Red Marker):
1. PARKING @ BOAT RAMP (I.E. KAYAKS)
2.
3.
4.
5.

Desires (Green Marker):
1. MORE PARKING AT BRIDGE AREA /////
2. PRESERVE NATURAL BEAUTY
3. BIKE PATH SEA TRAIL SIDE BRIDGE TO 904 + GREENWAY
4. REDUCE SPEED LIMIT 179
5. STREET LIGHTS at Bridge

Sunset Boulevard Vision Plan Study Area #1

Top 5. Assets, Issues, Desires:

Assets (Blue Marker):
1. Current Appearance of Bus. Struct.
2. Lots of greenery
3. 5 Acre Park
4. Boat Ramp + Water Access
5. Landscaping at bridge
6. Only 1 traffic light

Issues (Red Marker):
1. Remove illegal non-plant material
2. No idea of cars in parking area
3. Jet skis
4. Traffic at bridge entrance
5.

Desires (Green Marker):
1. Bike + Ped. Path continuing to traffic light
2. Continuity in landscaping / Plants
3. Desire planted area [illegible] and p. lot
4. Consistent signage ie Food Lion
5. Round about at Bills Seafood

ADA - SIDE WALK

ADA - SIDE WALK DISAGREEMENT ON 1 - OTHER - BOTH

ROUND ABOUT

DESIRED

Sea Trail Golf Resort

Town Hall

Proposed Sunset Beach Town Park

NC Wildlife Boat Ramp

ICWW

EDGEWATER CIR
STRACE SW
KINGS TRL
KINGS CT
COACH TRL
FAIRWAY DR E
CYPRESS CT
WISTERIA LN
FAIRWAY DRW
JASMINE LN
GINGER DR
LONGLEAF DR
PALMETTO DR
HIGH MARKET ST
FRONT ST
QUEEN ANNE ST
PARK RD
CHANDLERS LN
CLIPPERS WLK
WESTBROOK
LIVE OAK DR
KIRKWOOD PL
DUNCAN PL
SALT MARSH ST
INDIGO CIR
JAPONICA LN
BARTLETT LN
HOLLY LN
WATER OAK WAY N
CROSS CREEK DR
MILL SLOUGH LN
PECAN AVE
WATERWAY DR
TWISTED OAK LN
GREAT OAK CIR
ACORN CT
STOKES DR
DOGWOOD DR
BAYBERRY LN
MAGNOLIA DR
AZALEA CIR
STATION TRL
SUNSET BLVD N
SHORELINE DR E
HICKORY ST
SEA TRAIL DR W
OLDE OAK LN
CLUBHOUSE RD
SHORELINE DR W
W. CANAL AVE
CAMELLIA CT
HEATHER DR
GLENVIEW DR
SEA TRAIL DR
ROYAL POSINCIANA

Study Area
Town Limits
Parcels

Focus Areas:
1. Waterfront District
2. Sunset Boulevard
3. Seaside Crossroads

1 in = 300 ft
Feet
0 375 750 1,500

Sunset Boulevard Vision Plan Study Area

Top 5. Assets, Issues, Desires:

Assets (Blue Marker):
1. Existing greenery
2. Existing architecture
3. Banks, Professional/landscaped
4. Free Parking
5.

Issues (Red Marker):
1. Bridge Intersection
2. Shoreline Hwy Dr. & S.S. Blvd
3. Lack of Parking/Waterfront District
4.
5.

Desires (Green Marker):
1. Bike & Walking Path
2. Consistent Landscaping
3. More Restaurants, Cafés & varied-not same
4.
5.

Sea Trail Golf Resort

Town Hall

Proposed Sunset Beach Town Park

NC Wildlife Boat Ramp

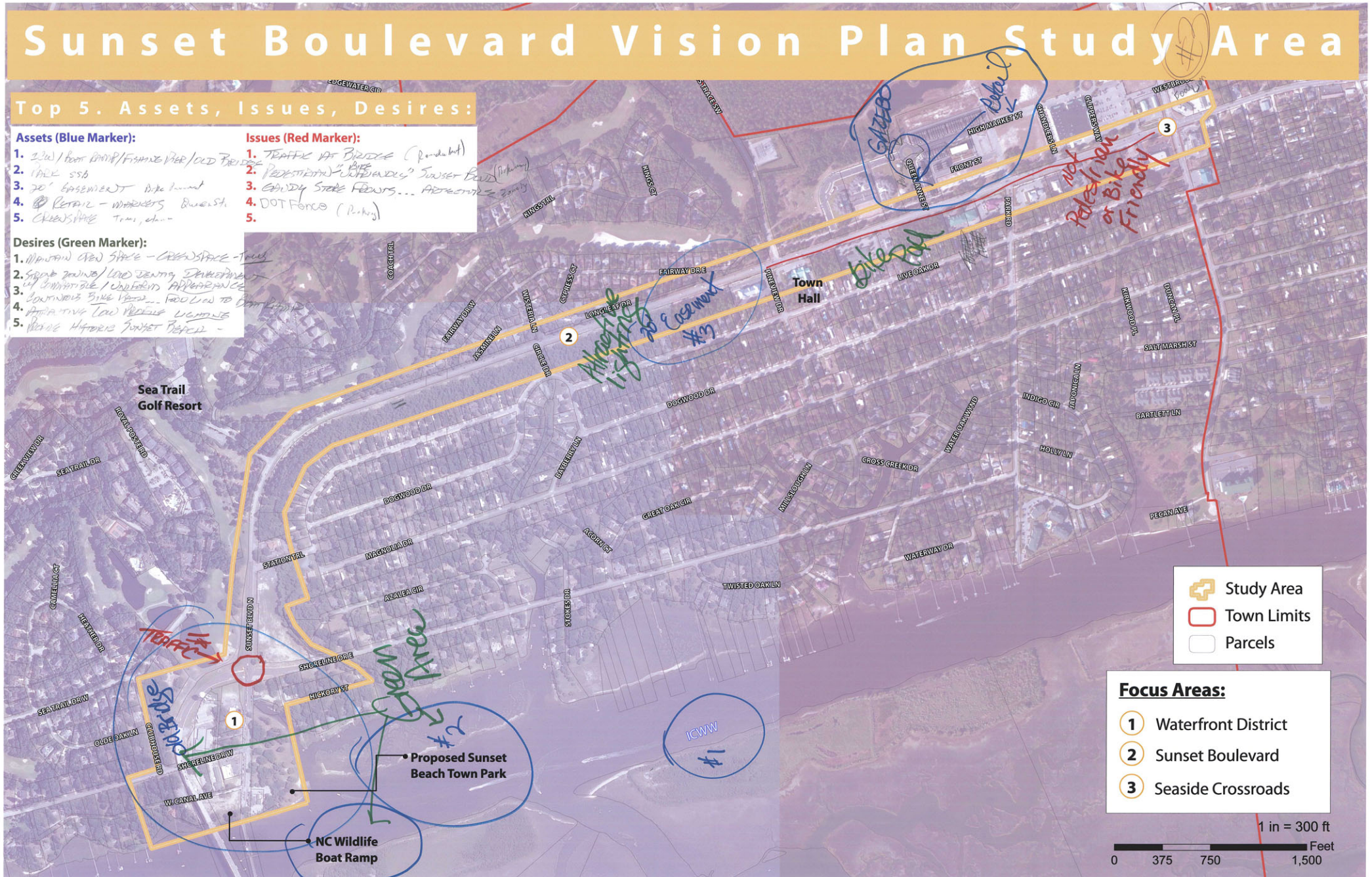
ICWW

Study Area
Town Limits
Parcels

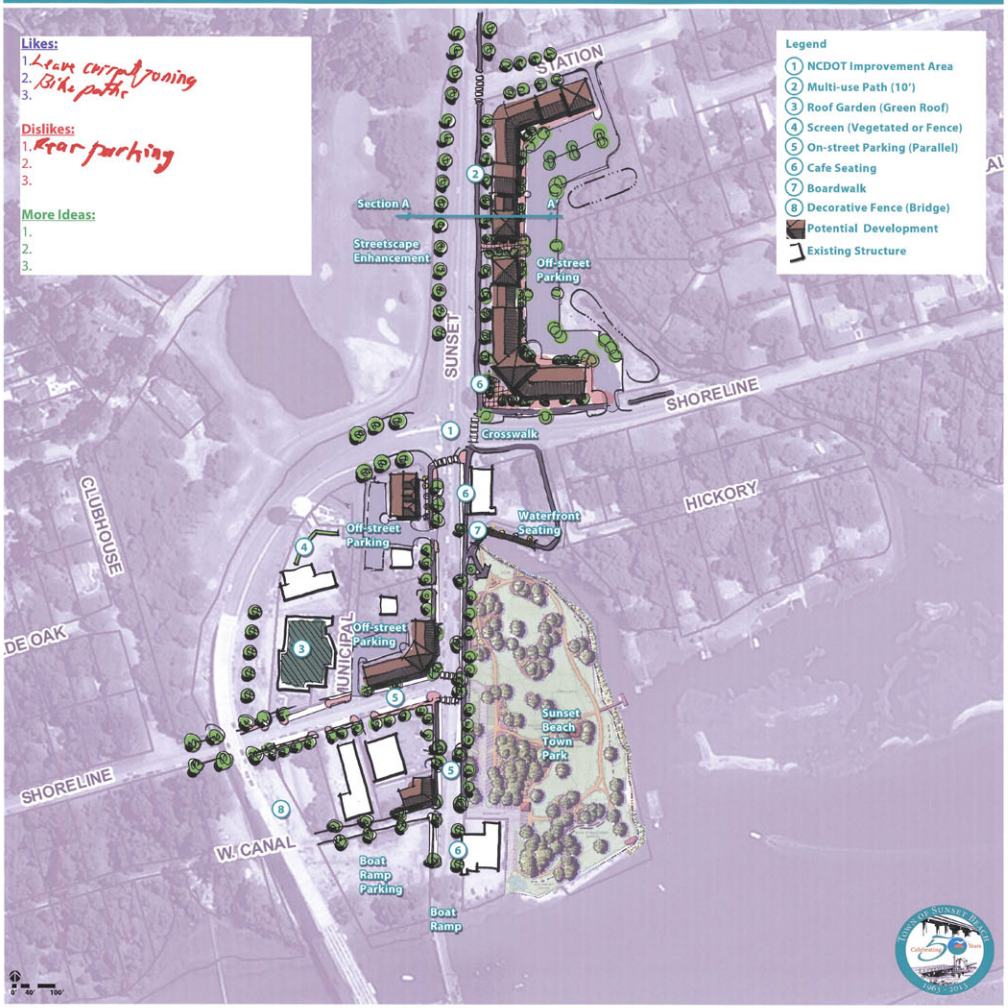
Focus Areas:
1. Waterfront District
2. Sunset Boulevard
3. Seaside Crossroads

