Jacksonville Tree Commission

TASK FORCE ON URBAN TREE PLANTING BEST PRACTICES
April 28, 2025 11:00am - 2:00pm
Ed Ball Building, 10th Floor, Conference Room 5
and Zoom Webinar

Task Force Members:

Susan Fraser, Tree Commission Member, Chair
Nina Sickler Tree Commission Member, Vice-Chair
Curtis Hart, Tree Commission Member
William Burke, Tree Commission Member

Non-Member attendees:

Jeff Lucovsky, PDDS
Jonathan Johnston, Parks
Guy Parola, DIA
Nancy Powell, Scenic Jax
Lisa Grubba, Greenscape
Valerie Feinberg, Fuse Fellow, UFMP

Advisors:

Jonathan Colburn, Urban Forestry Manager
Justin Gearhart, City Arborist
Shannon MacGillis, Office of General Council

Staff:

Joe Rainey, Executive Assistant

AGENDA

Order of Agenda is Subject to Change

1. **Call to Order –** Chair

2. **Roll Call and Verification of Quorum** – Chair Submittal of Speaker's cards

3. **Public Comment: (up to 3 minutes, allotted at discretion of Chair)**

4. **Submittal of Speaker's Cards –** Chair
   - **a.** A raised hand icon will be acknowledged by the Chair.
   - **b.** For those attending in person, paper speakers' cards will be available.

5. **Approval of Minutes of February 20, 2025 Task Force Meeting**
    - **a.** Policy Positions Supported
        i. Plant for longevity and ultimate size
        ii. Natural Solutions First, Constraints' Mitigation Second
        iii. Preserve soil structure or mitigate for constraints.

6. **Overview of Approach- 2025 Updates to Mitigation by Degree of Urbanization**

    i. Update of James Urban approach (1992) from James Urban (2025)
    ii. Modifications to the Urban Planting Specifications (matrix) to reflect 2025 Update.
    iii. Modifications to Filing an Application for Planting in an Urban Environment to reflect 2025 Update.
        a. Planting Soil Specifications - discussion
        b. Soil Profile Rebuilding as an alternative to Soil Replacement - discussion
        c. Vertical Clearance Standards - discussion
        d.
    iv. Cost Estimates for compliance with 2025 Update in a Compacted Planting Environment
    v. Sketch sections/ plan views to reflect 2025 Update

7. **Amendments to the Approved Tree Planting List**
    a. Updates to reflect Canopy /Spread and Suitability as Street Trees

OLD BUSINESS:

8. **Meeting Dates for May 2025**

    May 14th 11am -2pm

9. **ADJOURNMENT**

Task Force on Urban Tree Planting Best Practices

Minutes
Thursday March 20th, 2025, – 11:00am-2:00pm
Via Zoom Platform & In Person
[Recording of Meeting can be obtained by sending request to Joe Rainey JRainey@coj.net]

Commissioners:
Nina Sickler, Director of Public Works
Susan Fraser, Chair (Council Appointee; 2022-0063-A)

Non-Member attendees:
Jeff Lucovsky, PDDS
Jonathan Johnston, Parks
Guy Parola, DIA
Nancy Powell, Scenic Jax
Lisa Grubba, Greenscape
Joe Anderson JEA
Paul Davis, Planning
Valerie Feinberg, Fuse Fellow, UFMP
Tracy Arpen, Greenscape

Advisors:
Justin Gearhart - City Arborist
Carla Lopera - Office of General Counsel

Staff: Joe Rainey - Executive Assistant Mowing and Landscape

1. Call to Order
Conducted by Chair

2. Roll Call and Verification of Quorum
Conducted by Chair
Commissioners present:
Susan Fraser - Chair
Nina Sickler - Director of Public Works

Quorum present (2, in person): No

3. Call for Public Speakers (online & card): Speakers request to defer to respond within context of action items.

Action Items:

4. Submittal of speaker cards

5. March Minutes Vote Deferred to next meeting; Quorum not present

Subjects discussed out of order: See sections below for details

In-Depth open format discussion: Presentations: Fraser: Discussion of new application, How-to for use of matrix with detailed examples. Overview of specific problems relevant to current process, standards and new forms in relation to matrix and site conditions and Jacksonville processes.

