REDESIGNING THE PENSACOLA SCENIC BLUFFS HIGHWAY

INCREASING ENVIRONMENTAL AND CULTURAL SUSTAINABILITY BY CREATING IDENTITY

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A project submitted in partial fulfillment of the requirements for the degree of Master of Landscape Architecture

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ABSTRACT

The Pensacola Scenic Highway Foundation requested a Master Plan for the redesign of the Scenic Highway corridor that would beautify it, conserve it, and make it an asset to their community and an attraction for out-of-town visitors. The Pensacola Scenic Highway runs along the Escambia Bay Bluffs over the Escambia Bay. The project team made an initial site visit to Pensacola in May 2011 to assess the site and meet the client, then did site analysis and drafted conceptual designs for the corridor, its major entrance points, and the roadside City-owned properties Mallory Heights, Bay Bluffs Park, and Chimney Park. These designs were presented to the City in October 2011, along with preliminary research on mitigating ecological problems in the highway corridor, specifically invasive species outgrowth and erosion.

Final designs based on stakeholder feedback from the October 2011 presentation were prepared for the client and presented in April 2012. The overarching theme of these designs was to build a visual identity for the highway that would resonate with motorists and be easily recognizable, yet unique. The final designs beautified park entrances, preserved existing environmental features, showcased sites of historical significance along the highway, improved roadside landscaping, added pedestrian and bike access along the roadway, and used native planting designs to accent park properties and major access points to Scenic Highway. Design proposals for a pedestrian path that would run along the length of Scenic Highway and a trail that would run along an active freight line along the coast of the bay were also prepared. The team also provided a comprehensive research report on how to suppress and remove the more prevalent invasive species found along Scenic Highway, and how best to implement erosion control measures along the bluffs and prevent further ecological degradation of the entire corridor.

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PROJECT STATEMENT

The goal of the Pensacola Scenic Highway Master's Practicum is to create a Master Plan redesigning the Pensacola Scenic Highway corridor. The highway runs along the top of the Escambia Bay Bluffs, which overlook the Escambia Bay and create the potential for a stunning driving experience for travelers. The proposed overall improvements to the highway corridor maximize views across the bay from the road, make the highway friendly to pedestrians and bikers as well as motorists, and improve the roadside landscape with plants that are native, sustainable, and attractive. A new pedestrian path along the east side of the highway will accommodate foot traffic, bikes, and wheelchairs, and will link several park properties that are currently disconnected. A proposed rail trail will run along the base of the bluffs, within the right-of-way of an active freight line that follows the coast of the bay. This proposed trail will give users unparalleled views out across the water.

Figure 1- Scenic Highway Illustrative Overview Map

A potential greenway link from the highway into the City of Pensacola was identified. Designs for this greenway highlight the character and walkability of the redesigned Scenic Highway in the direction of the downtown and Pensacola Regional Airport.

New design proposals for four park properties along the highway—Mallory Heights, South Bay Bluffs, North Bay Bluffs, and Chimney Park—showcase the historical significance of these sites, beautify their entrances and make them more inviting to highway travelers, and use signs and planting designs to increase their visibility to drivers.

Important entry points to Scenic Highway from the north and the south were identified and prominently landscaped in order to give entering drivers a strong introductory impression of the highway.

The project's research component inves-

tigated possible solutions for removing invasive species along the highway corridor, and for mitigating erosion on the bluffs. A "rail with trail" case study was conducted in order to provide the client with precedent information on initiating and constructing such a trail. Research on greenways and complete streets provided context and backing for the design changes proposed to Scenic Highway and Summit Boulevard.

A template for educational signage was developed. Signs following this format can be placed in the city parks off the highway to help visitors identify local plants, birds, and learn interesting local or historical information about the area.

Finally, a selection of logos was produced for the Pensacola Scenic Highway Foundation, to brand the organization and highway and make them quickly identifiable to highway travelers, community members, and potential donors.

PROJECT BACKGROUND

The Pensacola Scenic Highway runs for 11 miles up the eastern edge of Pensacola, Florida, along bluffs that overlook the Escambia Bay. The highway corridor is an important environmental and cultural asset to the city of Pensacola. It is home to freshwater wetlands, mature oaks, magnolias, and short- and long-leafed pine remnants. The bluffs along the Escambia Bay hold a special ecological distinction: they are the only naturally occurring bluffs in the state of Florida. The highway corridor also passes some important historical sites, one of which is currently under review to be listed on the National Registry of Historic Places.

Scenic Highway was named the first Florida Scenic Highway in the state in April 1998, after a group of local volunteers spent three years compiling information for a designation proposal. The Scenic Highway Foundation was then founded to help maintain the Highway, and to seek funding and support for the conservation and enhancement of the corridor. The Foundation works with the City of Pensacola to conduct clean-up and maintenance of the highway corridor, to initiate improvements to City-owned park properties off the highway, and to involve the public in the upkeep of Scenic Highway through volunteer workdays. The Board of the Scenic Highway Foundation is the primary client for this Master's practicum; the City of Pensacola is a secondary client.

The highway terminates in the south at the Dr. Philip A. Payne Bridge over the Bayou Texar (where the road then becomes Cervantes Street) and it terminates in the north where U.S. 90 crosses the Escambia River. Scenic Highway falls partially within the jurisdiction of the City of Pensacola, and partially within the jurisdiction of Escambia County. This project focuses on the segment of the highway that falls within city property. The road, owned and maintained by the Florida Department of Transportation, is a two-lane highway, with a speed limit of 45 miles an hour. Over the 11 miles of Scenic Highway, stoplights are placed at the intersections with Perry Avenue, Summit Boule-

vard, Langley Avenue, Creighton Road, and the interchange with I-10. Otherwise, the flow of north- and south-bound traffic is unchecked and drivers often proceed at speeds well exceeding the legal limit. The only pedestrian access along Scenic Highway is at the southern end of the highway after the intersection with Hyde Park Road—here a sidewalk runs along the highway as it travels inland from the bay through residential and commercial areas for about 1.4 miles until its terminus at the Bayou Texar.

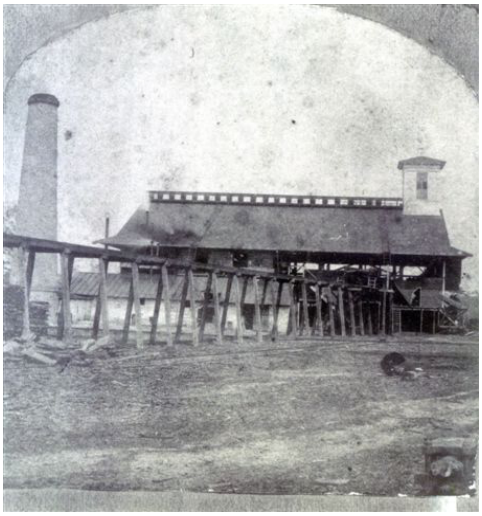


Figure 2- Historical Photograph, Chimney and Mill

Though FDOT owns and maintains the roadway, the City of Pensacola owns a 20 foot right-of-way on either side of the highway, and most of the parcels immediately adjacent to the highway are privately owned. The residents who own these properties also own the bluffs on the opposite side of the road, down to the water's edge. Except for some development at Gull Point, most residential development along Scenic Highway has been established on the side of the road away from the bay.

The City does own three bay-side properties along Scenic Highway. The southernmost property is Mallory Heights, a currently undeveloped parcel that overlooks the bay. The City and Foundation wish to make this into a public recreation area, though deed restrictions prohibit any development on this property that falls outside the City's Conservation Zoning designation. North of Mallory Heights, the City owns Bay Bluffs Park, a 32-acre park with a public boardwalk system that traverses the bluffs down toward the bay. The last City-owned property, Chimney Park, is the site of a historic brick chimney that is a remnant of a 19th century steam-powered saw mill that operated during the timber boom of the 1850s and 60s. The Florida Historical State Review Board recently recommended that the Old Chimney site be submitted to the National Register for Historic Places for potential inclusion, and this review is currently underway.

Figure 3- Civil War Military map, Pensacola, Florida, 1864

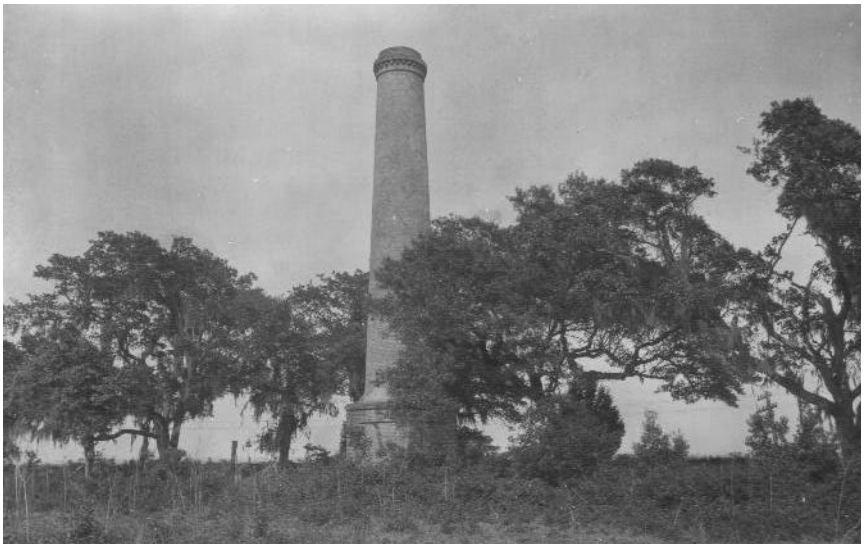


Figure 4- Historical Image, Old Chimney, 1940s

Another defining characteristic of the Scenic Highway corridor is the presence of an active railroad that closely follows the shoreline of the Escambia Bay, at the base of the bluffs and below the highway. The railroad is owned by CSX and about 12 freight trains pass through each day. CSX owns a 50-foot right-of-way on either side of the tracks. Because the railroad company prohibits members of the public from crossing the tracks, there is technically no access to the bay from anywhere along Scenic Highway; however, people regularly trespass across the railroad and right-of-way to get to the beach at Bay Bluffs Park and Chimney Park. Neither CSX nor the City strictly enforce the no-trespass rule, and access to the beach from both these parks is taken for granted by fishermen, joggers, sunbathers, birdwatchers, and others.

EXISTING SITE CONDITIONS

The Pensacola Scenic Highway corridor has become degraded by environmental and human influences over the last 20 years. Though the bluffs historically supported mainly populations of valuable species such as oaks and pines, those native plants have begun to be crowded out by the heavy establishment of invasive shrubs, vines, and trees. In addition to damaging the environmental quality of the area, this dense vegetation blocks views of the bay from the highway creating a less remarkable driving experience for travelers on Scenic Highway, and for visitors to the parks along it. This heavy roadside growth has had even further reaching effects: private homeowners who wish to enjoy views of the bay from their homes have begun to indiscriminately clear away all the vegetation, including mature oak and pine trees. This further threatens the establishment of native plant communities on the bluffs. Another consequence of the uncontrolled growth of invasives is that sight-lines into the roadside parks from Scenic Highway are obscured, creating secluded areas that attract vagrancy and illicit activity. Visitors feel less safe in the parks as a result.

Erosion is another pressing ecological problem along the highway corridor. The Escambia Bay Bluffs are severely eroding in several places, most notably in Bay Bluffs Park and in the area adjacent to Mallory Heights. Some efforts at restoration are already underway by an environmental organization, Earth Ethics, Inc. They received a $20,000 grant from the Fish and Wildlife Service to do restoration and erosion stabilization along the bluffs from Bayview Memorial Park Cemetery to Wimbledon Drive, and in other places on the bluffs that are beginning to erode away. Their efforts have focused on the area near Mallory Heights, which most urgently required intervention.

Bayou Texar Bridge

The southern terminus of Scenic Highway, at the Dr. Philip A. Payne Bridge, better known as Bayou Texar Bridge, approaches Scenic Highway from downtown Pensacola.

A sidewalk runs along the highway on either side of the bridge, which was once a very popular spot for fishing. However, the City recently banned fishing off the bridge because fishermen were leaving their refuse behind. Other pedestrian traffic along the bridge is light. A single crosswalk just east of the bridge conducts pedestrians across four lanes of traffic.

Currently, this entry to Scenic Highway is marked only by a small road sign with the Florida Scenic Highways logo. A sign with some landscaping welcomes visitors to East Pensacola Heights; otherwise there is no indication to drivers that they are entering a notable roadway. Open areas frame the eastern foot of this bridge, offering an opportunity for much more striking landscape plantings, and more visible signs cuing travelers to their entrance onto Scenic Highway.

Figure 5- Bayou Texar Current Condition, 1

Figure 6- Bayou Texar Current Condition, 2

Mallory Heights


Figure 7- Mallory Heights Current Condition, 1

Mallory Heights is a small, undeveloped City-owned property on the southern end of Scenic Highway, just south of the intersection with Logan Drive. There is nothing installed on this site, though the city wishes to make it into a recreational public use area. It was sold to the city by private homeowners on the stipulation that it be zoned for conservation land use only. This ensures the maintenance and conservation of the site's local environmental features but permits the new installment of nature trails, recreational facilities, bike trails, jogging trails, or other features for passive recreation. However, the homeowners who formerly owned this property live just across Scenic Highway and have strong reservations about making it accessible to the general public via trails or bike paths. Nonetheless, the site is very promising for development as a park area, with over 100 feet of level land between the road and the spot where the bluffs drop away to the bay. This area is largely cleared of vegetation, and a row of closely set bollards running along its edge by the highway prevents cars from pulling in and parking.

This Mallory Heights property is immediately adjacent to a bluff that slumped away into the bay two years ago. An environmental planner working for the organization Earth Ethics, Inc. has installed a series of stabilizing terraces in order to restore the vegetation and species habitat that were lost.

Bay Bluffs Park

Bay Bluffs Park is a 32-acre City-owned park, the largest on Scenic Highway. It has an entrance and parking lot at both its northern and southern ends. The north entry, just across from Scenic Highway's intersection with Summit Boulevard, is the busier and larger of the two. A crosswalk gives pedestrians access to the park from Summit Boulevard—a stoplight, as well as a "walk" signal are installed here. The north entrance and parking lot for Bay Bluffs Park has an entry/exit drive at either end of its single row of 24 parking spaces; these face the road and are divided from Scenic Highway by a long grass easement strip. Permanently situated on this easement is a security camera atop a metal column, the stoplight for Summit Boulevard, and an accessible concrete ramp that meets the crosswalk from Summit Boulevard and brings pedestrians down to the grade of the parking lot.

The main feature of the northern entry area to the park is a covered wooden pavilion overlook at the head of the boardwalk system, which originates here. In about 1980 the view from this overlook was a striking panorama of the bay; today, that view is mostly obscured by heavy vegetation, much of it invasive trees and vines. In addition to a short flight of wooden steps that leads up to the pavilion from the parking lot, there is an accessible ramp that provides access onto the boardwalk and to the pavilion overlook. Aside from this pavilion and a large sign that identifies the park as Bay Bluffs, there is no landscaping or any other beautification at this entrance. In July 2011, the City of Pensacola installed a split rail fence to block a steep drop down towards the bay, and a single picnic table on a concrete base at the head of the boardwalk.

From just beyond the pavilion overlook, the boardwalk climbs down the bluffs towards the bay in a series of short flights and landings. The wooden rails along the stairs occasionally open up to let visitors onto a couple of roughly marked trails that meander over parts of the bluffs. Outdoor exercise stations are also set up just off the boardwalk

Figure 8- Bay Bluffs South Current Condition, 1

Figure 9- Bay Bluffs South Current Condition, 2

Figure 10- Bay Bluffs South Current Condition, 3

at several of these trailheads, and trash cans are chained in place as well: the park is used heavily by people walking dogs. Just about 20 yard shy of the bay, the boardwalk and trails once gave people an outlet to cross the railroad tracks to the beach. Those outlets are now boarded off, following contentious interactions with CSX about public access across the railroad's right-of-way and tracks. However, this does not prevent visitors from bypassing the boarded-off outlets and crossing the tracks on their own, and they do this liberally.

The boardwalk system does not terminate at the base of the bluffs, but travels south along them with the bay in view for about .2 miles before climbing back up the

Figure 11- Bay Bluffs North Current Condition, 1

Figure 12- Bay Bluffs North Current Condition, 2

Figure 13- Bay Bluffs North Current Condition, 3

bluffs and terminating at the southern entry and parking area of Bay Bluffs Park. The northern portion of the boardwalk system is more heavily trafficked than this southern portion, and better maintained. The vegetation along the northern boardwalk is periodically pruned or cleared to maintain sight-lines ahead and into surrounding areas. Because the southern part of Bay Bluffs Park receives less care, it experiences more criminal mischief. Maintenance and clearing along the trail and boardwalks in Bay Bluffs Park is conducted by employees of the City and by groups of volunteers organized by a special division of the City's Parks and Recreation department. Interpretive signs identifying local plants and trees are placed along the boardwalk but have been largely destroyed by vandals. Graffiti also defaces just a few parts of the boardwalk; the city removes this a couple times a year.

The southern entrance to Bay Bluffs Park has a 10-space parking lot, and it too is laid in out in a loop with entry/exit drives on either end of the driving aisle. In this lot, the parking spots are aligned on the opposite side of the driving aisle, and face a simple deck that opens to the boardwalk over the bluffs. There is no landscaping, no sign identifying the area as part of Bay Bluffs Park, and no seating or resting area, either on or off the deck. There is no handicapped access to the boardwalk from this end of Bay Bluffs Park, though there is also no overlook of the bay here. If visitors hike the entire boardwalk system beginning at the northern entry and emerging at this southern terminus, they must walk about .2 miles along the highway to reach the northern entry and parking lot again. There is no path or trail for pedestrians along the road, or any buffer

from the fast-moving traffic, and at one point visitors must even climb behind a guard rail and skirt a steep gully to avoid having to walk on the roadway.

Summit Boulevard

Summit Boulevard is a major road that intersects Scenic Highway directly across from the entrance to North Bay Bluffs. Summit Boulevard approaches the highway from residential neighborhoods in downtown Pensacola to the west, and is the major east-west route for traffic leaving Pensacola's Regional Airport. A 20-foot median, currently planted with only a few trees and lawn, separates the road's east and westbound lanes. A single eastbound lane heads downtown for traffic turning off Scenic Highway; from the west, both right and left turn lanes approach the intersection. A traffic signal controls the flow of traffic onto and off of Scenic Highway. Street parking is available on either side of Summit Boulevard, which is lined with residences. Though a crosswalk ushers pedestrians across the highway from Summit Boulevard's north side, there are no sidewalks or bike lanes along Summit Boulevard to bring pedestrians or bikers to this point.


Figure 14-Summit Boulevard- Current Condition

Chimney Park

Chimney Park is a 2.16-acre City-owned property 1.85 miles north of Bay Bluffs Park on Scenic Highway. The entrance to the 5-space parking lot is just past the stoplight at the intersection with Langley Avenue. This configuration is confusing, and makes the park entrance easy to miss. The parking lot is a pull-through lot and drivers exit by a short drive to the north. The parking spaces, which are arranged in a single row facing the bay, are separated from the road by a median planted with a row of myrtle trees. A crosswalk over Scenic Highway connects the sidewalk that runs along the north side of Langley Avenue to a sidewalk on this median. This sidewalk continues along the length of the median, becomes a crosswalk over Chimney Park's exit drive, and then ends abruptly on the other side. A brick walk runs along the head of the parking lot and leads to the Old Chimney, frames it, and then continues through the center of the park, which is maintained as lawn. This brick walk terminates at a chain link fence that divides the maintained part of the park from a long overgrown, wild area to the north. Two benches and two trash cans, one each on either side of the Old Chimney, sit along the brick walk facing the road. Several large live oak trees provide canopy and shade in the north of the maintained area; the south part, nearer the parking lot, is exposed to sun. Except for the myrtle trees that screen the parking lot from the road, there is

no buffer, vegetative or otherwise, between Chimney Park and the highway. The Old Chimney is surrounded by a 6' wrought iron fence.

This site has great historical significance, and a sign near the parking lot briefly relates it. The 30-foot chimney was a part of the pre-Civil War Hyer-Knowles Planing Mill, a steam-powered sawmill that was built in the mid-1850's. It produced shingles, railings, doors, windows and other wood-lathed products, and had loading docks on the Escambia Bay to the east and on the old carriage road to the west, which is now Scenic Highway. Some of the bricks along the base of the chimney bear the stamp "J. Gonzalez," testifying to their production at a local brick plant owned by James Gonzalez that was north of the site. Though pre- and early Civil War records of the mill's operations are missing (and have likely been destroyed) there is evidence to suggest that the mill was being run with African slave labor.

The information currently available to visitors at Chimney Park now does not do justice to the sawmill's dramatic wartime demise, or the local lore that surrounds the old mill and the events of March 10, 1862. The story goes that in the thick of the Civil War, Confederate General Braxton Braggs began evacuating his forces from the area. The Confederate Secretary of War, Judah P. Benjamin, ordered him to destroy anything in his retreat that could be useful to approaching Union forces. Specifically, he ordered that sawmills around the bay be destroyed, and their lumber burned. Confederate companies did just that to the Hyer-Knowles Mill on the night of March 10, though some of the then state-of-the-art mill and wood-cutting equipment was loaded onto barges first, so that it could be salvaged. But in a cruel twist, violent storms over the bay late that night sunk the barges to the bottom of the bay, where they rest today. The Old Chimney is all that remains of the once prolific sawmill, and it has weathered lightning strikes, hurricanes of historic force, and numerous efforts to dismantle it.

Figure 15- Chimney Park Current Condition, 1

Figure 16- Chimney Park Current Condition, 2

Figure 17- Chimney Park Current Condition, 3

The Pensacola and Atlantic railroads were installed along the coast of the bay in 1882, and two wire-telegraph poles with antique glass insulators from that era still stand

along the tracks in the vicinity of Chimney Park and Gaberonne Swamp, just to the north. Aside from the single sign that relates the Old Chimney's history, there is only one other small sign on the property on the lawn near the roadway, identifying the area as Chimney Park.

Beyond the chain link fence that borders the end of Chimney Park's maintained property, a nearly impassable jungle of trees, vines, and shrubs have taken over the land. Though a gate and padlock once prevented access to this part of the park, they have since been broken and the area has subsequently become host to loitering and criminal activity. The remnants of old walkways and the crumbling brick remains of what seem to be low walls indicate that once the area was landscaped and maintained as part of the larger park. The state of its decay suggests that it was abandoned decades ago, however, and no record of its layout or former use seem to remain, though it is possible that these are the remains of a popular bar and restaurant that stood near the Old Chimney in the 1950's and 60's. Bisecting this overgrown area is a small drainage channel (or stream) which in heavy storms conveys a stream of water from neighborhoods across Scenic Highway down into the bay. Between storms, it is usually dry.

Chimney Park is the most level city property along Scenic Highway, and has a grade change of only 3 feet from the public use area of the park to the bay. The park area itself is less than 200 feet from the water. The railroad tracks run immediately behind the maintained park area and a chain link fence that marks CSX's 50-foot right-of-way creates the eastern boundary of the park. The right-of-way is densely populated with phragmites, which are beneficial in screening passing trains from the sight of park users, but do little to dampen its noise. The fence that runs along the railroad right-of-way is not well kept up, and is easily bypassed. Fishermen take advantage of Chimney Park's proximity to the bay to park here or in a private lot immediately to the south and cross the railroad tracks to the beach.

Figure 18- Park and Ride Current Condition,1

Park and Ride

At the northern end of Scenic Highway, just south of the I-10 interchange, Escambia County owns a Park and Ride parking lot with 19 spaces in a row facing the bay. The lot is configured as a pull-through, with the entry drive to the south and the exit drive to the north. An unlandscaped grass median separates the parking lot from the roadway, and a small, recently installed gazebo on the southern end of the lot provides cover, some seating, and a map of Scenic Highway. Beyond the row of parking spaces, there is about 50 feet

of level ground until the bluffs, with heavy tree cover, descend to the bay. This ground is currently bare of any vegetation, but its ownership is private, limiting the City or county's ability to install landscaping there.

On the northern end of the lot, a small lawn strip separates the Park and Ride's exit drive from the entry to an adjacent gas station and Dairy Queen. Drivers from the Park and Ride frequently drive directly over this strip to avoid having to pull back onto the highway en route to the businesses next door.

Figure 19- Park and Ride Current Condition,2

LOGOS AND BRANDING

The Pensacola Scenic Highway (or Scenic Bluffs Highway, as it is also known) currently lacks any emblem by which to identify itself to travelers and tourists. The few signs that do identify the road as Scenic Highway use the general Florida Scenic Highways logo, and the board of the Scenic Highway Foundation also uses this logo on its mailings, newsletter, and website (www.scenichighwayfoundation.com). Both the highway and Foundation need a custom-designed logo that people will quickly associate with them. It was decided that this logo should use a simple color palette easily readable to drivers moving at high speeds, and that it should use simple, sharp graphic imagery to convey the essence of Scenic Highway in a glance. The following logos were drafted for Scenic Highway and the Foundation. All used a palette of warm yellows and blues to impart to viewers a sense of the climate, bay, and sandy bluffs that are Scenic Highway's most prominent features. The logos were also created in greyscale to give the Foundation a cost-effective way of reproducing them in print.

Logo Design 1

Subtle golden rays in this logo communicate the mild, sunny climate that visitors to Pensacola and Scenic Highway experience. The elegant script suggests Scenic Highway's status as a unique Florida roadway in a rare setting.

Figure 20- Logo 1, Greyscale

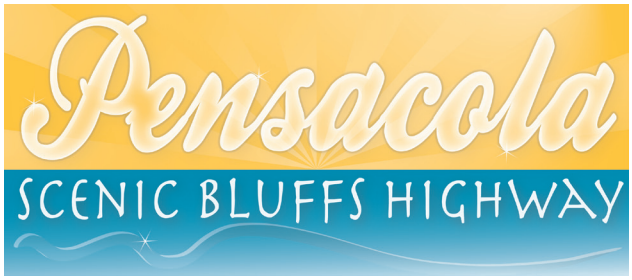


Figure 21- Logo 1, Color

Figure 22- Logo 1, Highway Sign Example

Logo Design 2

This logo shows an osprey, one the Escambia Bay Bluffs' native birds, perched on a dead tree at the edge of a bluff over the bay. This design was based on a photo taken by team member Helen Graham near the Mallory Heights property.

Figure 23- Logo 2, Greyscale


THE Scenic View

A NEWSLETTER FROM THE SCENIC HIGHWAY FOUNDATION

September 2011

Growing a Better Quality Life in Pensacola

From the President's Desk

Since you are reading this newsletter I know you are interested in one of the jewels of this area, the first state designated Scenic Highway in Florida, Pensacola Scenic Bluffs. Scenic Highway Foundation is dedicated to its mission to promote, preserve, protect, maintain and enhance Pensacola Scenic Bluffs Highway and we need your help in that mission. Please help by joining or donating to the Foundation. Member support helps us get the word out with newsletters like this one but also through a presence on the Web, which we will be rolling out, at the annual combined Scenic Highway Foundation/Scenic Highway Advisory Committee meeting on Oct 17 at the Bayview Senior Center. Your volunteer support helps us to carry out the work plan every year and to provide the necessary skills set for the organization to really make a difference in preserving and enhancing the highway for generations to come. We have openings at every level and we will value your willingness to spend time with us at this important work as a leader or a worker. Please

Figure 24- Logo 2, Newsletter Example

Figure 25- Logo 2, Color

Logo Design 3

The rendering of a long leafed pine in this logo showcases one of the Escambia Bay Bluffs' beautiful native trees at a lofty elevation overlooking the bay.

