Southern University Educational Urban Forest

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Report prepared for Southern University's Urban Forestry Program

DESIGN TEAM:

Dr. Kamran Abdollahi - SU Urban Forestry

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United States Department of Agriculture
National Institute of Food and Agriculture

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lower ravine - area of disturbance

middle ravine - looking from bridge

upper ravine - looking northeast

upper ravine - looking from road

Introduction

Southern University is a unique place along the Mississippi River corridor commanding breathtaking views and dramatic topography. The University, through the establishment of its Urban Forestry Program, has developed a master plan and vision for how Urban Forestry will be applied to its campus. The vision is as follows:

Southern University will strive to have a sustainable urban forest that contributes to the education, research, environment enhancement, information dissipation and livability of our student and neighborhood community. Our trees are recognized as part of our green infrastructure that provides educational, economic and environmental benefits. Efforts will be made to create an outdoor learning and teaching environment, a recreational environment and a research facility that will contribute to coastal restoration, wetland preservation, best practices in tree planting, preservation, and maintenance while fostering a sense of stewardship among residents.

It is this vision that directed a plan to develop an ecological park within and surrounding the University's ravine network. This report outlines the over arching concepts and goals of the project.

It is hopeful, through direction from University staff, that the project will continue to develop to provide the students, faculty, and residents of Baton Rouge and surrounding areas a place for learning, research, recreation, and enjoyment while supporting the vision and goals of the University's Urban Forestry Program.

So what is the value of a tree?

According to Steve Nix there are 10 top reasons trees are valuable to society. The trees around us are extremely important and have always been necessary for improving the human condition and their very existence. It's not too hard to believe that without trees we humans would not exist on this beautiful planet. In fact, some claim can be made that our mother's and father's ancestors climbed trees - another debate for another site.

So, trees are essential to life as we know it and are the ground troops making up an environmental frontline. Our existing forests and the trees we plant work in tandem to make a better world.

At the very beginning of our human experience, trees were considered sacred and honorable: oaks were worshiped by the European Druids, redwoods a part of American Indian ritual, baobabs a part of African tribal life, to the Chinese the ginkgo link and monkey puzzles to the Chilean Pehuenche. Romans and scholars during the Middle Ages venerated trees in their literature.

The modern human community has other, more practical reasons to admire and honor trees. Here is a short list of reasons trees are necessary for improving our worldly condition.

Top photo - Army Corps of Engineers - Erosion Control Construction

Lower photo - Graffiti with message

1. Trees Produce Oxygen

Let's face it, we could not exist as we do if there were no trees. A mature leafy tree produces as much oxygen in a season as 10 people inhale in a year. What many people don't realize is the forest also acts as a giant filter that cleans the air we breath.

2. Trees Clean the Soil

The term phytoremediation is a fancy word for the absorption of dangerous chemicals and other pollutants that have entered the soil. Trees can either store harmful pollutants or actually change the pollutant into less harmful forms. Trees filter sewage and farm chemicals, reduce the effects of animal wastes, clean roadside spills and clean water runoff into streams.

3. Trees Control Noise Pollution

Trees muffle urban noise almost as effectively as stone walls. Trees, planted at strategic points in a neighborhood or around your house, can abate major noises from freeways and airports.

4. Trees Slow Storm Water Runoff

Flash flooding can be dramatically reduced by a forest or by planting trees. One Colorado blue spruce, either planted or growing wild, can intercept more than 1000 gallons of water annually when fully grown. Underground water-holding aquifers are recharged with this slowing down of water runoff.

5. Trees Are Carbon Sinks

To produce its food, a tree absorbs and locks away carbon dioxide in the wood, roots and leaves. Carbon dioxide is a global warming suspect. A forest is a carbon storage area or a "sink" that can lock up as much carbon as it produces. This locking-up process "stores" carbon as wood and not as an available "greenhouse" gas.

6. Trees Clean the Air

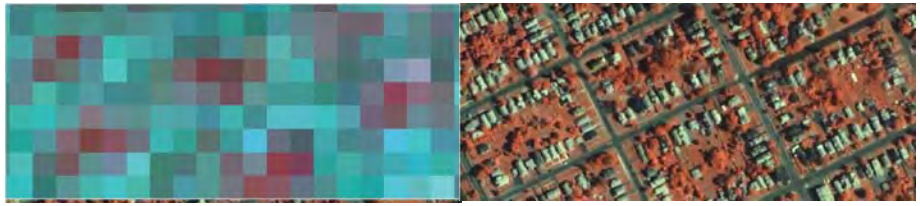
Trees help cleanse the air by intercepting airborne particles, reducing heat, and absorbing such pollutants as carbon monoxide, sulfur dioxide, and nitrogen dioxide. Trees remove this air pollution by lowering air temperature, through respiration, and by retaining particulates.

7. Trees Shade and Cool

Shade resulting in cooling is what a tree is best known for. Shade from trees reduces the need for air conditioning in summer. In winter, trees break the force of winter winds, lowering heating costs. Studies have shown that parts of cities without cooling shade from trees can literally be "heat islands" with temperatures as much as 12 degrees Fahrenheit higher than surrounding areas.

8. Trees Act as Windbreaks

During windy and cold seasons, trees located on the windward side act as windbreaks. A windbreak can lower home heating bills up to 30% and have a significant effect on reducing snow drifts. A reduction in wind can also reduce the drying effect



High resolution (below) vs. 30-m imagery.

on soil and vegetation behind the windbreak and help keep precious topsoil in place.

9. Trees Fight Soil Erosion

Erosion control has always started with tree and grass planting projects. Tree roots bind the soil and their leaves break the force of wind and rain on soil. Trees fight soil erosion, conserve rainwater and reduce water runoff and sediment deposit after storms.

10. Trees Increase Property Values

Real estate values increase when trees beautify a property or neighborhood. Trees can increase the property value of your home by 15% or more.

So how are urban forests assessed?

David J. Nowak with the U.S. Forest Service states that urban forests provide numerous ecosystem services. To quantify these services and guide management to sustain these services for future generations, the structure or composition of the forest must be assessed. There are two basic ways of assessing the structure or composition of the urban forest:

Bottom-up approach. Field-based assessments to measure the physical structure of the forest (e.g., species composition, number of trees)—typically used for strategic resource management or advocacy by connecting forest structure, functions and values with management costs, risks, and needs.

Top-down approach. Assessments of canopy cover using aerial or satellite images—used to determine amount and distribution of tree cover, potential planting space and other cover types.

The bottom-up approach involves collecting field data on vegetation. It provides the most detailed information needed for urban forest management and to assess urban forest structure and its associated ecosystem services and values. To aid in sampling or inventorying urban trees and forests, and for calculating their ecosystem services and values, the free i-Tree Eco and Streets models were developed (www.itreetools.org).

There are three common top-down approaches for assessing urban tree canopy cover and all three methods will produce estimates of tree and other cover types in an area, but with differing resolution, costs, and accuracy. The three methods are:

- ***NLCD analyses***
- ***High-resolution image analyses***
- ***Aerial photo interpretation***

NLCD analyses

The National Land Cover Database (NLCD) has tree and impervious cover maps (30-m resolution) for the entire contiguous 48 states with percentage tree and percentage impervious cover estimated for each pixel. These maps and data are available for free and can be loaded into the free i-Tree Vue program to estimate tree cover and general ecosystem services.

High-resolution land cover

With this approach, land cover features are extracted from high-resolution aerial or satellite imagery using automated techniques. This process yields a detailed map of tree and other cover types for a given area. This approach is used for Urban Tree Canopy (UTC) Assessments. For more information go to: http://www.nrs.fs.fed.us/urban/utc/

Photo-Interpretation

Uses digital aerial images and a series of random points that are interpreted to determine the cover type at each point center. This process produces statistical estimates of cover with a known error of estimation. A free tool (i-Tree Canopy) can be used to photo-interpret cover across the globe using Google Maps™. Photo interpretation has been used for accuracy assessments of the other top-down methods.

Example of high-resolution land cover map.

Existing Conditions

The campus of Southern University provides a diverse and unique learning environment due to its location along the Mississippi River high atop Scotts Bluff. The campus offers 360 degree views along a significant bend of the river, views that are not available anywhere else in Baton Rouge due to the river levee system. The campus is also home to a network of ravines that not only provide necessary drainage to the campus and surrounding neighborhoods, but also provide a degree of topographic change not found in many locations in south Louisiana. The campus is home to a number of species of trees, woody and herbaceous plants that help create a needed habitat for hundreds of species of birds and animals. These wildlife habitats are predominately found along and within the ravines of campus. For this reason alone, it is necessary to preserve and protect the ravines to ensure no habitat loss occurs.

The campus of Southern University encompasses 512 acres, with an agricultural experimental station on an additional 372-acre site, located five miles north of the main campus.
The campus is surrounded by the predominantly black neighborhood of Scotlandville. The campus has a significant tree canopy on the North West corner and more precisely along the banks of Mississippi river due to the fact that approximately 150 Acre tract is mainly wetlands.

Currently, one pedestrian circulation path exists that allows the user to engage with the ravine network with that connection being a bridge that connects the student housing area of campus to the campus core. Currently, no other access exists to allow users to experience the diversity and beauty of the natural feature of campus.

existing pavilion

open field area east of pavilion

closed pedestrian tunnel

upper lake- looking southeast

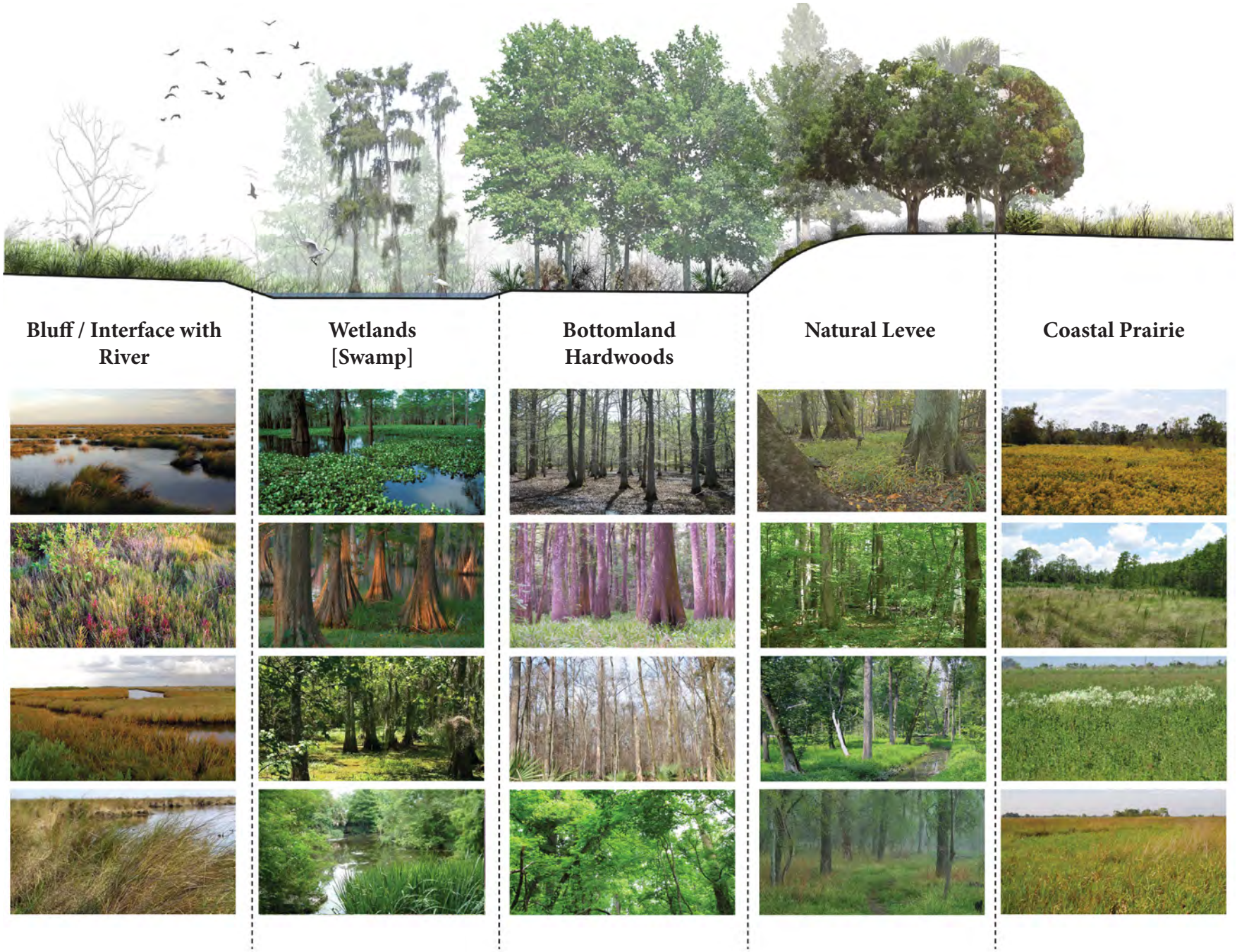
upper ravine - looking from road


vehicular circulation
pedestrian circulation
student housing


area of erosion control
under construction by
US Army Corps of Engineers


D. WETLANDS
LAB
TOWER
B. MIXED TREE SPECIES & RAVINE
A. BOTTOM LAND RAVINE & HARDWOOD FOREST
E. BLUFF
C. LAKE KERNAN
university boundary
university lakes
focus zone
secondary focus zone
additional focus zone
key points
significant views
filtered views