1 in = 300 ft
Feet
0 375 750 1,500

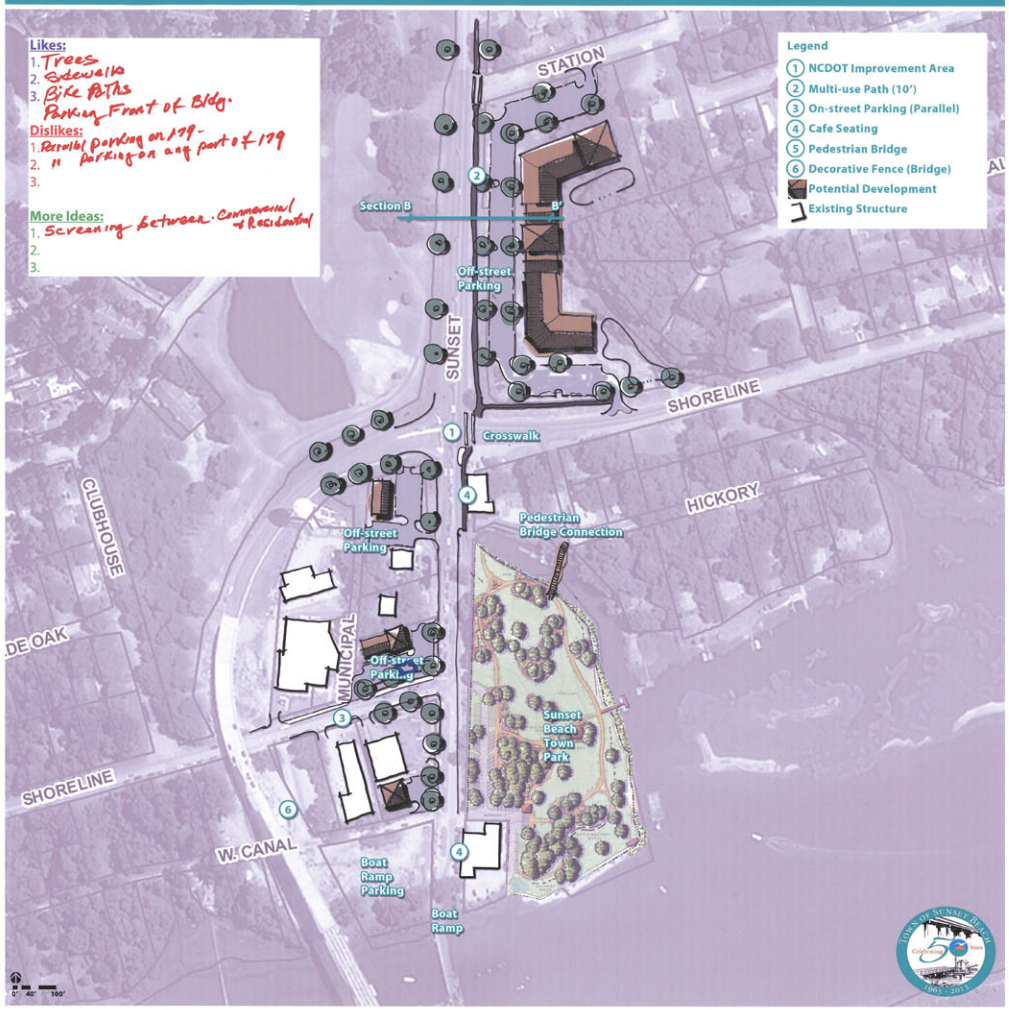
Sunset Boulevard Vision Plan Study Area



Sunset Boulevard Vision Plan: Concept A



Sunset Boulevard Vision Plan: Concept B



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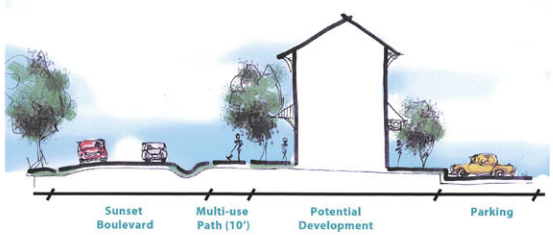
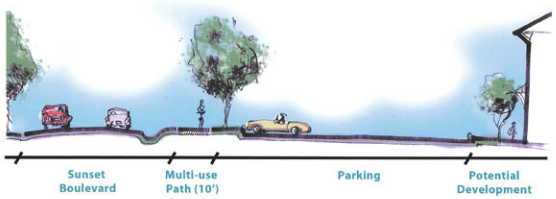


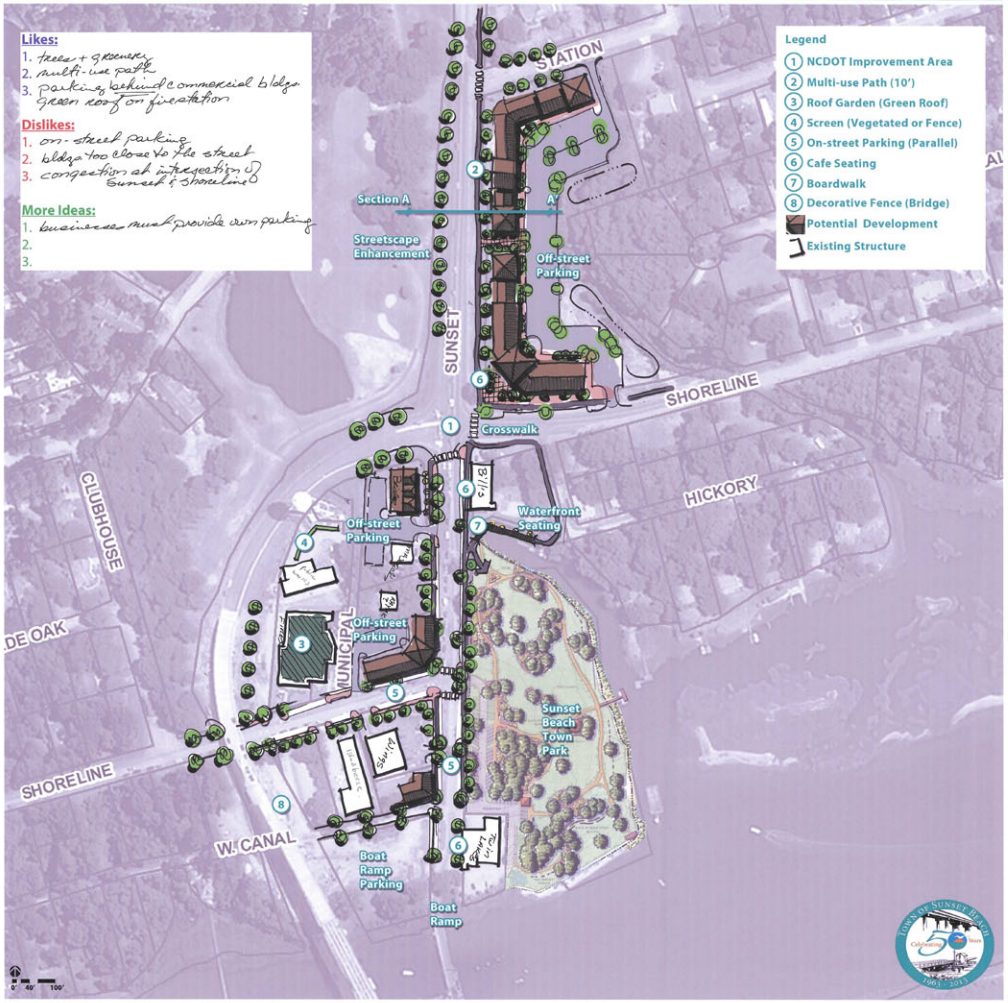
Sunset Blvd & Seaside Rd

Section B



Sunset Blvd & Seaside Rd

Sunset Boulevard Vision Plan: Concept A



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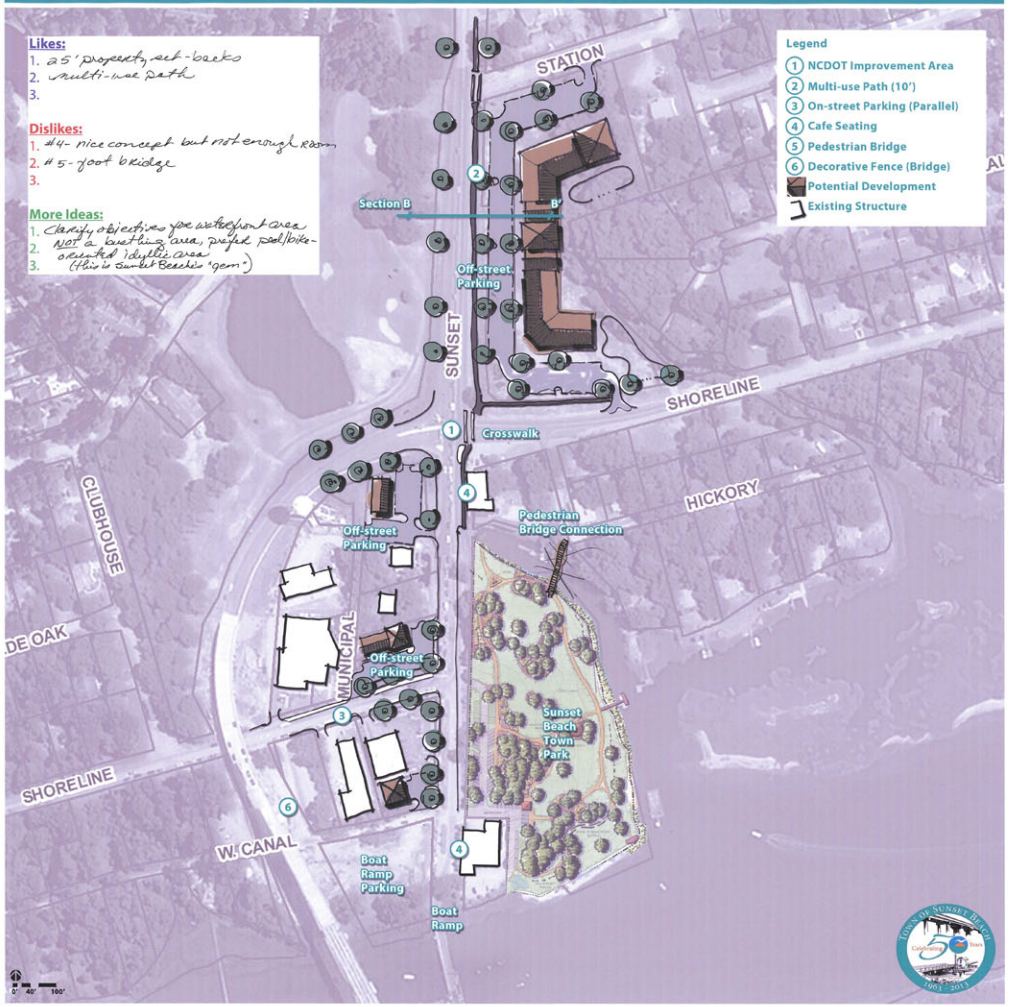

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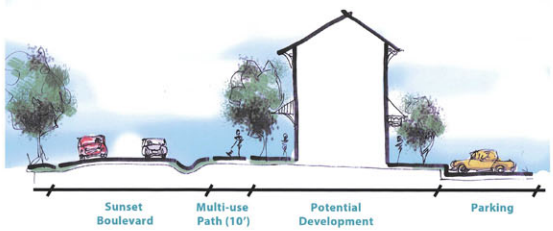