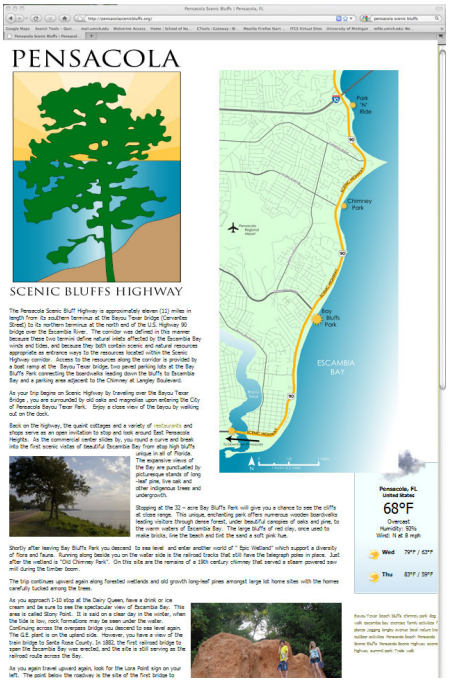


Figure 26- Logo 3, Website Example

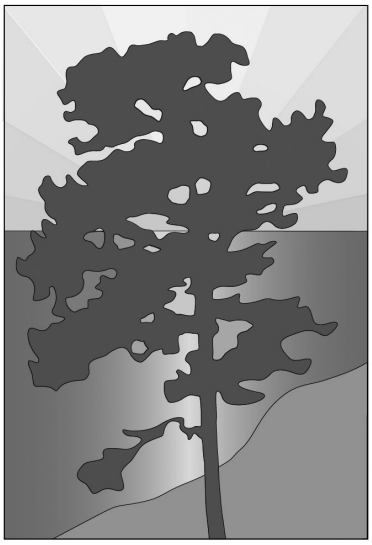


Figure 27- Logo 3, Greyscale

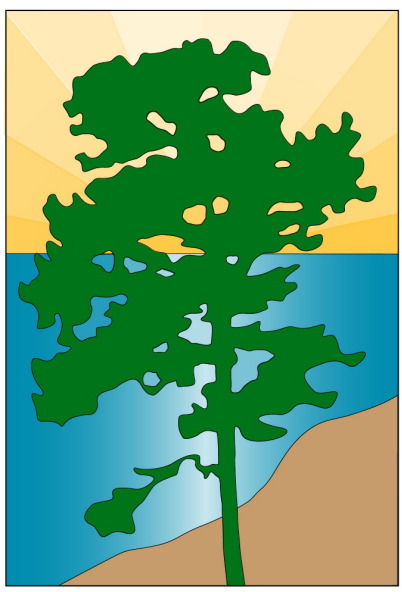


Figure 28- Logo 3, Color

SOILS

To provide a basis for plant selection, a study of the soils that compose the land around Scenic Highway was conducted, using GIS data provided by the City of Pensacola and the 2004 Soil Survey of Escambia County, Florida, put out by the Natural Resources Conservation Service of the USDA. The majority of the Scenic Highway corridor is composed of Troup Sand, Lakeland Sand, and Croatan and Pickney Sand. Of these soil types, the Troup Sand and Lakeland Sand, which mostly compose the bluffs above the Escambia Bay, are excessively well-drained, sandy soils, and occur mostly on upland sites with relatively steep slopes. A large area of Croatan and Pickney Sand occurs along the highway corridor just south of Gull Point at Gaberonne Swamp. These soils are poorly drained with very slow to ponded run-off, and have a very acidic pH. They occur primarily on slightly sloped or level topographies. Along the Scenic Highway corridor and in the surrounding areas, a number of other soils occur in smaller, disconnected patches; these include Albany Sand, Bonifay Loamy Sand, Foxworth Sand, and Poarch Sandy Loam.

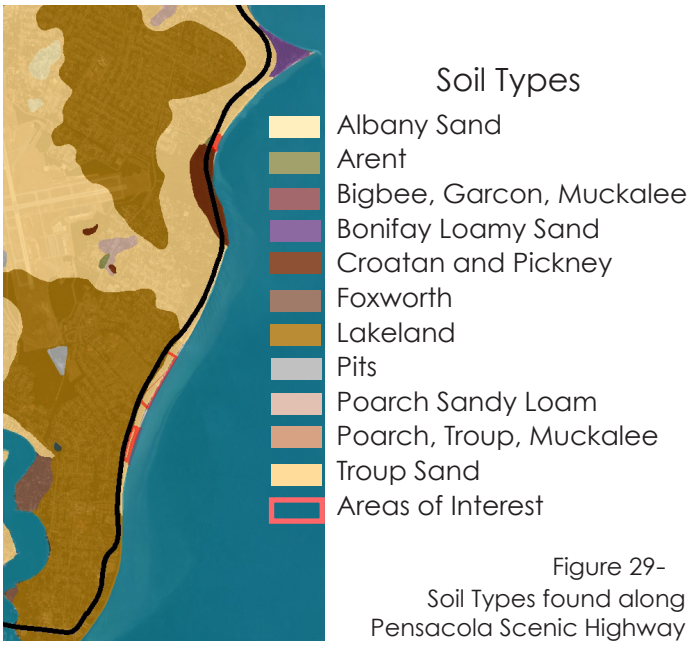


Figure 29- Soil Types found along Pensacola Scenic Highway

EXISTING PLANT COMMUNITIES

The areas with Troup Sand soils have plant communities composed of black jack oak, turkey oak, post oak, and long leaf pine in the overstory, and creeping bluestem, sandy bluestem, lopsided indiangrass, hairy panicum, fringeleaf paspalum, and native annual forbs in the understory. Phragmites have colonized dense patches surrounding the railroad tracks. Invasive species such as the popcorn tree, chinaberry, Russian olive, and Chinese privet thrive in these soils and have begun overtaking the valuable species that have historically grown on the bluffs. The Croatan and Pickney Sands grow swamp tupelo, southern baldcypress,

Troup Sand

Figure 30- Black jack oak *Quercus marilandica*

Figure 31- Fringeleaf paspalum *Paspalum setaceum*

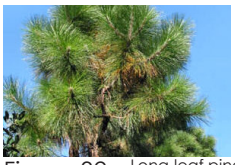


Figure 32- Long-leaf pine *Pinus palustris*

Figure 33- Lopsided indiangrass- *Sorghastrum secundum*

Figure 34- Sandy bluestem *Andropogon hallii*

Figure 35- Turkey Oak *Quercus cerris*

pond pine, sweetgum, black tupelo, and water oak in the overstory, and titi, gallberry, huckleberry, southern bayberry, greenbrier, sphagnum moss, redbay, sweetbay, switch-cane, giant cane, waxmyrtle, fern, maiden cane, and large galberry in the understory. This study showed what valuable vegetation was already doing well in the highway corridor, and might be most easily cultivated there. It also helped narrow the research that needed to be conducted on invasive species removal by establishing what species are the most prominent, and what areas they are most likely to colonize aggressively.

Croatan and Pickney Sands


Figure 36-Black tupelo *Nyssa sylvatica*


Figure 37- Gallberry *Ilex glabra*


Figure 38- Greenbrier *Smilax rotundifolia*


Figure 39-Huckleberry *Gaylussacia nana*


Figure 40- Redbay *Persea borbonia*


Figure 41- Pond pine *Pinus serotina*


Figure 42- Giant cane *Arundo donax*


Figure 43- Southern Bayberry *Morella caroliniensis*


Figure 44- Spaghnum moss- *Sphagnum spp.*


Figure 45- Swamp tupelo- *Lyssa biflora*


Figure 46- Sweetbay magnolia- *Magnolia virginiana*


Figure 47- Southern bald cypress *Taxodium distichum*


Figure 48- Sweetgum *Liquidambar styraciflua*


Figure 49-Switchcane *Arundinaria tecta*


Figure 50- Titi *Cyrilla racemiflora*


Figure 51- Water oak *Quercus nigra*


Figure 52- Wax myrtle *Quercus myrtifolia*

TOPOGRAPHY

The Pensacola Scenic Highway runs along the Escambia Bay Bluffs, which rise over the Escambia Bay at elevations of up to 110 feet above sea level. GIS data provided by the City of Pensacola was used to create topographical maps of the region using two-foot contour intervals. Individual topographical maps for Mallory Heights, Bay Bluffs Park, Chimney Park and the Park and Ride were generated. Then 3-D TINs of these areas were created to show an aerial view of their terrain. This information helped in the

formulation of designs that took into account topography, and safety issues that might arise from having visitors near areas with sheer vertical drops. Topographic information was also studied in order to determine where there were strong opportunities to enhance views across the bay or to create them, where topography did not provide the desired vantage point.

Mallory Heights

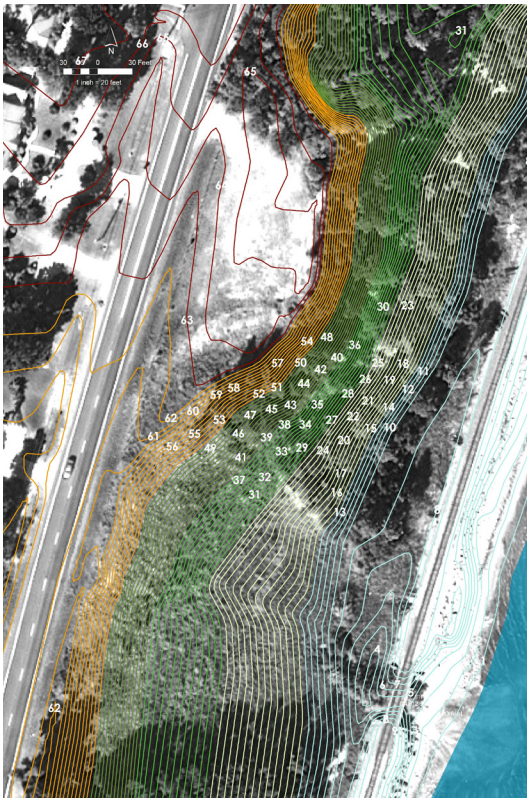


Figure 53- Mallory Heights Topography

At Mallory Heights, the site of the proposed design is very level, although it is located immediately adjacent to an area where a large piece of bluff slumped into the bay in 2009. Erosion-control methods have been installed at this site, though it remains a fragile area.

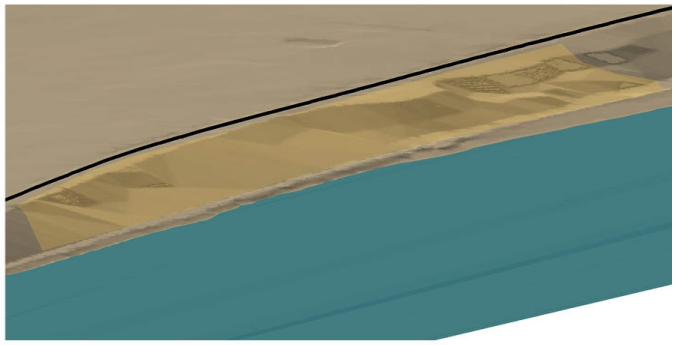


Figure 54- Mallory Heights 3D Relief

Bay Bluffs Park

Figure 55- Bay Bluffs Topography

Between the north and south entrances and parking areas of Bay Bluffs Park, several points along the bluffs have very steep, sometimes nearly vertical slopes. Theses slopes are already severely eroded, or seem sure to erode soon, should erosion-control measures not be taken.

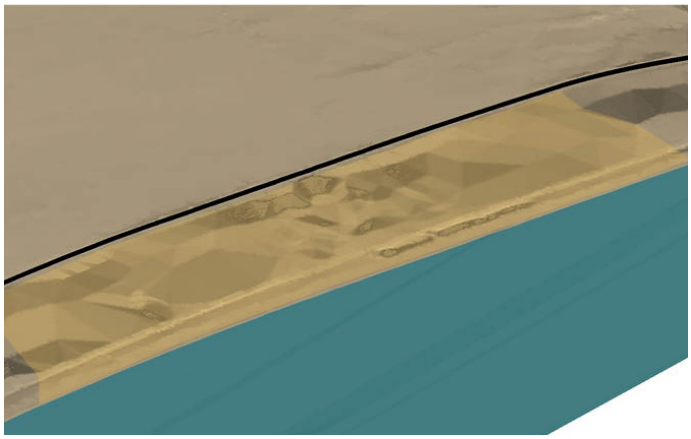


Figure 56- Bay Bluffs 3D Relief

Chimney Park

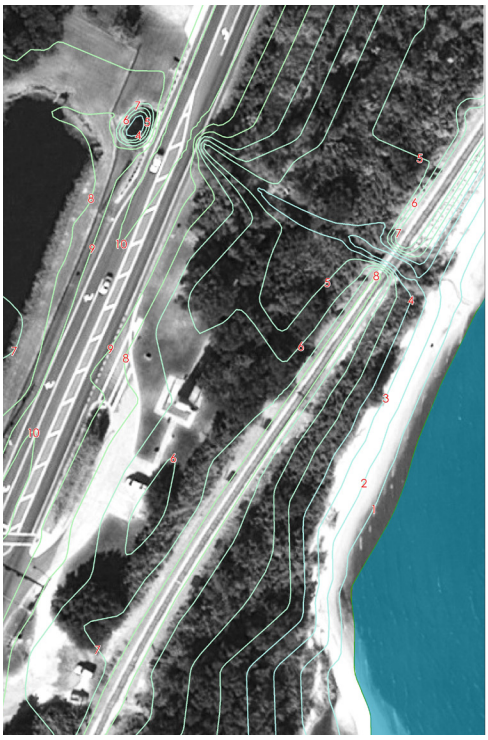


Figure 57- Chimney Park Topography

Chimney Park is the most level park property along Scenic Highway. The only significant grade change is the berm for the railroad, which bisects the property. This berm blocks views of the bay for anyone using the park.

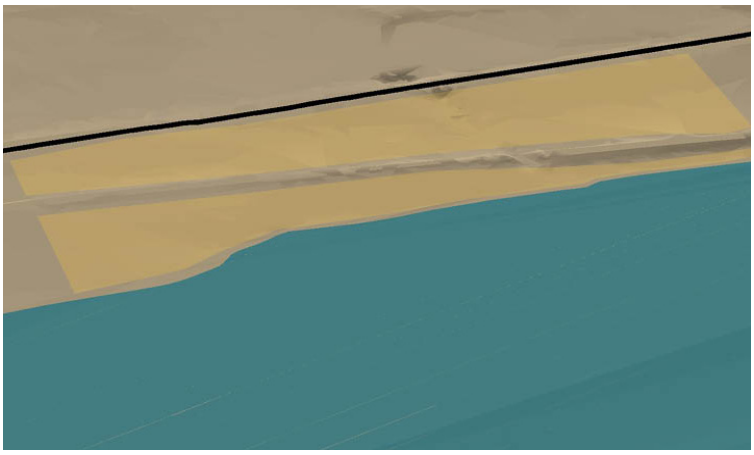


Figure 58- Chimney Park 3D Relief

Park and Ride

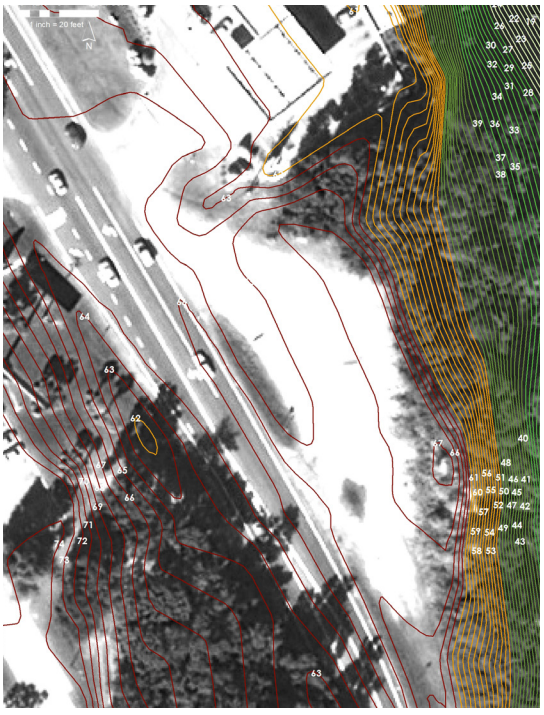


Figure 59- Park and Ride Topography

The Park and Ride parking lot near the I-10 interchange is on fairly level ground, with 40 feet of land stretching beyond it before the bluffs drop down about 75 feet to the Escambia Bay.

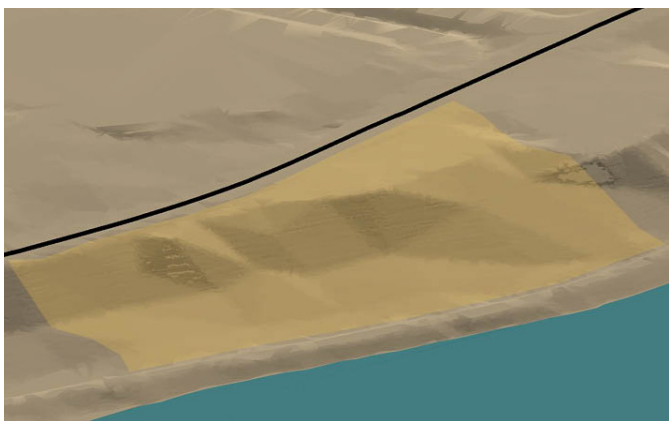


Figure 60- Park and Ride 3D Relief

EROSION

To provide background for research on erosion control methods, the areas on the bluffs most threatened by erosion were identified, and efforts already in place to mitigate it surveyed. The two most severely impacted areas along Scenic Highway are at Bay Bluffs Park and in the area next to the Mallory Heights property. The City of Pensacola has already made some efforts to stem erosion in some of the steepest gullies at Bay Bluffs by using broken concrete to hold the slopes in place. At Mallory Heights, an environmental organization has done work to restore and stabilize the bluffs.

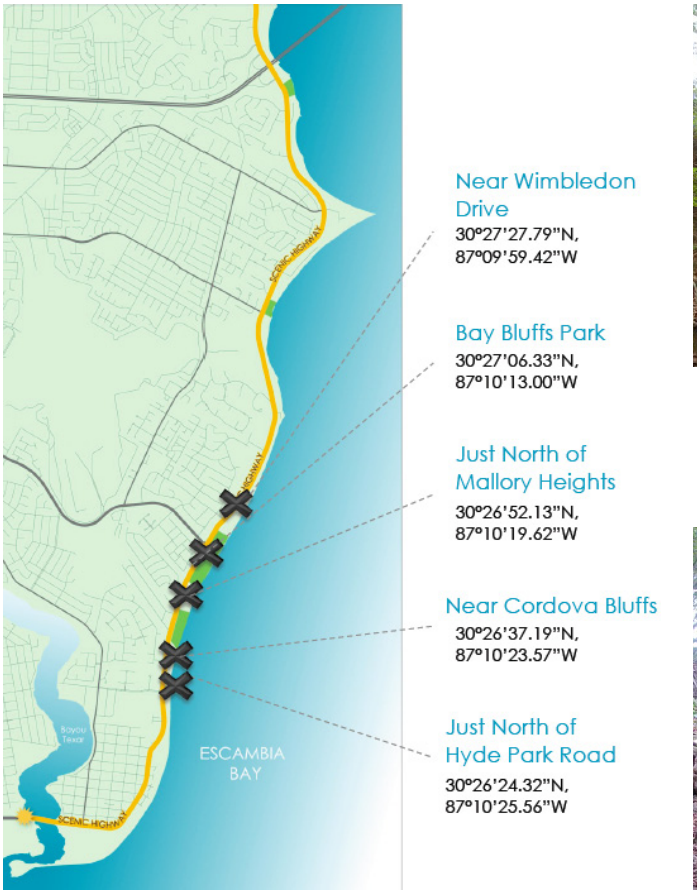


Figure 61- Points of Erosion along Scenic Highway

Figure 62- Erosion at Bay Bluffs

Figure 63- Erosion at Bay Bluffs

Figure 64- Google Aerial Imagery of Erosion Points at Bay Bluffs

VIEWSHEDS

Viewsheds are defined as spots along Scenic Highway where there is the potential for better views out over the bay, should the current dense roadside vegetation be selectively cleared. The locations for potential viewsheds on this map have been selected because they provide an initial view of the bay for travelers entering Scenic Highway from the north or south (Points A and G), because of their location relative to the entrances to Bay Bluffs Park or the proposed recreational area at Mallory Heights (points B,C, D, and E), or because they offer drivers a view out onto the bay at a point where the road is returning to the coast after running inland (point F).

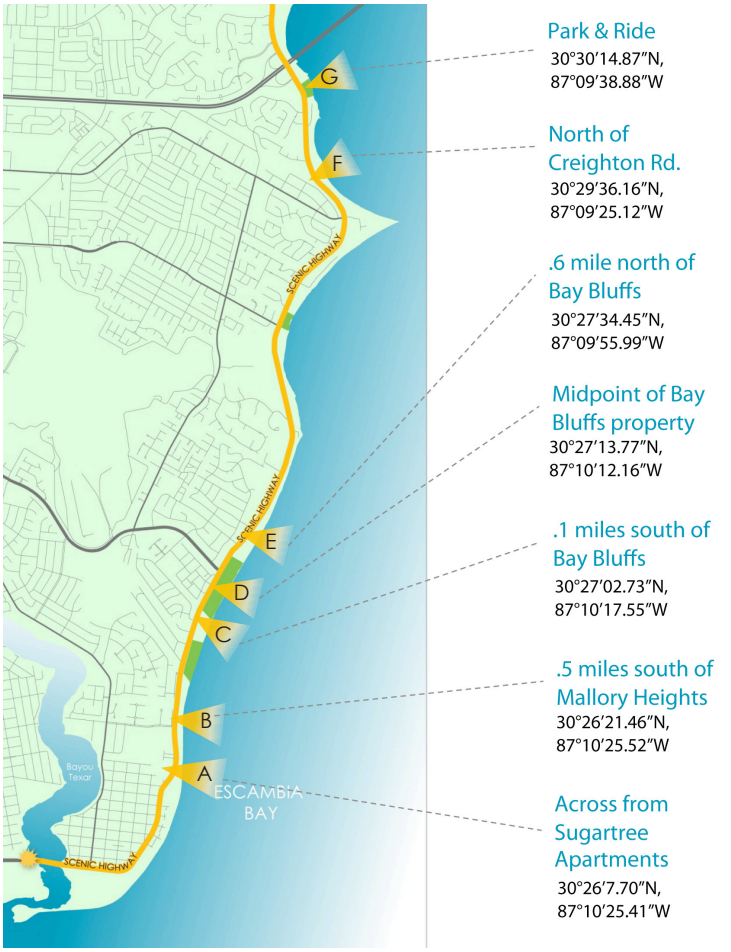


Figure 65- Potential Viewsheds along Scenic Highway

Figure 66- Existing Condition of Potential Viewshed Site

Figure 67- Rendered Interpretation of Potential Viewshed Site

NOISE AND VISUAL POLLUTION

The Escambia Bay Bluffs and the park properties overlooking them are bounded by Scenic Highway to the west and the railroad to the east along the base of the bluffs. In order to determine where proposed designs should be most concerned with buffering visitors from highway or train traffic, a survey of the noise from traffic and passing trains was conducted.

The shade of pink indicates the places on each property where traffic from the highway is most audible and visible. Traffic is highly intrusive for visitors to Mallory Heights, since the property sits level with the highway. It is also intrusive at each of the entrance areas of Bay Bluffs Park, but recedes in prominence when visitors are about halfway down the bluffs on the boardwalk, near the bay. At Chimney Park, where the grade across the entire park is nearly level, traffic is very prominent from nearly anywhere on the property.

Vehicle Traffic

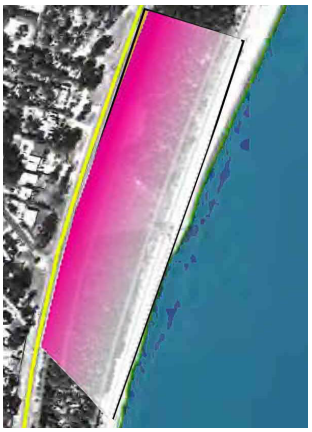


Figure 68- Mallory Heights Vehicle Traffic Pollution

Figure 69- Bay Bluffs Park Vehicle Traffic Pollution

Figure 70- Chimney Park Vehicle Traffic Pollution

Figure 71- Park and Ride Vehicle Traffic Pollution

Train Traffic

Figure 72- Mallory Heights Train Traffic Pollution

Figure 73- Bay Bluffs Park Train Traffic Pollution

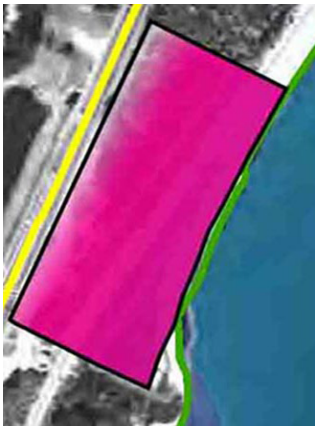


Figure 74- Chimney Park Train Traffic Pollution

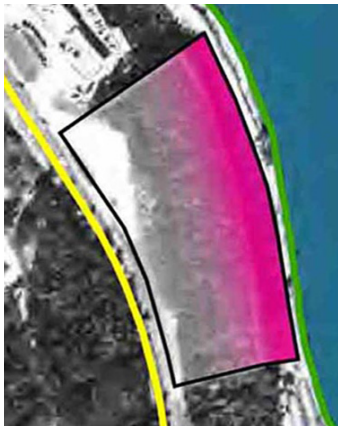


Figure 75- Park and Ride Train Traffic Pollution

The sight and noise from trains on the rail line at the base of the bluffs has essentially the inverse presence of traffic from the highway. Visitors about halfway down the bluffs or lower in Bay Bluffs Park are overwhelmed by the sounds and sight of passing trains though at the parking areas to each entrance, the train is more distantly audible, and not visible at all. At Mallory Heights, passing trains are not in sight, but can still be heard passing on tracks below. At Chimney Park, trains are loud and clearly in sight for visitors from nearly anywhere on the site, despite a dense outgrowth of phragmites along either side of the railroad embankment.

ACCESS AND TRANSPORTATION

In order to identify the places that give drivers and pedestrians their first impression of Scenic Highway, the most important entry points to the highway in the north and south, and major intersections in between were located. Places along the highway corridor that seemed to hold the greatest potential for improved pedestrian access were also identified.

Figure 76- Pensacola Access Overview

Bayou Texar

The southernmost major access point to Scenic Highway is at the bridge over Bayou Texar. Its western end was identified as a place that could act as a prominent entrance to the highway.

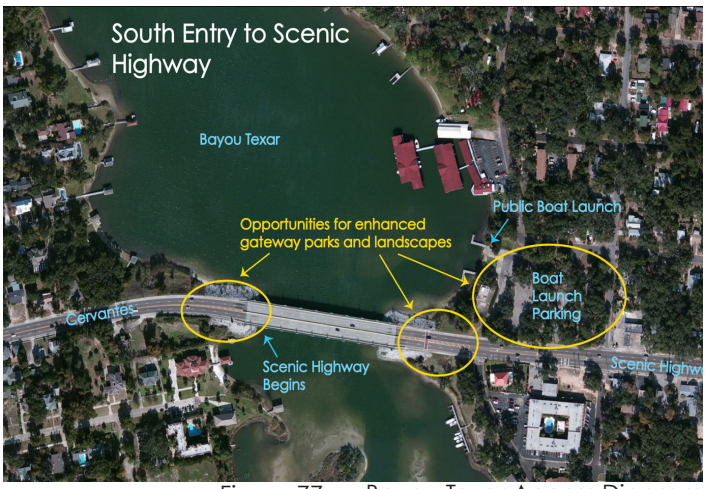


Figure 77- Bayou Texar Access Diagram

Summit Boulevard & Bay Bluffs

The intersection of Summit Boulevard and Scenic Highway, across from the northern entrance to Bay Bluffs Park, was found to be an important node of both pedestrian and vehicle access on Scenic Highway. It serves as a major entry point to the highway from the airport and downtown Pensacola, and also offers drivers and pedestrians approaching from the west a first, head-on view of the highway's most extensive park property. It was determined that Summit Boulevard, as an important link between Scenic Highway and the City, holds potential for design

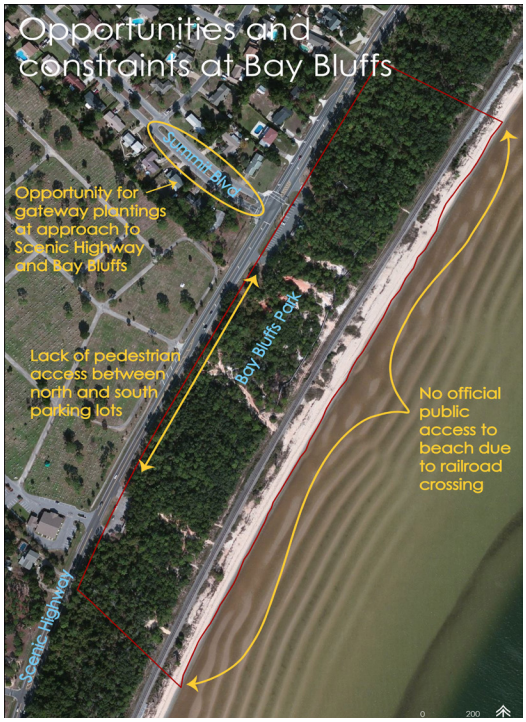


Figure 78- Bay Bluffs Access Diagram

improvements that extend Scenic Highway's character in the direction of the downtown. Finally, there was found to be a lack of adequate pedestrian access along Summit Boulevard approaching Scenic Highway and Bay Bluffs Park.

Figure 79- Mallory Heights Access Diagram

Mallory Heights

Between two places along Scenic Highway that already experience high volumes of public use (the south and north entrances to Bay Bluffs Park) and a place that has the potential for public use (the Mallory Heights property) a potential route for pedestrian access was identified to link these sites.

Northern Access

To the north, the I-10 interchange was noted as an important point of entry onto Scenic Highway for vehicle traffic, and several spots near this point were identified as opportunities for signs and landscaping that announce Scenic Highway to drivers.