Louisiana Vernacular Plant Zones



Existing Native Vegetation

American Ash
Ulmus americana

Black Willow
Salix nigra

Buttonbush
Cephalantus occidentalis

Cottonwood
Populus deltiodes

Overcup Oak
Quercus lyrata

Pond Cypress
Taxodium ascendens

Devil's Walking Stick
Aralia spinosa

American Beech
Fagus grandifolia

Fringe Tree
Chionanthus virginicus

Witch Hazel
Hammamelis virginiana

Crab Apple
Malus floribunda

Shining Sumac
Rhus copallina

Red Maple
Acer rubrum

Swamp Dogwood
Cornus drummondii

Blackgum
Nyssa sylvatica

Water Hickory
Carya aquatica

Water Locust
Gleditsia aquatica

Wax Myrtle
Morella cerifera

River Birch
Betula nigra

Sourwood
Oxydendrum arboretum

Black Cherry
Prunus serotina

Sugar Hackberry
Celtis laevigata

Yaupon
Ilex vomitoria

Slash Pine
Pinus elliottii

Existing Native Vegetation (cont.)

American Elm
Ulmus americana

American Holly
Ilex opaca

American Plum
Prunus americana

Bald Cycpress
Taxodium distichum

Black Locust
Roinia pseudoacacia

Carolina Buckthorn
Rhamnus carolinaian

Cherry Laurel
Prunus caroliniana

Cucumber Magnolia
Magnolia acuminata

Deciduous Holly
Ilex decidua

Dogwood
Cornus florida

Eastern Red Cedar
Juniperus virginiana

Green Hawthorne
Crataegus viridis

Parsley Hawthorne
Crataegus marshallii

Honey Locust
Gleditsia triacanthos

Ironwood
Carpinus caroliniana

Loblolly Pine
Pinus taeda

Longleaf Pine
Pinus palustris

Mayhaw
Crataegus opaca

Mexican Plum
Prunus mexicana

Shortleaf Pine
Pinus echinata

Shumard Oak
Quercus shumardii

Silverbell
Halesia diptera

Southern Crab Apple
Malus angustifolia

Southern Live Oak
Quercus virginiana

Existing Native Vegetation (cont.)

Southern Magnolia
Magnolia grandiflora

Southern Red Oak
Quercus fallcata

Southern Wax Myrtle
Myrica cerifa

Spruce Pine
Pinus glabra

Swamp Red Maple
Acer rubrum 'drummondii'

Sweetbay Magnolia
Magnolia virginiana

Sweetgum
Liquidambar styraciflua

Sycamore
Platanus occidentalis

Tulip Tree
Liriodendron tulipifera

Water Oak
Quercus nigra

White Oak
Quercus alba

Willow Oak
Quercus phellos

Invaisive Plant Varieties

Through the development of this project, it is recommended that all exotic/ invaisive plant species be removed. See Report Appendices, Articles E1-E3 for additional information concerning invaisives and their recommended eradication methods.

Chinese Tallow Tree
Triadica sebifera

Chinese Privet
Lagustrum sinense

Chinaberry Tree
Melia azedarach

Cogongrass
Imperata cylindrica

SU Urban Forestry Master Plan/Tree Care Plan Overview

The Urban Forest Master Plan (UFMP) provides guidance on the management and enhancement of treed environments throughout the campus area of the Southern University. With direction from the of Urban Forestry Program, the UFMP will provides a 'roadmap' to help the university and its neighborhood residents to invest in and maintain their urban forest for the future. Recognizing that much of the urban forest under consideration is on public land, the plan includes actions that could be undertaken by the different communities-of-interest that influence and are affected by the urban forest, such as university administration, homeowners, businesses, developers, community groups, and conservation organizations.

The Master Plan was developed with extensive input from Dr. Kamran Abdollahi, developers, conservation organizations, landscape architects, and others. The Plan incorporates best practices from across North America and Europe. Urban forest master plan reports from several jurisdictions, and an extensive review of current texts and journal articles on best practice in urban forest design, planning and management was conducted.

A desirable urban forest is about quality as much as quantity. It envisages a diversity of high quality, productive treed environments, distributed throughout all parts of a community. The urban forest character and density will vary by neighborhood and land use type, reflect local growing conditions and will provide many different functions and benefits for humans and other species that live there. To meet the present and future challenges facing Southern University's urban forest, a new approach is proposed for the university founded upon biophilic principles and community-based stewardship. This approach has three pillars:

1. A more holistic focus on the urban forest as a coherent resource which plays an essential role in providing contact with nature to university residents and visitors;

2. Strategic management for a broader range of ecological and utilitarian values;

3. Engagement of the entire community in the stewardship of this resource.

Master Plan Principles

Community-driven

The urban forest belongs to the whole community, and the community needs to provide direction on the type of urban forest that they would like to see. It is acknowledged that the "community" is actually made up of many communities-of-interest with a diversity of values, needs and perspectives.

Ecosystem-based thinking

Treed environments provide the greatest range of benefits to people and the environment when they most closely resemble fully-functioning natural ecosystems. Urban forestry is not just about trees, but the broader plant communities and ecosystems within which trees are (or should be) embedded. Urban forest enhancement tries to 'stuff as much ecosystem function as possible back into the urban environment.'

This approach benefits humans and their living environment as well, since more functional ecosystems are better able to provide the services and benefits humans need. Included in these benefits is the biologically-coded need of people to be in contact with nature, even (perhaps especially) within urban environments

Multi-scale Approach
The urban forest needs to be considered and managed at many scales, from the single tree to the site, neighborhood, watershed, city, and region. An overarching challenge is how to reconnect the fragments of green space within the city across multiple scales in a way that enhances functions and benefits and gradually restores some integrity to the entire urban ecosystem.

University wide Recommendations

Create a position for an Urban Forest Planner/ Coordinator, who is empowered to work with other Departments to achieve the University's urban forest goals and to report annually to Urban Forestry Program.

Develop and implement an Urban Forest Action Plan to operationalize the Urban Forest Master Plan, including measures of success, realistic timelines and the provision of estimates and options to resource the plan.

Incorporate the goals, policy objectives and strategies of the Urban Forest Master Plan within other relevant University's plans, policies, bylaws and development guidelines.

Increase urban forest cover to more optimal levels in surrounding neighborhoods currently exhibiting low canopy cover.

Conserve or replace sufficient green space to sustain the urban forest, with particular attention to the needs of large canopy trees.

Develop a biodiversity strategy, including measurable objectives for the protection, recovery or enhancement of sensitive ecosystems, species at risk and other important flora and fauna.

Encourage connectivity between areas of natural habitat through strategic greenway and University and neighborhood urban forest enhancement initiatives.

Measure and report on the scope and value of ecosystem services provided by the urban forest on both public and private lands. Communicate this information as part of a broader effort to engage and educate the broader community on urban forest values and benefits.

Recommendations for Public Lands

Ensure that operational resourcing levels keep up with increases in the public urban forest inventory and its associated support services over the entire life cycle of the asset.

Systematically map and measure the urban forest on public lands, identifying sites for new planting. Complete and implement a five-year Urban Forestry Plan for the University.

Develop a Tree Risk Management Program for public trees (including a Comprehensive Tree Risk Management Policy and Strategy).

Manage existing mature trees so as to extend their Safe Useful Life Expectancy (buying time for newer trees to develop and contribute meaningfully to the urban forest canopy).

Continue a vigorous tree replacement program, selecting species and locations so as to maximize species and age diversity, be ready for future climates, minimize nuisance and risk, minimize maintenance costs, and maximize green infrastructure and other benefits.

Make young tree care a high priority within the urban forestry program.

Make use of opportunities to "piggy-back" multiple functions into public spaces (e.g., transforming greenways into productive ecosystem corridors as well as attractive transportation corridors for pedestrians, cyclists and wheelchairs).

Recommendations for Privately Owned Lands

Revise the Tree Protection Bylaw to address the removal of young (non-protected) trees and increase replacement tree ratios and compensation levels.

Develop a program to identify and conserve heritage and other significant trees and landscapes throughout the neighborhood.

Consider a pilot project to encourage homeowners to 'host' public trees in their front yards, in areas where there is a high level of conflict between street trees and underground services and infrastructure.

Work on Local Area Plans should consider the development of guidelines and standards for permeable areas and urban place-based forest design.

Increase community support for the urban forest.

Empower homeowners to make good urban forest decisions on their property.

SU Campus Tree Care Plan 2014

The purpose of the Southern university campus tree care plan is to identify the policies, procedures, and practices that are used in establishing, protecting, maintaining, and removing trees on the Southern university campus. The overall goal of the plan is to ensure a safe, attractive, and sustainable campus urban forest. The specific objectives of the plan are:

1. Ensure proper species selection, high-quality nursery stock acquisition, and industry-consensus planting procedures.
2. Promote species diversity and proper age structure in the tree population Protect high-value campus trees during construction and renovation projects Promote tree health and safety by utilizing ISA's best management practices when maintaining campus trees.
3. Ensure that trees are reasonably replaced when there is mortality due to weather, pest infestations, injury, or construction displacement.
4. Encourage campus community members to respect and value the campus urban forest.

Campus Forest Areas

The proposed campus forest areas consist of existing wooded areas and open areas proposed for reforestation. There are four long-term objectives for the forest areas.

The first is to maintain stands of large native trees with associated understory and ground layer plants that will provide a regionally fitting visual theme for beautifying and unifying the University owned area surrounding the core campus.

The second is to provide the environmental benefits of cooling, enhanced storm water management, erosion control and water quality protection, increased species diversity and reduced water consumption and energy expenditure for grounds maintenance.

The third is to provide areas for research, education, and passive recreation in close proximity to the campus. And, the fourth is to provide an example of environmental responsibility that will serve to heighten public awareness of the relationship between human society and the natural environment.

All of these objectives are supportive of the University President's and University Chancellor's commitment to for a sustainable future. In balancing these objectives, it should be recognized that in areas of high visual sensitivity along roadways, the aesthetic quality of the forest should be given priority.

Research activities that may result in "unattractive" landscapes or the dominance of invasive exotic species over extended periods of time should be located in areas with limited public exposure.

The forest areas along roadways should be designed and managed to enhance and unify the campus image over the long-term with a minimum of short-term unattractiveness during periods of canopy establishment. The detailed planning of reforestation initiatives should also include, as an overarching design parameter, the maintenance of campus safety and security , and the preservation of significant views.