Sunset Blvd & Seaside Rd

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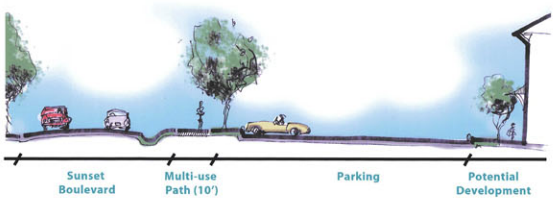
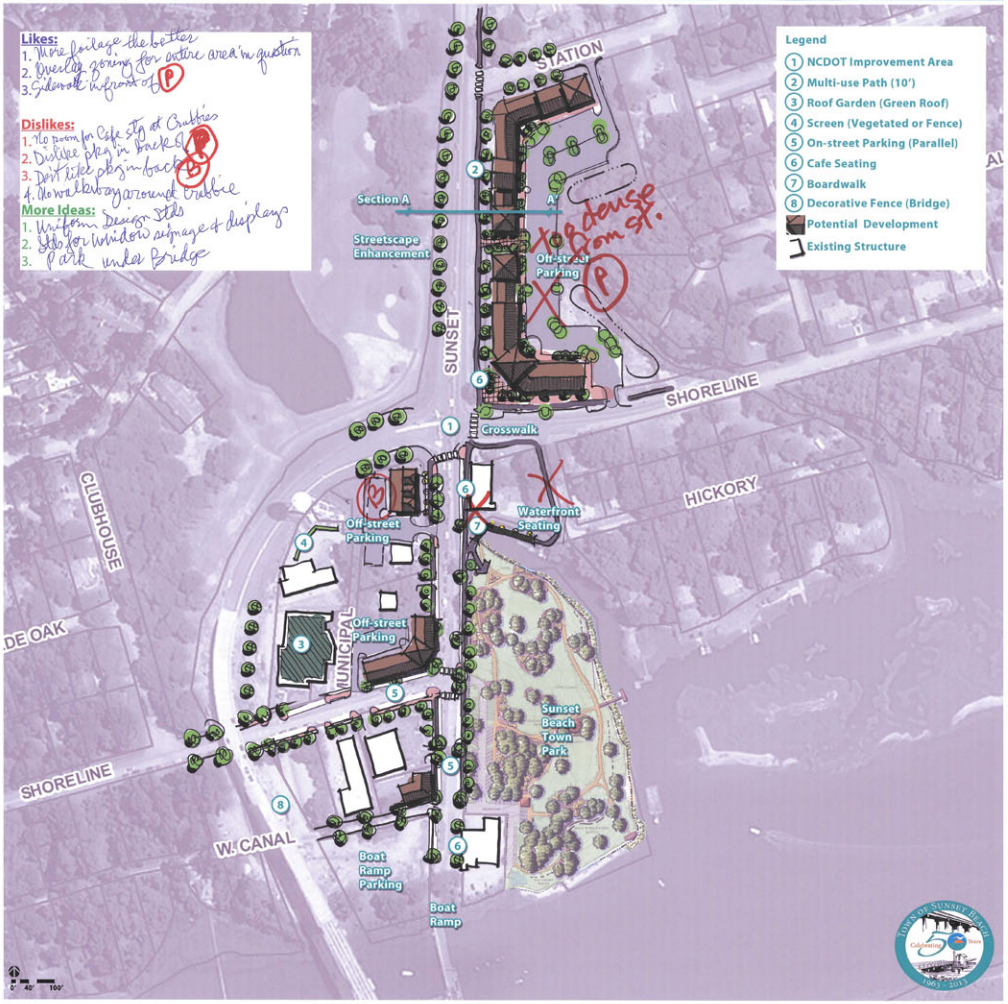


Sunset Blvd & Seaside Rd

Sunset Boulevard Vision Plan: Concept A



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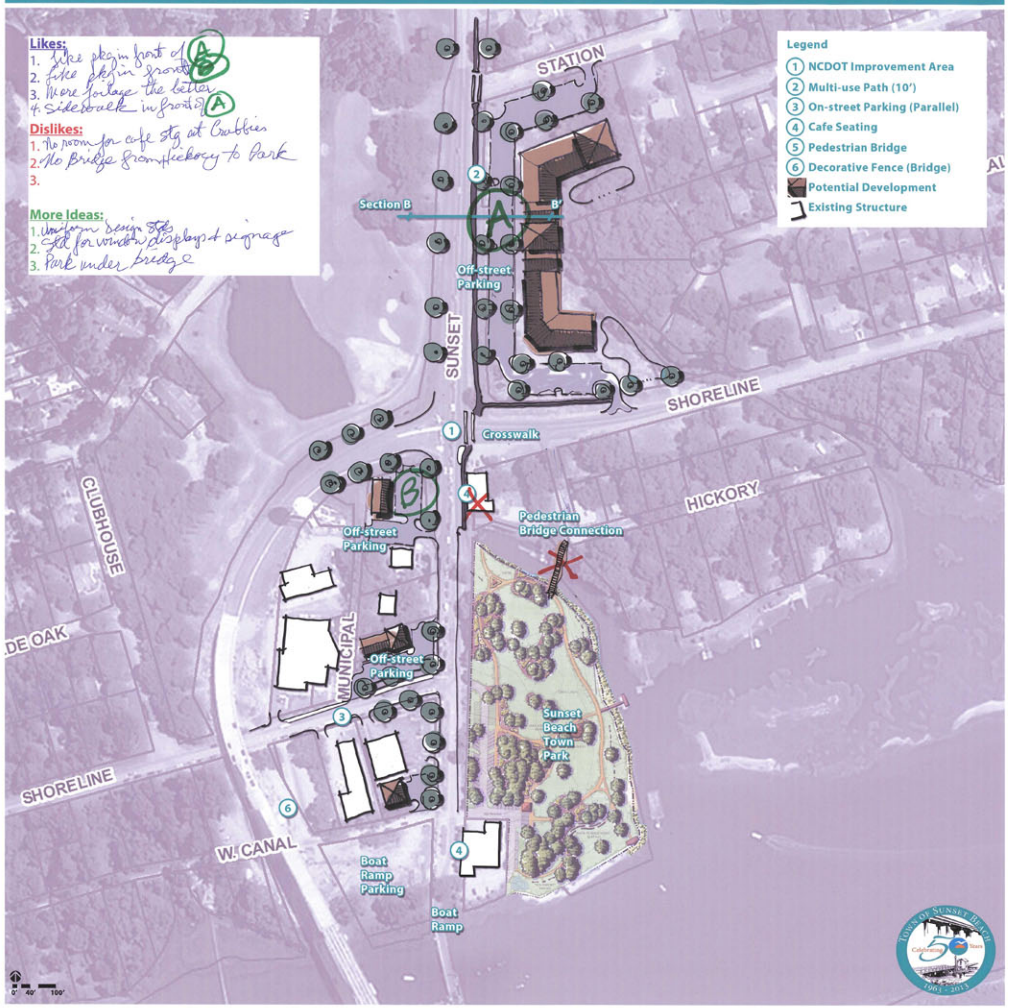

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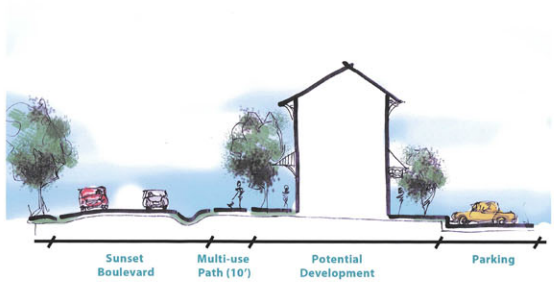

Sunset Blvd & Seaside Rd

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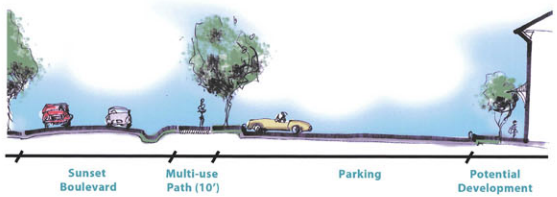
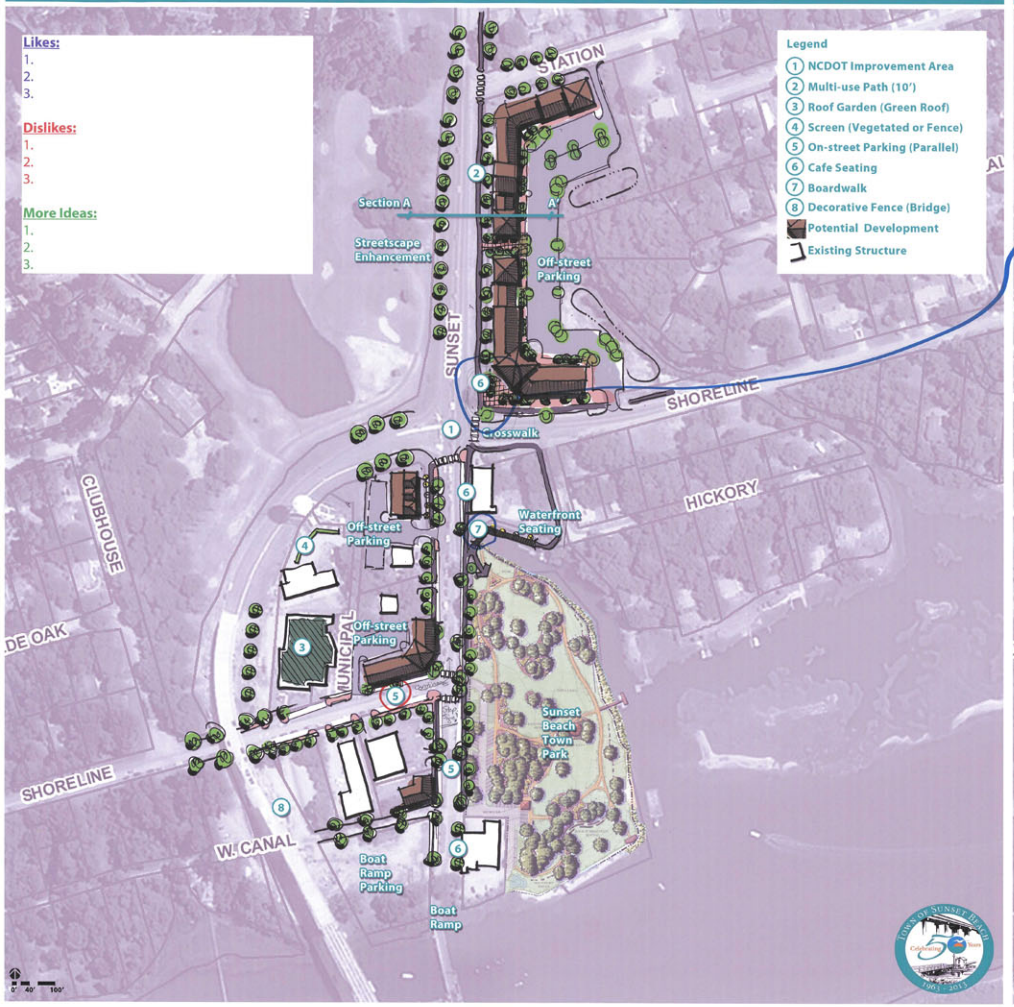


Sunset Blvd & Seaside Rd

Sunset Boulevard Vision Plan: Concept A



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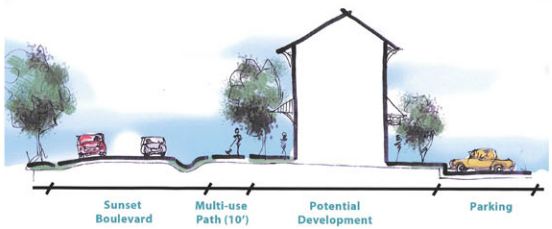
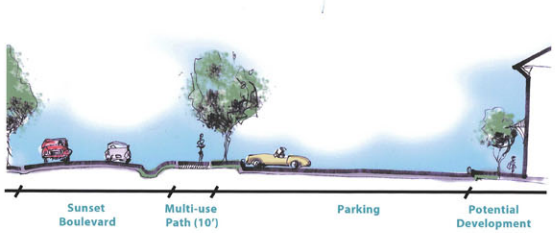
Section A



Sunset Blvd & Seaside Rd

Section B



Sunset Blvd & Seaside Rd

Appendix 4: Capital Improvement Cost Estimates

Please note the figures below are estimates. Consultation with NCDOT, a professional engineer, or licensed landscape architect should be sought prior to the design or construction of any of the facilities listed below.