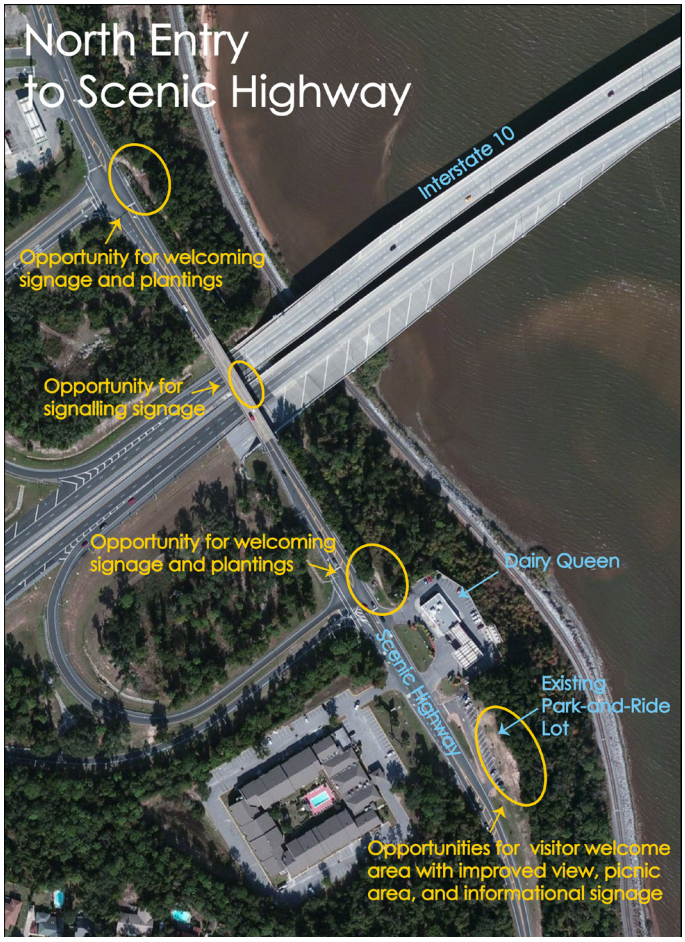


Figure 80- Park and Ride Access Diagram

CONCEPT DESIGNS

Conceptual designs for the highway and parks were drafted after a May 2011 trip to Pensacola for a site visit and client meetings. These early proposals were presented to the client and stakeholders during an October 2011 trip to Pensacola.

PEDESTRIAN PATH

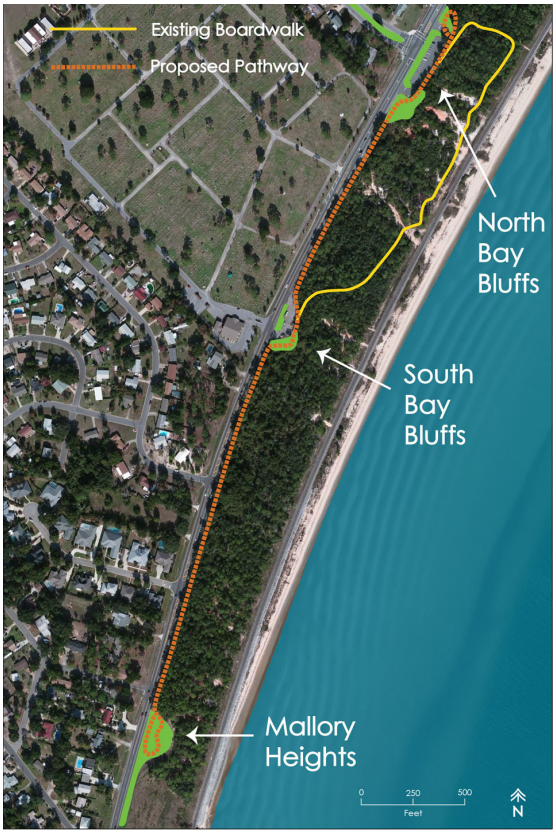


Figure 81- Scenic Highway Proposed Pedestrian Path

Early proposals for a pathway along Scenic Highway suggested that it follow the road's eastern edge, overlooking the bay, and that it be of a width and material that would make it accessible to walkers, joggers, wheelchairs, and strollers. In mind of some of the local reservations about the installation of such a path, the team suggested that it be built in phases. Early designs focused on the proposed first reach, which would connect Mallory Heights with Bay Bluffs Park. Those properties are currently inaccessible to each other by car, and present the greatest need for a connecting footpath. This first segment of trail would serve as a "trial run" for the path, after which (pending its popularity) it could be extended south to the residential development around Bayou Texar, and north to at least Chimney Park, and possibly ultimately the I-10 interchange. The early concept also included a planted buffer between the path and road, and a simple footbridge that would span a place where a gully runs nearly to the edge of the highway.

SUMMIT BOULEVARD

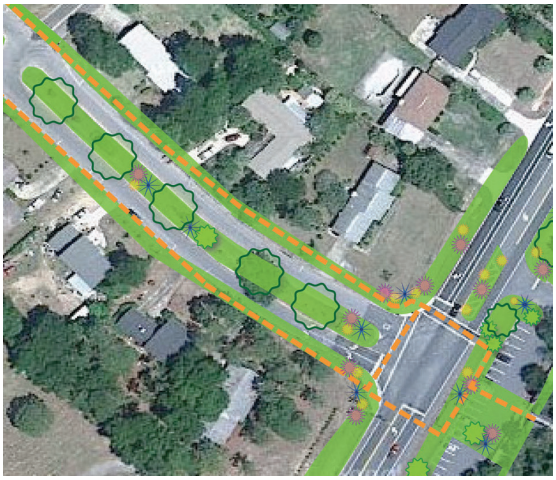


Figure 82- Summit Boulevard Concept Schematic

The design concept for Summit Boulevard proposed vegetating the median between the east and westbound lanes with planting palettes similar to those used along Scenic Highway. The proposal also suggested making Summit Boulevard a complete street by installing sidewalks and bike lanes along the existing travel lanes.

Streetscape Landscaping
Improved Pedestrian Paths
Native Plants

MALLORY HEIGHTS

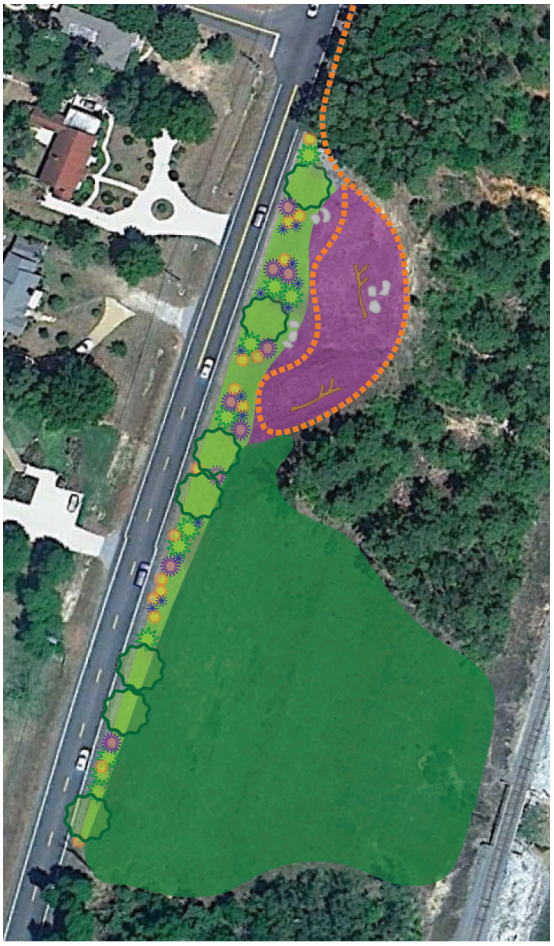


Figure 83- Mallory Heights Concept Schematic

Figure 84- Mallory Heights Existing Aerial Imagery from Google

The initial design for Mallory Heights suggested placing natural elements like boulders and logs in the area overlooking the bay for seating, in order to preserve the site's natural character while also making it hospitable for public use. A series of more extensive planting beds along the road right-of-way were proposed in order to screen the park from traffic and noise, and to give it an appearance of care. It was suggested that the first segment of the proposed pedestrian path terminate here, from its origin at Bay Bluffs' north entrance. No parking or paved surfaces were proposed for this site, to conserve its environmental quality and to guard the area immediately adjacent to it (and currently undergoing erosion stabilization and restoration) from further degradation.

BAY BLUFFS PARK- SOUTH ENTRANCE

Figure 85- Bay Bluffs South Concept Schematic

Figure 86- Bay Bluffs South Existing Aerial Imagery from Google

Streetscape Landscaping
Picnic and Seating Areas
Improved Pedestrian Paths
Native Plants

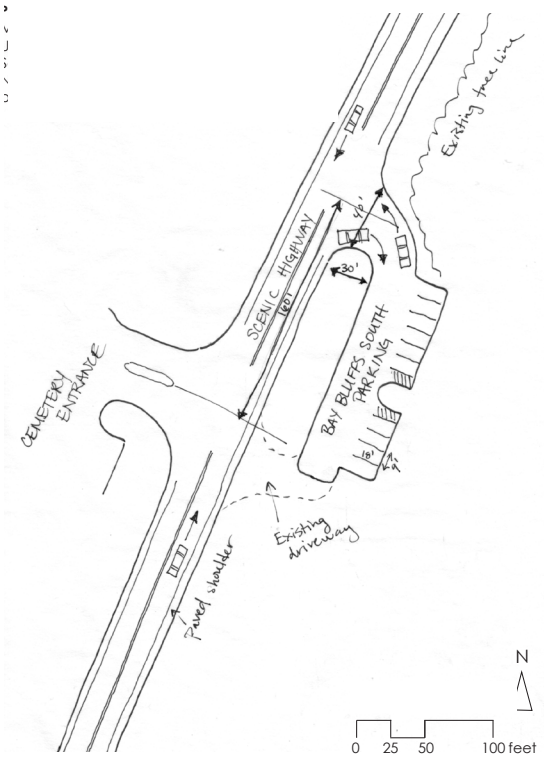


Figure 87- Bay Bluffs South Road Design Revisions

The early design proposals treated the southern entrance to Bay Bluffs Park as a particularly important link along the proposed new pedestrian path, between Mallory Heights and Bay Bluffs North. This property was considered a valuable resting point for those walking along the path from the south, and also for those who had just hiked the entire boardwalk system from the north. This concept design recommended closing the southern drive to the parking area and using the north drive for entering and exiting traffic. Removing this drive made way for extended green space, and created opportunities for seating and picnicking. It also created room to plant more native trees and shrubs around the boardwalk entrance, which would decrease storm runoff flowing down the bluffs and further eroding them.

BAY BLUFFS PARK- NORTH ENTRANCE

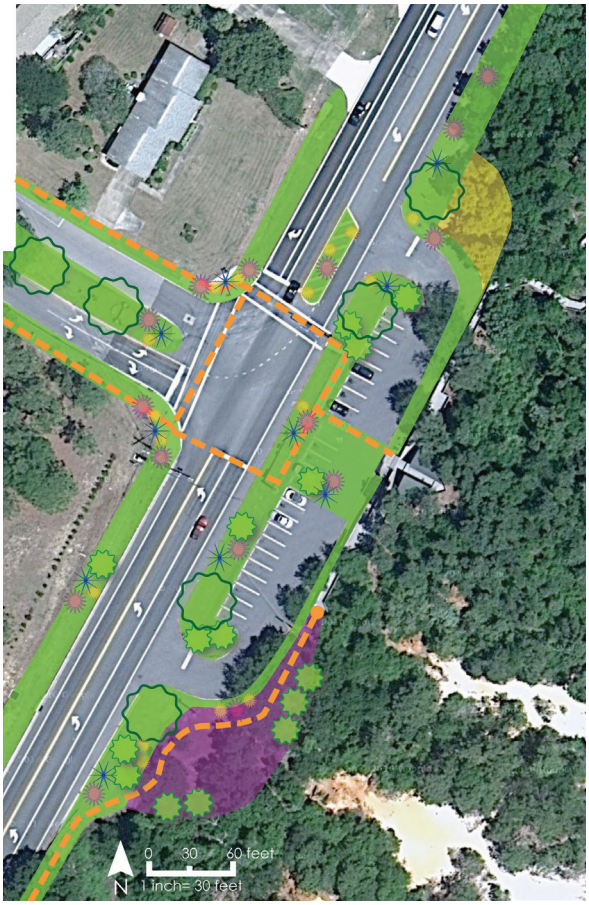


Figure 88- Bay Bluffs North Concept Schematic, Version 1

Figure 89- Bay Bluffs North Existing Aerial Imagery from Google

Streetscape Landscaping
Picnic and Seating Areas
Exercise Stations
Improved Pedestrian Paths
Native Plants

Two new design ideas were presented for the north entry to Bay Bluffs Park. Both were founded on the premise that this particular park entrance, at Scenic Highway's intersection with Summit Boulevard, was an opportunity to make a stronger statement to those approaching Scenic Highway from the west, and encountering the entrance of Bay Bluffs Park just across the road.

The first concept proposed creating a more substantial pocket of landscaping and signage in the area directly facing drivers on Summit Boulevard as they approach the light. This concept divided the single large parking lot into two smaller ones. One lot would use the existing entrance to the south, while the other lot would make use of the existing entrance drive to the north. The extended landscaped space between them would be used to create a more formal planted area that would announce Bay Bluffs Park, and would also open up additional space in front of the main deck overlook.

The alternative concept design for this site proposed altering the existing intersection at Summit Boulevard and Scenic Highway to accommodate a new, single entry to Bay Bluffs Park. This scenario proposed closing both the existing southern and northern drives to the parking lot, and changing the traffic signal already at the intersection to also handle the traffic coming and going from Bay Bluffs' new central drive. Parking was left in a single large lot. A new left turn lane into the park for southbound traffic on

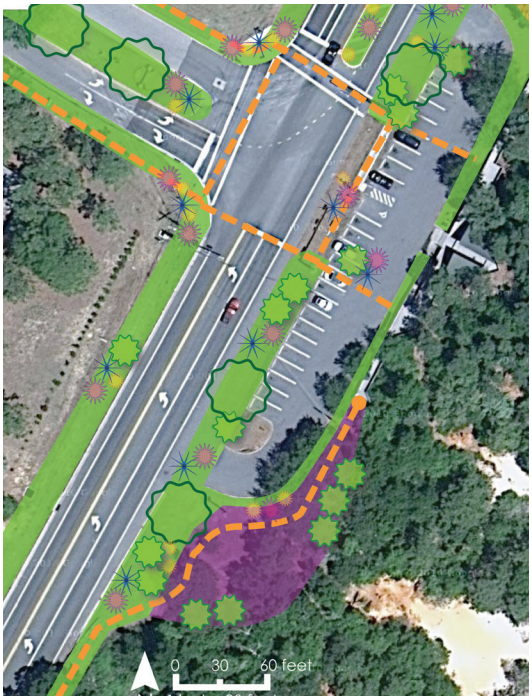


Figure 90- Bay Bluffs Concept Schematic, Version 2

Scenic Highway was proposed, to ease any congestion created by funneling all entering and exiting park traffic through a single drive.

Both concept designs proposed installing improved seating areas and a picnic area in the existing open space around the boardwalk. A new outdoor exercise station was proposed at the north end of the existing parking lot.

CHIMNEY PARK

Figure 91- Chimney Park Concept Schematic

Figure 92- Chimney Park Existing Aerial Imagery from Google

Streetscape Landscaping
Picnic and Seating Areas
Improved Pedestrian Paths
Native Plants

The initial redesign for Chimney Park proposed closing off the southern entrance to the parking lot and directing both entering and exiting traffic through the northern drive. This eliminated the confusing entrance to the park just past the light at the intersection with Langley Avenue. The space once occupied by the southern drive was used to extend the lawn area. The design proposed vegetating the median on Scenic Highway just north of the light, so that pedestrians crossing the highway from Langley Avenue had a refuge point halfway across the wide roadway.

The early concept suggested the removal of the deadend sidewalk on the easement separating Chimney Park's parking lot from the highway. An informational gazebo—intended to convey historical information about the site—was proposed on the new lawn to the south of the parking lot.

The design added shade trees in the lawn area north of the chimney, to create more comfortable seating and a buffer to highway traffic. It also proposed opening up the densely vegetated area to the north—currently fenced off by chain link fence—by removing invasive species, and increasing the open park area in that direction. Another phase of design for this northern area proposed the installation of a small footbridge over the existing drainage channel running west across the site, and the extension of the path from the southern end of the park into a nature loop through the northern area. Off this loop, seating and picnic areas were suggested.

PARK AND RIDE

Figure 93- Park and Ride
Concept Schematic

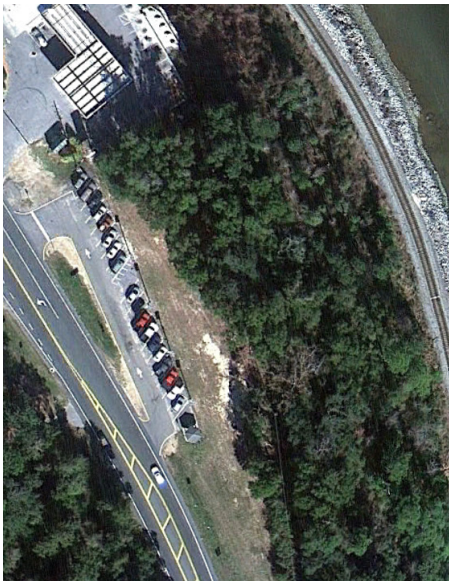


Figure 94- Park and Ride
Existing Aerial Imagery from Google

Streetscape Landscaping
Native Plants

Since the Park and Ride is one of the first places drivers coming off of I-10 onto Scenic Highway see, the early concept for this area was to design it with planting beds of native flowers and grasses that would make it a more noteworthy entryway to the highway. The design also proposed formal landscaping at the entrance and exit to the Park and Ride, along with new signs that notifed drivers of their entry to Scenic Highway.

FEEDBACK

Feedback from community members, representatives of the City of Pensacola, and the Scenic Highway Foundation was gathered by the team during the October 2011 presentation in Pensacola, and then from further meetings the Scenic Highway Foundation had with the City and other local stakeholders through January 2012. This input was compiled and used to inform final designs for the highway corridor.

Feedback from the various stakeholders in Pensacola indicated that there was general concern that the team lacked native plant expertise on which to base roadside and park planting designs. This was remedied by enlisting Theresa Cook, a local landscape design professional and regional plant expert, to consult on plant selections and designs for the highway corridor.

After confirming that the Park and Ride property would need to be excluded from further design consideration because of its private ownership, the Scenic Highway Foundation suggested that the team look into designing the area near the eastern terminus of the bridge over the Bayou Texar, which is in part owned by the City and presents important opportunities for a "first-impression" point for drivers entering Scenic Highway.

Pedestrian path

Plans for this path were positively received, although it was emphasized that such a path would need to be constructed of a material that is accessible to wheelchairs and others with disabilities.

Rail with Trail

The Foundation and community members were very interested in this proposal, and requested that a precedent study and background information on the planning and construction of such a path be undertaken for them.

Mallory Heights

Concerns about deed restrictions on this property were brought forward. The team was later provided with a copy of the zoning guidelines for the Mallory Heights property, which revealed that the plans originally proposed for the area were feasible from a zoning and legal standpoint. Members of the Mallory Heights neighborhood committee asked that tree landscaping along the highway in their area be conducted with care, to preserve residents' sight-lines to the bay.

FDOT expressed their intention to install turn lanes on Scenic Highway at the intersection with Logan Drive, making it necessary to shift design proposals for that area further back from the road, towards the water.

South Bay Bluffs

The City and Scenic Highway Foundation were amenable to the idea of eliminating the southern entry drive to this park entrance and routing all traffic through the northern one. They also approved of providing seating and more attractive, notable landscaping and signage at this entrance to Bay Bluffs Park.

North Bay Bluffs

The City did not think it could afford to install the single-entry concept design at North Bay Bluffs since it would entail reengineering the intersection of Scenic Highway and Summit Boulevard. The two-foot grade change from the highway to the level of the parking lot constituted a particular cost and engineering obstacle that the City and Foundation did not think could be surmounted. Both entities expressed interest in the alternative entrance design, in which two separate entry areas were maintained to give visitors access to two smaller parking areas.

However, on closer consideration of this design, team members felt that it had the potential to create new congestion on the highway, in the case of drivers pulling into one lot, finding it full, and then pulling back onto the roadway to access the other. In mind of this, a new concept was generated in which—as with Bay Bluffs South—the southern drive is closed and returned to lawn, and all traffic to and from a single, large parking lot directed through the northern drive. The Scenic Highway Foundation and City of Pensacola found this to be a viable solution to the concerns raised by the two prior concepts.

Summit Boulevard

The Summit Boulevard plans were very positively received. Foundation members, community members, and the City emphasized their desire that the median of Summit Boulevard be planted similarly to Scenic Highway and North Bay Bluffs. The Foundation also raised the prospect of installing demonstration gardens at Summit Boulevard, though team members ultimately decided not to pursue this idea, as the median does not generally accommodate foot traffic or close-up perusal by visitors.

Chimney Park

Community members expressed a desire for more shade trees in Chimney Park, in order to make seating in the summer more comfortable. The Scenic Highway Foundation asked that the informational kiosk for the park be modeled off the architecture of the mill that stood there in the 1850's. Though no photographs of the Hyer-Knowles Planing Mill are known to exist, photographs of timber-framed mills contemporary with the Hyer-Knowles one were provided to give team members a sense of the architectural style the kiosk should reflect. It was also noted that Chimney Park tends to flood during tropical storms, and that any structure installed there should be able to weather

conditions of periodic inundation.

The City and Foundation approved of plans to close the southern entrance drive to the parking area. However, plans to vegetate the median approaching the intersection with Langley Avenue from the north were declined, as the road was repaved last year and FDOT is unlikely to fund a street improvement project there anytime in the immediate future.

All the stakeholders deemed it very important that sight-lines into all areas of Chimney Park, and especially the densely vegetated area to the north, be established and maintained, as recent arrests for sexual activity and indecent exposure in the park have highlighted its popularity for illicit activities.

There was also interest in giving fishermen a route across the tracks on the Chimney Park property to the popular fishing spot on the bay immediately adjacent.

Park and Ride

The Park and Ride was determined to be on property owned by neither the City of Pensacola nor Escambia County, halting any further changes or improvements that could be proposed there. In light of this, designs for this area were not moved past the concept stage.

GREENWAYS

One of the overarching themes for the redesign of Pensacola's Scenic Highway corridor is the modification of roadways to accommodate pedestrian and bicycle use. Several successful precedents, and research conducted by organizations that are experts in this area, informed the proposals for the changes to Scenic Highway.

The National Complete Streets Coalition advocates the creation of more livable communities through the design of roadways that are accessible for users of all ages and abilities. "Complete streets" are roadways designed and operated to enable safe, attractive, and comfortable access and travel for pedestrians, bicyclists, motorists, and public transport users. Complete street policy is gaining popularity in city and regional planning all over the country. Some features of a complete street include planted medians, bike lanes, accessible and comfortable public transportation stops, and accessible pedestrian signals. Creating complete streets fosters strong communities, and contributes to healthier lifestyles by encouraging people to walk and bike. It also improves safety on the streets.

Moreover, providing more transportation opportunities can help reduce traffic congestion. Giving people the option of traveling by bike, on foot, or by public transportation increases the capacity of the overall transportation network. Trees and vegetation are also valuable addi-

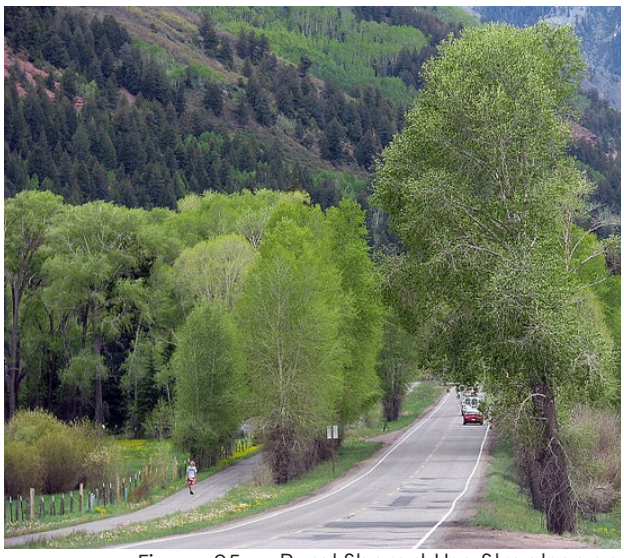


Figure 95- Rural Shared-Use Streetscape

Figure 96- Complete Streets Implementation in Charlotte, NC

Figure 97- Downtown Streetscape in West Palm Beach, Florida

tions to streetscapes. Increasing the tree canopy along city streets improves air quality and reduces stormwater runoff.

West Palm Beach, Florida is an example of a successful complete streets implementation. In 1993, the mayor decided to invest in revitalizing the downtown by making pedestrians a priority of the streetscape. Streets were narrowed, and curbs eliminated to make the environment feel safer for pedestrians and as a result, the city became more attractive to developers. Thanks to these city-wide improvements, over time, property values actually increased in West Palm Beach, due in part to the creation of a pedestrian-friendly city. The once-blighted downtown has become a thriving community for residents and tourists. This is strong evidence that the "walkability" of a city is an important selling point for tourists and residents alike.

Similar policies regarding streetscapes have been adopted across the country. Charlotte, North Carolina, has also implemented streetscape improvements throughout the city in order to improve their community. Smaller communities such as Boulder, Colorado, and Decatur, Georgia have created plans that identify specific streets across their citywide network that may constitute opportunities for future streetscape improvements.

Recommendations for Pensacola Complete Streets

In Pensacola, both Summit Boulevard and Scenic Highway are excellent candidates for a complete streets program. Summit Boulevard has great potential as a connector to Scenic Highway from the neighborhoods adjacent to it, and from the downtown. The width of Summit Bouldevard lends itself to street modifications like pedestrian sidewalks and bike paths in the right-of-way. Improvements to the planted medians, and new pedestrian and bike travel routes will make this boulevard a particularly attractive route for those interested in reaching Scenic Highway and its city parks. Additionally, the location of Summit Boulevard relative to Pensacola Regional Airport makes it an obvious choice for beautification and street improvements, since it is heavily traveled by tourists and visitors to the city.

Scenic Highway itself also presents opportunities for complete streets treatment. The highway would be well served by bike lanes that separate bicyclists from the fast-moving travel lanes of motorized traffic. Pedestrian access is also critically needed along Scenic Highway, since there is currently no comfortable or safe way to move between several of the City's park properties. Moreover, the views over the bay from the top of the bluffs are likely best appreciated on foot, while visitors have the leisure to look around and absorb them. A pedestrian route of travel along the highway and bluffs would offer visitors to Pensacola an experience they will not come by anywhere else in the state.