The forest areas should not be designed as strict restorations of the forest communities that naturally occur or occurred in the region during previous times. Rather, the forest areas should be designed to simulate the general structure and ecosystem functions of naturally occurring forest communities of the region, with a composition of species that may not necessarily replicate the original forests of the area.

The designs and the management methods for each forest area should respond to the existing vegetation soils, hydrology, exposure, size, shape and context of each site. The methods for establishing new forests should be adapted to the site conditions and budget available for each site.

The preferred method of forest establishment in areas of high public visibility is to plant canopy trees at densities and proportions of species similar to their final desired configuration, and to allow and encourage invasion by understory species as the forest canopy develops.

In the interest of minimizing the period for canopy establishment and increasing their immediate visual effect, trees should be planted at the largest sizes practical. Weed and grass competition should be reduced in the immediate area around the planted trees until such time that the new planting can successfully compete.

Existing grass and forbes should be allowed to grow without mowing in the remainder of the project area, until they are ultimately shaded out and colonized by woody plants. The grass should be removed if rodent control becomes necessary to protect young trees from girdling.

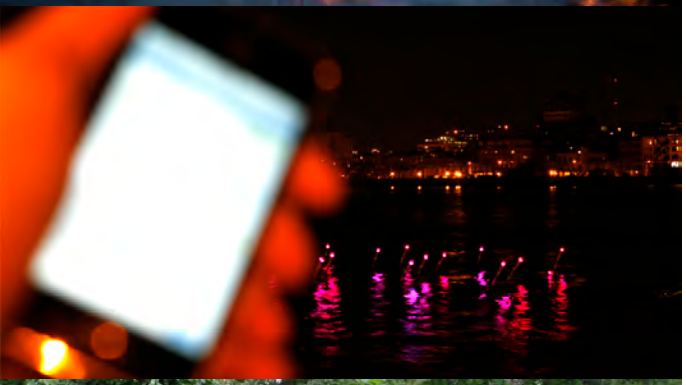
To maintain a neat edge along roadways, a narrow strip of lawn, free of trees, may be maintained during the establishment years, and later be phased out or maintained as a grass shoulder .

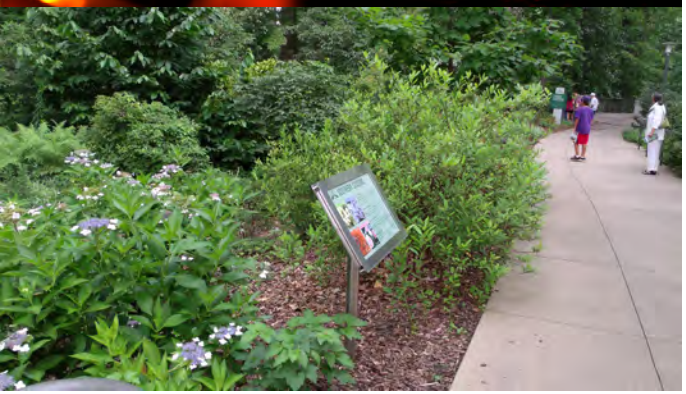
Other methods of planting may be employed in situations where less immediate visual effects are acceptable, or where soil conditions, exposure or the project budget will not allow planting large canopy trees at ultimate densities. These methods include: planting desired canopy trees at lower densities in loose savanna configurations that will, over time, naturally close or can be supplemented with future planting; planting desired canopy

trees at higher than ultimate densities (probably with smaller size planting stock for cost reasons) to increase the rate of canopy establishment and the opportunity for development of an understory layer; and planting fast-growing pioneer tree and shrub species at medium to high densities to rapidly establish a canopy followed by inter-planting with longer lived shade tolerant canopy species. Variations of these methods are also feasible.

The planting of fast growing temporary shelter belts and hedgerows may also be desirable to provide protection for the new forests during the first several decades of their establishment. In proposed forest areas along the edges of large parking areas it would be desirable to include a large proportion of conifers for visual and wind screening.

above - SU Tree Canopy Vision





top photos - water sensor technology (amphibious architecture - columbia university)

bottom photos - types of informational signage with QR codes for additional information and interaction

Technology

It is imperative today to ensure that all places tied to education and the larger public utilize as much technology and access to information as possible to maximize the user's experience of the place. This project will be no exception.

Due to the fact that the ravine network serves the university and greater area as a natural drainage basin, water quality for plants and wildlife is an important factor to consider. Several potential locations have been identified as water quality and sampling areas along the trails through the ravines. Similar uses of technology has been conducted by other educational institutions such as the Amphibious Architecture project which used different water quality sensors to detect levels and multi-colored LEDs to visually represent the readings. Users did not have to understand the exact levels but could deduce the quality by the light the sensors emitted. Further information was provided through the ability to text your location to a specific number to receive a live "report" of the water quality at that moment.

Another way of utilizing technology within the project will be provided through extensive signage development. A hierarchy of information will be provided for all levels of site users from grade school children, university students and faculty to local residents. One way to provide as much information as possible is to utilize QR codes on signage to allow the user to use a smartphone to access additional information, media, etc. This information could be anything from more information regarding a particular plant or animal species to understanding more about complex natural processes.

i-Tree will be integral to the technology aspect of the project. i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban forestry analysis and benefits assessment tools. The i-Tree Tools help communities of all sizes to strengthen their urban forest management and advocacy efforts by quantifying the structure of community trees and the environmental services that trees provide.

Since the initial release of the i-Tree Tools in August 2006, numerous communities, non-profit organizations, consultants, volunteers and students have used i-Tree to report on individual trees, parcels, neighborhoods, cities, and even entire states. By understanding the local, tangible ecosystem services that trees provide, i-Tree users can link urban forest management activities with environmental quality and community livability. Whether your interest is a single tree or an entire forest, i-Tree provides baseline data that you can use to demonstrate value and set priorities for more effective decision-making.

Design Intent

The design intent of the educational urban forest is to create a place that allows a broad user group to enjoy the area while keeping in mind the vision statement of Southern University's Urban Forestry Program.

Context of an Environmental Learning Park
Environmental learning parks can fi t into a wide variety of spaces. There are however several important factors that should be considered.

1) Connection to the natural environment.
This can involve a wide variety of elements such as, ponds, wetlands, forests, creeks, lakes, rivers, ecosystems, and watersheds.
2) Links to the community.
It is important to have some environmental learning parks closely linked to the community. While some parks may involve a whole watershed or ecosystem, smaller more local parks create a personal connection for people.
3) Variety of sizes and uses.
Environmental learning parks should work together to provide a wide variety of sites and uses. Instead of repeating or competing curriculums and topics, environmental parks can work more effectively strung together to form a web of environments, users, and opportunities.

Principles in bioremediation, biological engineering, constructed wetlands, riparian and habitat restoration will all be applied to achieve the project goals.

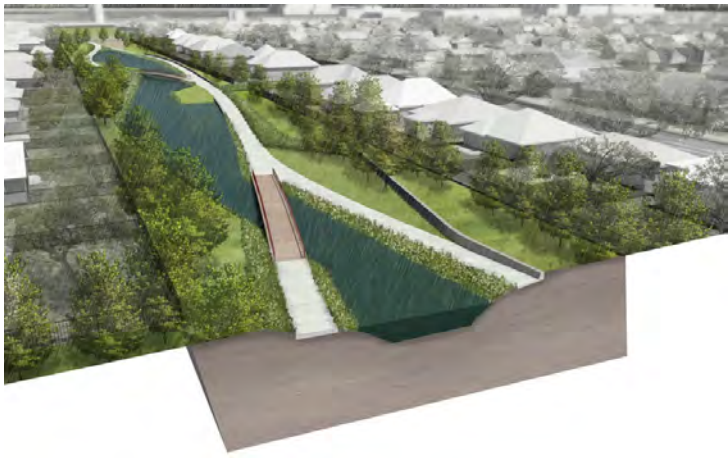
A variety of experiences within the park is vital to the success of the project, ensuring that the user will not become bored and ensuring that through this variety, a diverse habitat will be created as well. In areas where disturbance has been the highest, complete rehabilitation will be conducted such as the development and implementation of a Cajun prairie demonstration garden near the new recreation center and constructed wetlands in the lower ravine behind the ROTC buildings. These areas, along with the natural areas, will increase the variety of types of ecosystems along the greenway.

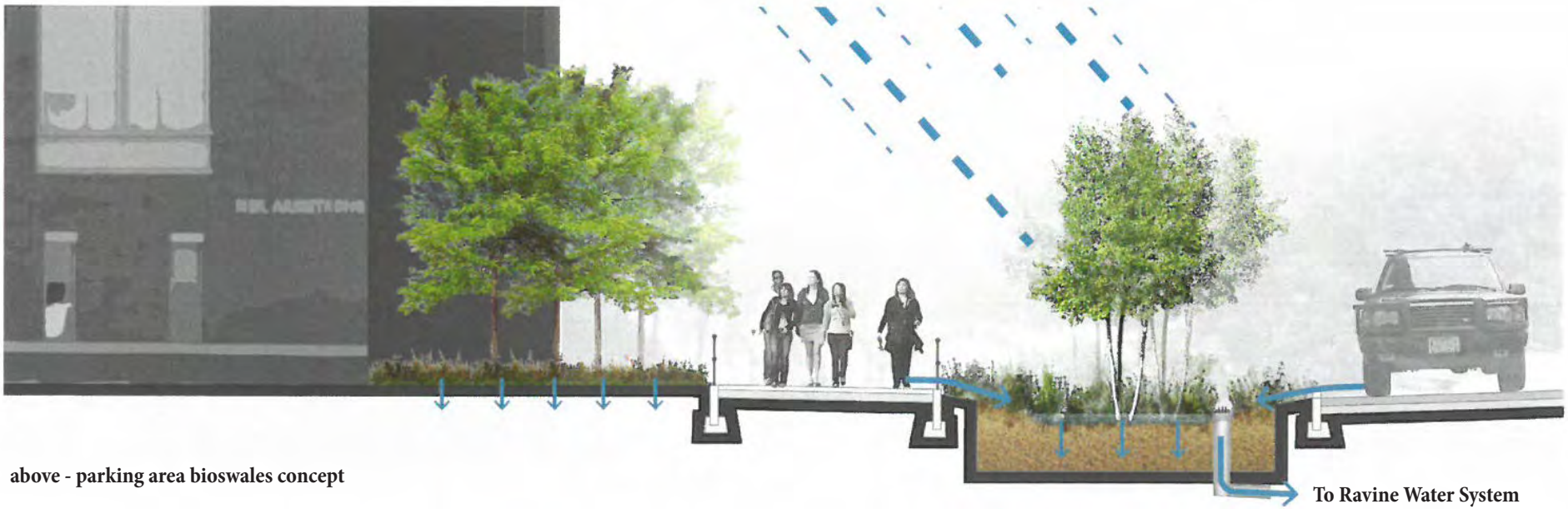
The park will be as accessible as possible with the majority, if not all the pathways being ADA-accessible and compliant. Long, transitional ramps will be necessary in places to provide the gentle grade into the ravines.

Keeping in mind the ravines serve as a major drainage way is also critical to the success of the project. Careful consideration will be given to ensure that in times of flooding/high water, the park will still be usable. This will be accomplished through a tier of programming that will allow lower portions of the park to go under water while upper portions will remain open and accessible.

Ample seating, lighting in key areas, as well as

spaces will be designed to allow for the natural processes of flooding, allowing for a varied experience throughout the year. (Spackman, Mossop, Michaels - New Orleans)





above - parking area bioswales concept

pavilion/shelters will be provided to ensure the park will be usable year-round in any weather condition.

Stormwater filtration will be vital to the health and success of the ravines. Educating the visitors on ecological methods of water filtration through bioswales at street-level parking areas to capture impurities before it enters the ravine is one method of addressing the pollutant load entering the ravine's streams.