Cost Estimates				
Item	**Comments**	**Low End Estimates**	**High End Estimates**	**Unit**
10' Asphalt Multi-use Path	Does not include right-of-way. Assumes no major drainage cost.	$25	$75	Per Linear Foot
Tree Plantings and Landscaping	Low end is trees only; High end is trees, sod, irrigation, & shrubs. Assumes sufficient right-of-way.	$5	$35	Per Linear Foot
Crosswalk Markings	Includes thermoplastic markings on pavement and on concrete portion of medians/sidewalks as necessary.	$500	$1,000	Per Intersection
Crosswalk Signage	Simple neighborhood signs.	$250	$300	Each
Pedestrian Countdown Signals	Assumes traffic signals exist at the intersection. Also, on NCDOT streets there are strict warrants that must be met for pedestrian signals to be allowed.	$2,500	$5,000	Per Intersection
Sidewalk Installation	Does not include right-of-way. Assumes no major drainage cost.	$20	$50	Per Linear Foot
Curb Ramps	ADA compliant. Does not include right-of-way.	$400	$600	Each
Streetscape	Cost varies based on material, amenities, size, and drainage requirement.	$400	$1,000	Per Linear Foot
Curb Extensions	Cost varies based on material, amenities, size, and drainage requirement.	$5,000	$15,000	Each
Vegetated Roof	Cost varies depending on plant material, structural requirements, and roofing membrane.	$15	$50	Per Square Foot
Lighting	Cost varies depending on size, wattage, and material of lighting.	$500	$1,250	Each
Mast Arm Signal Pole	25 foot galvanized steel mast arm signal post. Cost does not include utility relocation.	$6,000	$10,000	Each

Appendix 5: Capital Improvement Guidelines

Introduction

The following guidelines are provided to serve as a basis for facility design in Ayden. Alterations may be necessary for specific projects. Consultation with a professional engineer or licensed landscape architect should take place when designing and installing any of the listed facilities. Coordination with the NC Department of Transportation may be required in instances where innovative practices are utilized.

The following resources were used in the creation of these guidelines:

- NC Complete Streets
- Model Design Manual for Living Streets
  www.Modelstreetdesignmanual.com
- Pedestrian and Bicycle Information Center, 2010
  www.walkinginfo.org/engineering/
  www.bicyclinginfo.org/engineering/
- Bicycle Parking Design Guidelines
  www.bicyclinginfo.org/engineering/parking.cfm
- Manual on Uniform Traffic Control Devices (MUTCD) U. S. Department of Transportation, Washington, DC, 2009
  http://mutcd.fhwa.dot.gov
- Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities: An ITE Proposed Recommended Practice.

Pedestrian Facilities

ESSENTIAL PRINCIPLES OF PEDESTRIAN CROSSINGS

The following principles should be incorporated into every pedestrian crossing improvement:

- The safety of all street users, particularly more vulnerable groups, such as children, the elderly, and those with disabilities, and more vulnerable modes, such as walking and bicycling, must be considered when designing streets.
- Pedestrian crossings must meet accessibility standards and guidelines.
- Real and perceived safety must be considered when designing crosswalks—crossing must be "comfortable." A "safe" crossing that no one uses serves no purpose.
- Crossing treatments that have the highest crash reduction factors (CRFs) should be used when designing crossings.
- Safety should not be compromised to accommodate traffic flow.
- Good crossings begin with appropriate speed. In general, urban arterials should be designed to a maximum of 30 mph or 35 mph (note: 30 mph is the optimal speed for moving motor vehicle traffic efficiently).
- Every crossing is different and should be selected and designed to fit its unique environment.
- Ideally, uncontrolled crossing distances should be no more than 21 feet, which allows for one 11-foot lane and one 10-foot lane. Ideally, streets wider than 40 feet should be divided (effectively creating two streets) by installing a median or two crossing islands.

Crosswalk Markings

According to the MUTCD, the minimum crosswalk marking shall consist of solid white lines. They shall not be less than 6 inches or greater than 24 inches in width.

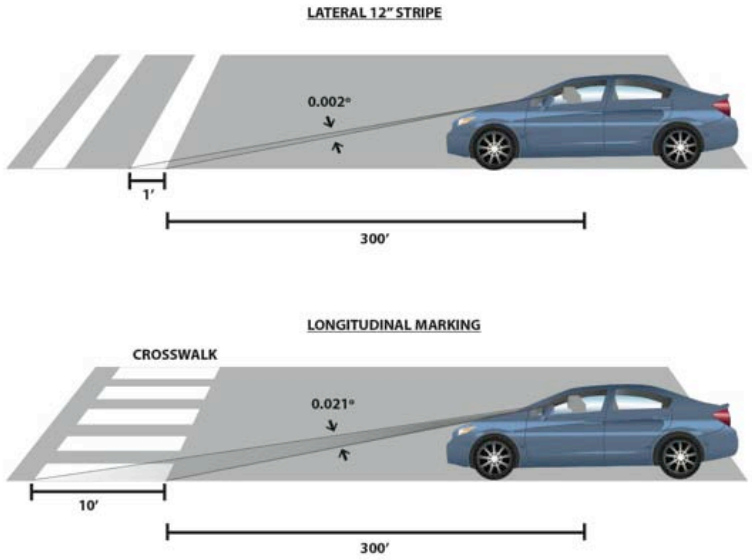
Placement

The best locations to install marked crosswalks are

- All signalized intersections
- Trail crossings
- High land use generators
- School walking routes
- When there is a preferred crossing location due to sight distance
- Where needed to enable comfortable crossings of multi-lane streets between controlled crossings spaced at convenient distances

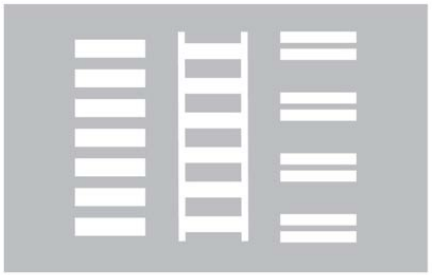
High-Visibility Crosswalks

Because of the low approach angle at which pavement markings are viewed by drivers, the use of longitudinal stripes in addition to or in place of transverse markings can significantly increase the visibility of a crosswalk to oncoming traffic. While research has not shown a direct link between increased crosswalk visibility and increased pedestrian safety, high-visibility crosswalks have been shown to increase motorist yielding and channelization of pedestrians, leading the Federal Highway Administration to conclude that high-visibility pedestrian crosswalks have a positive effect on pedestrian and driver behavior. Colored and stamped crosswalks should only be used at controlled locations.



Longitudinal crosswalk markings are more visible than lateral crosswalk markings (Credit: Michele Weisbart)

Staggered longitudinal markings reduce maintenance since they avoid vehicle wheel paths.



Typical crosswalk markings: Continental, Ladder, Staggered Continental (Credit: Michele Weisbart)

Continental striping (far left) provides the highest visibility.

Crosswalks and Accessibility

Longitudinal crosswalk markings provide the best visibility for pedestrians with limited vision.

Decorative crosswalk treatments, as shown here in Ayden, NC made of distinctive materials can become uneven over time.

Decorative crosswalk pavement materials should be chosen with care to ensure that smooth surface conditions and high contrast with surrounding pavement are provided. Textured materials within the crosswalk are not recommended. Without reflective materials, these treatments are not visible to drivers at night.

Decorative pavement materials often deteriorate over time and become a maintenance problem while creating uneven pavement.
The use of color or material to delineate the crosswalks as a replacement of retro-reflective pavement marking should not be used, except in slow speed districts where intersecting streets are designed for speeds of 20 mph or less.

RAISED/LANDSCAPED MEDIANS

Raised islands and medians are the most important, safest, and most adaptable engineering tool for improving street crossings. *Note* on terminology: a median is a continuous raised area separating opposite flows of traffic. A crossing island is shorter and located just where a pedestrian crossing is needed. Raised medians and crossing islands are commonly used between intersections when blocks are long (500 feet or more in downtowns) and in the following situations:

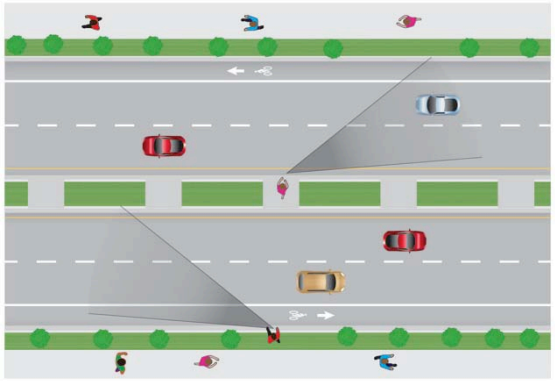
Staggered median crossing
(Credit: Marcel Schmaedick)

- Speeds are higher than desired
- Streets are wide
- Traffic volumes are high
- Sight distances are poor

Raised islands have nearly universal applications and should be placed where there is a need for people to cross the street. They are also used to slow traffic.

Reasons for Effectiveness

Their use changes a complex task, crossing a wide street with traffic coming from two opposing directions all at once, into two simpler and smaller tasks. With their use, conflicts occur in only one direction at a time, and exposure time can be reduced from more than 20 seconds to just a few seconds.