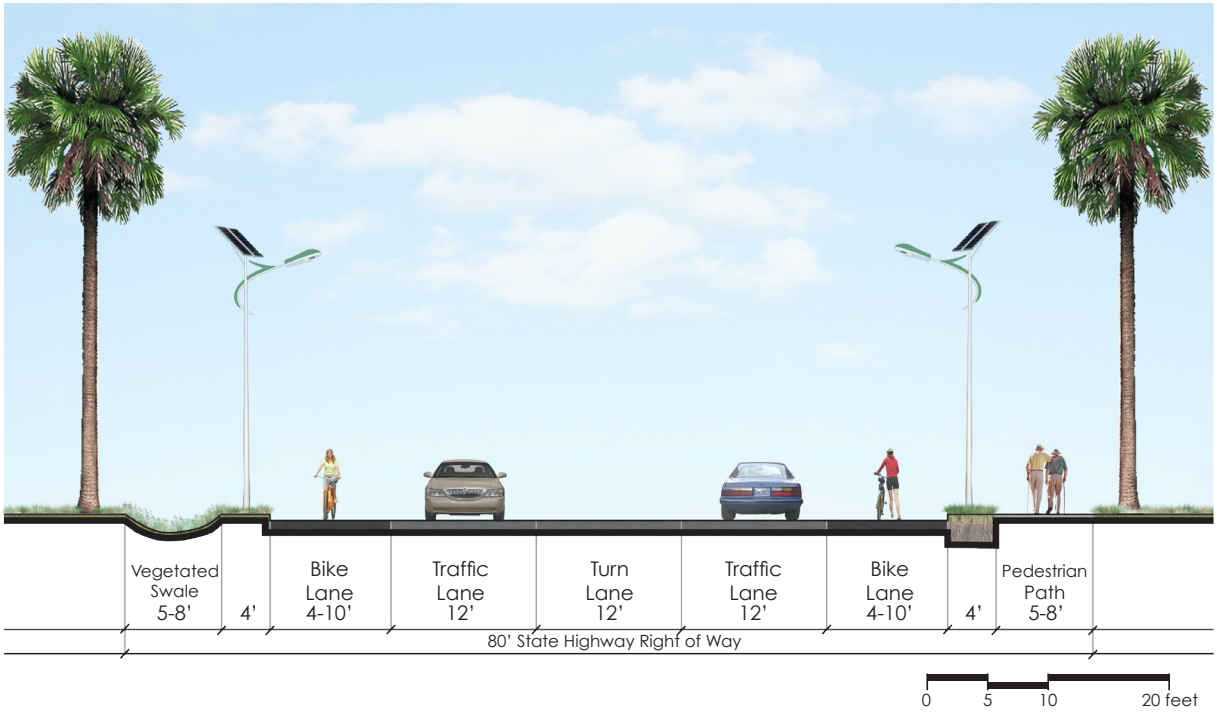


Figure 98- Typical Street Section, Pensacola Scenic Highway

SUMMIT BOULEVARD

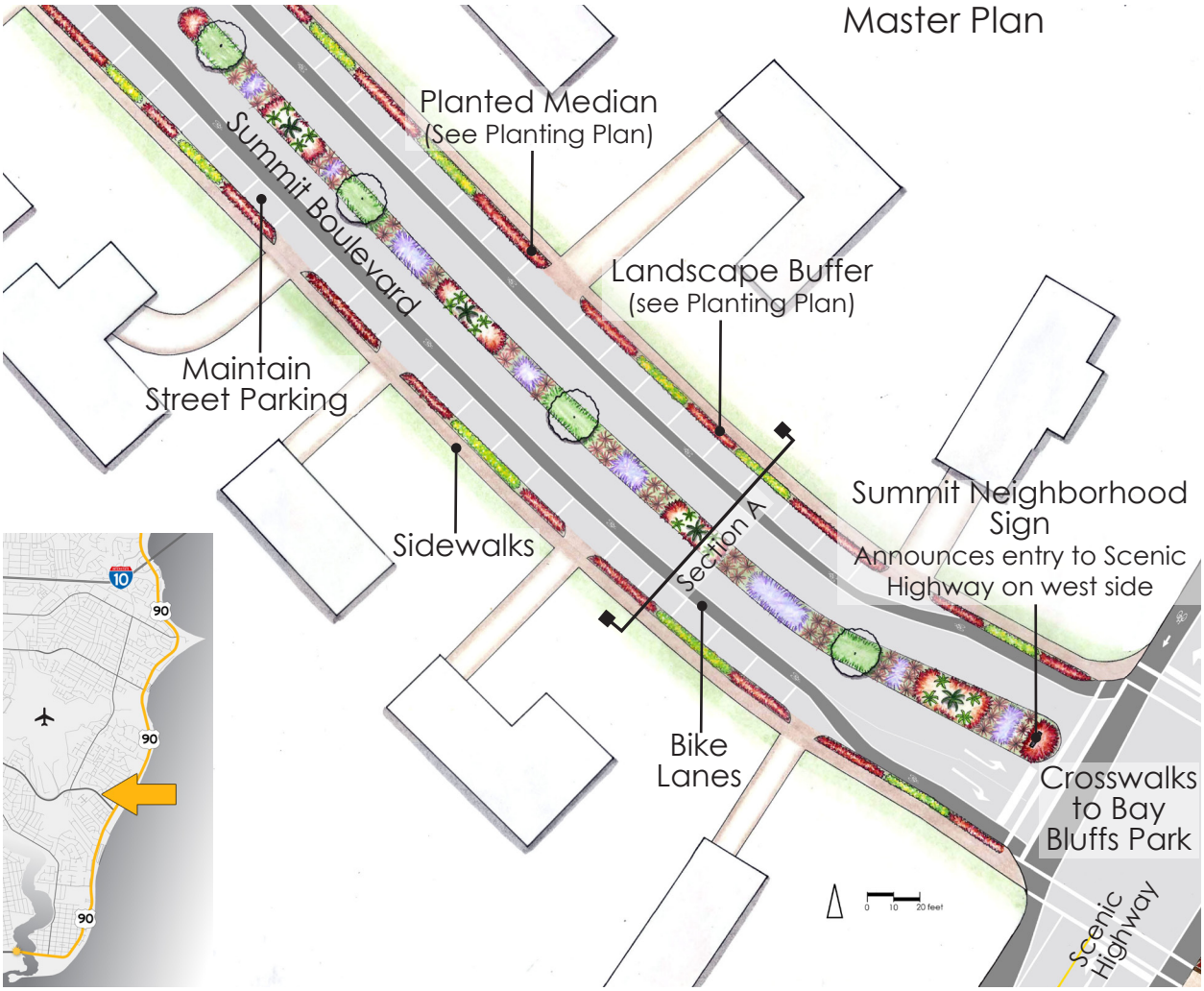


Figure 99- Summit Boulevard Master Plan

Section A: Typical Street Cross Section

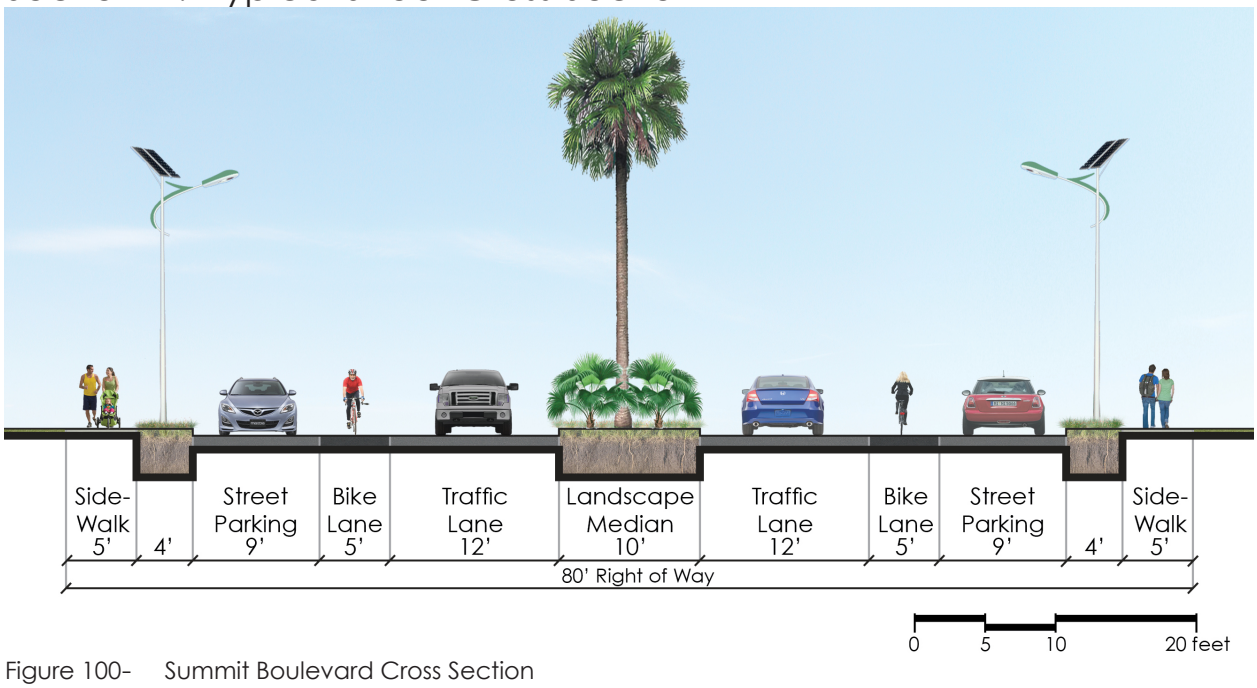


Figure 100- Summit Boulevard Cross Section

SUMMIT BOULEVARD

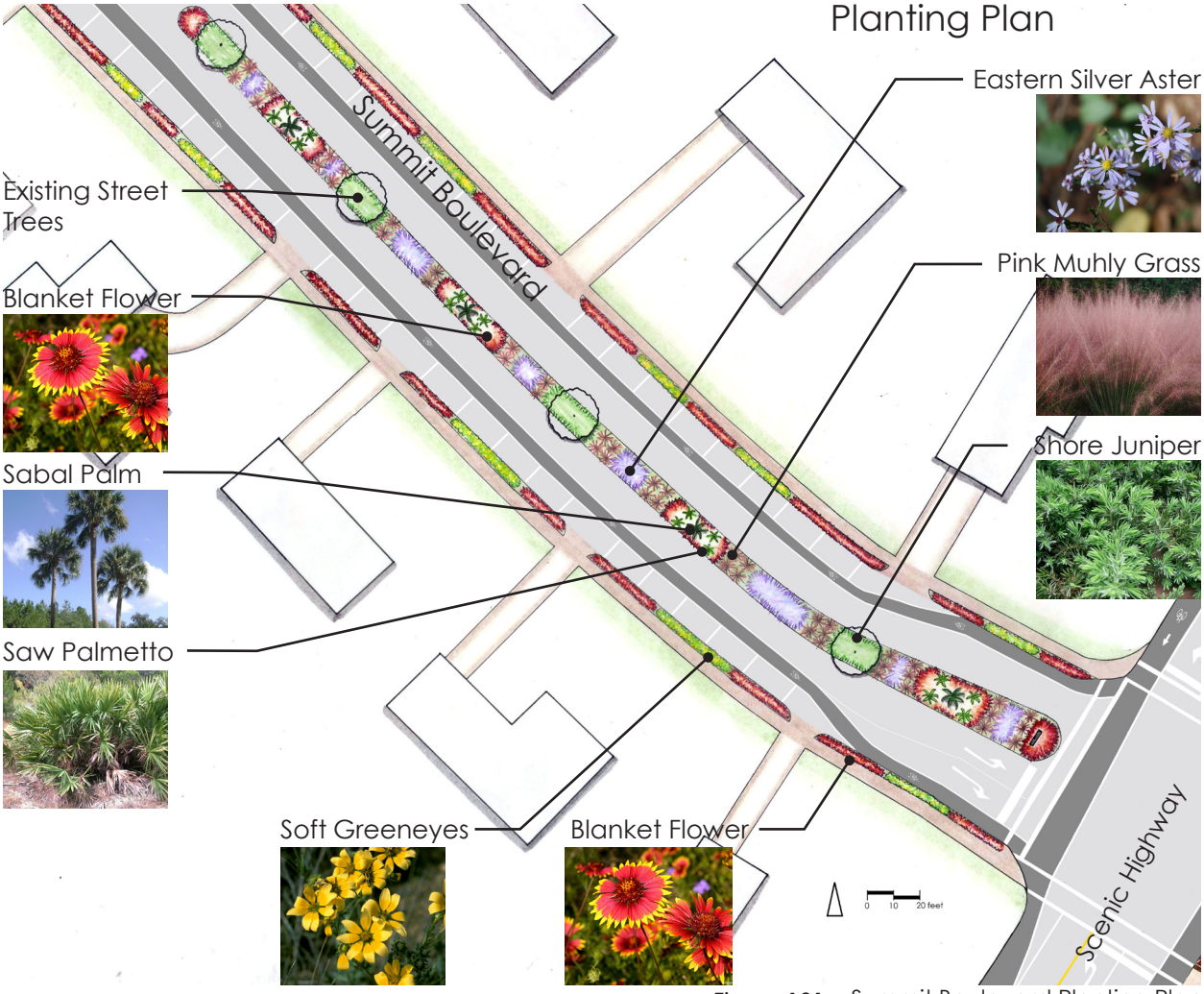


Figure 101- Summit Boulevard Planting Plan

Creating a Pedestrian and Bicycle Friendly Neighborhood

Figure 102- Summit Boulevard Intersection at Scenic Highway Illustration

Recommendations for a Rail with Trail in Pensacola

[In order to see the Rail with Trail case study on which these recommendations are founded, and which will provide the City and Scenic Highway Foundation with further insights into the funding, permitting, construction, and maintenance of such a trail, please see Appendix A.]

Figure 103- Railroad in Pensacola

A rail with trail at the base of the Escambia Bay Bluffs should fall within the 50-foot CSX railroad right-of-way, on the side of the tracks away from the bay. Because this railroad only experiences moderate amounts of freight traffic, and because the trains move through the area at relatively low speeds, a 35-foot setback for the trail should be proposed to the railroad company. An eight-foot wide trail will accommodate bike and foot traffic moving in both directions along the trail, while also allowing room for fencing and landscaped buffers bordering the path. It should be composed of crushed limestone with fines, a surface material that the U.S. Forest Service Trails Accessibility Guidelines deem appropriate for the use of wheelchairs, bikes, and pedestrian traffic. In addition to being more cost-effective than asphalt and less environmentally disturbing to install, crushed stone will better allow the filtration and drainage of runoff during Florida's heavy storm events. Additionally, this surface is less susceptible to graffiti, the removal of which adds to the trail's annual maintenance budget.

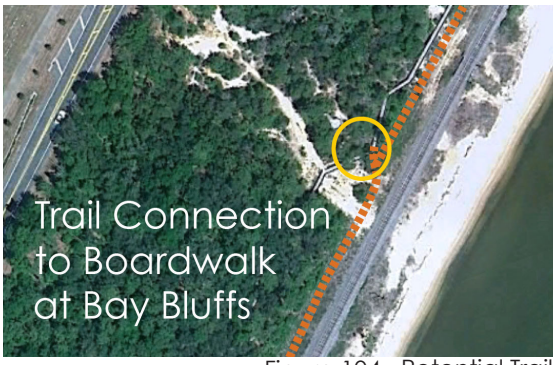


Figure 104- Potential Trail Connection at Bay Bluffs Park

The trail should be bordered on either side by split rail fences that discourage trespassing onto the tracks and adjacent properties yet are in keeping with Scenic Highway's existing fences at Bay Bluffs Park. Where the rail trail traverses City-owned properties, the west side of the path may be left unfenced in order to give users open access into those parks, and from the parks onto the trail. An accessible entrance to the trail should be located at Chimney Park, where level topography most readily permits it. A single at-grade pedestrian crossing over the tracks should be located at the base of the Bay Bluffs boardwalk system, where people are most inclined already to trespass to get to the beach. The prospect of a channelized, controlled route of human traffic across the tracks should be used to entice the railroad company to install this crossing. Pending the success of this first crossing, another at-grade pedestrian railroad crossing should be proposed at Chimney Park, in order to give fishermen access to this popular fishing spot.

In order to minimize the need for irrigation in the landscaped buffers on either side of the trail, hardy, drought tolerant, and fire resistant plant species such as purple coneflower, black-eyed susan, and 'breeze' ornamental grass should be planted in those areas. These plants are likely to be approved by the railroad company on the basis of their height, and they will add color and visual presence to the trail, while demanding relatively little maintenance. Signs prohibiting crossing of the tracks at unauthorized points should be clearly displayed along the trail. In order to eliminate the need for lighting and its associated costs, the trail should function as a day-use amenity, as do the public parks along Scenic Highway.

Because of the cost and complexity of installing a rail trail, Pensacola's trail should be undertaken in segments. The first segment constructed should be in the rail right-of-way between North Bay Bluffs and Chimney Park, in order to ensure handicapped access to the rail trail, and to connect the two most used City-owned properties. These parks will also connect the rail trail to Scenic Highway and the proposed pedestrian path running along it, and trail users can leave their cars in the parking lots of either park.

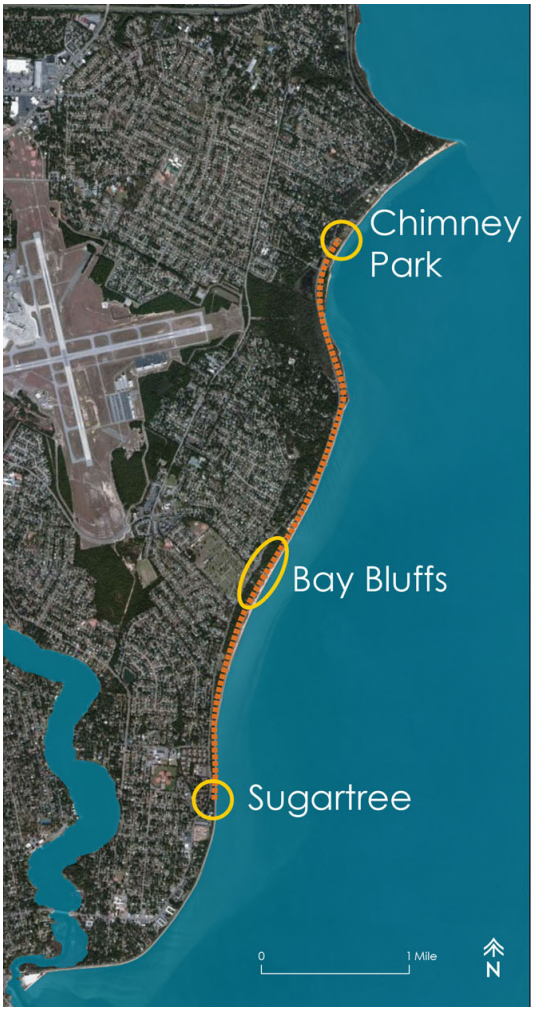


Figure 105- Rail with Trail Connection Points in Pensacola

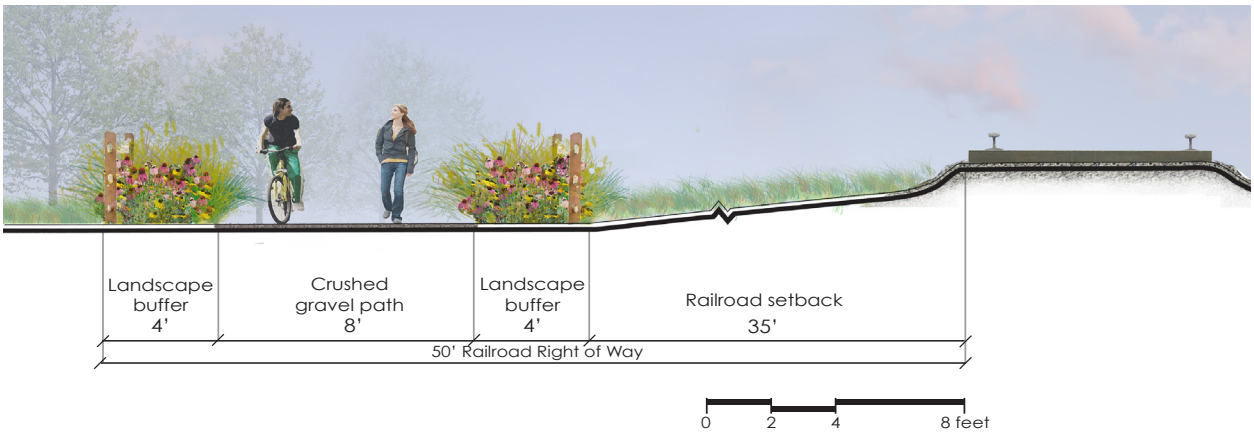


Figure 106- Typical Rail with Trail Cross Section

BAYOU TEXAR BRIDGE

On the second visit to Pensacola, it became clear the team had underestimated the importance of the Bayou Texar Bridge, where the Scenic Highway designation begins. As the southern gateway to Scenic Highway, the bridge deserves a complex and visually impressive planting design, as well as a more prominent welcome sign. The east side of the bridge was chosen as the gateway location because it is adjacent to the public park associated with the Bayou Texar boat launch. Here the available space is constrained by private property on the south side of the road. On the north side, part of the property is owned by the utility associated with the sanitary lift station located between the bayou and the boat launch parking lot. Because informal foot traffic has created a worn path from the parking lot to the bridge, we propose adding a more formal walkway.

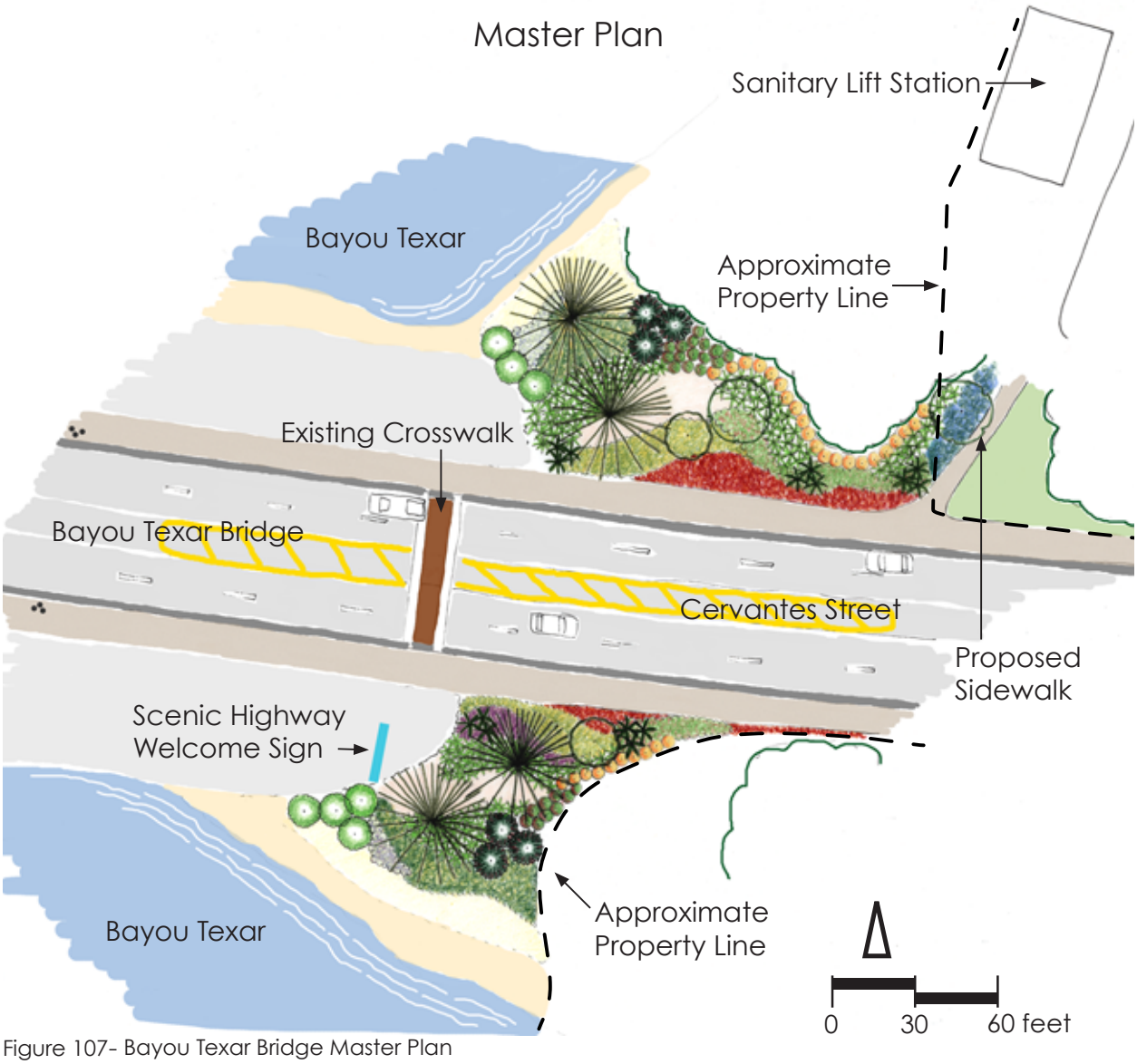


Figure 107- Bayou Texar Bridge Master Plan

In the future, it may be possible to extend the gateway effect to the west side of the bridge, where public property on the north side of the road could be transformed into a stopping place for bicyclists or pedestrians.

Planting Plan

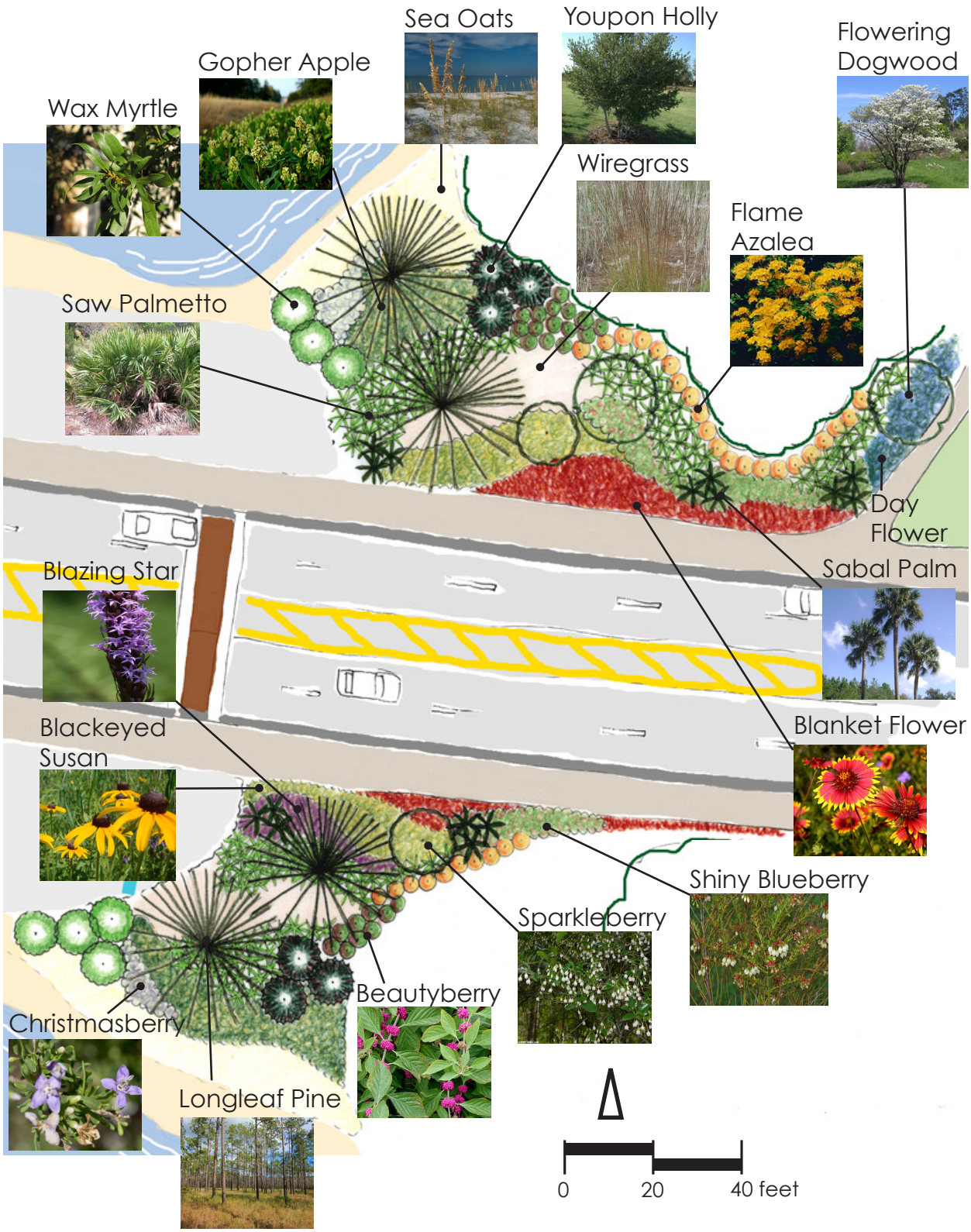


Figure 108- Bayou Texar Bridge Planting Plan

The planting design introduces several of the "signature plants" we use throughout the project area as a means of unifying the varied spaces and views along what will often be a fast-moving linear travel experience. Sabal Palm, also called Cabbage Palm, is featured prominently along the highway as a hardy, road safe plant, and is also Florida's State Tree. Saw Palmetto is also used extensively because it is a hardy, attractive, native plant characteristic of many Gulf Coast ecosystems. Longleaf Pine is the centerpiece of the Bayou Texar Gateway design because of its ecological and historical significance as the keystone of a savannah ecosystem once common across much of the Southeast, and now emblematic of conservation efforts in the American South.

Figure 109- Illustration of Bayou Texar Gateway, looking west toward downtown

Below the trees, layers of the native shrubs and understory trees Flowering Dogwood, Sparkelberry, Flame Azalea, Youpon Holly, Wax Myrtle, Christmasberry and Beauty Berry will provide spectacular floral and fruit displays while also increasing habitat value for birds and small mammals. Large beds of brightly colored native wildflowers such as Black Eyed Susan, Chapman's Blazing Star and Blanket Flower, as well as the Wiregrass characteristic of Longleaf Pine savannahs, provide a colorful, multidimensional signal to drivers that they are entering, or departing, a special place.

A larger, more distinctive welcome sign designed specifically for the Pensacola Scenic Bluffs Highway can complement the smaller Florida Scenic Highways sign, located on the west side of the bridge, that is currently the only announcement of the special designation of Scenic Highway. This new sign would be located on the right (south) side of the road just after the bridge, so that travelers heading east are greeted. This placemant also has the benefit of avoiding distraction from the landscaped sign that currently welcomes visitors to East Pensacola Heights, which is located on the north side of the road, several feet past the proposed gateway plantings.