Additionally, the bioswales will illustrate how water moves within the surrounding area and can further emphasize the importance of water carrying capacity and the natural filtration processes that the park provides to the University and the surrounding neighborhoods.

Care will be given to display these and other natural processes throughout the design of the park and educational signage will be provided to explain the processes in more detail.

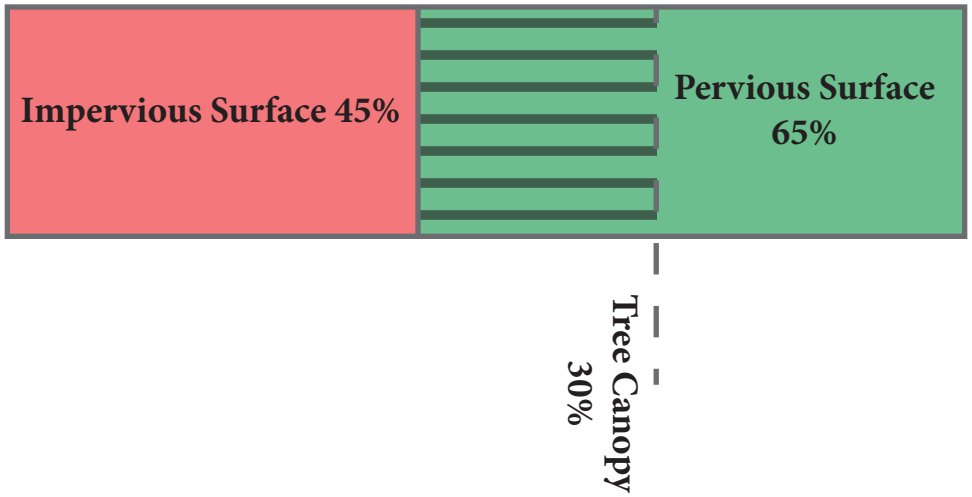
This signage will work in conjunction with the proposed water quality stations and sensors to provide the user a visual experience in having a greater understanding of water cleansing principles.

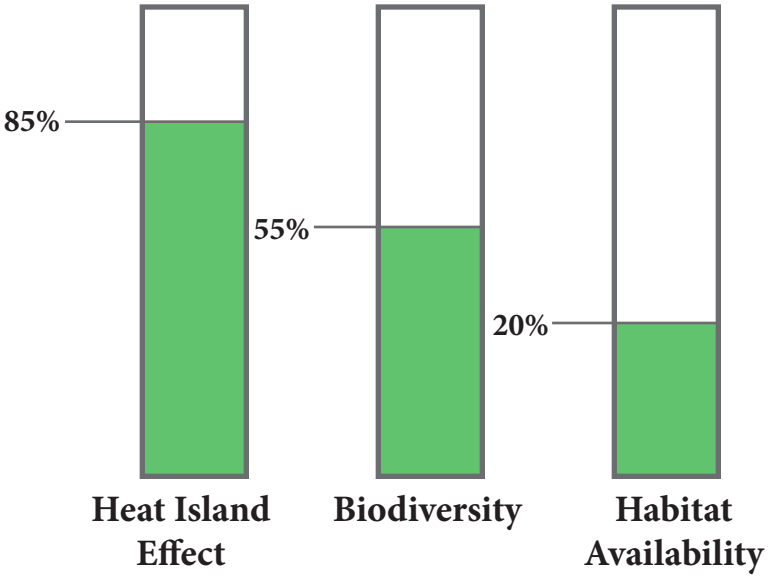
See Report **Appendices Section D** for additional information concerning the need for erosion control and bio-engineering techniques recommended during the implementation of this project.

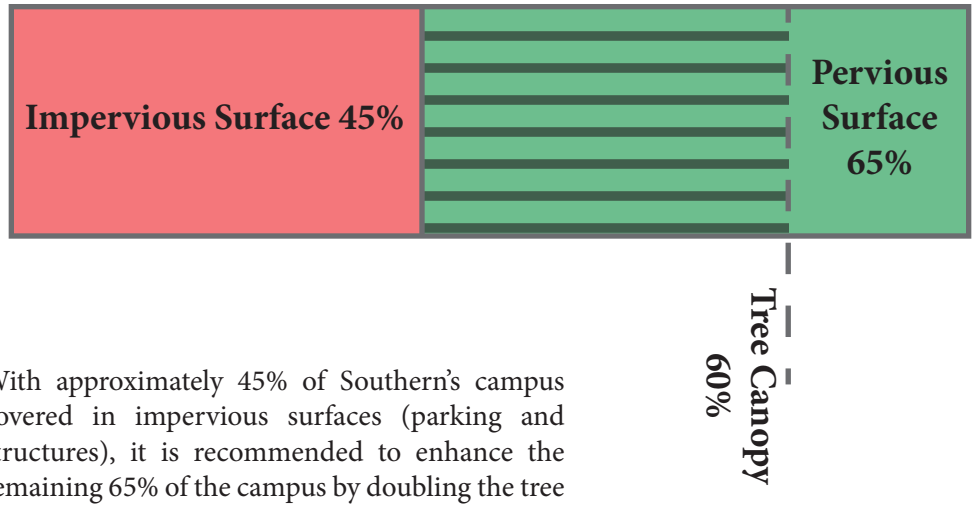
The Effects of Playing and Learning in Natural Settings

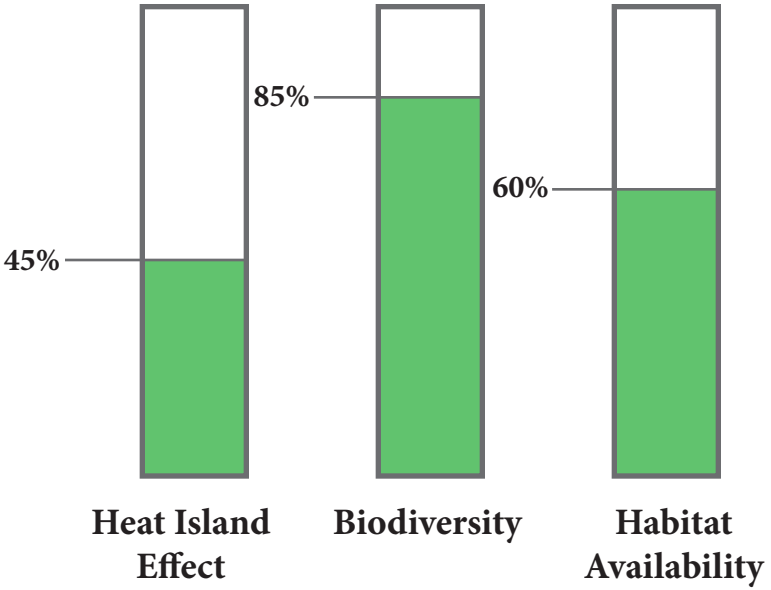
- Stimulates all aspects and stages of child development.
- Offer multi-sensory experiences.
- Stimulate informal play experiential learning, and natural learning cycles.
- Stimulate imagination and creativity in a special, boundless way.
- Integrate children by age, ability, ethnic background.
- Offer children a feeling of "intense peace."
- Center children in the environment where they live.
- Help children understand realities of natural systems.
- Demonstrate the principle of cycles and processes.
- Teach that nature is regenerative.