Medians and crossing islands allow pedestrians to complete the crossing in two stages.
(Credit: Michele Weisbart)

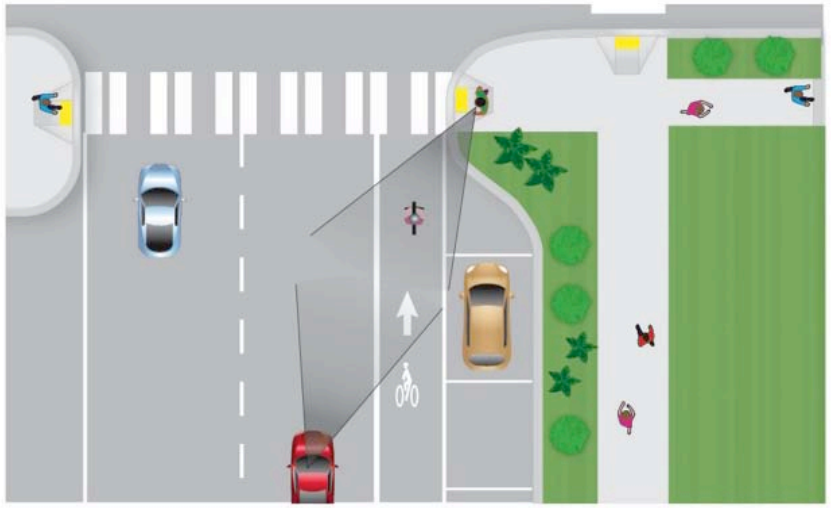
On streets with traffic speeds higher than 30 mph, it may be unsafe to cross without a median island. At 30 mph, motorists travel 44 feet each second, placing them 880 feet out when a pedestrian starts crossing an 80-foot wide multi-lane road.

In this situation, this pedestrian may still be in the last travel lane when the car arrives there; that car was not within view at the time he or she started crossing. With an island on multi-lane roadways, people would cross two or three lanes at a time instead of four or six. Having to wait for a gap in only one direction of travel at a time significantly reduces the wait time to cross. Medians and crossing islands have been shown to reduce crashes by 40 percent (Federal Highway Administration, Designing for Pedestrian Safety course).

As a general rule, crossing islands are preferable to signal-controlled crossings due to their lower installation and maintenance cost, reduced waiting times, and their safety benefits.

Curb Extensions

Curb extensions extend the sidewalk or curb line out into the parking lane, which reduces the effective street width. Curb extensions significantly improve pedestrian crossings by reducing the pedestrian crossing distance, visually and physically narrowing the roadway, improving the ability of pedestrians and motorists to see each other, and reducing the time that pedestrians are in the street. Reducing street widths improves signal timing since pedestrians need less time to cross.



Curb extensions
(Credit: Michele Weisbart)

Motorists typically travel more slowly at intersections or mid-block locations with curb extensions, as the restricted street width sends a visual cue to slow down. Turning speeds are lower at intersections with curb extensions (curb radii should be as tight as is practicable). Curb extensions also prevent motorists from parking too close to the intersection.

Example of curb extensions
(Credit: Marcel Schmaedick)

Curb extensions also provide additional space for two curb ramps and for level sidewalks where existing space is limited, increase the pedestrian waiting space, and provide additional space for pedestrian push button poles, street furnishings, plantings, bike parking and other amenities. A benefit for drivers is that extensions allow for better placement of signs (e.g., stop signs and signals).

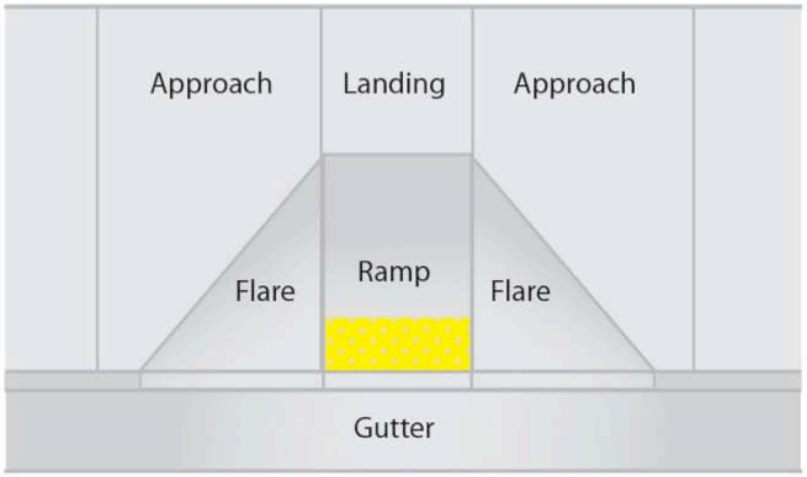
Curb extensions are generally only appropriate where there is an on-street parking lane. Where street width permits, a gently tapered curb extension can reduce crossing distance at an intersection along streets without on-street parking, without creating a hazard. Curb extensions must not extend into travel lanes or bicycle lanes.

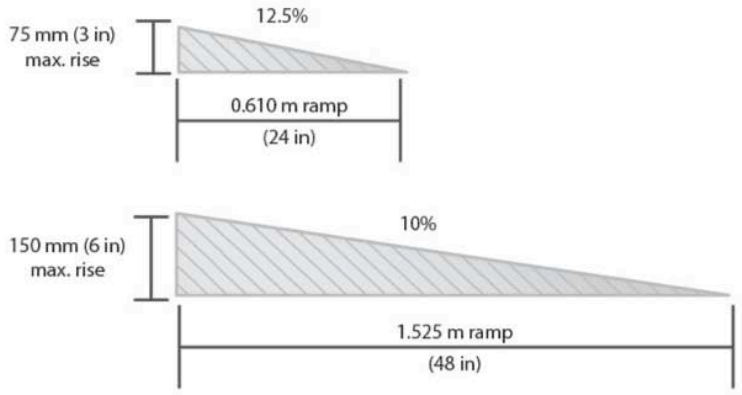
Curb extensions can impact other aspects of roadway design and operation as follows:

- May impact street drainage and require catch basin relocation
- May impact underground utilities
- May require loss of curbside parking, though careful planning often mitigates this potential loss, for example by relocating curbside fire hydrants, where no parking is allowed, to a curb extension
- May complicate delivery access and garbage removal
- May affect the turning movements of larger vehicles such as school buses and large fire trucks

Curb Ramps

Proper curb ramp design is essential to enable pedestrians using assistive mobility devices (e.g., scooters, walkers, and crutches) to transition between the street and the sidewalk. These design guidelines provide a basic overview of curb ramp design. The ADA requires installation of curb ramps in new sidewalks and whenever an alteration is made to an existing sidewalk or street. Curb ramps are typically installed at intersections, mid-block crossings (including trail connections), accessible on-street parking, and passenger loading zones and bus stops.





Curb ramp components, and alternate ramp slopes (Credit: Michele Weisbart).

The following define the curb ramp components along with minimum dimensions:

- **Landing** – the level area at the top of a curb ramp facing the ramp path. Landings allow wheelchairs to enter and exit a curb ramp, as well as travel along the sidewalk without tipping or tilting. This landing must be the width of the ramp and measure at least 4 feet by 4 feet. There should also be a level (not exceeding a 2 percent grade) 4 foot by 4 foot bottom landing of clear space outside of vehicle travel lanes.
- **Approach** – the portion of the sidewalk on either side of the landing. Approaches provide space for wheelchairs to prepare to enter landings.
- **Flare** – the transition between the curb and sidewalk. Flares provide a sloped transition (10 percent maximum slope) between the sidewalk and curb ramp to help prevent pedestrians from tripping over an abrupt change in level. Flares can be replaced with curb where the furniture zone is landscaped.
- **Ramp** – the sloped transition between the sidewalk and street where the grade is constant and cross slope at a minimum. Curb ramps are the main pathway between the sidewalk and street.
- **Gutter** – the trough that runs between the curb or curb ramp and the street. The slope parallel to the curb should not exceed 2 percent at the curb ramp.
- **Detectable Warning** – surface with distinct raised areas to alert pedestrians with visual impairments of the sidewalk-to-street transition.

There are several different types of curb ramps. Selection should be based on local conditions. The most common types are diagonal, perpendicular, parallel, and blended transition.

Diagonal Curb Ramps

Diagonal curb ramps are single curb ramps at the apex of the corner. These have been commonly installed by many jurisdictions to address the requirements of the ADA, but have since been identified as a non-preferred design type as they introduce dangers to wheelchair users. Diagonal curb ramps send wheelchair users and people with strollers or carts toward the middle of the intersection and make the trip across longer.

Perpendicular Curb Ramps

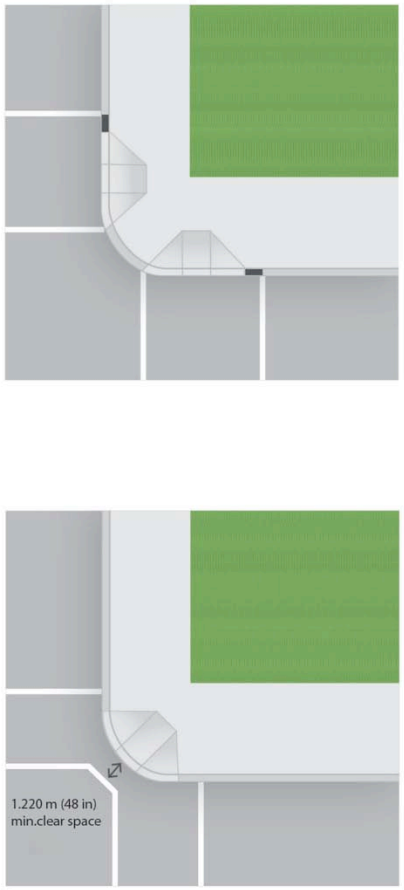
Perpendicular curb ramps are placed at a 90-degree angle to the curb. They must include a level landing at the top to allow wheelchair users to turn 90 degrees to access the ramp, or to bypass the ramp if they are proceeding straight. Perpendicular ramps work best where there is a wide sidewalk, curb extension, or planter strip. Perpendicular curb ramps provide a direct, short trip across the intersection.

Parallel Curb Ramps

Parallel curb ramps are oriented parallel to the street; the sidewalk itself ramps down. They are used on narrow sidewalks where there isn't enough room to install perpendicular ramps. Parallel curb ramps require pedestrians who are continuing along the sidewalk to ramp down and up. Where space exists in a planting strip, parallel curb ramps can be designed in combination with perpendicular ramps to reduce the ramping for through pedestrians. Careful attention must be paid to the construction of the bottom landing to limit accumulation of water and/or debris.

Curb Ramp Placement

One ramp should be provided for each crosswalk, which usually translates to 2 per corner. This maximizes access by placing ramps in line with the sidewalk and crosswalk, and by reducing the distance required to cross the street, compared with a single ramp on the apex.



One ramp per crosswalk vs. single ramp at the apex
(Credit: Michele Weisbart)

A single ramp at the apex requires users to take a longer, more circuitous travel path to the other side and causes users to travel towards the center of the intersection where they may be in danger of getting hit by turning cars; being in the intersection longer exposes the user to greater risk of being hit by vehicles. A single ramp at the apex should be avoided in new construction and may be used only for alterations where a design exception is granted because of existing utilities and other significant barriers. In all cases, reducing the curb radius makes ramp placement easier.

Signs

Signs can provide important information to improve road safety by letting people know what to expect, so they can react and behave appropriately. Sign use and placement should be done judiciously, as overuse breeds noncompliance and disrespect. Too many signs create visual clutter.

Regulatory signs, such as STOP, YIELD, or turn restrictions, require driver actions and can be enforced. Warning signs provide information, especially to motorists and pedestrians unfamiliar with an area.

Advance pedestrian warning signs should be used where motorists may not expect pedestrian crossings, especially if there are many motorists who are unfamiliar with the area. The fluorescent yellow/green color is designated specifically for pedestrian, bicycle, and school warning signs (Section 2A.10 of the 2009 MUTCD) and should be used for all new and replacement installations. This bright color attracts the attention of drivers because it is unique.