Presentation materials discussed tree planting project applications. Contributing parties from the public, JEA, DIA, etc. provided questions, Problems, insight and guidance as to real world application of developing best practices guidelines. Requests for full Taskforce meeting recording can be sent to JRainey@coj.com for detailed discussion.

Presentations:

6.Existing Standards Review presentations

a. ANSI A300 - Susan Fraser *(see Item 6a, pgs. 4-6 of Agenda)* Overview of tree care standards based on ANSI recommendations provided in support document.

b. JEA Underground Utilities – Joe Anderson *(see Item 6b, pgs. 7-8 of Agenda)* Discussion of installation and development of tree projects in urban locals. Focus on the complications and dangers utilities may contain when planning and maintaining.

c. Minimum Planting Area Detail – Susan Fraser *(see Item 6c, pgs. 8-9 of supplement)* Documents provided day of meeting to be included in supplemental documents. Brief detail of documents and relation to Urban article.

d. Silva Cell Details – JTA Busway on Park Street - Anna Walling*(see Item 6d, pgs. 10-24 of Agenda)* Overview of drafts and documents for presentation on structural soils, silva cells and their applications in relation to tree planting projects. Discussion was included in presentation.

e. Vertical Constraints – Jonathan Colburn
Issue: *(see Item 6e, pgs. 25-27 of Agenda)*
Overview with discussion of vertical constraints related to tree selection, location, obstructions, limitations and maintenance. Details found on support documents.
f. Existing Tree Fund Projects' Irrigation Approach – Jonathan Colburn *(see Item 6f, pgs. 28-29 of Agenda)*
Review of current contracts for tree planting regarding tree watering. Types of irrigation, applications and follow-through after warranty ends.
Discussion: Fraser: Question about volume vs frequency, to be found in further contract documents not provided.

7. Downtown Investment Authority

a. Design Guidebook - Guy Parola
DIA has previously contracted consultants to study what the taskforce is exploring. The design guidebook describes the aesthetic applications of trees and plant installs related to how they work with surrounding banners and other design aspects of downtown. DIA is looking to gain insight into how to merge the aesthetics with best practice plant selection, install and maintenance technics.

> **State Street and DIA tree wells:** Discussion of FDOT's interest in having the tree wells planted on state street. Acknowledgement of limitations on State Street and other DIA tree wells conclude that Live Oaks are not a viable solution and expectations of shorter duration tree with remove and replace plan may be best practice for these locations. Discourse regarding shade requirement from landowners in how to plant to fit this parameter. Easements suggested were not seen to be a viable option per DIA.

b. Examples of Utility Conflicts Downtown – Guy Parola
DIA is finding unmarked or unmapped utilities when implementing designs, they are seeking standards or options that will help alleviate utility constraints or resolve when unexpected utilities are found on ROWs. **Fraser:** How about Raised Planters?

8. The Good, Bad and Ugly

9. Development of Constrained Planting Environment Standards

a. Overview "Bringing Order to the Technical Dysfunction within the Urban
Forest", Journal of Arboriculture Volume 18, issue 2, March 1992

Read through of article and their relation to and application to City of Jacksonville tree planting solutions.

b. Application of Approach and Matrix to Jacksonville

i. Matrix
ii. Mitigation by Degree of Urbanization
iii. Outline of Needed Specifications and Details
iv. Application Requirements Level 2 and 3 Check

10. Expand Approved Tree Planting List to Include:

i. Planting Zone
ii. Mature Height and Spread
iii. Root Characteristics (invasive?)
iv. Suitability as a street tree adjacent to pedestrians
v. Suitability as street tree without pedestrian adjacency
vi. Maintenance Score
vii. Wind Resistance
viii. Water requirements minimum and Optimum
ix. soil volume required
x. Lifespan
xi. Crown shape

11. Meeting Dates for March - May 2025

April 28th 11am -2pm
May 14th 11am -2pm

ADJOURNMENT

END OF MEETING 1:32PM

Urban Planting Specifications (proposed 2025 Update)

NOT COMPACTED within the Required Soil Volume

S1	Dig the planting hole 24 inches larger in diameter than the root ball diameter. Backfill with unamended soil excavated from the hole.