* http://www.naturalearning.org/effectofplay.html





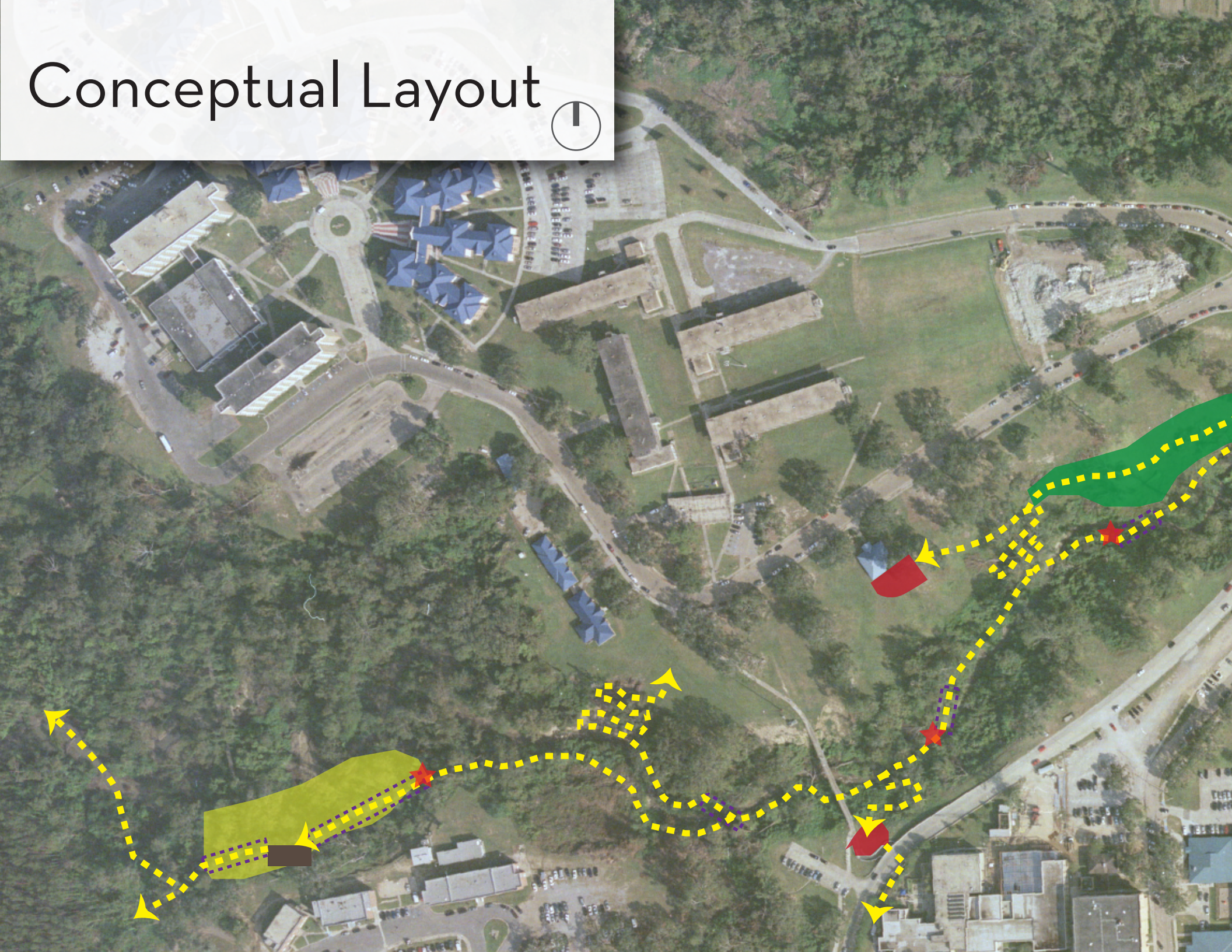


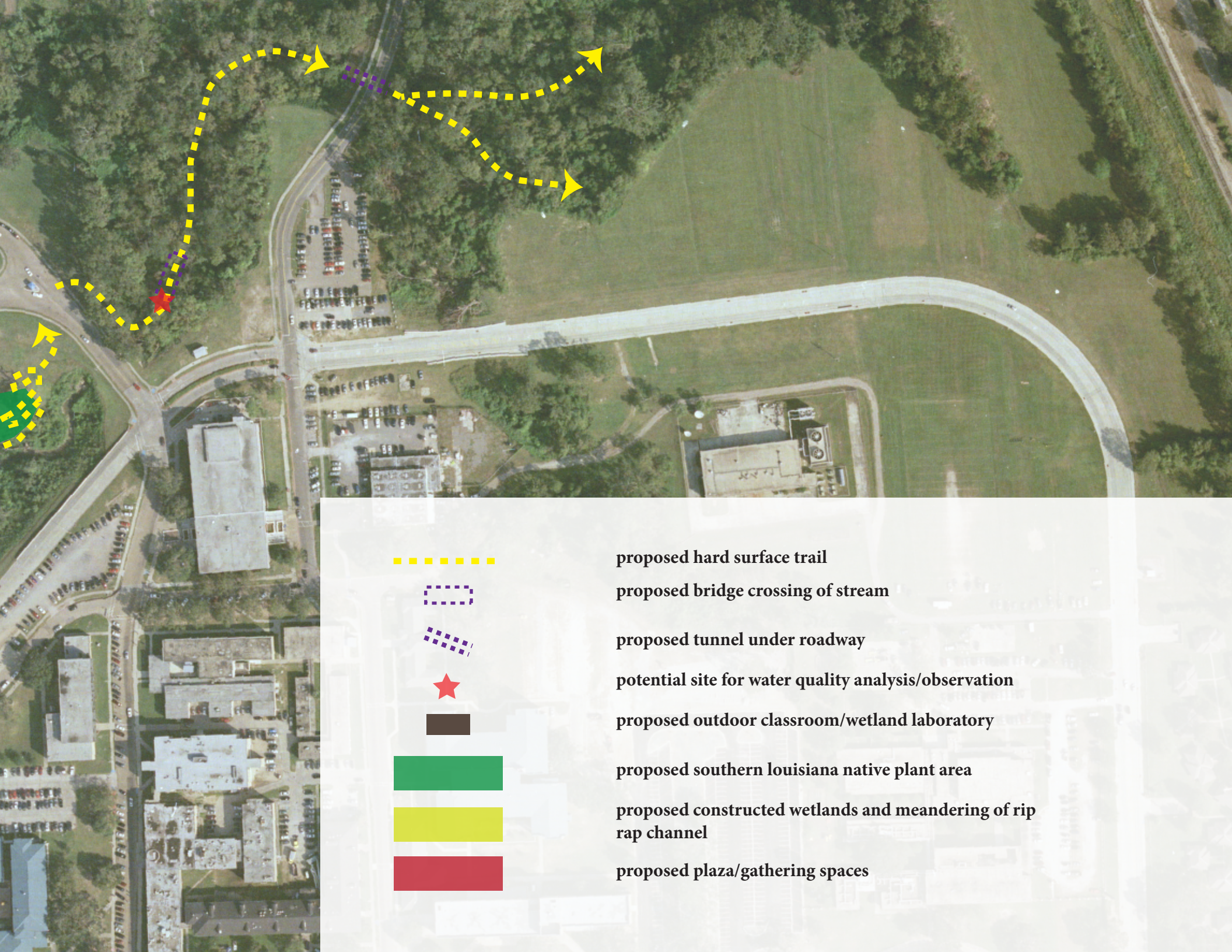


With approximately 45% of Southern's campus covered in impervious surfaces (parking and structures), it is recommended to enhance the remaining 65% of the campus by doubling the tree canopy from approximately 30% currently to 60% coverage.

Left - In the top image is today's conditions, the lower image is what it would look like with enhanced tree canopy.

Conceptual Layout





proposed hard surface trail

proposed bridge crossing of stream

proposed tunnel under roadway

potential site for water quality analysis/observation

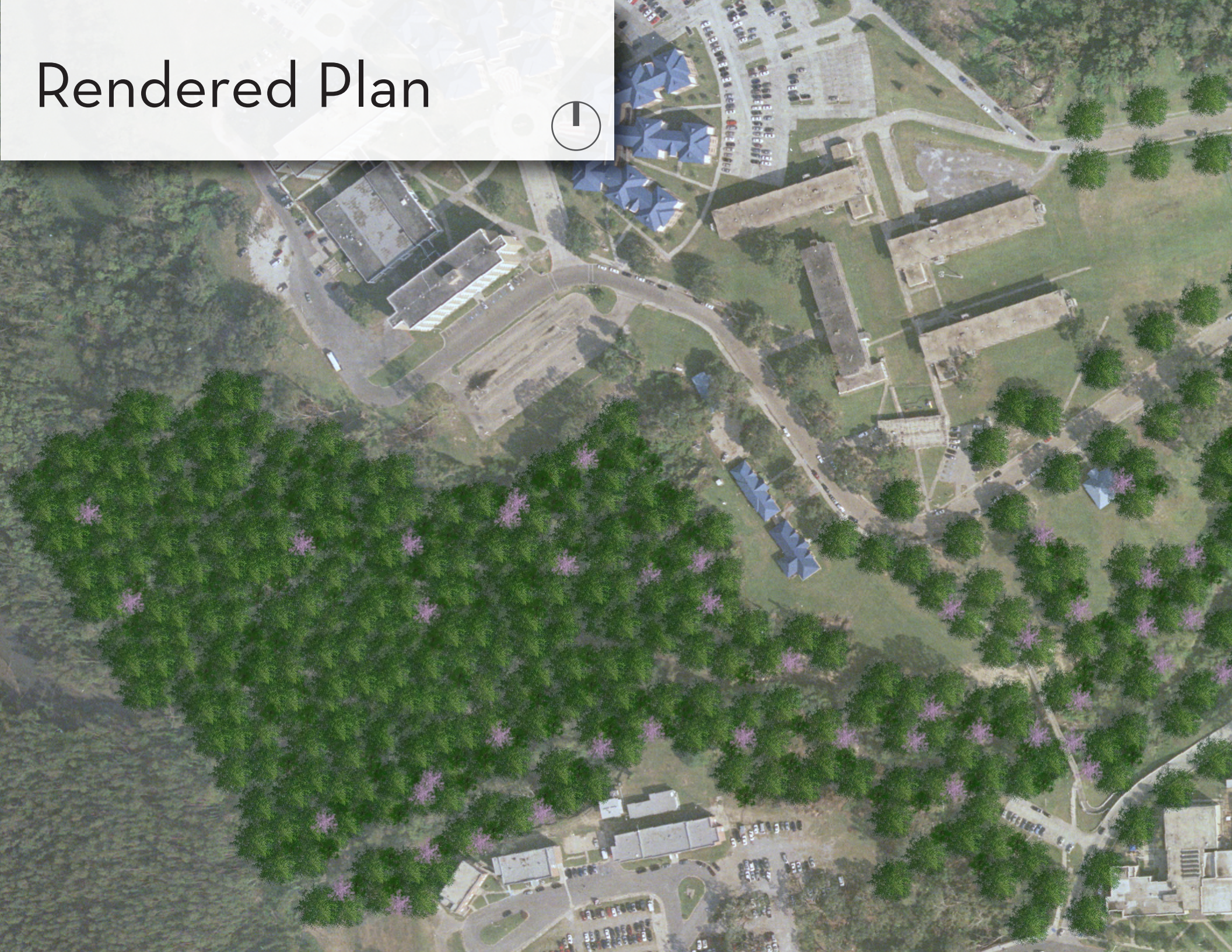
proposed outdoor classroom/wetland laboratory

proposed southern louisiana native plant area

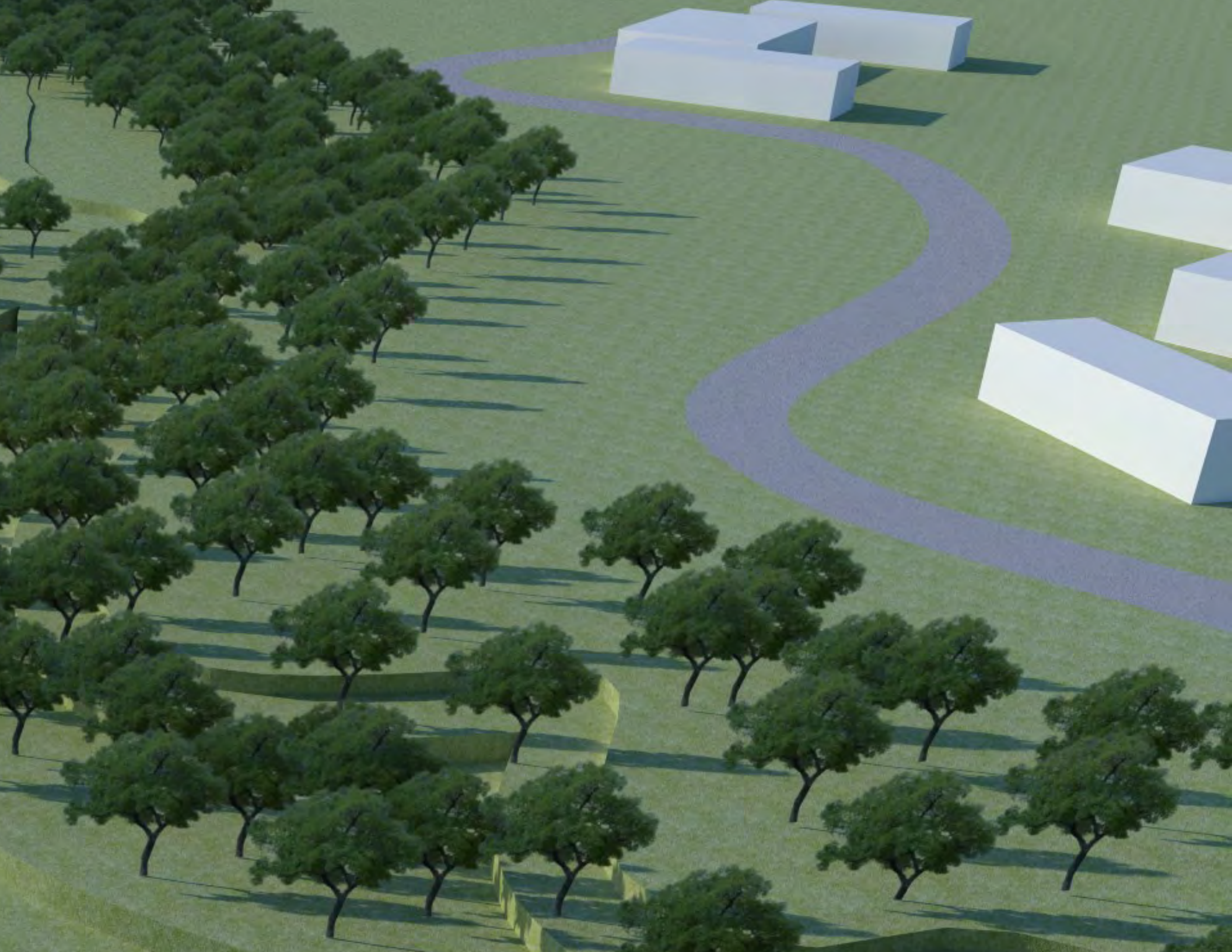
proposed constructed wetlands and meandering of rip rap channel

proposed plaza/gathering spaces

Rendered Plan



3D Site Rendering

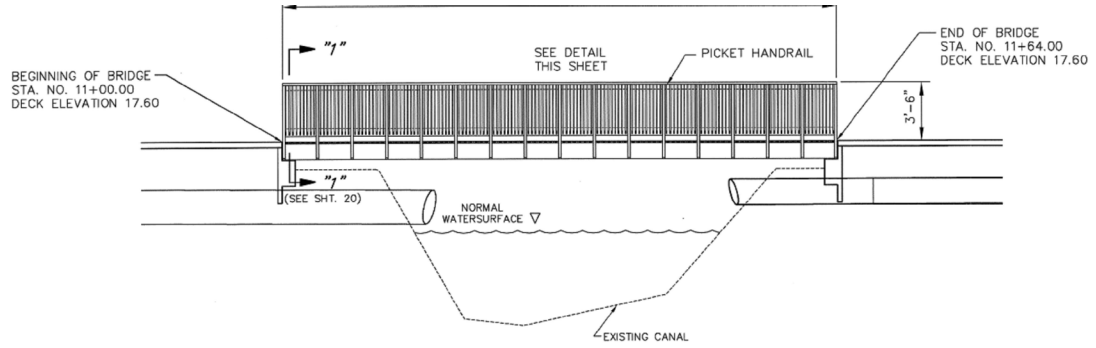


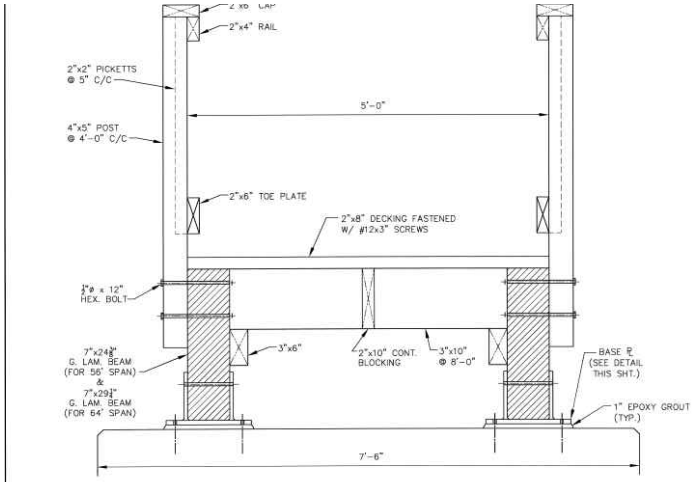

500 Year Flood
100 Year Flood
Average Level

right and following page - bridge concept and details.