Sign R1-5 should be used in conjunction with advance yield lines, as described below. Sign R1-6 may be used on median islands, where they will be more visible to motorists than signs placed on the side of the street, especially where there is on-street parking.

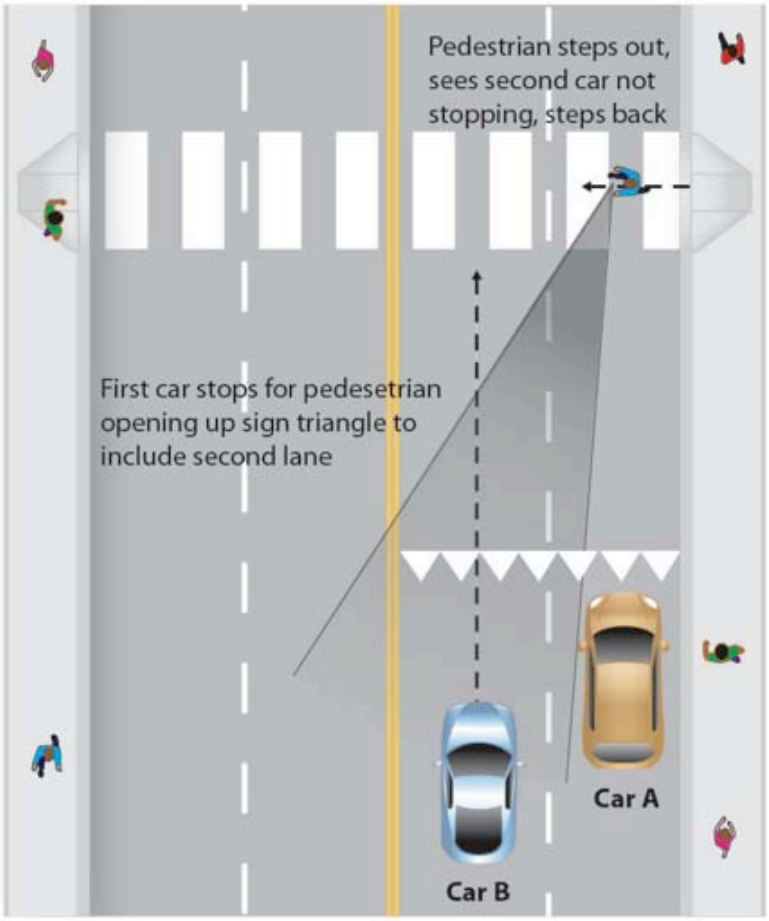
All signs should be periodically checked to make sure that they are in good condition, free from graffiti, reflective at night, and continue to serve a purpose.

All sign installations need to comply with the provisions of the MUTCD.

Advanced Yield/Stop Lines

Stop lines are solid white lines 12 to 24 inches wide, extending across all approach lanes to indicate where vehicles must stop in compliance with a stop sign or signal. Advance stop lines reduce vehicle encroachment into the crosswalk and improve drivers' view of pedestrians. At signalized intersections, a stop line is typically set back between 4 and 6 feet.

At uncontrolled crossings of multi-lane roads, advance yield lines can be an effective tool for preventing multiple threat vehicle and pedestrian collisions. Section 3B.16 of the MUTCD specifies placing advanced yield markings 20 to 50 feet in advance of crosswalks, depending upon location-specific variables such as vehicle speeds, traffic control, street width, on-street parking, potential for visual confusion, nearby land uses with vulnerable populations, and demand for queuing space. Thirty feet is the preferred setback for effectiveness at many locations. This setback allows a pedestrian to see if a car in the second (or third) lane is stopping after a driver in the first lane has stopped.



Bicycle Facilities

ESSENTIAL PRINCIPLES OF BIKEWAY DESIGN

The following principles should be followed when designing facilities for bicyclists:

- Bicyclists should have safe, convenient, and comfortable access to all destinations.
- Every street is a bicycle street, regardless of bikeway designation.
- Street design should accommodate all types, levels, and ages of bicyclists.
- Bicyclists should be separated from pedestrians.
- Bikeway facilities should take into account vehicle speeds and volumes, with
    - Shared use on low volume, low-speed roads.
    - Separation on higher volume, higher-speed roads.
- Bikeway treatments should provide clear guidance to enhance safety for all users.
- Since most bicycle trips are short, a complete network of designated bikeways has a grid of roughly ½ mile.

Bicycle Lanes

Bike lanes are a portion of the traveled way designated for preferential use by bicyclists; they are most suitable on avenues and boulevards. Bike lanes may also be provided on rural roads where there is high bicycle use. Bike lanes are generally not recommended on local streets with relatively low

traffic volumes and speeds, where a shared roadway is the appropriate facility. There are no hard and fast mandates for providing bike lanes, but as a general rule, most jurisdictions consider bike lanes on roads with traffic volumes in excess of 3,000-5,000 ADT or traffic speeds of 30 mph or greater.

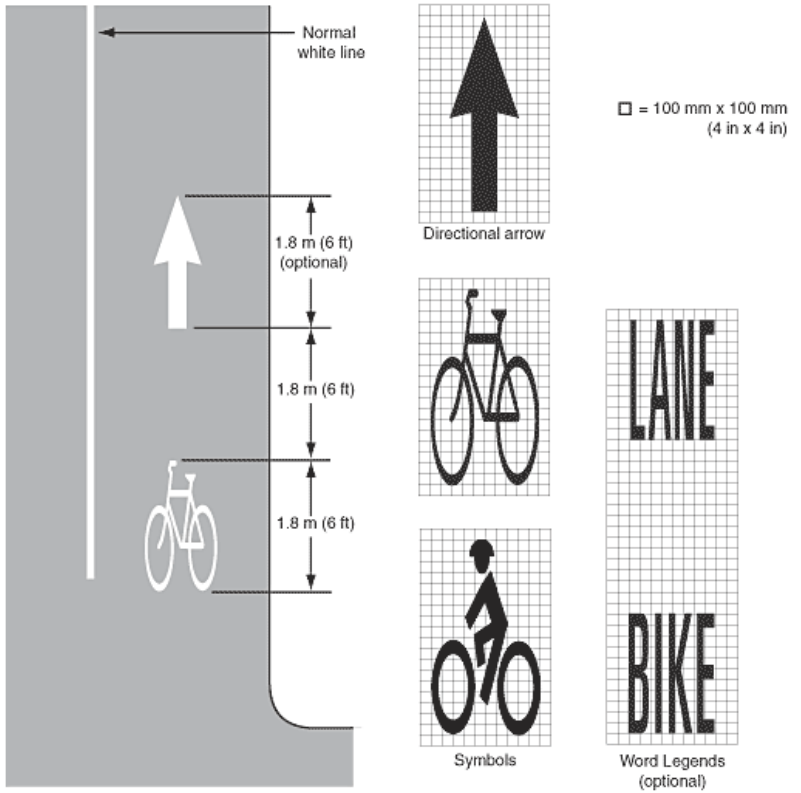
Bike lanes have the following advantages:

- They enable cyclists to ride at a constant speed, especially when traffic in the adjacent travel lanes speeds up or slows down (stop-and-go).
- They enable bicyclists to position themselves where they will be visible to motorists.
- They encourage cyclists to ride on the traveled way rather than the sidewalk.

Bike lanes are created with a solid stripe and stencils. Motorists are prohibited from using bike lanes for driving and parking, but may use them for emergency avoidance maneuvers or breakdowns. Bike lanes are one-way facilities that carry bicycle traffic in the same direction as adjacent motor-vehicle traffic. Bike lanes should always be provided on both sides of a two-way street. One exception is on hills where topographical constraints limit the width to a bike lane on one side only; the bike lane should be provided in the uphill direction as cyclists ride slower uphill, and they can ride in a shared lane in the downhill direction.

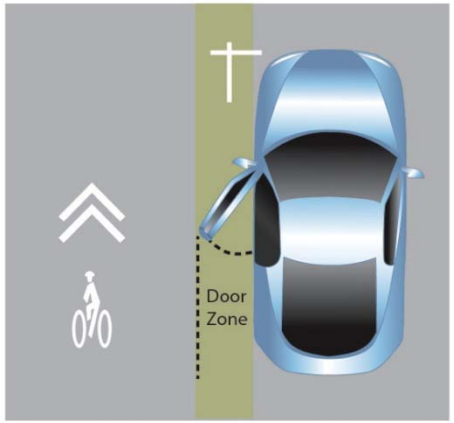
The minimum bike lane width is 5 feet from the face of a curb, or 4 feet on open shoulders. If on-street parking is permitted, the bike lane should be placed between parking and the travel lane with a preferred width of 6 feet so cyclists can ride outside the door zone. Streets with high volumes of traffic and/or higher speeds need wider bike lanes (6 feet to 8 feet) than those with less traffic or slow speeds. On curbed sections, a 4-foot (minimum 3 feet) wide smooth surface should be provided between the gutter pan and stripe. This minimum width enables cyclists to ride far enough from the curb to avoid debris and drainage grates and far enough from other vehicles to avoid conflicts. By riding away from the curb, cyclists are more visible to motorists than when hugging the curb. Where on-street parking is permitted, delineating the bike lane with two stripes, one on the street side and one on the parking side, is preferable to a single stripe.

Figure 9C-6. Example of Optional Word and Symbol Pavement Markings for Bicycle Lanes



Shared Lanes (sharrow)

Shared-lane marking stencils ("SLMs," also commonly called "sharrows") may be used as an additional treatment for shared roadways. The stencils can serve a number of purposes: they remind bicyclists to ride further from parked cars to prevent "dooring" collisions, they make motorists aware of bicycles potentially in the travel lane, and they show bicyclists the correct direction of travel. Sharrows installed next to parallel parking should be a minimum distance of 11 feet from the curb. Installing farther than 11 feet from the curb may be desired in areas with wider parking lanes or in situations where the sharrow is best situated in the center of the shared travel lane to promote cyclists taking the lane. Placing the sharrow between vehicle tire tracks increases the life of the markings and decreases long-term maintenance costs.



Sharrow
(Credit: Michele Weisbart)

Example of a sharrow: (Credit: Ryan Snyder)

Bicycle Parking

Secure bicycle parking at likely destinations is an integral part of a bikeway network. Bicycle thefts are common and lack of secure parking is often cited as a reason people hesitate to ride a bicycle. The same consideration should be given to bicyclists as to motorists, who expect convenient and secure parking at all destinations. Bicycle parking should be located in well-lit, secure locations close to the main entrance of a building, no further from the entrance than the closest automobile parking space. Bike parking should not interfere with pedestrian movement.

Bike racks along sidewalks should support the bicycle well, and make it easy to lock a U-shaped lock to the frame of the bike and the rack. The sample below shows an "inverted –U" rack.

Inverted U Bike Rack (Credit: Sky Yim)

Maintenance

Maintenance is a critical part of safe and comfortable bicycle access. Two areas that are of particular importance to bicyclists are pavement quality and drainage grates. Rough surfaces, potholes, and imperfections, such as joints, can cause a rider to lose control and fall. Care must be taken to ensure that drainage grates are bicycle-safe; otherwise a bicycle wheel may fall into the slots of the grate, causing the cyclist to fall. The grate and inlet box must be flush with the adjacent surface. Inlets should be raised after a pavement overlay to the new surface. If this is not possible or practical, the new pavement should taper into drainage inlets so the inlet edge is not abrupt.