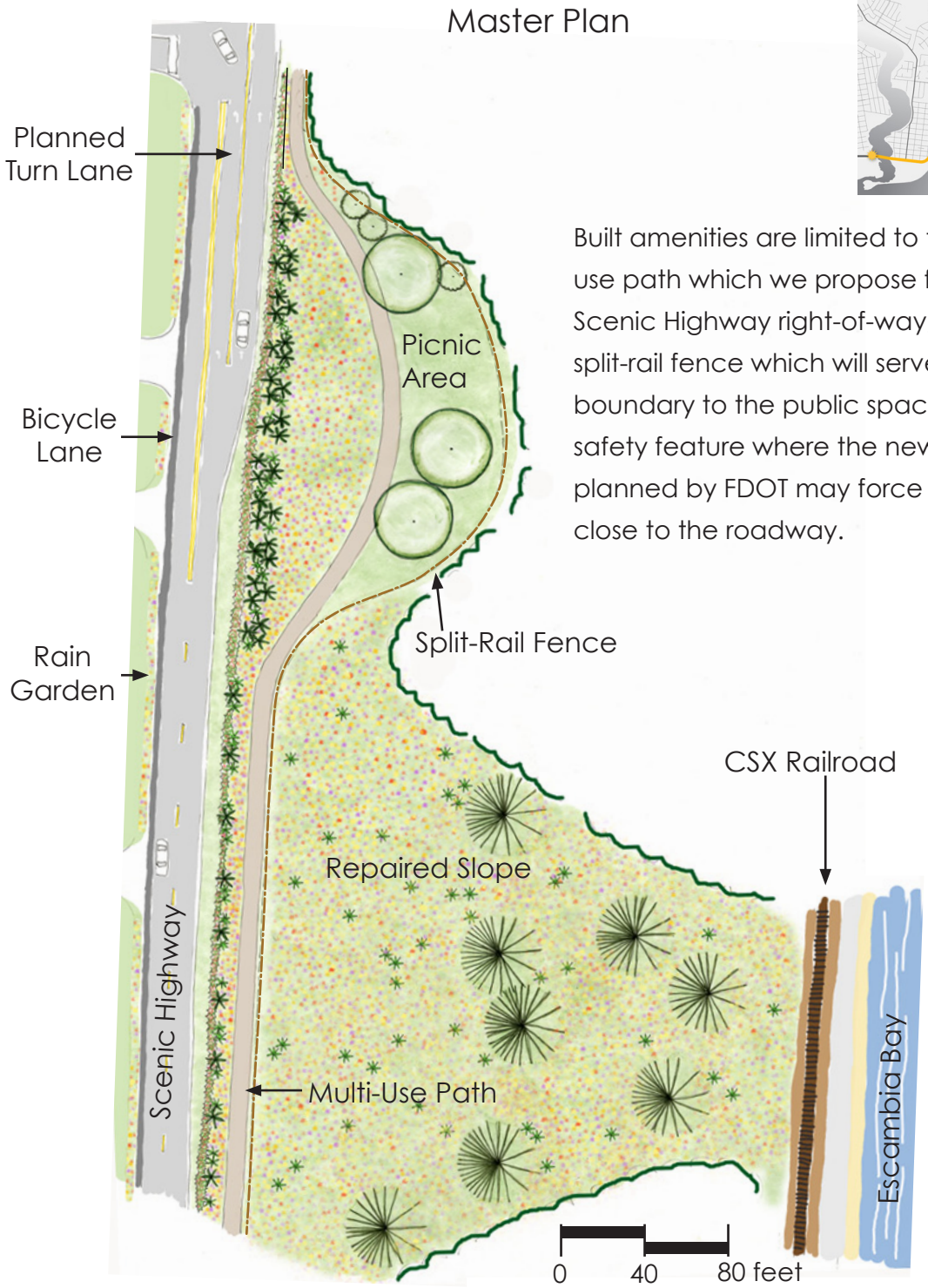
Figure 110- Illustration of Bayou Texar Bridge Gateway, looking east toward Scenic Highway

In essence, the Bayou Texar Bridge Gateway design seeks to create a feeling of formal entry through regular placement of trees and large, eye-catching flower beds. The design also tries to capture and highlight the character and identity of Scenic Highway by using native plants to build a stylized version of local native ecosystems.

MALLORY HEIGHTS

Mallory 3 Park, also referred to as Mallory Heights, after the residential neighborhood surrounding it, is a City-owned property zoned for conservation. Here, the 2005 landslide that took out the forest cover on a section of the bluff created an opportunity for expansive views of the bay. It is therefore important that the design of the park should neither interfere with conservation goals nor overshadow the natural beauty of the site.

Master Plan



Built amenities are limited to the multi-use path which we propose for the Scenic Highway right-of-way, and a split-rail fence which will serve as a boundary to the public space, and as a safety feature where the new turn lane planned by FDOT may force the path close to the roadway.

Figure 111- Mallory Heights Master Plan

Planting Plan

The planting design is largely informal, with regularly spaced elements restricted to the roadside, where Sabal Palms create visual rhythm and reinforce Scenic Highway's identity. Saw Palmetto and Shiny Blueberry create an informal hedge separating pedestrians from the roadway, and are joined on the bay side by a mixture of several colorful native wildflowers.

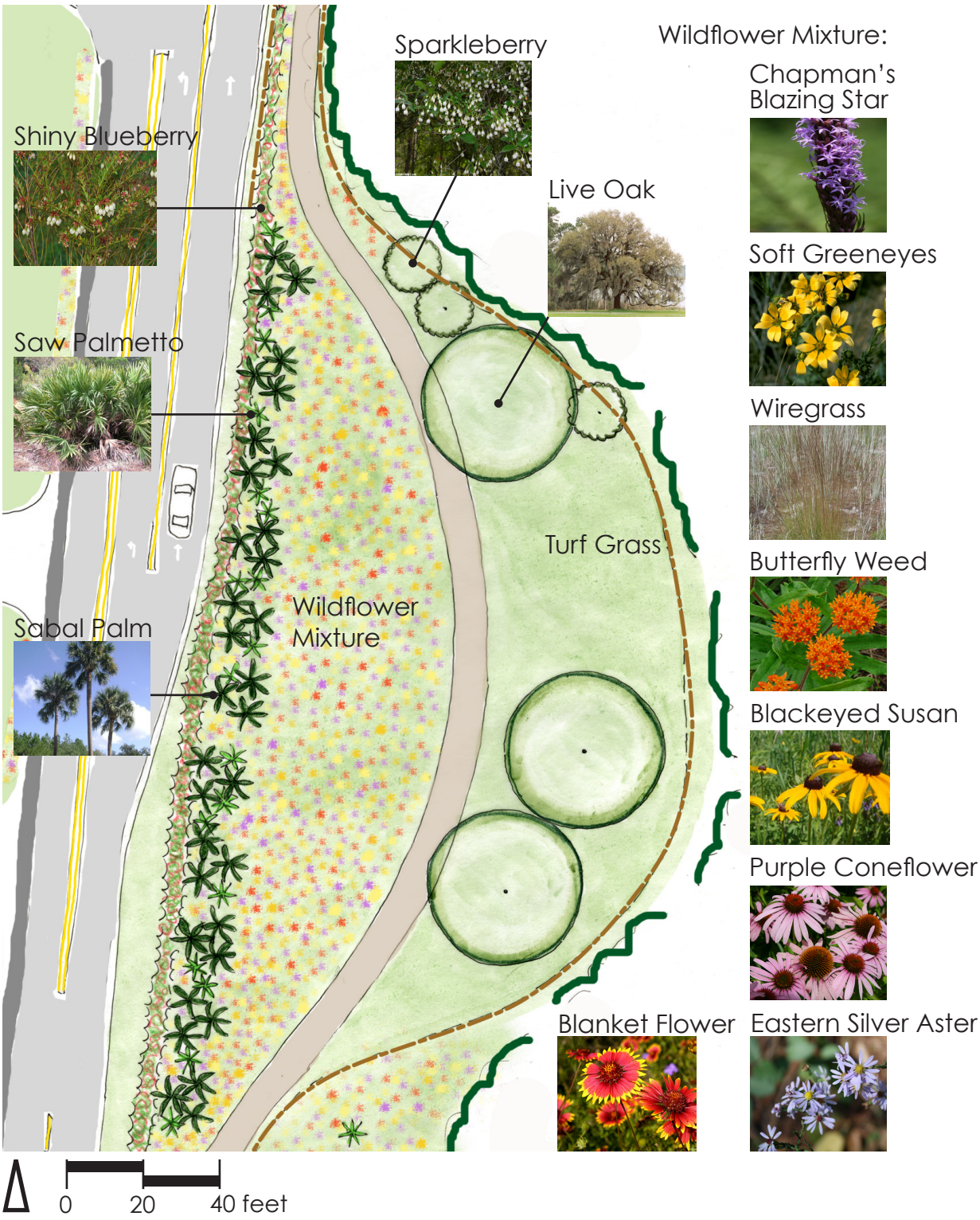


Figure 112- Mallory Heights Planting Plan

The Saw Palmetto and wildflower mix spills down the reconstructed bluff area, and is joined toward the bottom of the slope by widely spaced Longleaf Pines. On the intact bluff area in the north part of the park, three Live Oaks are accented by Sparkleberry trees. These trees will be spaced so as not to interfere significantly with current views of the bay from neighboring homes, and the area beneath them will remain open as a picnic and resting area. As the trees mature, this will become a shady respite for pedestrians and bicyclists, and a staging point for bird watching.

Figure 113- View of Mallory Heights from Scenic Highway, looking north

Figure 114- View of Mallory Heights from Scenic Highway, looking south

BAY BLUFFS PARK SOUTH ENTRANCE

Master Plan

The new design for South Bay Bluffs treats this entrance as an important link along the pedestrian path between Mallory Heights and Bay Bluffs Park northern entrance. The pedestrian path runs along the highway past this park property, and links directly to the boardwalk entrance from

Single Drive Entry/Exit

Scenic Highway

Existing Boardwalk

Landscaped Boardwalk Entrance

Plantings and a sign frame the boardwalk entry

Pedestrian Path

Extended Path

Connects roadside pedestrian path with boardwalk entrance

Seating Area

Rest area for hikers entering from board-walk, or returning from Mallory Heights

0 20 40

Figure 115- Bay Bluffs Park South Entrance Master Plan

the south. Parking is slightly reconfigured to permit landscaping around the entrance to the boardwalk, and to give visitors and pedestrians an approach to the steps that lead up to it. The southern entry drive has been removed to extend the park area, and to permit the installation of new seating areas that act as a resting area for those who have just hiked the entire boardwalk system from the north, or who are approaching the site on the pedestrian path from either direction.

Figure 116- Bay Bluffs South Entrance Illustration

Figure 116 shows the new design for the southern entrance to Bay Bluffs Park. The new pedestrian path is bordered by Sabal Palms, Blanket Flower, and Soft Greeneyes on the road side, and by Blazing Star and Beauty Berry shrubs on the park side. Butterfly Weed frames the entrance to the boardwalk. The parking spots on this side of the lot, which originally ran up to the very base of the steps onto the boardwalk, has been shifted back several feet to allow a path to bring visitors all the way to the foot of these steps.

BAY BLUFFS PARK
SOUTH ENTRANCE

Planting Plan

Soft Greeneyes

Blanket Flower

Sabal Palm

Roseling

Dayflower

Beauty Berry

Blazing Star

Ground Juniper

Butterfly Weed

Flaming Azaleas

0 20 40

Figure 117- Bay Bluffs Park South Entrance Planting Plan

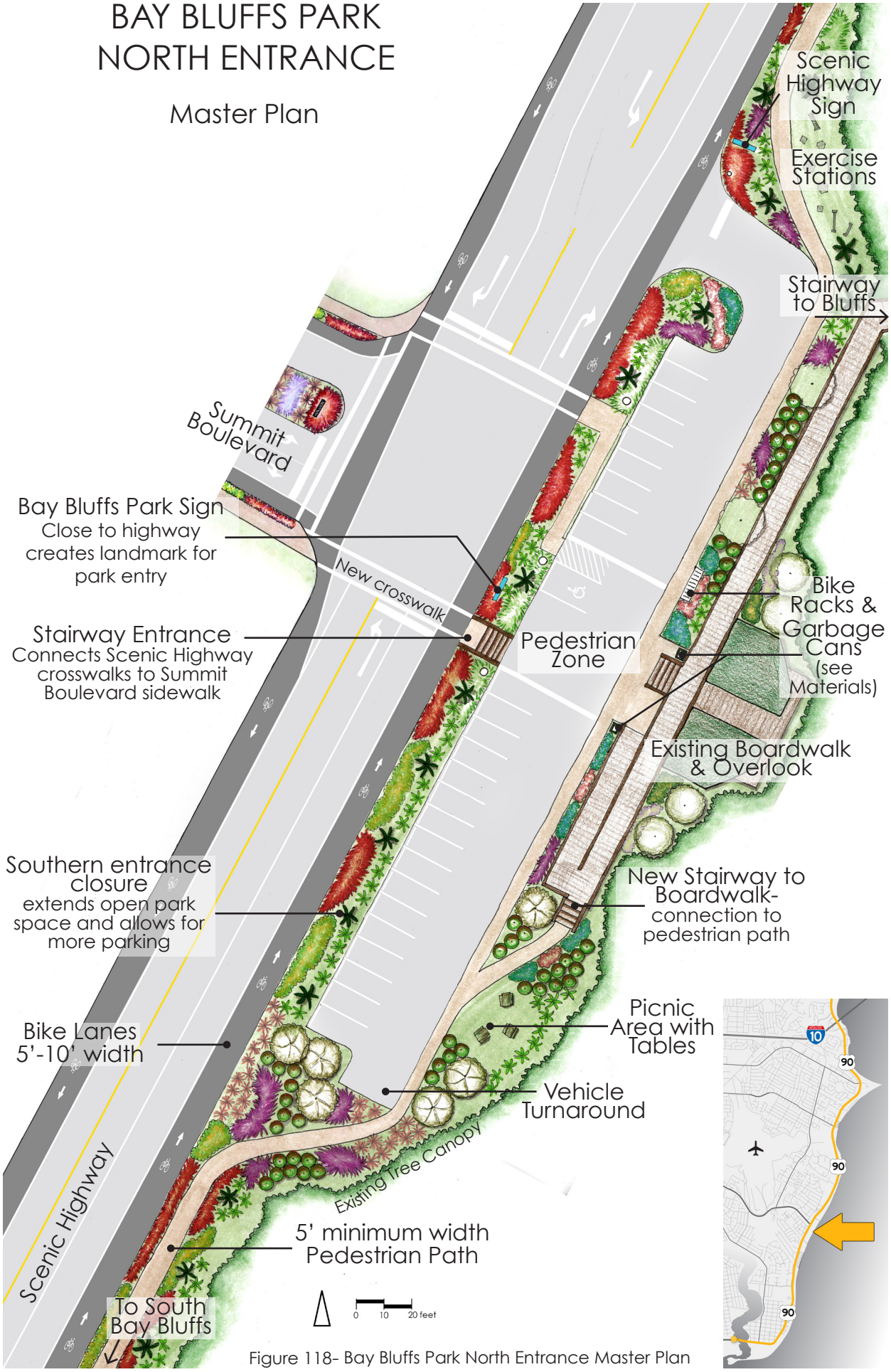


Figure 118- Bay Bluffs Park North Entrance Master Plan

Figure 119- Bay Bluffs Park Intersection at Summit Boulevard Illustration

Several improvements to the streetscape at the main entrance to Bay Bluffs Park beautify this important area, and make it safer for non-motorized visiting traffic. A new bike lane along the highway and new crosswalks connecting the proposed sidewalks on both sides of Summit Boulevard to the park will provide safer entrance routes for pedestrians and bikers. The existing wheelchair ramp that accommodates the two foot drop from the highway to the Bay Bluffs parking lot has been retained. A new stairway (Figure 120) is proposed at the foot of the south crosswalk over Scenic Highway from Summit Boulevard, and will bring visitors directly down into the park.

A newly designed sign (Figure 120) announcing Bay Bluffs Park at the head of these stairs and facing Summit Boulevard will clearly announce the presence of the park to those appraching from that direction. New signs at the entry drive to the park-

Figure 120- Bay Bluffs Park Proposed Stairway and Entry Sign

Bay Bluffs Park - Main Boardwalk Entrance

Figure 121- Bay Bluffs Park Main Boardwalk Entrance Rendering

ing lot will identify Bay Bluffs Park to those traveling on the highway. Signature native plant palettes along the edge of Scenic Highway also weave this park entrance into the landscape character that has been established for the entire highway corridor.

The existing southern entry drive to the parking lot has been removed in this design to eliminate unneeded impervious surface area (some of the bluffs in Bay Bluffs Park are already suffering from severe gully wash) and to allow more space for parking. A small picnic area enclosed by native shrubs and perennials at the south end of the boardwalk provides a restful space for visitors, and a small stairway connecting this area directly to the boardwalk has been proposed. A new outdoor exercise station is installed at the northern end of the parking lot (Figure 122). Bicycle racks near the entrance to the boardwalk provide a secure place for visitors to leave their bikes while they hike down to the bay.

The proposed pedestrian path along Scenic Highway leads directly to the new stairway at the south end of the boardwalk, and invites people approaching on foot into the park.

Figure 122- Exercise Stations at Bay Bluffs Park

BAY BLUFFS PARK
NORTH ENTRANCE

Planting Plan

Figure 123- Bay Bluffs Park North Entrance Planting Plan

CHIMNEY PARK

Master Plan

The master plan for the redesign of Chimney Park proposes a new focal feature for the park: an informational structure (detailed in the following pages) that recalls the history and former use of the site. The lawn park area is extended to the north by clearing away the dense vegetation that is currently there, with special care to remove the invasive under- and over-growth. The new park area will be made

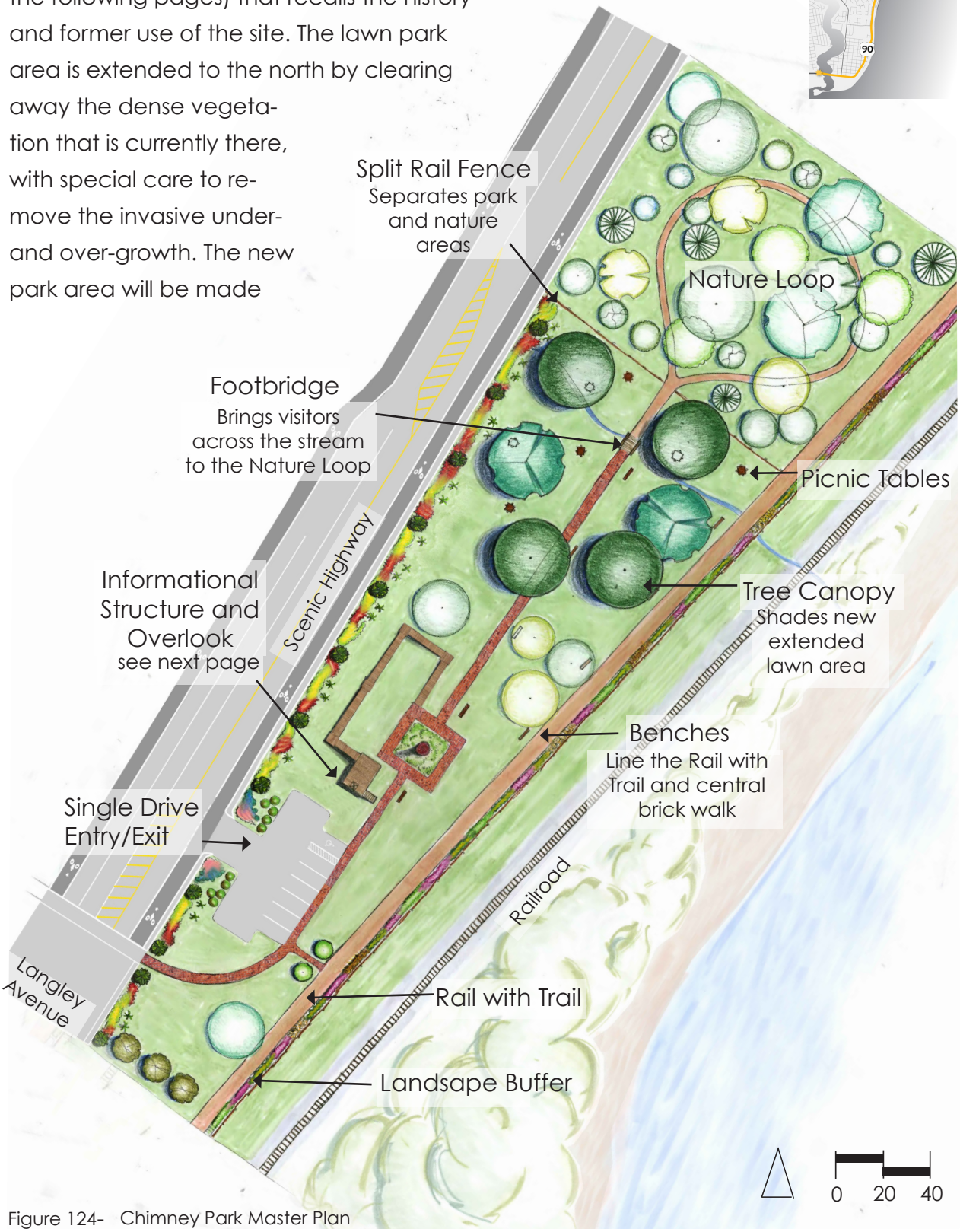


Figure 124- Chimney Park Master Plan

comfortable for visitors by preserving existing aluable tree species, and by planting new trees with broad canopies for shade cover such as Shumard and Live Oaks. New benches lining the central brick walk and rail trail and picnic tables placed in the lawn area will offer visitors new opportunities for seating and picnicking.

The northernmost area of the park will remain more heavily vegetated in order to retain a habitat patch along this part of Scenic Highway for birds and small mammals. The central walk will take visitors over a little footbridge across the stream bisecting the property, and will extend into a nature loop through this area. Despite the denser vegetation here, sight-lines from the highway and the rest of the park will be maintained in order to discourage criminal activity or vagrancy.

The proposed rail with trail runs along the eastern edge of the park, and is open to the park area on the west side. Chimney Park will act as an important and handicapped accessible entry point to the rail trail.

The southern entry drive to the park has been removed to reduce impervious surface, and a single entry and exit drive leads to the parking lot, which has been expanded by two spots in the anticipation that rail trail users will wish to leave their cars here.

Proposed Focal Structure: Precedent

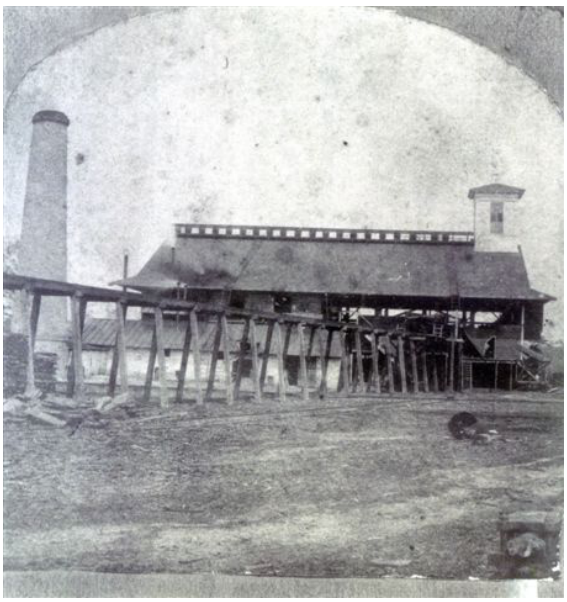


Figure 125- 19th Century Sawmill

Figure 126- Distinctive Mill Features

Figure 125 shows a 19th century sawmill similar to the one the Old Chimney is believed to be a remnant of. (No known images of that orginal structure exist, and are believed to have been destroyed in the Civil War fire). In Figure 126, the elements that the new structure in Chimney Park is intended to evoke are highlighted: the trestle running in front of the Old Chimney up to the mill, the interesting roof line of the old mill with the cupola, flared edge, and the vertical slats of what is believe to be a drying vent running along the top edge of the roof.

Proposed Focal Structure:
Timber Mill and Trestle Skeleton

Figure 127- Axon of Timber Mill Skeleton Structure

A timber skeleton of the distinctive mill features highlighted on the previous page is proposed at Chimney Park, and situated around the Old Chimney so that visitors approaching the park on Scenic Highway will see the Chimney through the trestle much as they would have when they approached the mill by the old carriage road in 1862. Using just the bones of the historic mill will evoke the former presence and significance of the mill at this place, but will also give the structure the ghost-like quality of a thing long destroyed and gone from the site.

Figure 128- Chimney Park
Current Site Condition

Chimney Park is loaded the with potential to draw people to Scenic Highway, and engage them in Pensacola's dramatic Civil War era history. The design for this new structure at Chimney Park is intended to take the Old Chimney from being a historical remnant that simply sits on the site, to being one that arrest drivers' attention and entices them off the highway and into the park to explore.

Mill and Trestle Structure: Phasing and Experience

This new structure is intended to be something that's used as well as seen, and it will relate the site's history to visitors. Since it is a large structure that will take some effort and expense to install, its construction in proposed in two phases.

Phase I

The first proposed phase of construction phase is this simple structure that recalls the form and roof line of the old mill. On the lower level, interpretive signs and images will relate the mill's history, and tell of its destruction in the Civil War fire. A simple viewing platform, 10 feet high and accessed by a single flight of stairs, gives visitors an overlook of the bay, which is obscured by the railroad embankment on the ground. At this level, signs will point out where the mill's loading dock on the bay would have been, and how on the night of the fire barges moored there were loaded with mill equipment in an effort to salvage it. As visitors look out over the water, they will contemplate how terrible storms late that night sunk those barges to the bottom of the bay, where they still rest today.

Figure 129- Phase I: Mill Structure

Phase II

The second proposed phase of construction adds the trestle that runs up to the mill viewing platform. This trestle doubles as an ADA-compliant ramp for wheelchairs, so that visitors with disabilities also have access to the overlook. People climb up the gently ascending ramp through the trestle, which is an unusual and exciting experience. The trestle passes in front of the chimney as it approaches the mill structure.

Figure 130- Phase II: Trestle Structure

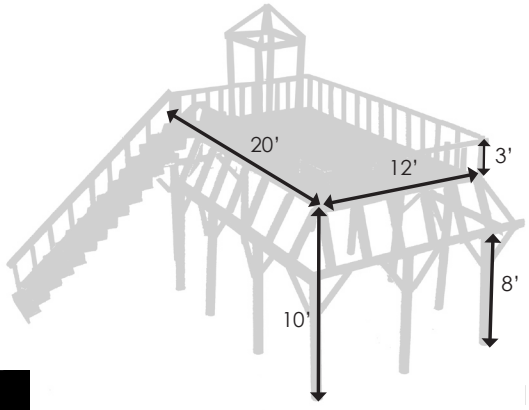
Mill and Trestle Structure:
Scaled Model and Dimensions

A model of the proposed mill and trestle structure for Chimney Park was hand-built to scale to give the client a realistic depiction of its size and dimensions, and its placement on the site relative to existing features (see Figure 124, Master Plan).

Phase I

Figure 131- Phase I: Scaled Model

- 10' high overlook
- 20' x 12' viewing platform
- 20' x 12' covered pavilion with 8' overhead clearance
- Single flight of stairs



Phase II

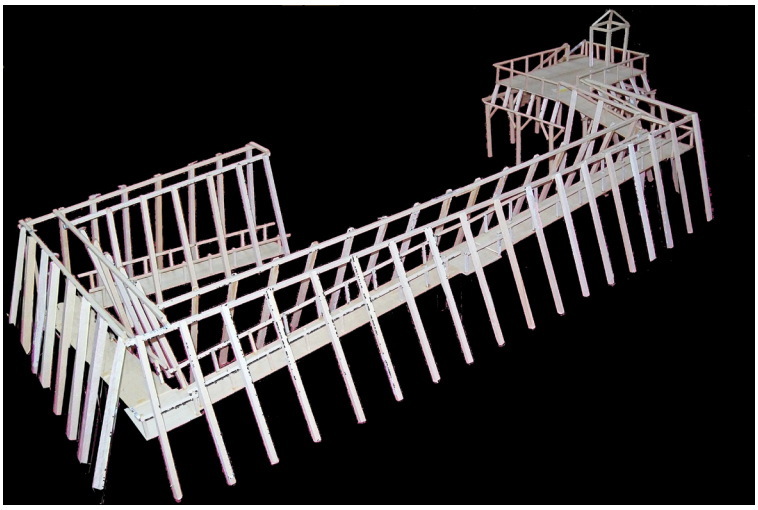
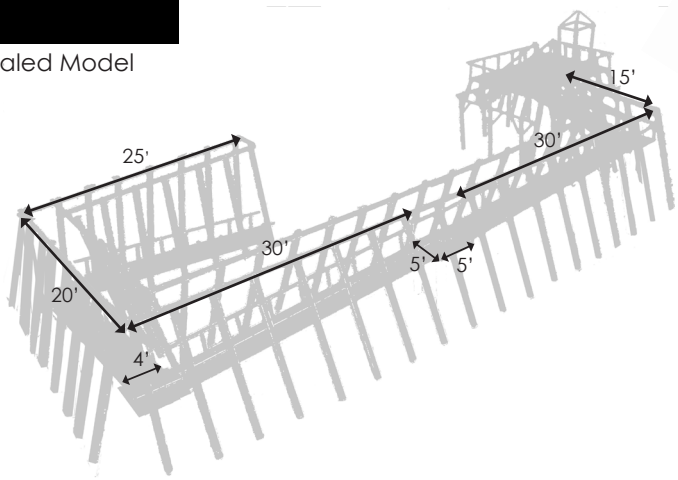


Figure 132- Phase II: Scaled Model

- 120' of ADA compliant ramp
- 1:12 slope
- 5' by 5' landing at every 30" rise in the ramp
- 4' wide ramp
- 3' high handrails along the entire ramp and landings



CHIMNEY PARK

Planting Plan

Figure 133- Chimney Park Planting Plan

PLANT RECOMMENDATIONS

Plant recommendations for the Pensacola Scenic Highway are based on their drought tolerance, low maintenance requirements, appeal to native wildlife, and their nativity to Florida. Suggested highway plants from the Florida Department of Transportation were also chosen for the designs.