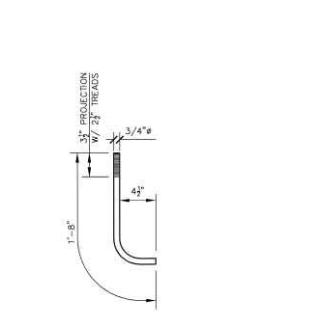
left top - Section illustrating riparian restoration along ravine bottom.

left bottom - Section illustrating terraced bottom lands at lower ravine and bluffs areas.

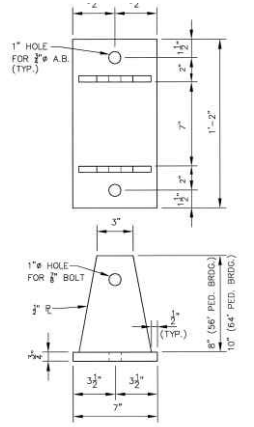




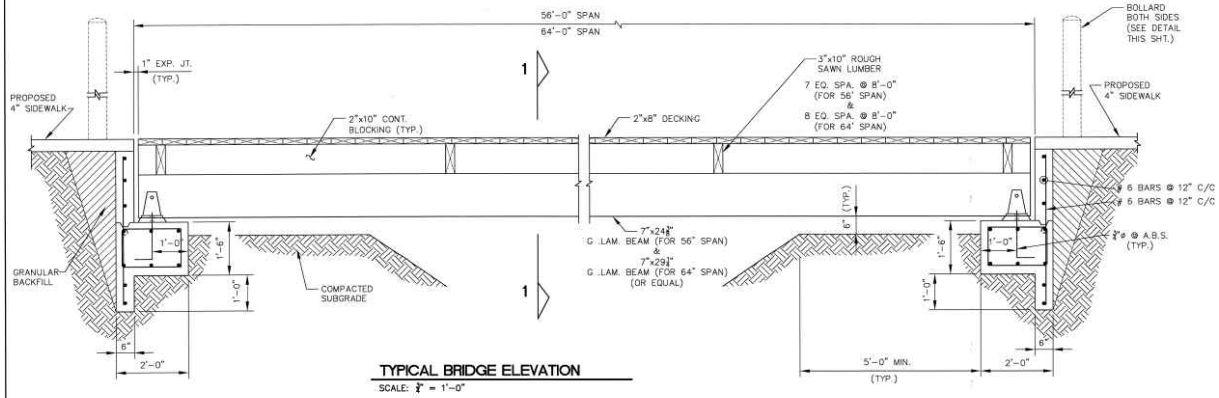
TYPICAL BRIDGE SECTION 1-1
SCALE: 1½" = 1'-0"



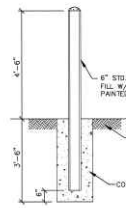
ANCHOR BOLT DETAIL (16 REQ'D)
SCALE: 1" = 1'-0"



BASE PLATE ASSEMBLY DETAIL
SCALE: ¾" = 1'-0"



TYPICAL BRIDGE ELEVATION
SCALE: ¾" = 1'-0"



BOLLARD DETAIL
SCALE: ¾" = 1'-0"

Architectural Study

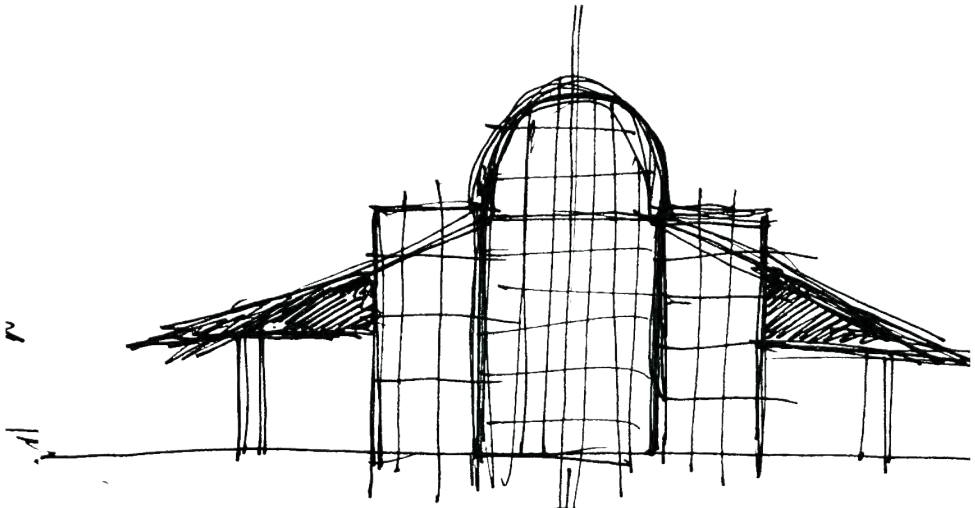
The architectural components for this project were born out of a detailed study of the architectonics of the existing structures on campus. (See sketches this page) Southern University has the advantage of both classical and modern structures present throughout its campus. Key components of both styles were chosen to merge the old with the new with the proposals of architectural form shown of the following pages.

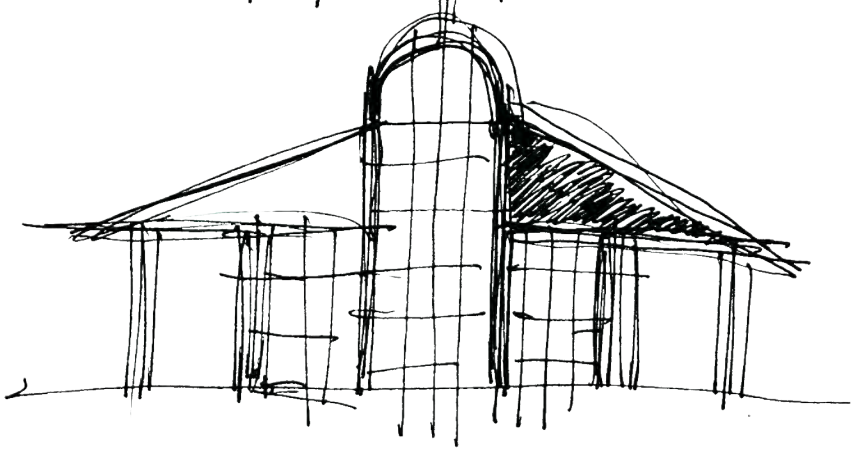
The arch, cylinder, plane, and simplicity of form were all chosen as features of the new form of the proposed structures.

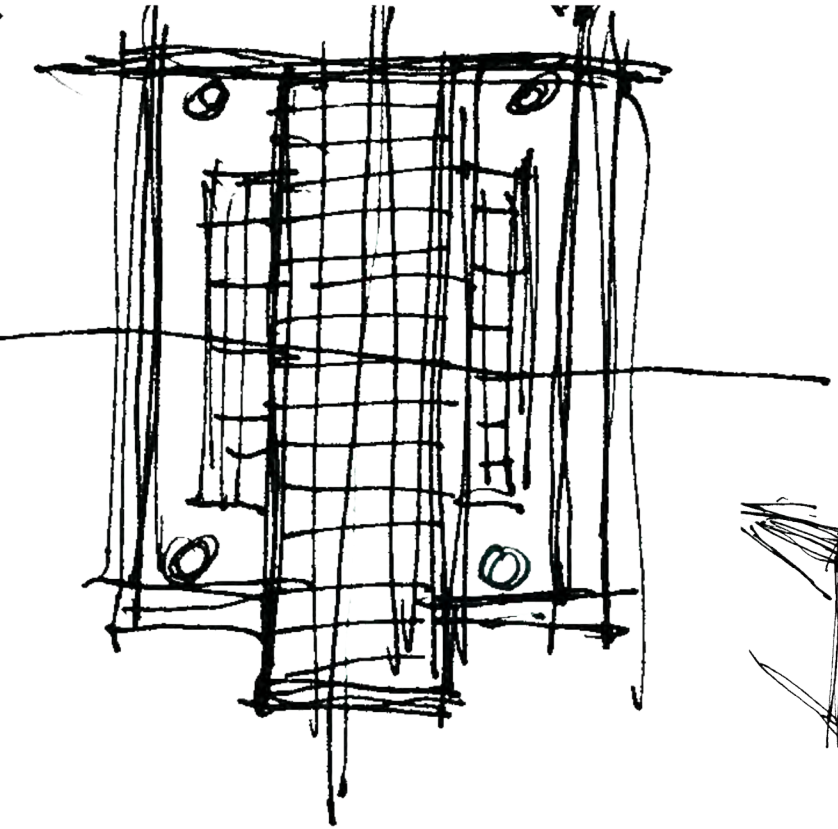
Moving forward, this type of melding of architectural typologies will allow for a more uniform language and style to the architectural presence of the campus.

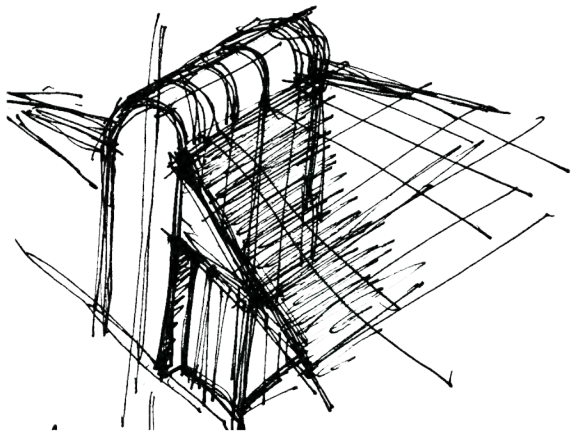
Shown on the previous page are study sketches used to develop the concept for the renovation of the existing pavilion into a trailhead welcome center.

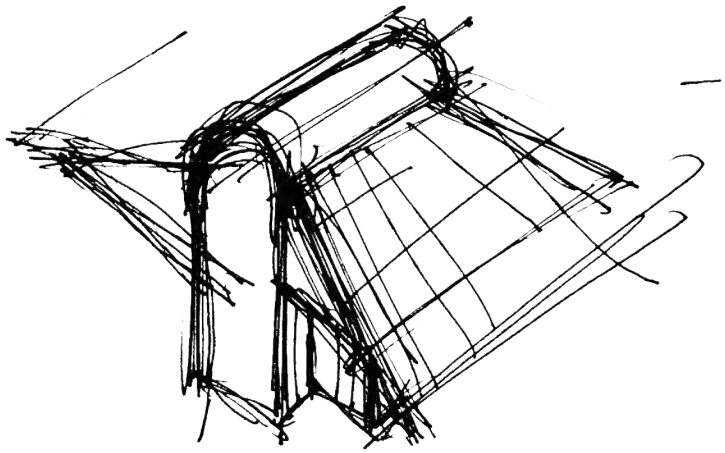
This page represents the final concept of the new welcome center with a glass and steel cube placed under the canopy. Along with this cube, it was necessary to peel back the roof to allow sufficient light to enter the space. This was achieved by creating a glass arch that runs the length of the building to create a focal point of the renovated structure but to also pull part of the classical elements of campus architecture into the design.