COMPACTED within the Required Soil Volume

S2	Excavate compacted area of Required Soil Volume. Perform Soil Profile Rebuilding or soil replacement to achieve Required Soil Volume.
WT	Area within the Required Soil Volume must be located above the high water table.
MT	Long term maintenance must be provided by written agreement.

Compacted	compressed to a bulk density that prohibits root growth (worst case should be assumed)

1992 Standards

Minumum Design Criteria Matrix

Soil Quality	% Impervious	15% or Less Impervious		15% - 50% Impervious		50% - 70% Impervious		70% - 90% Impervious		90% or More Impervious	
	Not Graded AND	1	D1	3	D1	6	D1	10	D2	14	D2
	Not Compacted	S1	A1	S1	A1	S2	A1	S2	A2	S3	A2
	Not Graded BUT	2	D1	5	D1	9	D2	13	D2	17	D3
	Compacted	S1	A1	S2	A1	S2	A2	S3	A2	S4	A3
	Graded BUT	4	D1	8	D2	12	D2	16	D3	19	D3
	Not Compacted	S1	A1	S2	A2	S3	A2	S3	A2	S5	A4
	Graded AND	7	D2	11	D2	15	D2	18	D3	20	D3
	Compacted	S2	A2	S3	A2	S4	A2	S4	A3	S5	A4

source: Bringing Order to the Technical Dysfunction within the Urban Forest, Urban, 1991

2025 PROPOSED UPDATE

Urban Planting Specifications

Soil Status											
	Not Compacted	NC									
	within Req'd Soil Volume	S1									
	Compacted	C1		C2		C3		C4		C5	
	within Req'd Soil Volume	S2		S3		S4		S4		S5	

Filing an Application for Planting in an Urban Environment

Apply Organizing Characteristics based on the condition of the planting environment (area within the root zone of all planted trees) **at time of planting**. Multiple conclusions may apply based on location within a project boundary. Application to include a plan identifying the level of urban constraint associated with each planting area.

Soil Disturbance is / is not Present

Compaction has / has not occurred

Storage of equipment, laydown of materials or supplies and/or presence of construction equipment within any planting area. Includes use of planting area for construction access.

Potential Mitigation : Limit construction area: establish limits of grading outside of all root zones of planted and retained trees.

Limit all access (including laydown areas, delivery, storage, debris collection, etc.) to area outside of all root zones of planted and retained trees.

Guidance: Compacted soils are assumed when planting area is located within any development site or right of way (only parks to be excluded). Assumption can be rebutted with bulk density testing within proposed planting areas immediately prior to planting.

Minimum Planting Area is Provided

Sufficient area is provided to accommodate mature trunk volume, flare and surface roots.

Minimum Open Surface / Cut Out (OSCO). No compaction permitted within OSCO; if installed, tree grates must have an opening (symmetrical around the truck) equal to 50% of the minimum OSCO dimensions.

Small Tree	6’ x 6’ min. OSCO; min. 3 feet to any horizontal surface
Medium Tree	6’ x 6’ min. OSCO; min. 3 feet to any horizontal surface
Large Tree (not live oak)	8’ x 8’ min. OSCO; min. 4 feet to any horizontal surface
Large Tree (live oak)	12’ x 12’ OSCO; min. 6 feet to any horizontal surface

Continuous OSCO for multiple trees is eligible for 25% reduction in OSCO dimension for an individual tree. Minimum distance to any horizontal surface cannot be reduced.

Apply Urban Planting Specifications - see Matrix. Multiple specifications may apply within a project boundary; standards may differ for each tree planting area.

Soil Quantity Goal:

Provide sufficient soil quantity to support the tree mass proposed.

Required Soil Volume

Small Tree:	300 cubic feet**	Min. Planting Area: 150 sf - 100 sf Required Depth: 2' – 3' OSCO 6' x 6'min.; 8' x8' prefer
Medium Tree:	1,200 cubic feet**	Min. Planting Area: 480 sf - 300 sf Required Depth: 2.5' – 4' OSCO 6' x 6' min.; 8'x8' prefer
Large Tree:	1,800 cubic feet**	Min Planting Area: 600 sf – 450 sf Required Depth: 3' – 4' OSCO 8' x 8' min.; 10'x10' prefer
Live Oak:	1,800 cubic feet	Min. Planting Area 600 sf - 450 sf Required Depth 3' – 4' OSCO 12' x 12' min.