The most effective way to avoid drainage-grate problems is to eliminate them entirely with the use of inlets in the curb face. This may require more grates to handle bypass flow, but is the most bicycle-friendly design.

Greenways/Multi-Use Path

Width and Clearance

Ten feet is the recommended minimum width for a two-way, shared use path on a separate right- of-way. Other critical measurements include:

- 8 feet (2.4m) may be used where bicycle traffic is expected to be low at all times, pedestrian use is only occasional, sightlines are good, passing opportunities are provided, and maintenance vehicles will not destroy the edge of the trail.
- 12 feet is recommended where substantial use by bicycles, joggers, skaters, and pedestrians is expected, and where grades are steep (see later).
- 2 feet of graded area should be maintained adjacent to both sides of the path.
- 3 feet of clear distance should be maintained between the edge of the trail and trees, poles, walls, fences, guardrails or other lateral obstructions.
- 8 feet of vertical clearance to obstructions should be maintained; rising to 10 feet in tunnels and where maintenance and emergency vehicles must operate.

Design Speed, Horizontal and Vertical Alignment

The design of a shared use path should take into account the likely speed of users, the ability of bicyclists to turn corners without falling over, skidding, or hitting their pedal on the ground as they lean over. The AASHTO Guide for the Design of Bicycle Facilities has a number of tables, and equations to help designers meet the tolerances of a bicyclist based on the following key numbers:

- 20 miles per hour (30 km/h) is the minimum design speed to use in designing a trail
- 30 miles per hour (50 km/h) should be used where downgrades exceed 4 percent
- 15 miles per hour (25 km/h) should be used on unpaved paths where bicyclists tend to ride more slowly (and cannot stop as fast without skidding or sliding on a loose surface)

The result is a series of recommended desirable minimum curve radii for corners that should be safe for bicyclists.

Grade

Another critical factor in trail design is the grade or slope of the path. Generally, grades greater than 5 percent (one feet of climbing for every 20 feet traveled forward) are undesirable as they are hard for bicyclists to climb and may cause riders to travel downhill at a speed where they cannot control their bicycle. However, recognizing that trails cannot always remain quite flat, the AASHTO Guide offers the following suggested lengths for certain grades:

- 5-6 percent is acceptable for up to 800 feet (240m)
- 7 percent is acceptable for up to 400 feet (120 m)
- 8 percent is acceptable for up to 300 feet (90m)
- 9 percent is acceptable for up to 200 feet (60m)
- 10 percent is acceptable for up to 100 feet (90m)
- 11 percent plus is acceptable for up to 50 feet (15m)

However, slopes with 9 percent grade are not acceptable for inexperienced bicyclists and are not compliant with Americans with Disabilities Act (ADA) guidelines. Consider the ADA grade guidelines as a guide to better meet the needs of pedestrians or bicyclists with disabilities and inexperienced bicyclists.

And, suggestions are offered for ways to mitigate the impact of steeper slopes, such as:

- adding 4-6 feet of additional width to the trail to allow sufficient space for a cyclist to dismount and walk their bicycle without blocking the trail, or to allow cyclists to pass each other,
- alerting cyclists to the approaching grade with appropriate signs and markings posting a recommended descent speed
- exceeding the usual minimum stopping sight distances to allow for the higher speeds
- exceeding the usual minimum thresholds for providing recovery areas, railings etc
- using a series of short switchbacks to contain the speed of descending riders

Sight Distances

The ability of a cyclist to stop or slow down to avoid a collision or crash is affected by many things. The rider must have time to identify a potential problem and react accordingly, which means that they must be able to see approaching intersections or corners in plenty of time even when they are traveling at the design speed of the trail. The bicycle itself must be able to be stopped or brought under control in time, which is affected by the braking ability of the bike, the surface material (a loose surface requires greater stopping distance), and the weather (wet conditions require greater stopping distances than dry). Once again, the AASHTO Guide and state/local manuals have tables and charts to enable the designer to calculate the appropriate sight distances in a range of situations.

Drainage

In response to a message about trail maintenance posted recently to an e-mail listserv, one trail manager identified the three most important issues: drainage, drainage and drainage. Poor drainage can ruin a good trail.

The AASHTO Guide recommends a minimum cross slope of 1 percent and the need to make trails accessible to people using wheelchairs demands a maximum cross slope of 2 percent. Other considerations to ensure adequate drainage include:

- slope the trail in one direction rather than having a crown in the middle of the trail
- ensure a smooth surface to prevent ponding and ice formation
- place a ditch on the upside of a trail constructed on the side of a hill (where needed)
- place drainage grates, utility covers etc out of the travel path of bicyclists, unless they can be made fully bicycle-friendly.
- preserve natural ground cover adjacent to the trail to inhibit erosion

Surface

Another important consideration in trail design is the type of surface that will be provided. A hard surface, such as cement or asphalt, will generally see cyclists operating at a faster speed than a soft surface, but may not be as popular with joggers and is more expensive to install. A soft surface trail (i.e. crushed granite) will discourage or prevent in-line skating but may be less expensive to install (although it will require more maintenance than concrete). Factors such as weather conditions and soil types can affect the choice of asphalt, concrete, or crushed rock. Choices in surface will affect requirements for periodic monitoring of the path surface and appropriate levels of maintenance.

Structures

One of the great advantages and unique features of trails along former railroad corridors is that they often have grade separated intersections with the highway system, and have bridges to carry them over rivers or stream valleys. However, not all corridors have this asset and structures of all kinds are needed to carry trail users under or over obstacles such as highways, rivers, freeways etc. The critical dimensions to use in designing underpasses, overpasses, bridges and tunnels, include:

a. the minimum width of the trail (usually 10 feet) should be maintained through the structure

b. the clear distance of two feet on either side of the trail surface should also be maintained through the structure — otherwise, riders will tend to ride in the center of the trail to stay away from the wall or railing of the structure

c. an overhead clearance of 10 feet (8 feet with good horizontal and vertical clearance, good sightlines etc) should be maintained through an underpass or tunnel

d. railings, fences, or barriers on both sides of a path on a structure should be at least 42 inches (1.1m) high, and where they are higher than this a rub rail should be provided at the approximate handlebar height of 42 inches.

e. clearances should allow for maintenance and emergency vehicles, as should the strength of the bridge (live loading)

Under-crossings are generally less expensive than overpasses and require less change in grade as a clearance height of only 10 feet is required. However, they may present security problems due to reduced visibility and drainage problems, both of which can be expensive to fix.

Over-crossings are more open and present fewer security problems but they require much longer approaches to achieve the minimum 17 feet of clearance from a roadway, and they are often more expensive. Overpasses also may result in complaints from nearby residences due to a loss of privacy or due to aesthetic concerns.

Another issue is when retrofitting a shared use path onto an existing highway bridge, should a separate path on one side, both sides, or an on-street facility be recommended?

The Florida DOT's Bicycle Facilities Planning and Design Handbook discusses the various options and recommends that:

- the shared use path should be carried across the bridge on one side where:
    - the bridge facility connects to a shared use path at both ends
    - sufficient width exists on one side of the bridge, or can be obtained by widening or restriping lanes
- provisions are made to physically separate bicycle and pedestrian traffic from motor vehicle traffic on-street facilities such as bike lanes may be advisable where:
    - the shared use path transitions into bicycle lanes at one end of the bridge
    - sufficient width exists or can be obtained by widening or restriping.

The AASHTO Guide also warns that this latter option must only be used if the transition from bike lanes to shared use path can be achieved without increasing the potential for wrong way riding or inappropriate crossing movements.

Lighting

Shared use paths in urban and suburban areas often serve travel needs both day and night, for example, commuter routes and trails accessing college campuses. Fixed source lighting improves visibility along trails and at intersections, and is critical for lighting tunnels and underpasses. The AASHTO guide recommends using average maintained illumination levels of between 5 and 22 lux.

Preventing Motor Vehicle Use of Paths

In some locations, shared use paths may be mistaken for motor vehicle roads or may suffer from illegal or unauthorized motorized use. At intersections with roadways, therefore, the path should be clearly signed, marked and/or designed to discourage or prevent unauthorized motorized access. A variety of alternatives exist to achieve this:

a. Bollards. Probably the most common device is the bollard, often lockable, collapsible or removable to allow for authorized access to the trail. Great care should be used in locating the bollard to ensure that they are visible, allow trail users through, and are not placed so as to channel both directions of trail users towards the same point in the trail. If bollards are to be used, they should be retro-reflective, brightly colored, and have pavement markings around them. On a ten foot trail, one bollard should be used in the center of the trail. If more than one bollard is necessary, there should be five feet between them.

b. Splitting the trail in two. Many manuals suggest the option of splitting a ten foot trail into two five foot approaches to an intersection, with a planted triangle between them. This may increase maintenance costs.

c. Medians. The Florida DOT manual notes that "curbing with tight radii leading up to the roadway can often prevent motorists from

attempting to enter the path. Medians should be set back from the intersection 25 feet (8m) to allow bicyclists to exit the roadway fully before navigating the reduced pathway width."

Signing and marking

While fewer signs may be needed on paths compared to on-street facilities, adequate signing and marking are essential on shared use paths, just as they are on streets and highways. Trail users need to know about potential conflicts, regulatory information, destinations, cross streets etc. The Manual on Uniform Traffic Control Devices (MUTCD) provides some minimum traffic control measures that should be applied and a range of options.

Striping: a yellow center line stripe is recommended where trails are busy, where sight distances are restricted, and on some unlit trails where night time riding is expected. The line should be dashed when adequate passing sight distance exists, and solid when no passing is recommended.

A solid white line may be used to separate pedestrians from bicycle/blading traffic, and solid white edge stripes may also be useful where nighttime riding is expected.

Warning signs: a range of warning signs can be used to inform users that recommended design criteria cannot be met, for example curve radii or grades or where unexpected conditions may exist.

Informational signs: trail users need to know where they are, where they are going, what cross streets they are crossing, how far destinations are away, and what services are available close to the trail. The MUTCD has information on the appropriate signs to use in these instances. Although not in the MUTCD, many trails post signs encouraging uniform trail user etiquette (e.g. "give audible signal when passing" or which type of trail user has the right-of-way).

Intersection markings and signs: pavement marking and signs at intersections should channel users to cross at clearly defined locations and indicate that crossing traffic is to be expected. Similar devices to those used on roadways (STOP and YIELD signs, stop bars, etc) should be used on trails as appropriate.

The AASHTO Guide notes that in addition to traditional warning signs in advance of intersections, motorists can be alerted to the presence of a trail crossing through flashing warning lights, zebra-style or colored pavement crosswalks, raised crosswalks, signals, and neck-downs/curb-bulbs. However, some devices such as flashing warning lights are expensive to install and maintain and should be kept to a minimum.

Streetscape

Urban Forestry

The urban forest includes all trees, shrubs, and other understory plantings on both public and private lands. Street trees and landscaping are essential parts of the urban forest, as they contribute positively to the urban environment—to climate control, stormwater collection, and the comfort and safety of people who live or travel along the street. A street lined with trees and other plantings looks and feels narrower and more enclosed, which encourages drivers to slow down and to pay more attention to their surroundings. Trees provide a physical and a psychological barrier between pedestrians and motorized traffic, increasing safety as well as making walking more enjoyable.