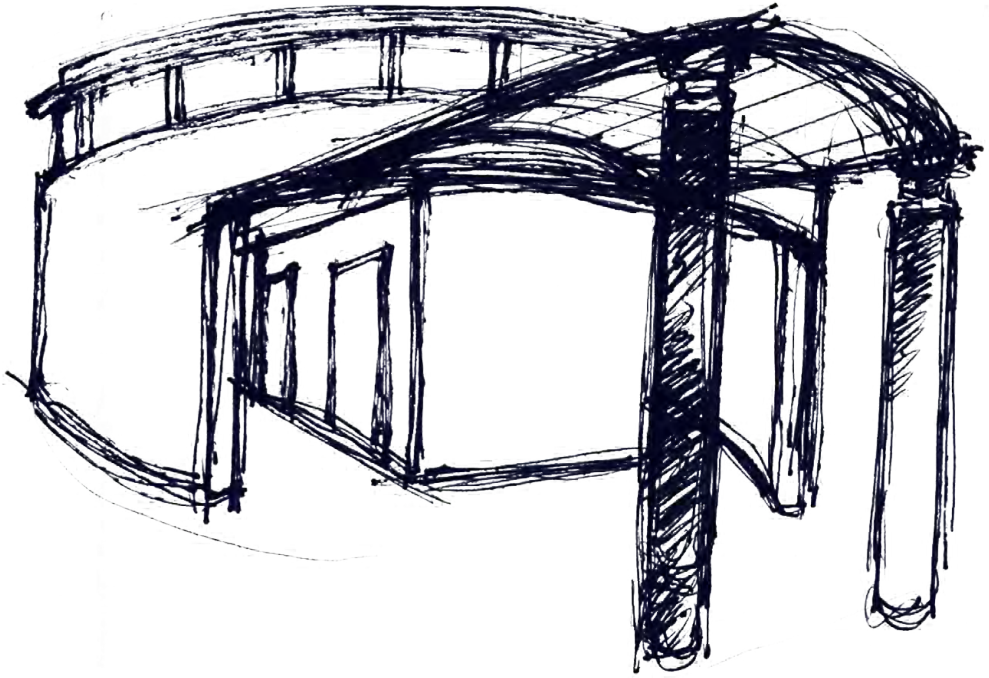




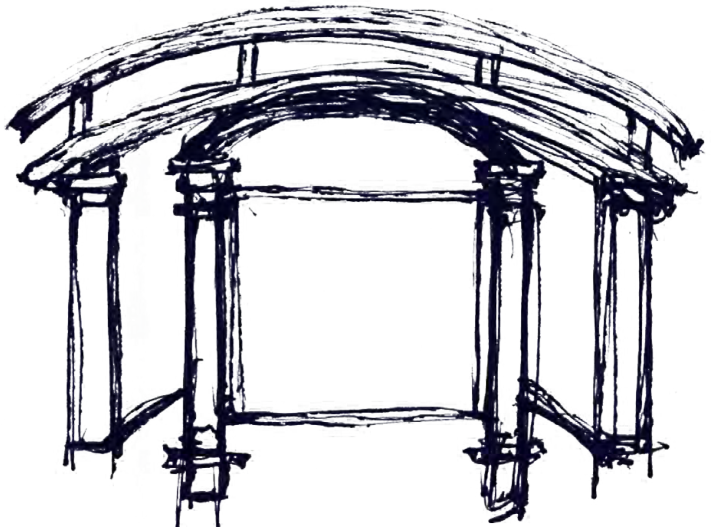


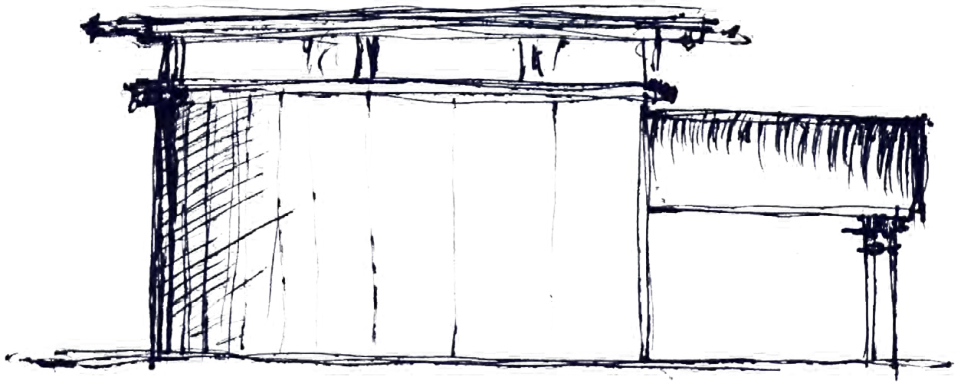


below - restroom structure concept



above - overall concept of proposed structures is using a cube surrounded by a shell to re imagine the conventional form into something that takes its cues from nature and natural forms





Above and the Following Pages -
Although this project is conceptual in nature, the following renderings illustrate what the remote classroom structure could look like. Care was given to create a space that opened to the external environment and allowed natural light to enter the space. A metal "exoskeleton" was utilized to further tie the natural to the built.

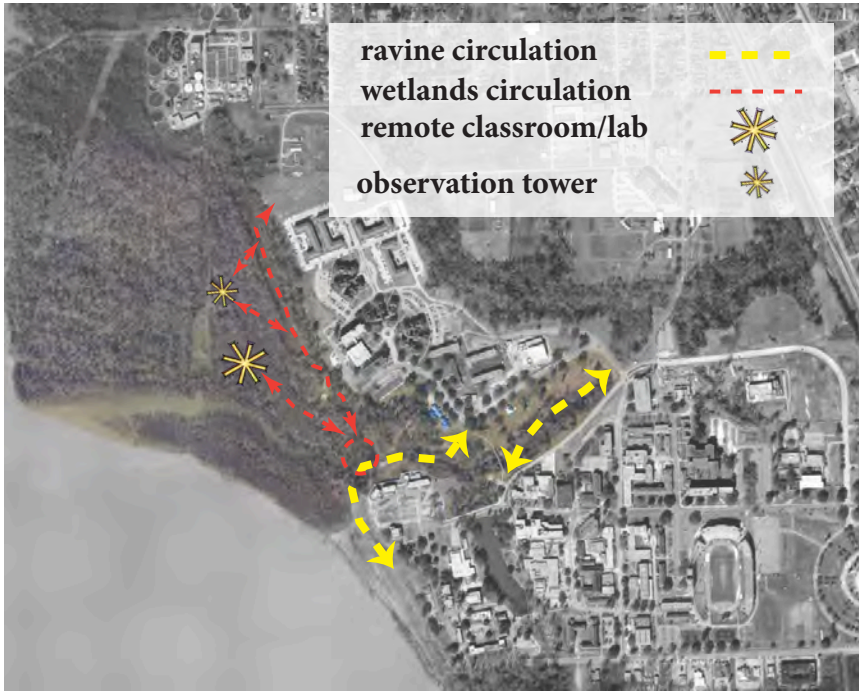
Additional Focus Areas

As the project continues to develop, a number of additional focus areas will be examined and plans will be developed for these areas, either through integration within the ravine system project or possibly as stand-alone projects. Some of the additional focus are Scotts Bluff/Mississippi River overlook area, Lake Kernan areas, and the large wetland areas adjacent to campus.

Some initial ideas for the bluffs area include flexible spaces for large gatherings such as concerts, plays, etc. through the development of multiple scales of plaza/terraced spaces. Utilizing the dramatic topography, this area could lend itself to a integrated stormwater cleansing system that could provide visual interest while keeping with the educational component.

The adjacent wetlands area could be programmed as a "remote" educational facility using a "light-touch" of not over programming the area due to the sensitive nature of its ecosystem. However, facilities could be provided such as a remote laboratory/classroom, wildlife observations platforms/ blinds, and other facilities.

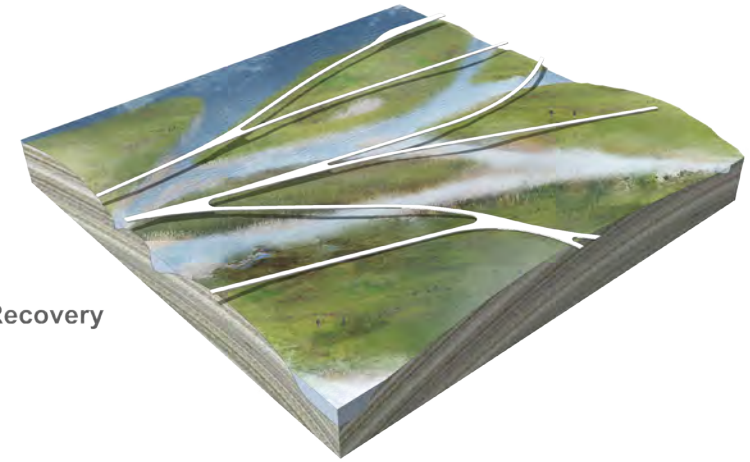
The lakes on campus are one of the major focal points of campus. Key improvements such as added circulation around the lakes, possible platform/piers into the lake for relaxation/ gathering, etc. will be examined as possible options.



above - conceptual layout and location of remote classroom/laboratory and connection via interpretive trailhead from ravine path system to building and along ridgeline to student housing.

left - observation tower example.

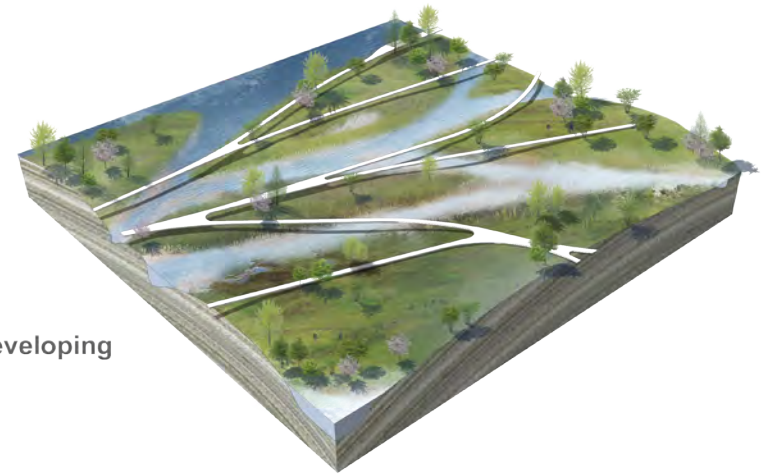
following page - diagrams representing the revegetation of the bluffs area. See section 2, page 41 for terraced concept.