Groundcovers

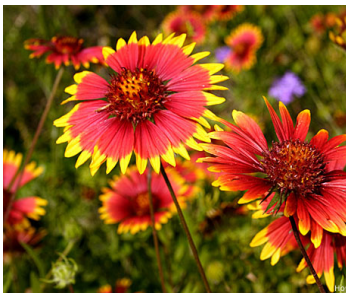


Figure 134- Blanket Flower *Gaillardia pulchella*

Figure 135- Gopher Apple *Licania michauxii*

Figure 136- Shore Juniper *Juniperus conferta*

Common Name	Botanical Name	Height (ft)	Spread (ft)	Bloom Season	Aesthetic Value	Wildlife Value
Blanket flower	*Gaillardia pulchella*	1-2	1-2	Spring-Summer	Maroon/red yellow flowers	Butterflies, Birds
Gopher Apple	*Licania michauxii*	0.5-1.5	spreading	Summer	Yellow flowers	Mammals, Gopher Tortoise, Bees
Shore juniper	*Juniperus conferta*	1	1-2		Evergreen, aromatic	

Grasses

Figure 137- 'Breeze' Ornamental *Lomandra longifolia 'Breeze'*

Figure 138- Pink Muhly Grass *Muhlenbergia capillaris*

Figure 139- Purple Lovegrass *Eragrostis spectabilis*

Figure 140- Sea Oats *Uniola paniculata*

Figure 141- Wiregrass *Aristida stricta*

Common Name	Botanical Name	Height (ft)	Spread (ft)	Bloom Season	Aesthetic Value	Wildlife Value
Breeze' ornamental grass	*Lomandra longifolia 'Breeze'*	3	3	Spring	Evergreen, yellow flowers	
Pink Muhly Grass	*Muhlenbergia capillaris*	3-4	2-3	Summer-Fall	Pink/purple flowers	Butterflies, Birds
Purple Lovegrass	*Eragrostis spectabilis*	1-3	spreading	Fall	Purple panicles	Birds
Sea oats	*Uniola paniculata*	3-6	spreading	Spring-Fall	Tan flowers	Birds, Mammals
Wiregrass	*Aristida stricta var. beyrichiana*	2-4	2-3	Yearlong	Fall color	Birds, Mammals, Reptiles

Perennials

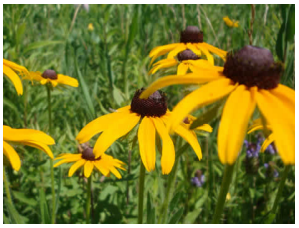


Figure 142- Black Eyed Susan
Rudbeckia hirta

Figure 143- Butterfly Weed
Asclepias tuberosa

Figure 144- Dayflower
Commelina erecta

Figure 145- Chapman's Blazing Star
Liatris chapmanii

Figure 146- Eastern Silver Aster
Aster concolor

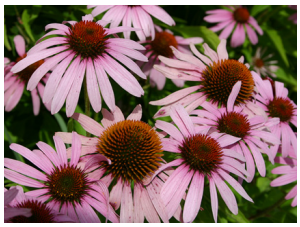


Figure 147- Purple Coneflower
Echinacea purpurea

Figure 148- Roseling
Callisia graminea

Figure 149- Soft Greeneyes
Berlandiera pumila

Common Name	Botanical Name	Height (ft)	Spread (ft)	Bloom Season	Aesthetic Value	Wildlife Value
Black Eyed Susan	*Rudbeckia hirta*	3	2	Summer	Yellow flowers, Attractive Seed heads	Bees, Birds
Butterfly weed	*Asclepias tuberosa*	1-2	1-2	Summer-Fall	Orange/yellow flowers	Butterflies, Birds
Chapman's blazing star	*Liatris chapmanii*	2-3	1	Fall	Purple flowers	Butterflies, Bees
Dayflower	*Commelina erecta*	1-2	1	Summer	Blue flowers	Birds
Eastern silver aster	*Aster concolor*	1-3	1	Fall	Silvery blue/pink flowers	Butterflies
Purple Coneflower	*Echinacea purpurea*	3-4	2-3	Summer-Fall	Purple flowers	Bees, Butterflies, Birds
Roseling	*Callisia graminea*	1	1	Spring-Fall	Purple/pink flowers, Evergreen foliage	Butterflies, Birds, Bees
Soft Greeneyes	*Berlandiera pumila*	1-2	1-2	Yearlong	Yellow flowers, Attractive foliage	Butterflies, Birds

Shrubs

Figure 150- Beauty Berry
Callicarpa americana

Figure 151- Christmas Berry
Lycium carolinianum

Figure 152- Dwarf Blueberry
Vaccinium darrowii

Figure 153- Florida Flaming Azaleas
Rhododendron austrinum

Figure 154- Prickly Pear
Opuntia vulgaris

Figure 155- Saw Palmetto
Serenoa repens

Figure 156- Shiny blueberry
Vaccinium myrsinites

Figure 157- Sparkleberry
Vaccinium arboreum

Common Name	Botanical Name	Height (ft)	Spread (ft)	Bloom Season	Aesthetic Value	Wildlife Value
Beauty berry	*Callicarpa americana*	4-8	3-6	Late Spr-Summer	Pink/lavendar flowers	Birds, Bees, Mammals
Christmas berry	*Lycium carolinianum*	6-8	1-2	Yearlong	Violet/Lavendar flowers	Butterflies, Birds, Bees, Mammals
Dwarf blueberry	*Vaccinium darrowii*	2-3	1.5		Evergreen, Fall color, attractive berries	Birds, Mammals, Gopher Tortoise
Florida Flaming Azaleas	*Rhododendron austrinum*	6-8	6	Spring	Yellow/orange flowers	
Prickly pear	*Opuntia vulgaris*	4-6	3-4	Late Spr-Summer	Yellow flower, Fragrant	Butterflies, Birds, Bees
Saw palmetto	*Serenoa repens*	4-6	4-6		Interesting foliage	Mammals
Shiny blueberry	*Vaccinium myrsinites*	2-3	2-3	Late Winter-Spring	Pale pink/white flowers, Evergreen foliage	Butterflies, Birds, Bees
Sparkleberry	*Vaccinium arboreum*	12-15	15-20	Late Winter-Spring	White flowers	Butterflies, Birds, Bees

Trees

Figure 158- Cherry Laurel *Prunus caroliniana*

Figure 159- Flatwoods Plum *Prunus umbellata*

Figure 160- Flowering Dogwood- *Cornus florida*

Figure 161- Live Oak *Quercus virginiana*

Figure 162- Longleaf Pine *Pinus palustris*

Figure 163- Sabal Palm *Sabal palmetto*

Figure 164- Shumard Oak *Quercus shumardii*

Figure 165- Wax myrtle *Myrica cerifera*

Figure 166- Yaupon holly *Ilex vomitoria*

Common Name	Botanical Name	Height (ft)	Spread (ft)	Bloom Season	Aesthetic Value	Wildlife Value
Cherry laurel	*Prunus caroliniana*	20-45	15-30	Spring	White flowers	Birds, Mammals
Flatwoods plum	*Prunus umbellata*	15-20	15	Spring	White flowers	Butterflies, Birds, Bees
Flowering Dogwood	*Cornus florida*	15-30	15-20	Spring	Pink/white flowers	Birds
Live oak	*Quercus virginiana*	40	40	Spring	Yellow/green catkins	Butterflies, Birds, Mammals
Longleaf pine	*Pinus palustrus*	60-120	30-50	__	Evergreen	Butterflies, Birds, esp. Red Cockaded Woodpecker, Bees,
Sabal palm	*Sabal palmetto*	50	6		Attractive foliage	
Shumard oak	*Quercus shumardii*	40	40	Spring	Yellow/green catkins, Fall color	Butterflies, Birds, Mammals
Wax myrtle	*Myrica cerifera*	4-20	4-20	Spring	Small brownish flowers	Birds
Yaupon holly	*Ilex vomitoria*	8-25	5-15	Spring	White flowers	Birds, Mammals

SIGNATURE PLANT COMBINATIONS

To create a unique sense of character for Scenic Highway, special plant combinations were selected for use along the road and in the parks. These combinations can be used at intervals along the highway and at park entrances, as proposed in the final designs. These distinctive plant palettes were chosen not only for their bright colors and interesting foliage, but their hardiness and drought tolerance.

Park Entry Plant Palette

Figure 167- Beauty Berry *Callicarpa americana*

Figure 168- Dayflower *Commelina erecta*

Figure 169- Roseling *Callisia graminea*

Figure 170- Saw Palmetto *Serenoa repens*

Common Name	Botanical Name	Height (ft)	Spread (ft)	Bloom Season	Aesthetic Value	Wildlife Value
Beauty berry	*Callicarpa americai*	4-8	3-6	Late Spr-Summ	Pink/lavendar flowers	Birds, Bees, Mammals
Dayflower	*Commelina erecta*	1-2	1	Summer	Blue flowers	Birds
Roseling	*Callisia graminea*	1	1	Spring-Fall	Purple/pink flowers, Evergreen foliage	Butterflies, Birds, Bees
Saw palmetto	*Serenoa repens*	4-6	4-6		Interesting foliiage	Mammals

Landscape Buffer and Median Plant Palette

Figure 171- Blanket Flower *Gaillardia pulchella*

Figure 172- Eastern Silver Aster- *Aster concolor*

Figure 173- Pink Muhly Grass *Muhlenbergia capillaris*

Figure 174- Sabal Palm *Sabal palmetto*

Figure 175- Saw Palmetto *Serenoa repens*

Figure 176- Soft Greeneyes *Berlandiera pumila*

Common Name	Botanical Name	Height (ft)	Spread (ft)	Bloom Season	Aesthetic Value	Wildlife Value
Blanket Flower	*Gaillardia pulchella*	1-2	1-2	Spring-Summer	Maroon/red yellow flowers	Butterflies, Birds
Eastern silver aster	*Aster concolor*	1-3	1	Fall	Silvery blue/pink flowers	Butterflies
Pink Muhly Grass	*Muhlenbergia capillaris*	3-4	2-3	Summer-Fall	Pink/purple flowers	Butterflies, Birds
Sabal palm	*Sabal palmetto*	50	6		Attractive foliage	
Saw palmetto	*Serenoa repens*	4-6	4-6		Interesting foliiage	Mammals
Soft Greeneyes	*Berlandiera pumila*	1-2	1-2	Yearlong	Yellow flowers, Attractive foliage	Butterflies, Birds

Rail Trail Plant Palette

Figure 177- Black Eyed Susan- *Rudbeckia hirta*

Figure 178- 'Breeze' Ornamental Grass *Lomandra longifolia 'Breeze'*

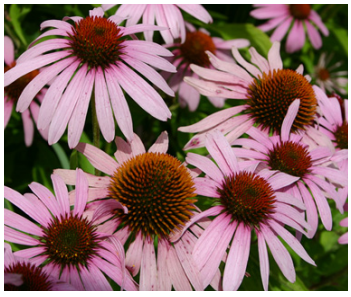


Figure 179- Purple Coneflower *Echinacea purpurea*

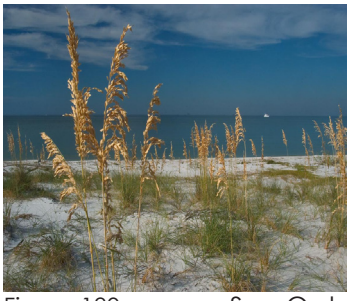


Figure 180- Sea Oats *Uniola paniculata*

Figure 181- Shore Juniper *Juniperus conferta*

Common Name	Botanical Name	Height (ft)	Spread (ft)	Bloom Season	Aesthetic Value	Wildlife Value
Black eyed susan	*Rudbeckia hirta*	3	2	Summer	Yellow flowers, Attractive seed heads	Bees, Birds
Breeze' ornamental grass	*Lomandra longifolia 'Breeze'*	3	3	Spring	Evergreen, yellow flowers	
Purple coneflower	*Echinacea purpurea*	3-4	2-3	Summer-Fall	Purple flowers, Attractive seed heads	Bees, Butterflies, Birds
Sea oats	*Uniola paniculata*	3-6	spreading	Spring-Fall	Tan flowers	Birds, Mammals
Shore juniper	*Juniperus conferta*	1	1-2		Evergreen, aromatic	

OTHER RECOMMENDED PLANTS

These trees were chosen specifically for use along the Pensacola Scenic Highway. They were selected for their nativeness to Florida and their beauty, but also because they are highly suited to the site conditions, low maintenance, fast-growing, and are recommended by the Florida Department of Transportation for highway use. Though this list is intended as a guide for the highway corridor, not all these plants were used in the final designs.

Figure 182- American Elm-*Ulmus americana 'floridana'*

Figure 183- American Holly- *Ilex opaca*

Figure 184- American Hop Hornbeam *Ostrya virginiana*

Figure 185- Laurel Oak *Quercus hemisphaerica*

Figure 186- Loblolly Pine *Pinus taeda*

Figure 187- Pignut Hickory- *Carya glabra*

Figure 188- Sand Pine *Pinus clausa*

Figure 189- Slash Pine *Pinus elliottii*

Figure 190- Southern Red Cedar- *Juniperus sillicicola*

Figure 191- Sweetgum *Liquidambar styraciflua*

Figure 192- Water Oak *Quercus nigra*

Figure 193- Weeping Holly- *Ilex vomitoria 'pendula'*

Common Name	Botanical Name	Height (ft)	Spread (ft)	Bloom Season	Aesthetic Value	Wildlife Value
American elm	*Ulmus americana 'floridana'*	60-80	20-40	Early Spring	Green/red flowers	Birds, Bees, Mammals
American holly	*Ilex opaca*	30-50	15-30	Spring-Summer	White flowers	Birds, Mammals
American hop hornbeam	*Ostrya virginiana*	20-50	20-50	Spring	Inconspicuous green/yellow	Birds, Mammals
Laurel oak	*Quercus hemisphaerica*	40-60	20-40	Spring	Green catkins	Butterflies, Birds, Mammals
Loblolly pine	*Pinus taeda*	60-100	30-60		Evergreen	Birds, Mammals, Insects
Pignut hickory	*Carya glabra*	50-100	30-100		Fall color	Mammals, Moths
Sand pine	*Pinus clausa*	20-40	20-30		Evergreen	Birds, Mammals, Insects
Slash pine	*Pinus elliottii*	40	8-10		Evergreen	Birds, Mammals, Insects
Southern red cedar	*Juniperus sillicicola*	30-45	20-30		Evergreen	Butterflies, Birds
Sweetgum	*Liquidambar styraciflua*	40-125	20-60	Early Spring	Green/yellow flowers, Fall color	Birds, Insects, esp. Luna Moth
Water oak	*Quercus nigra*	50-80	20-50	Spring	Yellow/brown catkins	Butterflies, Birds, Mammals
Weeping holly	*Ilex vomitoria 'pendula'*	15-30	10-20	Spring	White flowers, Evergreen	Birds, Mammals

MATERIALS

Pathways

Figure 194- Crushed Limestone Pathway

Crushed limestone is an inexpensive material that can be used on the pedestrian path along Scenic Highway. This material is easy to install, inexpensive, and is locally available in Florida.

Compacted 3/8" crushed limestone is ADA-compliant. For accessible user-friendly paths, a 4-6% grade and 48" minimum width is recommended. Proper installation can ensure a durable pathway for Scenic Highway. A recommended 4-6" of crushed limestone spread over geotextile landscape fabric will also help to suppress weeds, lowering maintenance costs.

Brick is another appropriate material for use in pathways along the highway, particularly in well-traveled areas. Brick is currently being used on paths in Chimney Park, and constructing part of the pedestrian path with brick will tie that trail in to the character of Chimney Park.

Wayfinding

Figure 195- Scenic Highway Wayfinding Example

Another way to establish visual character for Scenic Highway is to use a well-designed wayfinding system. Principles of good wayfinding include creating well-structured paths, establishing visual cues, and providing signs at decision points on a pathway. A few well-placed signs along the rail trail and the highway pedestrian path will not only create valuable wayfinding cues for pedestrians, but will also help establish an identity for the highway. In a good wayfinding system, signs are standardized and continue from the beginning to the end of a trail system. Another simple, inexpensive way to help trail users orient themselves might be with wooden posts with colored reflective markers. Figure 195 shows an example of how Scenic Highway could create a recognizable wayfinding system with signage that uses one of the logos created for the Pensacola Scenic Highway. This sign was designed to match the color and style of the Bayou Texar Bridge.

Educational Signage Template

A basic format for educational signage was created for use along Scenic Highway, and its city parks. Educational, historical, and cultural information could be substituted into this template to provide relevant, interesting information to visitors to Scenic Highway and Pensacola.

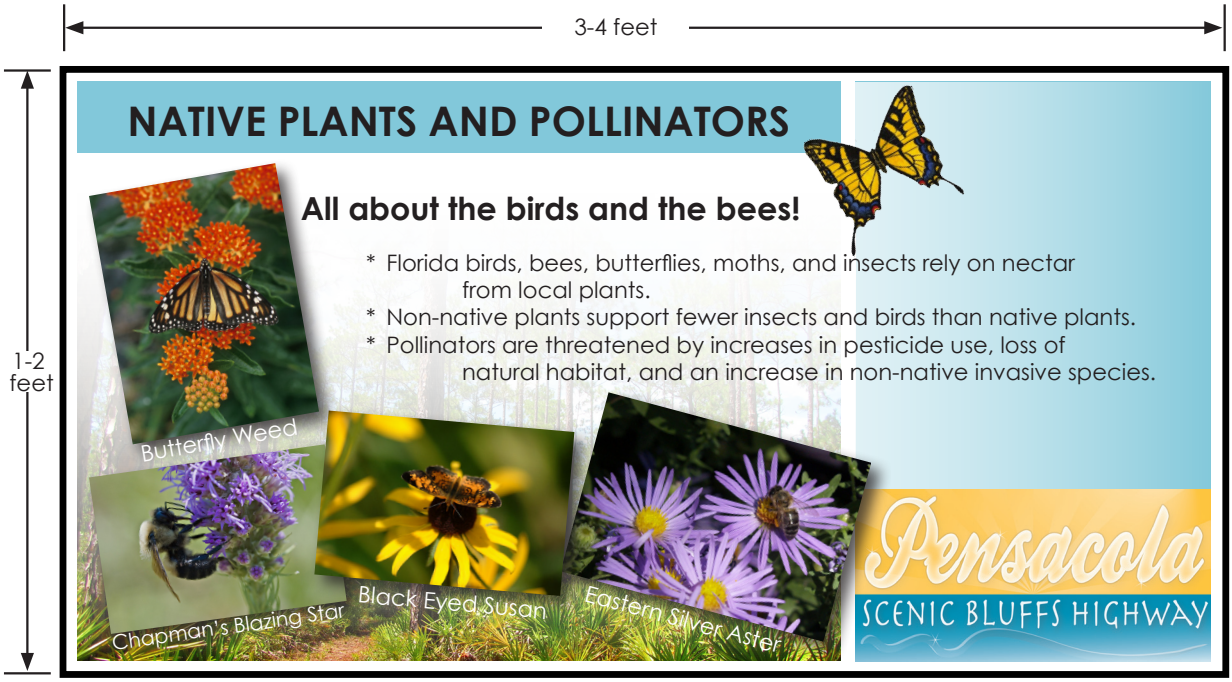


Figure 196- Scenic Highway Educational Sign Example

The Scenic Highway corridor has many educational opportunities to offer the public, and this can be accomplished with the use of signs along the pathway and trail system. Significant events in Pensacola's history can be showcased by placing these signs at strategic points. Chimney Park, for example, has a rich history that could be shared with visitors on signs following the format of Figure 196. Other educational opportunities for signage include the natural history of the bluff formations, the bluffs' existing native plant communities, and significant local climate and weather events.

Vandal proof signage

The City of Pensacola has struggled with acts of vandalism, and many of the signs along the boardwalk system at Bay Bluffs Park have been all but destroyed. Glass Reinforced Plastic signs have been shown to be the most resistant to vandalism. This material is also less susceptible to fading, permits easy removal of graffiti, and can weather impact. A sturdy frame is also an important component of vandal-proof signs. A galvanized steel post and frame are most likely to stand up over time to the acts of vandals. Because vandals are more likely to damage things that already show signs of disrepair, maintaining the signs will also help to deter destructive behavior.

Site Furnishings

Another effective way to establish a unique character for Scenic Highway is to use uniform site furnishings at each of its parks. Examples of site furnishings that could help create the highway's character are shown below. The park bench, garbage can, and bike racks (Figure 197-199) are made from recycled plastic, which is often a cheaper alternative to galvanized steel or wood, and also a sustainable material choice. Various colors are available; however, the distinctive blue-green color shown here stands out and matches colors used to represent Scenic Highway in the logo designs.

Figure 197-Recycled Plastic Bench Example
Image Credit: Park Bench Source

Figure 198- Recycled Plastic Garbage Can Example
Image Credit: Crowd Control Store

Figure 199- Recycled Plastic Bike Racks
Image Credit: School Outfitters

Street Lighting

Solar panel street lamps are also recommended for installation along the highway. The solar streetlights used at the Park and Ride parking lot would also be a wise choice for Chimney Park, Bay Bluffs Park, and along the highway's pedestrian path and the sidewalks at Summit Boulevard. Solar lights are a strong investment for the City and would represent a commitment to sustainable energy.

Figure 200- Solar Street Light Example

INVASIVE PLANT SPECIES

Introduction and Background

Aggressive non-native plant species are among the greatest current threats to biological diversity in the Pensacola Scenic Highway corridor. These plants are able to spread rapidly and outcompete, and in some cases directly kill, native plant species. While the reasons for this ability are not clear (Inderjit 2012; Parker et al. 2012), and probably vary by species, the result can be a monoculture, in which most native plants are unable to survive and spontaneous reversion to native ecosystems, while theoretically possible, is slow and rare (Mack et al. 2000; Siemann and Rogers 2006). This is a clear threat to plant diversity, but also creates serious problems for native animals, which are not adapted to life in these new conditions. For example, while many introduced plants provide cover and even produce edible fruits, most are not edible by native insects (Burghardt et al. 2010; Tallamy and Shropshire 2008). While this is often seen as a positive characteristic by human gardeners, nearly all of our native songbirds depend on insects to feed their young, and can have difficulty finding them where non-native plants are dominant (Burghhardt et al. 2008; Tallamy 2004).

Many introduced plants can alter the structure of the ecosystems they invade, creating unfavorable conditions for the return of native species (Crooks 2002). One example is the spread of Malaleuca trees in South Florida saw-grass meadows, which transforms open habitat into forest and increases fire risk (Rayamajhi et al. 2007). Some plants produce chemicals that inhibit the growth of other plants around them. This ability, known as allelopathy, gives many invasive plants a competitive advantage, and can hasten the decline of native species (Hierro and Callaway 2003).

There are a wide variety of methods for controlling and removing invasive plants, each with its own advantages and disadvantages. While some plants can be controlled by prescribed fire, others may be encouraged by it. Many can be removed by hand pulling when young, but quickly become too large and must be cut. Unfortunately, many invasive trees and shrubs tend to re-sprout from their roots when cut, and cannot be controlled effectively without the use of herbicides.

Many concerns arise when using chemical means to control invasive plants, but fortunately most can be addressed through care and planning. Many herbicides are of low toxicity to animals, and can be applied in ways that keep accidental damage to native plants (sometimes called “overspray” or “drift”) minimal. For example, in the case of shrubs and trees, it is usually possible to cut an individual down and carefully paint or spray only the stump, rather than spraying the entire tree.

Each plant species responds differently to treatment methods, making it im-

portant to customize removal plans. If herbicide is used, it is important to choose a chemical type and concentration that has been proven effective against the target species and an application method that will protect desirable species. Unfortunately, the majority of scientific studies of herbicide effects have focused on agricultural systems, which involve different goals from ecological restoration, and different plant species. This can lead to surprises when detailed restoration studies are carried out. For example, triclopyr (sold as "Garlon") is generally thought to effect only broadleaved plants, leaving grasses unharmed, but a 2010 study of several native species found that it did injure some grass species (Kaiser and Kirkman 2010). Because of this lack of clarity regarding native plant systems, many invasive species control recommendations come mainly from field experience shared among natural area managers.

Recently, concerns have arisen surrounding the development of herbicide resistance in some species. Hutchinson et al. (2007) reviewed the potential for resistance among Florida's invasives, finding that more species have become resistant to the class of chemicals called ALS Inhibitors, which includes imazapyr, metasulfuron methyl and imazapic, than to other categories of herbicide. In addition, they found that species that produce a large amount of seed and have annual life cycles are most likely to become resistant. They speculate that Old World Climbing Fern, Cogon Grass, Torpedo Grass and Tropical Soda Apple may be the most likely candidates in Florida for developing resistance to herbicides. Because of this, they recommend rotating herbicide types to avoid selection for resistance, which occurs with repeated application of the same chemical.

In addition to the immediate effect of an herbicide, it is also important to consider its behavior in the soil. For example, glyphosate (sold as "RoundUp" and "Rodeo") is normally quickly bound in soil and rendered inactive, but how strongly it is bound depends upon the amount of phosphorus in the soil (Cornish and Burgin 2005). Others, such as imazapyr (sold as "Arsenal") remain active in soil for several months, depending upon soil characteristics and temperature, suppressing the growth of many species (Jenkins et al. 2000; Bovey and Senseman 1998). This may be desirable for certain types of restoration work, particularly in long-leaf pine savannah ecosystems, in which some native species are resistant to the herbicide while weed species are not (Freeman and Jose 2009; Jose et al. 2008). Another important factor to consider is whether a particular herbicide can be translocated between plants, as this can result in injury to valued trees. While the mechanisms by which this can occur are not well documented, some non-target plants have been shown to be affected by nearby application of imazapyr, for example (Lewis and McCarthy 2008). Because aquatic environments can be particularly sensitive to chemical action, informed decisions are important when planning restoration efforts in and near wetlands and water bodies. Differences in herbicide products can be subtle but important. For example RoundUp and Rodeo both contain the active ingredient glyphosate, but RoundUp also contains a surfactant that has

been shown to substantially increase its harmful effects on fish and amphibians (Moore et al. 2012; Cattaneo et al. 2011; Rossi et al. 2011).

The Florida Department of Agriculture and Consumer Services regulates the use of pesticides and requires that anyone using certain Restricted Use Pesticides be trained and certified in their safe and appropriate application. While some herbicides can be purchased and applied without a license, federal law requires that all pesticides be used strictly in accordance with their labels. It is always best to be well educated on their use, and the state certification program offers both training and public assurance that anyone applying chemicals in a public area will use proper care. While allowing volunteers to apply herbicides is often impractical at best, certification would be advisable for those key caretakers of Scenic Highway's parks and natural areas who are able. City parks department employees in particular may already be qualified, making their help extremely valuable to restoration efforts along the highway corridor.

The Florida Exotic Pest Plant Council evaluates the level of invasiveness of any plant reported to have naturalized, and if a species is determined to pose a risk to the integrity of areas in which it has become established, it is placed on the FLEPPC's "Invasive Plant List." Within that list, species are categorized according to the severity of their invasive behavior. Category I species are those that have been shown to alter native plant communities, while Category II species are those known to be increasing in abundance or expanding their range, but are not known to damage native plant communities. If evidence of damage is reported, the species can be changed to Category I (FLEPPC 2012). Moreover, the designation of a plant as a "noxious weed" by federal or state agencies means it exhibits invasive tendencies so strong that it is illegal to propagate or cultivate it without a permit.