A healthy urban forest is also a powerful stormwater management tool. Leaves and branches catch and slow rain as it falls, helping it to soak into the ground. The plants themselves take up and store large quantities of water that would otherwise contribute to surface runoff. Part of this moisture is then returned to the air through evaporation to further cool the town.

As an important element along sidewalks, street trees must be provided with conditions that allow them to thrive, including adequate uncompacted soil, water, and air. This section provides guidance for appropriate conditions and selecting, planting, and caring for street trees, as well as for other landscaping along streets.

Street Trees

Goals and Benefits of Street Trees

The goal of adding street trees is to increase the canopy cover of the street, the percentage of its surface either covered by or shaded by vegetation, not simply to increase the overall number of trees. The selection, placement, and management of all elements in the street should enhance the longevity of a town's street trees and healthy, mature plantings should be retained and protected whenever possible.

Principles for Street Trees

The following principles influence the selection of street trees and landscaping design:

- **Seek out and reclaim space for trees**. Streets have a surprising number of residual or left-over spaces between areas required for travel lanes and parking, once they are examined from this perspective. Traffic circles, medians, channelization islands, and curb extensions can provide space for trees and landscaping.
- **Create optimum conditions for growth.** Space for roots and above ground growth is the main constraint to the urban forest achieving its highest potential. Typically a 6 to 8-foot wide, continuous sidewalk furniture zone must be provided, with uncompacted soil to a minimum of a 3-foot depth. If space for trees is constrained, provisions should be made to connect these smaller areas below the surface to form larger effective areas for the movement of air, root systems, and water through the soil.
- **Select the right tree for the space**. In choosing a street tree, consider what canopy, form, and height will maximize benefits over the course of its life. Provide necessary clearances below overhead high-intensity electrical transmission lines and prevent

limbs from overhanging potentially sensitive structures such as flat roofs. In commercial areas where the visibility of façade-mounted signs is a concern, choose species whose mature canopy allows for visibility, with the lowest branches at a height of 12 to 14 feet or more above the ground. Select trees with non-aggressive root systems to avoid damaging paving and sidewalks.

- **Start with good nursery stock and train it well.** When installing plant material, choose plants that have complete single leaders and are in good "form," and check that boxed trees are not root bound. Proper watering and pruning every three to four years will allow trees to mature and thrive for many years of service.

- **Do not subject plants to concentrated levels of pollutants.** Trees and other plants should be integrated within stormwater management practices whenever possible, but filtering of pollutants from “first flush” rain falls and street runoff will extend the life of trees and prevent toxic buildup of street pollutants in tree wells.

Guidelines

Climate and Soil

Selecting trees that are adapted to a site's climate and local rain cycles can create a more sustainable urban forest. The urban environment is harsh for many plants. Often plants native to an area are best adapted to that area’s climate. Select plants that can tolerate the environmental elements, such as radiant heat from the sidewalk or street surface or 50 to 60 mph winds from passing traffic.

Urban soils have became highly compacted through construction activities and the passage of vehicle and even foot traffic. Compaction reduces the soil's capacity to hold and absorb water. Plants need healthy soil, air, and water to thrive.

Using planters in the urban forest can increase the biomass and canopy cover, but these plants and trees are still compromised and confined. At its bottom and sides, a barrier will exist as the prepared area meets the surrounding compacted soils. Covering the soil surface with some form of mulch can help as the shade, cooling, and retained moisture that mulch provides help support the biological activities close to the soil’s surface. These activities open the pore structure of the soil over time, help keep it open, and cushion the impact of foot traffic. This process works better if the mulch material is organic, as opposed to stones. If planters have limited resources for soil preparation, they should have an extensive covering of mulch.

The generalized soil types map for a town can be used as a starting point when planning projects, but then the basic soil classifications should be identified on-site, especially when confronted by planting sites at the extreme ends of the spectrum: very fast-draining, nutrient-poor sands, and dense, often nutrient-rich, but oxygen-starved poorly drained clays.

Planting Sites

Traditionally, trees have been squeezed into whatever limited space is easily found, but this does not work well for either the tree or the street. The following guidelines provide recommended planting areas:

- Establish and maintain 6 to 8-foot wide sidewalk furniture zones, where possible. Many large trees need up to 12 feet in width, and are not suitable for placement in narrower furniture zones. In residential areas, sidewalk furniture zones within the root zone should be unpaved and planted/surfaced with low groundcover, mulch, or stabilized decomposed granite where these can be

maintained. Where maintenance of such extensive sidewalk furniture zones is not feasible, provide 12-foot long tree wells with true permeable pavers (standard interlocking pavers are not permeable).

- If the above conditions are not feasible, provide for the tree's root system an adequate volume of uncompacted soil or structural or gap-graded soil (angular rock with soil-filled gaps) to a depth of 3 feet under the entire sidewalk (in the furniture, frontage, and pedestrian sidewalk zones).

- Spacing between trees will vary with species and site conditions. The spacing should be 10 percent less than the mature canopy spread. Closer spacing of large canopy trees is encouraged to create a lacing of canopy, as trees in groups or groves can create a more favorable microclimate for tree growth than is experienced by isolated trees exposed to heat and desiccation from all sides. On residential streets where lots are 40 or 50 feet wide, plant one tree minimum per lot between driveways. Where constraints prevent an even spacing of trees, it is preferable to place a tree slightly off the desired rhythm than to leave a gap in the pattern.

- Planting sites should be graded, but not overly compact, so that the soil surface slopes downward toward the center, forming a shallow swale to collect water. The crown of the tree should remain 2 inches above finished grade and not be in the center of a swale, but off to the side. The finished soil elevation after planting is held below that of the surrounding paving so 2 to 3 inches of mulch can be added. The mulch layer must be replenished as needed to maintain a nearly continuous level surface adjacent to paving.

- Generally tree grates and guards are best used along streets with heavy pedestrian traffic. Along streets without heavy foot traffic and in less urban environments, use mulch in lieu of tree grates.

<u>Species Selection</u>

- Select trees with non-aggressive root systems to avoid damaging paving and sidewalks.

- In general, street trees should be species that will achieve a height and spread of 50 feet on residential streets and 40 feet on commercial streets within 10 years of planting to provide reasonable benefits. Typically, trees on commercial streets will not achieve the same scale as they will on residential streets where greater effective root zone volumes may be achieved. On commercial streets with existing multi-story buildings and narrow sidewalks, select trees with a narrower canopy than can be accommodated on the limited sidewalk width.

- Cities and towns should establish a list of recommended tree species for use in the public street rights-of-way. On commercial streets with ground-floor retail, deciduous trees with a strong central leader, such as Ginkos and London Planes, are desirable as they grow rapidly above the ground floor business signs. A town's list of recommended tree species should specify minimum planting site widths for each and which trees may be planted below utility lines. Where there are overhead power lines that are less than 50 feet above grade, braided insulated electrical wire should be used so that trees do not have to be pruned to avoid the electrical lines. If braided insulated electrical wire cannot be provided, appropriate trees that will not grow tall enough to reach the power lines should be specified and planted.

- Consistent use of a single species helps reinforce the character of a street or district, but a diversity of species may help the urban canopy resist disease or insect infestations. New plantings added to streets with existing trees should be selected with the aim of meeting the same watering requirements and creating visual harmony with existing trees and plantings. Native species should be considered for inclusion whenever possible, but consideration should be first given to a species' adaptability to urban conditions.
- Consider evergreen species where it is desirable to maintain foliage through the winter months.
- Consider deciduous species where their ability to allow sunlight to penetrate into otherwise shaded areas (such as south facing windows of adjoining buildings) during the winter months will be a plus.

Tree Spacing and Other Considerations

- Most jurisdictions have spacing requirements between trees and street lights (typically about 30 feet high), which typically vary from 10 to 20 feet. The smaller setback provides greater flexibility in tree spacing and allows for a more complete tree canopy.
- Pedestrian lights, which are about 12 feet tall, generally do not conflict with the tree canopy, so spacing is less rigid. Some jurisdictions still require wide clearance for their convenience in maintaining the lights, but this wide spacing greatly reduces tree canopy and is therefore discouraged. Spacing of 10 feet away from trees is generally adequate.
- An 8-foot minimum clearance must be maintained between accessible parking spaces and trees.
- Adequate clear space should be provided between trees and awnings, canopies, balconies, and signs so they will not come into conflict through normal growth or require excessive pruning to remediate such conflicts.
- Trees may be planted in medians that are 4 feet or wider, but must have an adequate clear height between the surface of the median and the lowest branches so that pedestrians can be seen. Where trees hang over the street, the clear height should be 14 feet.

Understory Landscaping

Understory landscaping refers to landscape elements beneath the tree canopy in areas within the public right-of-way not required for vehicular or pedestrian movement, including

- Medians
- Curb extensions
- Furniture and frontage zones

Benefits of Understory Landscaping

- Complements and supports street trees, in particular by providing uncompacted, permeable areas that accommodate roots and provide air, water, and nutrients
- Reduces impervious area and surface runoff
- Treats stormwater, improving water quality
- Provides infiltration and groundwater recharge
- Provides habitat

- Reduces the perceived width of the street by breaking up wide expanses of paving, particularly when the understory is in medians and sidewalk furniture zones
- Contributes to traffic calming
- Provides a buffer between the walkway zone and the street, contributing to pedestrian comfort
- Improves the curb appeal of properties along the street, potentially increasing their value
- Enhances the visual quality of the community

Principles

- Trees take precedence: the understory landscape should support them. It should not compete with them.
- Only pave where necessary: keep as much of the right-of-way unpaved and planted as possible to maximize benefits
- Design understory areas to infiltrate water
- The entire understory area does not have to be covered with plants—composted mulch is a good groundcover (top of mulch should be below adjoining hardscape so that runoff will flow into planting areas)
- Make the understory sustainable: use drought-tolerant plants
- Replenish the soil with compost
- Design the understory to contribute to the sense of place

Guidelines

Soil

Provide good quality, uncompacted, permeable soil. Soil analyses should address the concentration of elements that may affect plant growth, such as pH, salinity, infiltration rate, etc. Remove and replace or amend soil as needed. Good preparation saves money in the long run because it reduces the need to replace plants, lowers water consumption, and reduces fertilizer applications.

Design

Generally, understory landscaped areas should be as wide as possible where there are trees: when feasible, at least 6 to 9 feet wide for parkways and 8 to 12 feet wide for medians. However, many existing parkways and medians are less wide. Narrower parkways can support understory plants and some tree species. A path or multiple paths should be added as needed across a parkway as a means of access from the curb to the sidewalk. For example, where there are striped curbside parking spaces, a path across the parkway should be provided at every one or two parking spaces.

Install plant species that:

- Do not require mowing more frequently than once every few months
- Are drought tolerant and can survive with minimal irrigation upon establishment
- Do not exceed a height of 2 feet within 5 feet of a driveway/curb cut and within 20 feet of a crosswalk, and, excluding trees, 3 feet elsewhere

- Do not have thorns or sharp edges adjacent to any walkway or curb
- Are located at least 4 feet from any tree trunk