Recovery

Stage 1

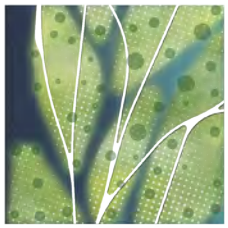
Environment starts to recover from constructional activities. Moss and other herbaceous plants start to grow

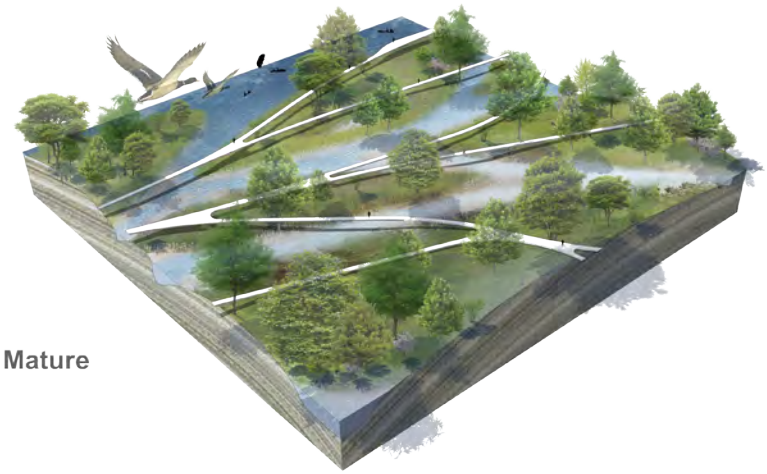


Developing

Stage 2

Environment is left undisturbed. In this period natural systems are healthy and work harmoniously

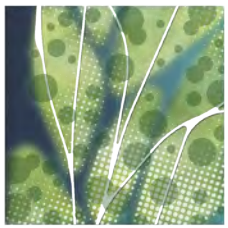




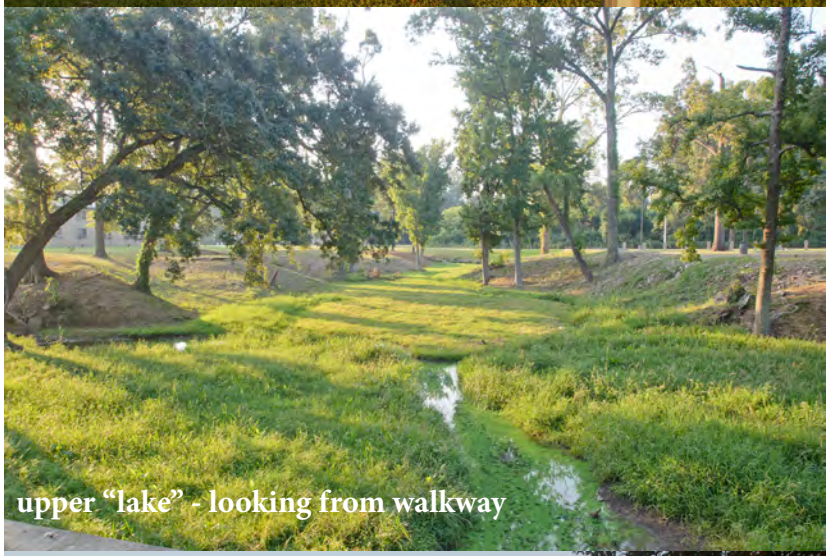
Mature

Stage 3

The ecological system reaches mature stage. The landscape begins to incorporate human activity through cultivation and modification of the land for survival



scotts bluff - river overlook



upper “lake” - looking from walkway

lake kernan - looking from walkway

Opinion of Probable Costs

On the following pages are the probable construction costs for the project breaking the project down into three sections; lower ravine and welcome center, upper ravine, and wetlands area. Key items were broken down to their probable construction costs.

Phasing will be likely and depends on the funding source of the project as to the methodology of that phasing. It would be recommended to begin with the lower ravine as the first phase. If all that portion cannot be build at the same time, priority should be given to the water quality station and trails with the structures, etc. being phased in at a later date.

above - future vision of wetland laboratory/classroom campus for SU Urban Forestry.

Southern University Educational Urban Forest

Conceptual Design

Preliminary Opinion of Construction Costs - Rough Order of Magnatude Estimate

March, 2014

Description		Qty.	Unit	Unit Price	Total		Comments
Overall Site Preparation and Utilities							
	Clearing and Preparation	1	AL	$65,000.00	$65,000.00		*Includes the removal of all exotic/invaisive species and rip rap along stream
	Erosion Control	1	AL	$20,000.00	$20,000.00		*Includes protection to storm inlets and stream during construction
	Electricity						
	Site Electrical	1	AL	$200,000.00	$200,000.00		*Includes electrical service to all areas excluding remote classroom
	Site Lighting	1	AL	$300,000.00	$300,000.00		*Hard wired lighting at structures / solar lighting along trails
	Water and Sewer						
	Water	1	AL	$150,000.00	$150,000.00		*Includes water run to all strucutes
	Sewer	1	AL	$250,000.00	$250,000.00		*Includes sewer to all structures / incineration system at remote classroom
Subtotal Site					**$985,000.00**	**$985,000.00**	
Lower Ravine and Welcome Center Areas							
	Welcome Center Reconfiguration - Structure	2,650	SF	$250.00	$662,500.00		*Reconstruction of Open Pavilion to Welcome Center/Trailhead
	Welcome Center Reconfiguration - Site	1	LS	$60,000.00	$60,000.00		*Includes Additional Sitework around Welcome Center incl. bus parking, walks, etc.
	Small Restroom Facility x 2	432	SF	$375.00	$162,000.00		*Includes two (2) Approx. 12'x18' restroom structures
	Small Classroom/Large Pavillion Strucuture	352	SF	$375.00	$132,000.00		*Includes 5'W, Wood Construction from Grade to Classroom Elevation
	Trail System	3,000	LF	$65.00	$195,000.00		*Includes 6' wide 4" Thick Conc. Sidewalk w/Reinforcement
	Ramps to trail system	900	LF	$180.00	$162,000.00		*Includes 6' wide 4" Thick Conc. Sidewalk w/Reinforcement
	Plaza at Welcome Center	3,975	SF	$6.50	$25,837.50		*Assumes 4" Thick Conc. Paving w/Reinforcement
	Plaza at Tunnel/Bridge	2,000	SF	$6.50	$13,000.00		*Assumes 4" Thick Conc. Paving w/Reinforcement
	Bike Racks	4	EA	$1,000.00	$4,000.00		*5" Long, Steel, 5-6 Bike Capacity
	Water Quality Stations	3	AL	$85,000.00	$255,000.00		*Concrete access and remote sensing equipment
	Typical Bridge Crossing of Stream	3	EA	$160,000.00	$480,000.00		*Approx. 50' long wood brodge structure with embutments
	Boardwalk section through Constructed Wetlands	300	LF	$275.00	$82,500.00		*Approx. 6' wooden boardwalk facilities on wood piers
	Constructed Wetlands/Remeandering of Stream	40,000	SF	$30.00	$1,200,000.00		*Assumes the remeandering of approx. 400 LF of channelized stream
	Cajun Prairie Demonstration Gardens	24,000	SF	$4.00	$96,000.00		*Creation of a Cajun Prairie Demonstration Garden
	General Bio-Engineering along stream	1	AL	$700,000.00	$700,000.00		*Bio-Engineering Techniques along stream for bank stabilization
	Plantings/Area landscape/Habitat Restoration	1	AL	$500,000.00	$500,000.00		*Additional Plant materials along project corridor
	Informational Signage	1	AL	$200,000.00	$200,000.00		*Wayfinding and informational signage along trails and at trailheads
	Security/Call Boxes	1	LS	$300,000.00	$300,000.00		*Addition of call boxes in key locations and cameras at tunnel and key areas
Subtotal Lower Ravine and Welcome Center Areas					**$5,229,837.50**	**$5,229,837.50**	
Upper Ravine Areas							
	Small Restroom Facility	216	SF	$375.00	$81,000.00		*Includes Approx. 12'x18' restroom structures
	Trail System	1,400	LF	$65.00	$91,000.00		*Includes 6' wide 4" Thick Conc. Sidewalk w/Reinforcement
	Ramps to trail system	160	LF	$180.00	$28,800.00		*Includes 6' wide 4" Thick Conc. Sidewalk w/Reinforcement
	Bike Racks	2	EA	$1,000.00	$2,000.00		*5" Long, Steel, 5-6 Bike Capacity
	Water Quality Stations	1	AL	$85,000.00	$85,000.00		*Concrete access and remote sensing equipment
	Typical Bridge Crossing of Stream	1	EA	$160,000.00	$160,000.00		*Approx. 50' long wood brodge structure with embutments
	Tunnel under roadway	1	AL	$500,000.00	$500,000.00		*Approx. 60' long pedestrian tunnel under existing roadway
	General Bio-Engineering along stream	1	AL	$350,000.00	$350,000.00		*Bio-Engineering Techniques along stream for bank stabilization
	Plantings/Area landscape/Habitat Restoration	1	AL	$200,000.00	$200,000.00		*Additional Plant materials along project corridor
	Informational Signage	1	AL	$150,000.00	$150,000.00		*Wayfinding and informational signage along trails and at trailheads
	Security/Call Boxes	1	LS	$80,000.00	$80,000.00		*Addition of call boxes in key locations and cameras at tunnel and key areas
Subtotal Upper Ravine Areas					**$1,727,800.00**	**$1,727,800.00**	

Wetlands Area							
	Remote Classroom/Laboratory	2,800	SF	$350.00	$980,000.00		*Includes Approx. 1800 SF of indoor space and 1000 SF of canopy
	Trail System - Accessible	650	LF	$65.00	$42,250.00		*Includes 6' wide 4" Thick Conc. Sidewalk w/Reinforcement
	Trail System - Accessible	1,500	LF	$35.00	$52,500.00		*Includes crushed stone pathway along ridgeline to campus housing
	Ramps to trail system	85	LF	$180.00	$15,300.00		*Includes 6' wide 4" Thick Conc. Sidewalk w/Reinforcement
	Bike Racks	2	EA	$1,000.00	$2,000.00		*5" Long, Steel, 5-6 Bike Capacity
	Water Quality Stations	2	AL	$85,000.00	$170,000.00		*Concrete access and remote sensing equipment
	Wetland Restoration	1	AL	$500,000.00	$500,000.00		*Restore damaged portions of wetlands to promote habitat
	Observation Tower	1	AL	$750,000.00	$750,000.00		*Assumes 60'-100' Steel Pre-fab Observation Tower with Foundations
	Plantings/Area landscape/Habitat Restoration	2	AL	$300,001.00	$600,002.00		*Additional Plant materials within project boundaries
	Informational Signage	1	AL	$150,000.00	$150,000.00		*Wayfinding and informational signage along trails and at trailheads
	Security/Call Boxes	1	LS	$100,000.00	$100,000.00		*Addition of call boxes and cameras at key areas
Subtotal Wetlands Area					**$3,362,052.00**	**$3,362,052.00**	
					Subtotal	**$11,304,689.50**	
Legend				**GC Overhead and Profit @ 10%**		**$1,130,468.95**	
EA	Each				**Subtotal**	**$12,435,158.45**	
LS	Lump Sum				**20% Contingency**	**$2,487,031.69**	
AL	Allowance				**Total**	**$14,922,190.14**	
SF	Square feet			Construction Drawing/Construction Oversight Fee		$1,492,219.01	
LOT	Lot				**Total**	**$16,414,409.15**	

Appendices Listing

A - State of Louisiana Related Information

1 - Conservation, Protection and Utilization of Louisiana's Coastal Wetland Forests April 30, 2005

B - Other University/Community Plans/Reports

1- University of Wisconsin, Stevens Point Campus Tree Care Plan - December 2010
2- Georgia Tech Campus Tree Care Plan - 2008
3 - Developing an Urban Forest Management Plan for Hurricane-Prone Communities
4- City of Alexandria, Virginia Urban Forestry Master Plan

C - Federal Urban Forestry Porgram Information

1 - USDA i-Tree Program Information
2 - Tree Campus USA Program Information

D - Erosion Control/Bio-Engineering Information

1 - Sediment and Erosion Control
2 - Bioengineering for Hill Slope, Stream Bank, and Lakeshore Erosion Control

E - Invaisive Plants / Native Plant Community Information

1 - Louisiana's Landowners Guide to Invaisive Plants
2 - Invaisive Species Information for Southeast Louisiana
3 - Invaisive Species Distribution and Eradication Information

E - Invaisive Plants / Native Plant Community Information (Cont.)

4 - Louisiana's Cajun Prairie: An Endangered Ecosystem
5 - Prairie Cajuns and the Cajun Prairie: A History
6 - The Cajun Prairie Restoration Project
7 - Vascular Flora of the Cajun Prairie of Southwestern Louisiana