Invasive plants common to Pensacola

The Six Rivers Cooperative Invasive Species Management Area, which serves as a communication and partnership network for natural area managers in Escambia, Holmes, Okaloosa, Santa Rosa, Walton and Washington Counties, lists the following species as the "top five" invasives of concern in the western Florida Panhandle (6 Rivers CISMA 2011):

- Cogon Grass *(Imperata cylindrica)*
- Chinese Tallow Tree/Popcorn Tree *(Triadica sebifera)*
- Chinese Privet *(Ligustrum sinense)*
- Japanese Climbing Fern *(Lygodium japonicum)*
- Torpedo Grass *(Panicum repens)*

Of these, both Chinese Tallow Tree and Chinese Privet have been recorded at Bay Bluffs Park and other areas along the Scenic Highway Corridor (EDDMapS 2011). Several other invasive species have also been reported at Bay Bluffs and other areas along Sce-

nic Highway, including:

- Camphor Tree *(Cinnamomum camphora)*
- Chinaberry *(Melia azederach)*
- Kudzu *(Pueraria montata)*
- Largeleaf Lantana *(Lantana camara)*
- Natalgrass *(Melinis repens)*
- Silk Tree/Mimosa *(Albizia julibrissin)*
- Thorny Olive *(Elaeagnus pungens)*

A large number of non-native invasive plants have been recorded in the area near Scenic Highway, making them candidates for impending or unrecorded invasion. These are:

- Air Potato *(Dioscorea bulbifera)*
- Arrowleaf Elephant's Ear *(Xanthosoma sagittifolium)*
- Bay Biscayne Creeping-Oxeye *(Sphagneticola trilobata)*
- Britton's Wild Petunia *(Ruellia simplex)*
- Carrotwood *(Cupaniopsis anacardiodies)*
- Chinese Wisteria *(Wisteria sinensis)*
- Coco Yam/Wild Taro *(Colocasia esculenta)*
- Cogongrass *(Imperata cylindrica)*
- Golden Bamboo *(Phyllostachys aurea)*
- Glossy Privet *(Ligustrum lucidum)*
- Guineagrass *(Megathyrsus maximus)*
- Hydrilla *(Hydrilla verticillata)*
- Japanese Climbing Fern *(Lygodium japonicum)*
- Japanese Honeysuckle *(Lonicera japonica)*
- Ladder Brake *(Pteris vittata)*
- Narrow Sword Fern *(Nephrolepis cordifolia)*
- Primrose Willow *(Ludwigia peruviana)*
- Paper Mulberry *(Broussonetia papyrifera)*
- Red Sesbania *(Sesbania punicea)*
- Sacred Bamboo *(Nandina domestica)*
- Sprenger's Asparagus Fern *(Asparagus aethiopicus)*
- Swamp Morning Glory *(Ipomoea aquatica)*
- Sweet Autumn Virgin's Bower *(Clematis terniflora)*
- Torpedo Grass *(Panicum repens)*
- Tropical Soda Apple *(Solanum viarum)*
- Tung Oil Tree *(Vernicia fordii)*
- Water Hyacinth *(Eichhornia crassipes)*
- Water Lettuce *(Pistia stratiotes)*

Continued surveys of public, and wherever possible, private properties along

Scenic Highway are an important preventative measure, because species invasions are always easier to control when caught early. For this reason, new invasions or populations should be given highest priority for removal.

The following are brief descriptions and recommendations for control of local invasive species, beginning with those known to occur on Scenic Highway.

Invasive Plants of the Pensacola Scenic Highway Corridor

Camphor Tree

Cinnamomum camphora

Figure 201- Camphor Tree *Cinnamomum camphora*

Camphor Tree (Figure 201) was imported to Florida from its native Asia in 1875 for production of camphor (UF/IFAS 2011), which is commonly used as an anti-inflammatory in traditional herbal medicine, and is a familiar (though now synthetically produced) ingredient in many topical pain and itch-relievers (Lee et al. 2005; WebMD 2012). Essential oils from the seed have been demonstrated to have insecticidal and repellent properties (Liu et al. 2006). Unfortunately, it did not prove to be profitable in Florida, and has since naturalized into dry, disturbed areas and natural areas (UF/IFAS 2011). It is not currently listed as a noxious weed by either USDA or the Florida Department of Agriculture and Consumer Services, and is still available in trade in the state, but the Florida Exotic Pest Plant Council (FLEPPC) lists it as a Category I invasive species, meaning that it is considered to be "altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives" (FLEPPC 2011).

In Florida, Camphor Tree is often a small to medium sized tree, but it can grow to 100 feet in height and have an extremely wide trunk. It is evergreen, and the leaves have a distinctive smell when bruised (UF/IFAS 2011). It produces large amounts of small blue/black fruits in the winter and spring, which are eaten by birds and other wildlife and carried to new locations. There is some evidence that passing through a bird's digestive tract may actually aid the germination of Camphor Tree seeds (Jordaan et al. 2011). This rapid spread by seed means that managers should prioritize large fruiting trees as first targets for removal (UF/IFAS 2011).

Mowing typically kills seedlings, as does burning, but large trees are likely to resprout following such removal methods. For established trees less than 6 inches in diameter, a basal bark herbicide treatment using a 30% solution of Garlon 4 in vegetable oil is recommended (UF/IFAS 2011). This technique consists of spraying a ring of herbicide directly onto the bark near the base of the tree. Young trees will absorb the chemical through the bark. An effective treatment for larger trees is the "frill-girdle and spray"

technique, in which the bark is peeled away in a circle around the base of the tree, creating a cup that will catch and hold herbicide sprayed onto the exposed vascular tissue of the tree (Langeland et al. 2011). While time consuming, these techniques have the advantages of protecting nearby desirable plants from herbicide drift, and of leaving trees standing, which reduces both the labor associated with disposal of cut brush and logs, and the accidental damage to desirable species and compaction and/or erosion of soils associated with hauling debris out of a sensitive area. It is also possible to cut the tree down entirely and apply herbicide to the stump. In this case, a 50% Solution of Garlon 4 and oil is recommended (UF/IFAS 2011).

Chinaberry

Melia azederach

Figure 202- Chinaberry *Melia azederach*

Chinaberry (Figure 202) is a small to medium-sized deciduous tree native to Southeast Asia and tropical Australia. It is easily confused with the native American Elderberry *(Sambucus canadensis)*, but has distinctly different flowers and fruit (Reemts 2009). Chinaberry was introduced into Georgia and South Carolina in 1830 as an ornamental, and tends to escape into disturbed areas, forest edges, open woods, swamps and thickets (Waggy 2009). While Chinaberry has several uses, including wood for furniture making and fuel, and may have medicinal properties, it has been found to disproportionately affect ecosystems by raising soil pH and nitrogen levels, and possibly chemical allelopathy (Waggy 2009). The Florida Exotic Pest Plant Council currently lists it as a Category II invasive species, and some counties have banned its sale (FEPPC 2011).

Chinaberry is a prolific seeder, producing drupes that, while poisonous to humans and some other mammals, are fed on by some animals and may also be disbursed by water. Sources disagree about the hardiness of Chinaberry's seed bank, with some reporting that the hard seeds remain viable for a long time, necessitating multiple treatments (UF/IFAS 2011), and others that the seed bank will not persist without new additions each year (Waggy 2009). There is agreement, however, that Chinaberry reproduces clonally when injured, sending up many root sprouts after cutting or burning. There is some evidence that the trees are not only likely to survive fire, but actually resprout more vigorously on burned sites, and that trees that grow from sprouts grow faster than those growing from seed (Waggy 2009).

Chinaberry can be treated similarly to Camphor Tree, with possible adjustments in herbicide choice or concentration. The best time to treat is in late summer or fall. Treating in spring is not recommended because the rising sap can push herbicide out so that it doesn't reach all parts of the plant (Reemts 2009).

Chinese Privet

Ligustrum sinense

Figure 203- Chinese Privet *Ligustrum sinense*

Chinese Privet (Figure 203) is a semi-evergreen to evergreen flowering shrub of the Olive family, which was introduced in 1852 and has traditionally been used as an ornamental throughout the southern states (Mitchell et al. 2011). It tolerates shade, and can grow to 20 - 30 feet in height, often forming dense thickets, particularly in bottomland forests and field edges. It can spread by seed, which is often facilitated by birds, and by root sprouts (Miller 2003). In addition to physically displacing native plants, Chinese Privet has been associated with an increased rate of decomposition in forest litter, which may lead to alterations in plant assemblies (Mitchell et al. 2011). It may also indicate that invasion by Chinese Privet can reduce a forest's ability to store carbon, a potential concern in reference to climate change.

In addition to Chinese Privet, Japanese and Glossy Privet are common invaders in northern Florida woodlands. The three species can be managed similarly. Young sprouts can be hand pulled, with care taken to remove all of the roots, but removal of plants too large to uproot typically requires herbicide, because re-growth is quite common (UF/IFAS 2011). Small plants can be treated with a foliar spray, but cutting large individuals and treating the stumps makes more efficient use of chemicals. A basal bark treatment, using a 25% solution of Triclopyr (Garlon) can be effective, but a higher rate of spray is needed (UF/IFAS 2011). Because stems are often very numerous and small, which makes stump treatments time consuming, another strategy is to cut shrubs to the ground and wait for regrowth, and then apply a foliar herbicide treatment. This reduces the amount of chemical needed without requiring each sprout to be sprayed individually. Harrington and Miller (2005) found that timing of application was the most important factor in the effectiveness of herbicide treatments for Chinese Privet. Specifically, they found that of several experimental foliar treatments, applications of glyphosate in early spring (April) and late fall (October and December) were most effective, regardless of the rate of application.

Chinese Tallow Tree/Popcorn Tree

Triadica sebifera

(synonyms: Sapium sebiferum (L.) Roxb., Croton sebiferum L.)

Figure 204- Popcorn Tree *Triadica sebifera*

Chinese Tallow Tree (Figure 204), also known as Popcorn Tree, Chicken Tree, Vegetable Tallow, Florida Aspen, or White Wax Berry, was introduced

from Southeast Asia, where it is cultivated for its oils and medicinal properties, in the late 1800s (McCormick 2005). The first documented import was by Benjamin Franklin, who obtained seed in 1772 from what is now Vietnam. By 1803, the botanist Andre Michaux noted that it had begun "spreading spontaneously into the coastal forests" (McCormick 2005). In the early 1900s, the USDA recommended the culture of Chinese Tallow for use in soap production, and because it is prized for its fall color and use in beekeeping, it has been introduced across the southeastern states (McCormick 2005). Unfortunately, it has naturalized readily, and caused significant changes to ecosystems across Florida. It has been suggested that in addition to shading and out-competing native plants, Chinese Tallow may have an ability to suppress nearby plants by releasing chemicals that inhibit their growth (Conway and Smith, 2002). Because of its aggressive spread, Chinese Tallow has been listed by the Florida Department of Agriculture and Consumer Services, USDA, and the Exotic Pest Plant Council as a noxious weed, the further planting of which is prohibited (UF/IFAS 2011).

Chinese Tallow Tree spreads both by seed and clonally, and notoriously sprouts from the roots when injured, making mechanical control impractical. It is well adapted to fire, and can reduce the flammability of an area, making prescribed burning difficult (McCormick 2005). For small trees, a basal bark treatment method is recommended (Urbatsch 2000). For larger trees, a girdle and spray technique is recommended. Herbicide treatments of Chinese Tallow Tree have been found to be most effective in the late summer to early fall. If herbicide cannot be used, it is more effective to cut in the spring during seed formation (McCormick 2005). For specific herbicide recommendations, see: Demers at al. 2008.

Kudzu

(Pueraria montana, Pueraria lobata)

Kudzu (Figure 205) is a leguminous vine introduced to the U.S. from Southeast Asia at the 1876 Centennial Exposition in Philadelphia and the 1883 New Orleans Exposition (Forseth and Innis 2004). Initially promoted as an ornamental plant, and during the 1930s and 40s by the Soil Erosion Service as livestock forage and for slope stabilization, it has become one of the most pernicious invasive species in the southern U.S., covering an estimated 3 million hectares (Forseth and Innis 2004). Its ability to fix nitrogen allows it to colonize even the most marginal soils, and its high photosynthetic rate and rapid growth, up to 60 feet in a single growing season, allows it to engulf nearly everything in its path (Forseth and Innis 2004). In addition, it shows allelopathic effects, which may reduce competition by other species (Rashid et al. 2010). Kudzu has been used for fiber, food and medicine in its native range for centuries (Li et

Figure 205- Kudzu
Pueraria montana

al. 2011) and produces several chemicals that have been investigated for medicinal benefits (Wong et al. 2011). It is currently listed as a noxious weed by the USDA, Florida Department of Agriculture and Consumer Services (USDA, NRCS 2012; UF/IFAS 2011).

Kudzu is difficult to control using herbicide, in part because its leaves are able to rapidly reorient toward the sun (Forseth and Innis 2004). This means that leaves are often oriented in multiple directions, making it difficult to reach every surface (UF/IFAS 2011). Efforts at developing biological control agents have met with limited success, but the fungal plant pathogen Myrothecium verrucaria has shown promise (Weaver and Lyn 2007). Mechanical control using "solarization," or covering infested areas with translucent polyethylene sheeting, has been shown to be marginally effective, but not cost effective for large areas (Newton et al. 2008). Li et al. (2011) suggest that in its native range Kudzu is controlled by human harvesting, which substantially damages the plants. Repeated cutting or mowing, or intensive grazing can reduce infestations. Effective treatment methods using herbicide depend upon the age and location of the infestation. For example, patches more than 10 years old may need stronger herbicide and more repetitions of application (UF/IFAS 2011). In general, eradication may require repeated applications for 4 to 10 years. For detailed advice, see: Nelson 2003, http://www.clemson.edu/extfor/publications/ec656/ or Everest et al. 1999, http://www.aces.edu/pubs/docs/A/ANR-0065/.

Largeleaf Lantana

Lantana camara (=Lantana strigocamara)

Cultivars of Largeleaf Lantana (Figure 206), an evergreen flowering shrub native to South and Central America, became popular greenhouse plants in Europe in the 18th century and were introduced to many parts of the world through European colonists' gardens (UF/IFAS 2011; Patel 2011). Largeleaf Lantana has since become a serious pest across much of Asia and Oceana, particularly in India, Australia and South Africa (Bhagwat et al. 2012). It is also invasive in Florida, where it hybridizes with the endemic native species Lantana depressa, contaminating its genepool and confusing conservation efforts (Maschinski et al. 2010). The native species has a tapered leaf base, while the invasive has a truncated one, and the native bears only yellow flowers, while the invasive bears multiple colors, often on the same plant (UF/IFAS 2011).

Figure 206- Largeleaf Lantana *Lantana camara*

Largeleaf Lantana flowers year-round, and a single plant can produce as many as 12,000 fruits in a year (UF/IFAS 2011). While the unripe fruits are toxic, they become edible when ripe, and are spread by wildlife, particularly birds. Passing through a bird's digestive tract has been shown to increase the seeds' rate of germination, which is otherwise low (UF/IFAS

2011; Jordaan et. al 2011). Largeleaf Lantana can also spread vegetatively by rooting from stems that bend low enough to touch the ground. It is capable of resprouting from the base of the stem, but does not sucker from damaged roots (UF/IFAS 2011).

Largeleaf Lantana tolerates a wide range of conditions, and commonly invades roadsides, forests, pastures, and citrus groves, where it causes significant economic damage. The foliage is unpalatable to livestock, but is highly toxic and has reportedly caused fatalities in horses and cattle, and severe liver damage in dogs (Morton 1994). Largeleaf Lantana creates dense cover, physically out-competing other plants, and also produces allelopathic chemicals that suppress competitors. While this makes the plant a menace to native ecosystems, numerous beneficial uses of its chemistry may be possible, including medicinal, insecticidal, biogas production and several others (Patel 2011).

Small infestations can sometimes be treated mechanically, by hand-pulling seedlings and by removing flower heads from mature plants before they go to seed (UF/IFAS 2011). Mowing has not been found to be effective by itself because of resprouting (Ferrell et al. 2012), and while burning can reduce a population, a follow-up treatment with herbicide is needed because the species thrives on disturbance and may even increase in numbers if left untreated (UF/IFAS 2011). Because a number of commonly used herbicides have proven ineffective against Largeleaf Lantana, an integrated management protocol including several control methods may be needed. Glyphosate is not particularly effective, and a combination of fluroxypyr ("Vista") plus aminopyralid applied twice within in 6 months (spring and fall) has been found effective but is costly (UF/IFAS 2011). Imazypyr has produced effective control in basal applications (UF/IFAS 2011), and the new herbicide aminocyclopyrachlor has been found quite effective even when applied only once (Ferrell et al. 2012). Mowing and then treating stumps is recommended as an easy measure that uses less herbicide (UF/IFAS 2011).

Natalgrass

Melinis repens (synonym: Rhynchelytrum repens)

Natalgrass (Figure 207) is a tussock-forming annual grass native to South Africa. It was introduced as an ornamental and forage plant by 1866 and was commonly grown as forage and between citrus rows in the early 20th century (Stokes et al. 2011) but is of low nutritional value to livestock (UF/IFAS 2011). It has become invasive in dry, open areas of Florida, particularly in roadsides, disturbed scrub, wastelands and perennial crop fields (David and Menges 2011; UF/IFAS 2011), and is currently listed as a Category I invasive species by the Florida Exotic Pest Plant Coun-

Figure 207- Natalgrass *Melinis repens*

cil (FLEPPC 2011).

Natalgrass does not spread by rhizomes, but is capable of rooting at the nodes. It mainly propagates by windborn seeds, of which it produces tremendous amounts. This can lead to a large seed bank in the soil, but recent research suggests that if further seed rain can be prevented, the seed bank will deplete rapidly, which may mean that mechanical methods of control can be developed (Stokes et al. 2011). Natalgrass invades quickly after fire, and mowing has not proven effective at controlling it. Glyphosate applied as a 1-2% solution using a surfactant provides adequate control, and imazapyr has been found effective but is non-selective and persistant. Current research suggests that imazapic may prove to be effective as well (UF/IFAS 2011). Little information is available regarding seasonal timing of treatments.

Figure 208- Silk Tree
Albizia julibrissin

Silk Tree/Mimosa

Albizia julibrissin

Silk Tree, or Mimosa (Figure 208), is a small to medium sized tree with attractive, fern-like leaves and fragrant pom-pom flowers. It was introduced to the region in 1745 as an ornamental, and is still used by some (Remaley 2009). It regularly escapes from cultivation and though it is not listed as a weed by the state or federal government, it is listed as a Category I invasive species by the Florida Exotic Pest Plant Council (USDA, NRCS 2012; FLEPPC 2011). It tolerates part-shade, but prefers full sun, and is most common on roadsides, vacant lots, and riverbanks. It is intolerant of deep shade or excessive cold (Remaley 2009).

Silk Tree produces a large amount of seed, which most often falls near the parent, but can also be transported by water and is capable of remaining dormant for years (Remaley 2009). Seedlings can be hand-pulled, but like many other woody invasive species, mature Silk Trees will resprout if top-killed (UF/IFAS 2011). A basal bark treatment applied when seeds are on the tree can reduce its ability to spread (UF/IFAS 2011). Foliar treatments using a 2% solution of glyphosate or triclopyr have been found to be effective, but can harm nearby desirable vegetation. The same herbicides applied as a 25% solution are effective when used as a cut-stump or girdle and spray treatment for larger trees, and for smaller individuals a basal bark treatment using 25% triclopyr in oil is effective (Remaley 2009).

Thorny Olive/Silverthorn

Elaeagnus pungens

Thorny Olive, or Silverthorn (Figure 209), is a relative of the well-known invasive shrub Autumn Olive, and is very similar in appearance, with pale, sweet-smelling flowers

and distinctive silvery scales on the leaves and twigs. Unlike Autumn Olive, it blooms in the fall, producing fruit in spring. The leaves are evergreen, and stems are armed with 2-3 inch thorns. It was introduced in 1830 as an ornamental evergreen hedge plant, and is still commonly available in trade. It is often used in roadside plantings, because its rapid growth and tolerance of heat, drought and salt, as well as both sun and shade, allow it to survive in the toughest conditions (Gucker 2011). In its native Asia, Thorny Olive is used as a treatment for asthma and chronic bronchitis, but its biology is otherwise not well studied, and the effects it can have on Florida's native ecosystems are not well documented (Gucker 2011). It appears capable of serious invasion and is listed as a Category II Invasive Species by the Florida Exotic Pest Plant Council (FLEPPC 2011).

Figure 209- Thorny Olive
Eleagnus pungens

Thorny Olive typically grows as a shrub, but is also capable of producing long, tendril-like stem sprouts that allow it to "scramble" through surrounding vegetation, sometimes climbing as much as 35 feet high (UF/IFAS 2011). Its seed is dispersed by fruit-eating animals, particularly birds. Certain bird species, the most often noted being Cedar Waxwing, appear to have strong preferences for Thorny Olive, and can be endangered by traffic when attracted to roadside plantings (Gucker 2011).

Thorny Olive's response to fire is not well known (Gucker 2011). Aggressive tillage or mowing can help reduce a population, but neither is practical in natural areas. Small numbers of plants may be possible to dig out, with care to remove as many roots as possible, but larger infestations will likely require herbicides (UF/IFAS 2011). Hand removal should be done before plants are fruiting to avoid spreading the seed. Little information is available on chemical control of Thorny Olive, but some sources indicate that it can be slow, with symptoms not evident immediately (Gucker 2011; Maddox et al. 2012). A foliar treatment using a 2% solution of glyphosate or triclopyr, or a 1% soultion of imazapyr has been suggested, and has been found more effective in fall than in spring (Maddox et al. 2012). A 50% solution of triclopyr in oil, 20-50% glyphosate in water with a surfactant, or 5-10% imazapyr is suggested for cut stump treatments, and triclopyr as either a 50% solution in vegetable oil or a 20% solution petroleum base with a penetrant is recommended for basal bark or upper stem treatment (Maddox et al. 2012; UF/IFAS 2011).

Cogon Grass

Imperata cylindrica

Figure 210- Cogon Grass *Imperata cylindrica*

Cogon Grass (Figure 210) was introduced from Southeast Asia in the early 20th century as a packing material, forage crop and slope stabilizer (Dozier et al. 1998). It has proven extremely difficult to control, producing copious amounts of windblown seed and spreading by dense and persistent rhizomes, and is currently listed as a noxious prohibited weed by both the USDA and the Florida Department of Agriculture and Consumer Services (UF/IFAS 2011; USDA, NRCS 2012). While seedling vigor is low, once a population becomes established it cannot be removed without killing the rhizomes (Dozier et al. 1998; MacDonald 2004). Burning is not always recommended, because Cogon Grass is highly flammable, producing hotter, faster moving fires than native grasses. This is not only a safety concern for managers, but can also have detrimental effects on native fire-dependent ecosystems (MacDonald 2004).

Some control of Cogon Grass is possible by repeated deep plowing or disking to a depth of at least 6 inches in the dry season (UF/IFAS 2011), but care must be taken to avoid introducing fragments into uninfested areas via equipment. Because tillage is not possible in sensitive natural areas, integrated protocols of mowing and herbicide application, such as is suggested by the Plant Conservation Alliance's Alien Plant Working Group (Johnson and Shilling 2009), have often been recommended. In this scheme, an initial late-spring mowing is followed approximately 6-8 weeks later by a systemic herbicide application. This application is recommended to be timed in early fall before first frost (Johnson and Shilling 2009). While some studies indicate increased control (Willard et al. 1996), others have shown no advantage to including mowing, and suggest that herbicide application alone is more efficient (MacDonald, 2004).

Studies have found both glyphosate and imazapyr to be effective against Cogon Grass, but their success depends upon application rate and repetition. Over-application can kill the leaves too quickly, preventing translocation of the herbicide to the rhizomes (Dozier et al. 1998). Of these chemicals, glyphosate, which is typically applied as a 2-3% solution, is least problematic because it does not remain active in the soil, allowing quick revegetation of a treated area. Revegetation is critical to preventing reestablishment of Cogon Grass or invasion by other non-native species (UF/IFAS 2011). To improve effectiveness, it may be necessary to add imazapyr at a 0.5% rate (6 Rivers CISMA 2011).

Japanese Climbing Fern

Lygodium japonicum

Japanese Climbing Fern (Figure 211) is a twining ornamental perennial vine introduced to the U.S. in the early 20th century. By 1964, it was noted as an occasional escapee in Georgia, Florida and Alabama (Ferriter 2001). Both Japanese Climbing Fern *(L. japonicum)*, and its cousin, Old World Climbing Fern *(L. microphyllum)*, have become serious pest plants in Florida and across much of the southern U.S. Old World Climbing Fern is of particular concern in South Florida, but *L. japonicum,* which is native to forest edges and open forests in temperate and tropical Asia, is increasingly problematic in North Florida, where it is capable of smothering entire plant communities (Ferriter 2001). Both Old World and Japanese Climbing Fern have been listed as noxious weeds by the Florida Department of Agriculture and Consumer Services, and as Category I invasive species by the Florida Exotic Pest Plant Council, but as yet only Old World Climbing Fern has been federally listed (Munger 2005, USDA/NRCS 2012).

Japanese Climbing Fern does not need human disturbance in order to spread, and can invade remote parts of natural areas, probably by wind-borne spores (Ferriter 2001). It does not appear to establish well in very dry sites, meaning that much of the Pensacola Scenic Highway Corridor may be at low risk for invasion. Lower areas such as Chimney Park and Gaberonne Swamp, however, may be suitable and should be watched particularly carefully for signs of infestation. Several sources note that control of Japanese Climbing Fern can be extremely difficult once it has established, making monitoring for new invasion extremely important (Minogue et al. 2009).

Figure 211- Japanese Climbing Fern
Lygodium japonicum

Biological control agents approved for Old World Climbing Fern were first released in 2005 with limited success (Munger 2005, Minogue et al. 2009), but because *L. japonicum* is closely related to the rare North American Climbing Fern, it may not have a natural enemy that does not harm the native species (Ferriter 2001). No studies have yet documented the effects of fire on *L. japonicum,* but anecdotal reports suggest that *Lygodium* infestations can change fire behavior. Thick mats can carry fire into tree canopies, causing damage to normally fire-tolerant species, and pieces of burning fern can break off and spread fire to new locations (Munger, 2005; Ferriter 2001). The presence of Old World Climbing Fern has in some cases caused areas that are not naturally fire prone to burn, and experiments have shown that while fire can kill the fern back, it regenerates quickly, making burning without herbicide ineffective at control. Flooding does not appear to be effective either. While specific studies are lacking, the same is likely to be true for Japanese Climbing Fern (Ferriter 2001).

Physical removal is possible but difficult, as fronds will regrow from below a cut,

and even those above the cut may still have viable spores. Removed material should be disposed of on-site by burning, or in plastic bags, and any equipment used should be sterilized in order to avoid spread spores or rhizomes (Ferriter 2001). Few studies have been made of herbicide treatment for Japanese Climbing Fern, but both glyphosate (Round-Up) and metsulfuron methyl (Escort or Ally) have been recommended. Glyphosate alone at a 2-4% solution has been shown to be nearly 100% effective eight months after treatment, but metsulfuron methyl, while persisting longer in soil, causes less damage to non-target species. The two chemicals can be used in combination as well. Application is recommended in July-October, before peak spore release (Minogue et al. 2009, Six Rivers CISMA 2011).

Torpedo Grass

Panicum repens (synonyms: Panicum littorale Mohr ex Vasey, Panicum nitidum Hack. & Arechav.)

Torpedo Grass (Figure 212) was first introduced to Florida in the 1920s as a livestock forage (Gordon and Thomas 1997). While it is not yet listed by the state as a noxious weed, it is widely considered to be among the worst invasive weeds found in the region, colonizing wetlands and shallow waters and displacing native marsh communities. It is tolerant of flooding up to about a meter's depth (Smith et al. 2004) but is also relatively drought-tolerant, and can invade heavy upland soils as well (Masterson 2007). Reproducing mainly vegetatively in Florida, Torpedo Grass spreads rapidly both by rhizomes and by fragmentation. Both shoot and rhizome fragments are able to root and become established on exposed sediment or slightly flooded areas, allowing Torpedo Grass to take advantage of fluctuations in water level (Smith et al. 2004).

Figure 212- Torpedo Grass *Panicum repens*

Because even a tiny fragment can regenerate into a new colony of plants (Masterson 2007), management by mechanical means is not often effective, and disturbed areas, including burned areas, are vulnerable to invasion (UF/IFAS 2011). Torpedo grass is palatable enough that grazing can be used to contain it to some extent, but because it becomes tough late in the growing season, it is often avoided by livestock (Masterson 2007). While some work has focused on the possibility of biological control, a specific enough natural enemy had not been identified as of 2007 (Cuda et al. 2007). Effective removal generally requires the use of herbicide. Glyphosate products have been found most effective against Torpedo Grass, but care must be taken when using herbicides in aquatic environments. The Six Rivers CISMA recommends using the Rodeo formulation in areas near wetlands. The Hillsborough County Invasive Species Task Force (Valle 2003) recommends applying glyphosate in late fall when leaves are bright

green.

Because of its preference for aquatic habitats, Torpedo Grass may not be of concern in all areas of the Scenic Highway corridor, and is most likely to occur at Chimney Park and Gaberonne Swamp. For detailed advice on treatment protocol, see: Langeland et al. 2011 (SP242).

Figure 213- Air Potato
Dioscorea bulbifera

Air Potato

Dioscorea bulbifera

Air Potato (Figure 213) is a fast growing, counter-clockwise twining vine introduced to Florida in 1905 for study of its possible medicinal properties. Several researchers have speculated that it may have been introduced to the U.S. during the African slave trade, but there is no indisputable evidence of this. The earliest U.S. record is of a 1777 garden specimen in Mobile, AL, of unknown origin (Overholt 2008, UF/IFAS 2011). It is currently listed as a noxious prohibited weed by the Florida Department of Agriculture and Consumer Services, but is not federally listed.

Air Potato does not commonly flower in Florida, but produces many small round bulbils in summer, which fall to the ground and produce new plants the following season. It is able to colonize a broad range of habitats, but is most commonly found in hardwood forests, pinelands and disturbed areas. It is capable of changing the vertical structure of a forest by climbing into the canopy and creating dense shade below, and eventually causing the collapse of plants on which it grows (Overholt 2008). Air Potato is a member of the Yam family, but unlike several of its relatives, its tubers are bitter and often poisonous (UF/IFAS 2011). It is very similar in appearance to Winged Yam, another introduced invasive, and can be confused with the native Wild Yam, which is occasionally found in hammocks and floodplains in Northwest Florida. Wild Yam, however, never produces bulbils and its leaves are rarely longer than 6 inches. Two other introduced species, Chinese Yam and Zanzibar Yam, are also present in Florida, but are not currently considered problematic (Langeland and Meisenburg 2011).

It is not known exactly how Air Potato spreads, but it appears that even a tiny bulbil can form a new infestation. These may be spread by moving contaminated soil or brush, by mowers, by water, and possibly by wildlife. Because of this, disturbed areas are more vulnerable to invasion, and mechanical control is problematic (UF/IFAS 2011). Pulling the vine off of trees often causes damage to the tree, and may inadvertently spread propagules. Prescribed fire is difficult in areas infested with Air Potato because the vine tends to carry fire into the tree canopy, causing both collateral damage and safety concerns (UF/IFAS 2011). Collecting bulbils can reduce the number of new plants in an area the following year. To prevent accidental spreading, bulbils can be

rendered unviable by placing them in a freezer overnight before disposing of them (Langeland and Meisenburg 2011). Heavy infestations usually require herbicide to control. Research results differ to some extent, but it appears that the most effective treatment depends upon season. One effective treatment regimen is to apply Garlon (or other triclopyr-based herbicide) in early summer when the plant is growing strongly, and before it forms new bulbils. Later in the year, when the plant is drawing carbohydrates down into its roots, but before the leaves turn yellow, glyphosate-based herbicides have been found to be more effective (UF/IFAS 2011; Langeland and Meisenburg 2011; Overholt 2008).

Species of Possible Future Concern

Brazilian Pepper Tree

Schinus terebinthifolius

Figure 214- Brazilian Pepper Tree- *Schinus terebinthifolius*

Brazilian Pepper Tree (Figure 214) is a shrub or small tree native to Argentina, Paraguay and Brazil, and was introduced to Florida in the late 1840s as an ornamental. It has become a serious pest in South Florida and is listed as a prohibited species by the state, but because of its sensitivity to cold, it is of less concern in Northern Florida (Gioeli and Langeland 2009). However, given how problematic it can be, it should not be ignored if discovered.

Brazilian Pepper Tree tends to colonize hammocks, pine flatlands and mangrove swamps, its seeds spread by birds and mammals. Flowers are present in the fall, from September to November, and fruit is mature by December. A relatively high percentage of seeds germinate, and seedlings are reportedly somewhat flood and drought tolerant (Gioeli and Langeland 2009). Brazilian Pepper Tree sprouts from the roots, and while the seeds are killed by fire, root sprouts are usually not controlled. Other mechanical means of control can be used, including exposing the roots using power sprayers (Cuda et al. 2006).

Brazilian Pepper Tree is related to Poison Ivy and Poison Sumac, and contact with it can cause a rash in some cases. For this reason, a cut stump treatment should be used with care, and a basal bark treatment may be more practical. Cutting should certainly be avoided while fruit is on the trees to prevent spreading them. For basal bark treatment, a triclopyr-based herbicide mixed with a penetrating oil is effective, and girdling the tree is not necessary (Gioeli and Langeland 2009). Because Brazilian Pepper Tree is dioecious, having separate male and female plants, Cuda et al. (2006) recommend that managers with limited resources treat only female plants. This prevents seed production and contains the spread of the infestation.

Common Reed

Phragmites spp.

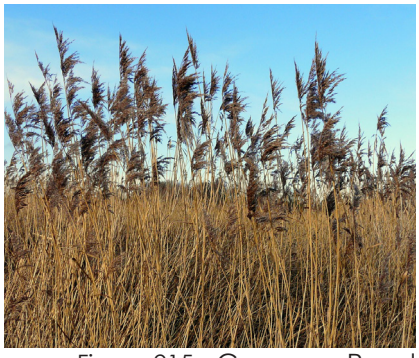


Figure 215- Common Reed *Phragmites spp.*

There are three types of Phragmites (Figure 215) in the United States. The species *Phragmites australis* is represented by two subspecies: *P. a. subsp. americanus,* which is native to most of North America except the southeastern states, and *P. a. subsp. australis,* a Eurasian introduction also known as "Haplotype M." Eurasian Phragmites is notorious for invading wetlands and displacing the native subspecies across the northeastern U.S., and has spread to much of the western U.S. as well. Most Gulf Coast population, however, belong to a third subspecies called *P. australis subsp. berlandieri,* which has recently been lumped by some botanists into the species *Phragmites karka* (Gucker 2008; Overholt et al. 2011). It is unclear whether Gulf Coast Phragmites can be called native, as it also exists in South America and the South Pacific, but if introduced, it has apparently been naturalized here for quite a long time and is much less aggressive than the Eurasian subspecies (Meyerson et al. 2009).

Overholt et al. (2011) report that Eurasian Phragmites is not yet found in Florida, but with populations known to exist in Mississippi, it is likely that the Pensacola area may soon face an invasion. Genetic testing is the most reliable way to differentiate between Gulf Coast and Eurasian plants, as field characteristics can be quite confusing (Swearington and Saltonstall 2010). Should local plants turn out to be of the Eurasian lineage, steps should be taken to report their presence to the state, and to control them to prevent further spread.

Coral Ardisia/Spice Ardisia

Ardisia crenata

Figure 216- Coral Ardisia *Ardisia crenata*

Coral Ardisia (Figure 216) is an evergreen shrub with attractive red fruits that was introduced as an ornamental in the early 1900s and has naturalized in hardwood hammocks, moist woods and grazing areas (Sellers et al. 2010) in Florida. There are dozens of known cultivars of Coral Ardisia, but only three are commonly available in the U.S., of which the invasive ecotype common in Florida appears to be one (Kitajima et al. 2006). Wild Japanese plants appear to behave quite differently from Florida plants under controlled conditions, prompting speculation that selection for the dense foliage and high fruit yield desired in horticultural specimens may have led to the plant's invasive characteristics (Kitajima et al 2006). The Florida Exotic Pest Plant Council currently lists Coral Ardisia as a Category I invasive species (FLEPPC 2011),

but it is not listed by the USDA or the Florida Department of Agriculture and Consumer Services. There has been some evidence that Coral Ardisia fruits may be toxic to livestock (Sellers et al. 2010), but they are frequently consumed by birds and raccoons (UF/IFAS 2011). Germination rates are very high, and mature plants resprout when damaged by fire or cutting (UF/IFAS 2011).

Hutchinson et al. (2011) found that mature plants could be dramatically reduced, but not entirely eliminated, by a single foliar application of herbicide. All treatments they tested were effective, but imazapic resulted in the most thorough control, particularly in reducing seedling cover 12 months after treatment. They recommend that an initial treatment be followed by another within 12 months for further suppression. Their treatments were performed in December and February, but there is limited research on whether season of treatment affects results.

Seasonal Management Chart

The following chart is intended as an aid to invasive species management planning in the Pensacola Scenic Highway Corridor. Species included reflect distributions obtained through the University of Georgia's online Early Detection and Distribution Mapping System (EDDMapS). Species for which information on seasonality of management was not available are listed in all seasons.

WINTER	*SPRING*	*SUMMER*	*FALL*
		Air Potato	Air Potato
Camphor Tree	Camphor Tree	Camphor Tree	Camphor Tree
		Chinaberry	Chinaberry
			Chinese Tallow
Chinese Privet	Chinese Privet		Chinese Privet
		Climbing Fern	Climbing Fern
			Cogon Grass
	Kudzu	Kudzu	Kudzu
	Lantana		Lantana
Natalgrass	Natalgrass	Natalgrass	Natalgrass
Silk Tree	Silk Tree	Silk Tree	Silk Tree
Thorny Olive	Thorny Olive	Thorny Olive	Thorny Olive
			Torpedo Grass

Figure 217- Seasonal Management Chart

EROSION

Erosion on Pensacola's Bay Bluffs

Many aspects of Pensacola's natural resources—like water quality and aquatic resources—have been studied extensively, but there is little published literature on the geology of Pensacola's Bay Bluffs. There is confusion surrounding the origin of geologic formations in the Florida Panhandle, and much misinformation resulting from overly superficial study in past decades (Otvos 1995). The Bay Bluffs are known to be located within the Citronelle geologic formation, which is described as "gray to orange, often mottled, unconsolidated to poorly consolidated, very fine to very coarse, poorly sorted, clean to clayey sands. It contains significant amounts of clay, silt and gravel which may occur as beds and lenses and may vary considerably over short distances" (USGS 2012), and is possibly the remains of an ancient estuary (Means 2009).

The mixture of sandy soil and clay lenses in the Citronelle formation creates a variable groundwater dynamic which is difficult to predict without detailed study of a particular site. In general, rain water drains down through the highly permeable sand until it reaches an impermeable clay lens, which forces it to travel horizontally. When this groundwater flow encounters a steep slope, it emerges as a spring or seep (Schumm et al. 1995; Fox and Wilson 2010).

Many examples of unusual gully-type formations called "steepheads" exist in the Florida Panhandle (Schumm et al. 1995). These are stream channels that originate at groundwater-fed springs located at the base of a ravine. They are formed by a process called spring sapping, in which a groundwater spring saturates the soil, destabilizing it and causing repeated landslides. This causes the head of the ravine to retreat over time, lengthening the streambed. Steepheads are common at Eglin AFB, across the Escambia Bay from Pensacola (Schumm et al. 1995), making it reasonable to expect that similar processes may be at work in the Scenic Highway corridor.

Fox and Wilson (2010) define "sapping" as a mass failure of a hillside or streambank due to groundwater seepage, and "seepage erosion" as the transportation of soil particles entrained in the flow from a seep or spring. While both may occur at Pensacola Bay Bluffs, extensive field study for this project was not possible, so the exact causes of the bluffs' erosion are unknown. The April 2005 collapse of a portion of the bluff at Mallory Heights, which resulted from a broken storm drain, indicates that the bluff will indeed slump when super-saturated. However, in the absence of definitive research on natural erosion in this area, the team assumed that human activities, including building and modifying vegetation, have increased rates of erosion in many places along Scenic Highway.

Because this project did not include field study, the site-specific information necessary for creating detailed restoration plans for particular locations was not at the

team's disposal. However, the non-profit corporation Earth Ethics, Inc. has obtained funds to begin restoration of eroded areas from just south of Bay Bluffs Park to Wimbledon Drive just north of the park. Knowing that this work is planned, we elected to make only general recommendations for prevention and repair of erosion.

Human Causes of Erosion

Human activities can contribute to erosive forces in several ways. Changes in drainage patterns as a result of the grading and increased imperviousness associated with buildings and roads, as well as the removal of vegetation, can impact both surface erosion and that caused by groundwater seepage (Marsh 2010).

For a given slope and soil type, immediate causes of surface erosion fall into three general categories: volume and velocity of water (including raindrop splash effects), loss of vegetation, and physical disturbance (Marsh 2010; Brady and Weil 2008). Most of the eroded areas on the bluffs appear to be gullies that have formed where water concentrates and/or vegetation has been removed.

Both volume and velocity of surface runoff are increased by paved or otherwise impervious surfaces such as roads and rooftops (Marsh 2010; Strom et al. 2004). The traditional means of preventing flooding is to use storm drains to collect and transport this increased runoff away from buildings and infrastructure and deliver it into natural waterways. This system has a number of negative effects on the receiving waterway, but it also has the potential to lead to hillslope blow-outs like the one at Mallory Heights by concentrating water at a single outlet point. Promoting small stormwater treatment installations such as home rain gardens and permeable paving (known as "source controls," because they address runoff at its source) in neighborhoods near the bluffs can increase natural infiltration further from the bluffs, reducing flows to storm drain outlets (Marsh 2010).

The impact of runoff from Scenic Highway itself can be reduced by transforming existing stormwater swales along the roadside into rainwater infiltration gardens by adding native wildflowers and grasses whose roots can take up more water than turf grasses. This can reduce concentrated surface flows over the bluff edge, preventing the formation or exacerbation of gullies. Reducing impervious surface area along the top of the bluffs as much as possible will also aid in reducing runoff volume. Scenic Highway is not due for resurfacing in the near future, and in fact new turn lanes are planned in places, but the addition of vegetated medians in locations where center lanes are not used is one way in which paved area could be reduced in the future. In the nearer term, we propose changes to driveway configurations at the city parks along the highway, which will reduce the paved area needed. One very easy measure, which has been used in some places and which can be implemented immediately is the creation

of small berms at the edge of the bluff to encourage water to drain the other direction.

Protecting vegetation is another very important preventative measure. While the effects of vegetation on soil stability are complex and not well studied, the combination of plant roots' high tensile strength and the high compressive strength of soil tends to create a strong composite material (Fox and Wilson 2010). Vegetation also protects against raindrop impacts, a critically important but often overlooked source of erosion (Brady and Weil 2008; Strom et al. 2004). The City of Pensacola has already begun working toward the protection of large trees, whose extensive root systems provide much of the bluffs' stability. Ironically, the main threat to these trees comes from homeowners who clear their land in order to improve their view of the bay. City ordinance forbids the removal of trees from the bluffs, but this has proven difficult to enforce.

While the city has made efforts to educate property owners on the negative effects of deforesting the bluffs, the desire to improve scenic qualities is a powerful one. Approaching the problem from a positive angle by contacting owners directly and encouraging them to improve their property in ways that benefit the bluffs' ecology, such as removing invasive vines and brush instead of native trees, may have better results (Ryan 2009). In addition to reducing ecological damage while promoting views from the highway, this could increase community involvement in the maintenance of the Scenic Highway corridor.

Physical disturbance plays an important role in destabilizing the bluffs by damaging vegetation and creating new erosion channels. While natural disturbances such as hurricanes cannot be controlled, trail design on city properties can. Boardwalks, such as the one at Bay Bluffs Park, have both advantages and disadvantages. They are expensive to construct and maintain, and have some potential to discourage vegetation by shading the area below them, but they keep foot traffic off of the unstable soil of the bluffs. Informal trails, which are desired by the City and the Scenic Highway Foundation, are often more problematic in such a fragile natural area, but they can be designed to minimize impact (Olive and Marion 2009). For example, trails that are aligned across slopes are less likely to collect and channel water than ones aligned downslope. Little information is available on the effectiveness of common trail erosion control techniques such as water bars and rolling grade dips in contexts like Bay Bluffs, where sandy soils may make them difficult to maintain. Preventing visitors from going off trail can reduce impacts as well, but is not easy to accomplish. Simple rope fences may help by clearly delineating the path, and signage indicating that areas are "closed for plant rehabilitation" or similar may be of benefit.

In addition to considering the impacts of recreational activity, it is important to use care in planning invasive species removal. Large groups of volunteers can make the work go faster, but they can also cause damage simply by walking through sensitive areas. A small group of well-trained and dedicated volunteers could perform more precise work. The City or Scenic Highway Foundation could also consider seeking fund-

ing for restoration interns.

Removal techniques can also be chosen to reduce collateral damage. For example, using a basal bark or girdling technique that kills woody invasive plants but leaves them standing eliminates the need for dragging brush up the bluffs for disposal. Alternatively, cut brush could be incorporated into repairs of erosion channels.

Repair/Mitigation of Existing Erosion

Brush layering, live fascines, and live staking are all common techniques for natural erosion control on stream banks. Each takes advantage of the ability of many trees and shrubs to root from cuttings. In the case of live staking, sections of living branches approximately thumb-thick and 3-4 feet long are driven into the bank, where they root and grow into new shrubs that hold the soil in place. Stakes can be driven directly though burlap or other erosion control cloth. Live fascines consist of similar cuttings bundled and laid in shallow trenches along a bank, which can catch soil while the cuttings are becoming established. Brush layering is a similar technique in which cuttings are laid like blankets in alternating directions, creating a matrix that holds loose soil as well as establishing vegetation (Donat 1995).

Unfortunately little information is available on the suitability of commonly used live-staking species for the existing habitat on the bluffs. Because most live-staking species are moisture-loving plants common to riverbanks, such as willows and shrub dogwoods, they may not be able to thrive in the dry, sandy soil of the bluffs. A modified version of natural erosion control, using biodegradable structures planted with very young trees native to the bluffs, might be more successful.

Examples of techniques often used to repair gully erosion are crib walls and check dams (Donat 1995; Marsh 2010). Crib walls are log-cabin type structures, most often built into a hillside as retaining walls. The insides are often filled with rock or gravel, but can also be filled with soil and planted (Donat 1995). Structures like this, built of untreated lumber, could hold the soil in place until the seedling trees develop root networks. Check-dams are small dams built across gullies, often in series. Over time, soil collects behind the dams, forming a terraced structure (Brady and Weil 2008). A series of check dams, built as modified crib walls and planted with native trees, could be a good solution to erosion gullies on the bluffs.

PROJECT SUMMARY

All the final designs and research for this project were very well received by the Scenic Highway Foundation. The client expressed its intention to pursue grants to begin installation of the team's final design proposals. The final graphics that the team produced for this report were considered to be a very great asset for the Foundation in pursuing funding—their earlier grant applications had not been able to effectively convey the improvements they wished to make to the highway corridor. Moreover, the team's careful attention to ecological restoration and handicapped accessibility in all the designs was deemed to be a strength for funding applications, as many of the entities that provide funding to transportation corridor enhancements and complete streets implementation are particularly concerned that these issues be addressed. The team was asked to continue to consult on the Pensacola Scenic Highway corridor improvement project and to provide guidance to the Foundation as needed, so that the actual implementation of the design proposals and restoration recommendations are conducted as the team intended.

ADDITIONAL RESOURCES

Complete Streets

Massachusetts Department of Transportation, Project Development and Design Guide, Chapter 11: Shared Use Path and Greenways. Online at: http://www.mhd.state.ma.us/default.asp?pgid=content/designGuide&sid=about

National Complete Streets Coalition. Online at: http://www.completestreets.org/

San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook. Online at:
http://www.flowstobay.org/documents/municipalities/sustainable%20streets/San%20Mateo%20Guidebook.pdf

America Walks: The National Resource for Walking Communities and Advocates. Online at: http://americawalks.org/

Florida Department of Transportation

Bicycle Lane Design Guidelines: http://www.dot.state.fl.us/rddesign/DS/10/IDx/17347.pdf

Landscape Site Distance Guidelines:
http://www.dot.state.fl.us/rddesign/DS/10/IDx/546.pdf

Planting Installation Guidelines:
http://www.dot.state.fl.us/rddesign/DS/10/IDx/544.pdf

Geographic and Soils Information

Escambia County Geographic Information System. Online at: http://www.myescambia.com/Bureaus/DevelopmentServices/GeographicInformationSystemsDivision.html

Soil Survey Geographic (SSURGO) Database for Escambia County, Florida. USDA, NRCS. Online at http://soildatamart.nrcs.usda.gov.

USDA, NRCS Web Soil Survey, national data. Online at: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Equicross, distributors of crowd control, display and safety equipment. Online at: http://www.crowdcontrolstore.com/

Frog Furnishings, by JayHawk Plastics, Inc. Online at: http://www.jayhawkplastics.com/products.php?catid=1&start=10

Greenshine New Energy solar lighting. Online at: http://www.streetlamp-solar.com/solar-street-lights.html or http://www.streetlights-solar.com/

Nex-Terra, manufacturers of type 2 recycled plastic furnishings. Online at: http://www.nex-terra.com/

Park Bench Source.com. 2012. Product information and online catalog. Online at: http://www.parkbenchsource.com/recycled-park-benches/recycled-fremont-bench

School Outfitters, equipment and furnishings distributor. Online at: https://www.schooloutfitters.com/catalog/default/cPath/CAT563

Sol solar lighting manufacturer. Online at: http://www.solarlighting.com/

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APPENDIX A

Rail with Trail Case Study: Carlsbad, California Coastal Rail Trail

Background

The San Diego County Coastal Rail Trail is a 40 mile rail with trail (still under construction) that runs along the active railroad right-of-way from Oceanside in the north of the county, to San Diego in the south. The trail will eventually connect all the coastal cities in between, though only segments of the trail are currently completed. This rail trail (and in particular the City of Carlbad's segment) was selected for study for the City of Pensacola and the Scenic Highway Foundation because it has several features that the proposed rail trail for Pensacola, along the base of the Escambia Bluffs would share. Specifically, the Coastal Rail Trail runs almost entirely within the railroad company right-of-way, traverses sensitive coastal habitat, and runs parallel to a major body of water that people are eager to access.

The decision to undertake the construction of the Coastal Rail Trail came about in the late 1990's, when the San Diego Association of Governments (SANDAG) formed a coalition to study the feasibility of such a trail and to study conditions in the rail corridor where the trail would be located. Each of the cities along this railroad corridor (Oceanside, Carlsbad, Encinitas, Solana Beach, and San Diego) then took on the task of constructing and maintaining their segment of the trail. Though the railroad right-of-way is jointly owned by several railroad companies, the corridor itself is owned by a public entity, The North County Transit District, which was instrumental in negotiating with the railroad companies for permission to use their right-of-way for the trail.

Solana Beach and Carlsbad were the first cities to construct portions of the trail. This case study examines the construction and maintenance of Carlsbad's section of trail, a .7 mile paved, fully accessible path along the tracks that was completed in 2006. The rail trail is extremely popular with the community, and according to a survey conducted just last year by the city, is Carlsbad's most used trail.

Railroad Criteria for Trail Construction

Railroad company permission for the trail was difficult to obtain. Most of the rail trail in Carlsbad runs within the railroad right-of-way at a setback distance of 60 feet from the tracks, which was the distance required by the railroad. Because nearby buildings closely border the tracks in one place, however, the trail must jog outside the right-of-way briefly.

The train tracks running through Carlsbad are very busy, and used daily by multiple freight trains and passenger trains like Amtrak's heavily used Pacific Surfliner. Some of these trains are fast-moving and move at speeds of up to 80 miles per hour.

When they granted the City of Carlsbad permission to build a trail in their right-of-way, the railroad companies made their agreement contingent on a series of conditions that would make the trail safe for pedestrians, and compatible with their current and future needs from the rail corridor. They forbade the use of overhead lighting like street lamps along the trail, but permitted the use of low, bollard-style lighting. They also had specific guidelines for the vegetation that could be planted in their right-of-way: trees over a certain height, and other tall dense vegetation was not permitted. They required the placement of some sort of fence dividing the trail and the tracks. And as an ongoing safety and compliance measure, they stipulated that city workers from Carlsbad—including project managers, engineers, and maintenance workers—attend their annual safety training workshops.

Figure 218- Rail with Trail, Carlsbad, California

Preparation

After railroad permission to use the right-of-way was secured, the City of Carlsbad embarked on permitting and laying the other groundwork that needed to precede the construction of the trail. They located utility and sewer lines and any other underground infrastructure that might influence how the path could be laid out. They also identified utilities that might need to be relocated. They consulted with the California State Coastal Commission on how to go about developing a trail in the coastal zone, and then hired an environmental consultant to conduct an environmental assessment of the rail corridor. This consultant identified sensitive habitat that the trail installation would disturb or displace. The City then completed the state-mandated mitigation for effected areas of coastal sage and coastal wetlands. This step proved to be an expensive one: mitigating impacted wetland cost the City about $60,000 per acre.

The City also planned out where to provide emergency access along the trail, and how to factor into the trail design and construction future demands the railroad might have of the corridor. Last, the City of Carlsbad established temporary construction easements as it began work on the trail,

Figure 219- Rail with Trail, Carlsbad, California

Funding

The City of Carlsbad was able to raise enough money for this initial segment of their rail trail through several means. SANDAG agreed to match the funds the City of Carlsbad raised, and the City was also able to secure funding from the U.S. Department of Transportation's Recreational Trails Program; the Department of Transportation's Transportation Enhancement Activities division; the Rails to Trails Conservancy; and the federal government's Congestion Mitigation and Air Quality (CMAQ) Improvement Program.

Trail Construction and Features

Carlsbad's rail trail is 12 feet wide, and paved with asphalt. It is fully accessible, and intended for use by bikers, walkers, runners, wheelchairs, and skateboards. Two-foot strips of decomposed granite on either side of the paved path provide extra clearance for runners and others on foot. A 25-foot landscaped easement acts as a buffer between the path and the development on the side of the trail away from the tracks. This easement also contains several areas of pod-style concrete seating, an irrigation system, and the low, bollard-style lights permitted by the railroad company. The plants in the easement are low-growing to meet the railroad's criteria, and are drought tolerant to minimize the need for supplemental irrigation. The City has gone to great trouble to vegetate this easement with plants that add vibrant color and interesting texture to the path, and the result is a truly beautiful and inviting trail design.

On the side of the trail nearer the tracks, a thin strip of landscaping holds a chain link fence, about 4 feet in height, that divides the trail from the tracks.

Pedestrian Crossings

At-grade pedestrian crossings give trail users access across the tracks in two places where city streets already cross the tracks. A separated-grade pedestrian crossing was considered for the northern end of the path, and the city looked into the installation of an ADA-compliant footbridge that would span the tracks at the required 22-foot overhead clearance. However, project managers ultimately estimated that $3-4 million was needed to construct the bridge, along with an extended period of securing complicated zoning permissions, and the project was eventually abandoned.

Cost and Maintenance

In general, the expense per mile of constructing and maintaining a rail trail is hard to estimate, since so much of the expense depends upon the path material, existing conditions, the space available, and the railroad company's requirements.

One the greatest challenges (and greatest maintenance expenses) Carlsbad's rail trail faces is vandalism. People who wish to cross the train tracks to gain quicker access to the water frequently cut the chain link wire fence to let themselves through.

Vandals also smash the low bollard lighting and spray graffiti on the path's asphalt surface. Replacing the bollard lights, removing graffiti, and repairing the fence is simply considered a part of the annual maintenance budget for the rail trail.

The budget for maintaining the rail trail is significantly more than the maintenance budget for Carlsbad's other public trails. Electricity for the lighting, maintenance of the landscaping, and repairing damage done to the trail by vandals adds up to a maintenance cost of about $30,000 per year, while the average budget per mile for Carlsbad's other trails is about $3,600.

In order to monitor the trail and keep track of needed repairs, workers from the City and a corps of volunteers walk the path every week to look for damage, and report their findings to trail supervisors. Volunteers regularly pick up litter along the trail.

Safety and Liability

Signs forbidding pedestrians to cut across the tracks are very visibly placed along the rail trail, and the liability for any accident that may occur while a pedestrian is trespassing falls on that individual alone. No incidents involving injuries to trespassers by trains have yet occurred. The largest safety issue the City of Carlsbad deals with on the trail is loitering after-hours. The City installed dummy cameras to try to discourage this behavior, but those proved ineffective, and instead attracted vandals. Now the City encourages pedestrians to simply to use their own discretion on the rail trail after dark, and to report any suspicious behavior to the police and city officials.

Ongoing Construction

The City of Carlsbad eventually plans to install over eight miles of rail trail within its city boundaries. They have divided this distance into several "reaches" of trail, which they are completing as time and funding allow. After the initial completion of the first segment in 2006, progress on the rail trail stalled because of economic constraints. Now the City is moving ahead with its planning and construction of several more reaches of the trail. These efforts were begun in earnest in early 2011, with phased completion of the trail planned over the next several years. Where possible, the City piggybacks its work on the trail with the work utility companies are already doing along parts of the planned route. This minimizes the need for additional excavation, especially as the trail often follows the route of major utility lines anyway.