1. *Plans and specifications demonstrate compliance with minimum soil volumes and OSCO based on tree size. Install Soil Cell Support System (SilvaCell or equivalent) as required to meet weight requirements of surface) for area of required soil volume that is in excess of the provided OSCO.*
2. *Plans identify location of underground utilities within each minimum soil volume area associated with tree planting area(s) including depth, horizontal location and type. Standard location can be assumed if located within a City right of way unless non-standard location is identified by utility provider.*
    a. *If underground utilities are located within a minimum soils volume area, confirm compatibility with proposed tree planting with utility provider(s). If suitable, identify the volume of the planting area encumbered by utilities. Compensate for lost volume in area provided for each urban tree planting area when utilities encumber greater than 10% of the required soil volume.*
3. *Plans and specifications demonstrate compliance with application of soil mitigation : S1, S2, S3, S4 or S5*

Drainage Goal:

Drainage adequate to obtain root growth in the soil.

1. *Plans and specifications demonstrate water table below planting depth utilized in calculation of minimum planting area. Submit test results as required by staff.*
2. *Plans and specifications confirm positive site drainage away from planting area(s).*

Soil Quality Goal:

In situ or imported soil is of sufficient quality to support tree growth and long term health.

1. *When planting mix is required, the plans and specifications meet the planting mix standards established.*
2. *When Soil Profile Rebuilding is undertaken, plans and specifications are consistent with adopted means and methods for implementation.*
3. *If imported soil/topsoil is proposed, provide soil analysis for imported soil within each area of urban planting (one analysis per 25 CY imported soil for single source).*
4. *If soils have been disturbed by prior development or other activity, provide Phase 1 Environmental Report of history of the site and, as required by staff, soil samples for urban planting areas may be required.*

   Submit soil report prepared by a licensed Soil Scientist to identify site specific recommendations.

Maintenance Goal:

Support long-term health and viability of mature canopy spread.

All planting funded from Tree Mitigation Funds is supported with short term maintenance under the applicable contract warranty period. Additional long term maintenance is required to support long term health and viability of the planted tree. This includes regular pruning, and ongoing insect and disease control.

1. *Plans and specifications include a post planting, warranty period maintenance plan. Projects constructed under City Tree Mitigation Contract are assumed to meet minimum maintenance requirements for the warranty period.*
2. *For Compacted Planting Environments, provide an enforceable maintenance agreement for post warranty maintenance. City maintained projects shall be subject to adopted standards for post warranty maintenance.*

Vertical Clearance Goal:

Provide sufficient vertical setback for mature canopy spread.

Trees planted adjacent to vertical structures of 2 stories or greater are located a minimum of the radius of the mature canopy of the tree * 0.75.

1. *Plan and specifications demonstrate compliance with minimum building vertical setback for all planting locations.*
2. *Plan and specifications demonstrate compliance with overhead constraints posed by utilities.*

3.6 CORRECTION OF CONDITIONS DETRIMENTAL TO PLANT GROWTH

A. When conditions detrimental to plant growth, such as poor drainage, hardpan of clay or silt, rubble fill, obstructions, limerock, petroleum products, and construction debris are encountered during the landscape work, cease landscape work in the affected area and immediately notify Engineer.
B. B. After the Engineer's review, excavate the area of contaminated soil to the depth approved by the Engineer. If the soil is contaminated by the Contractor's construction operations, then remove and replace with topsoil or yard sand at no additional cost to the City. If contaminated soil is discovered that appears by the Engineer to be pre-existing before the beginning of construction operations, and not identified for removal by the contract documents, then the cost of removal of contaminated soil and replacement with new topsoil or yard sand will be in accordance with the price established by the contract documents.

3.7 REMOVAL OF EXISTING VEGETATION AND DEBRIS IN PLANT BEDS

A. Remove bottles, boards, construction materials, limerock, and other debris to a depth of 6 inches inside all plant beds.
B. If there is no vegetation in plant beds, proceed to bed preparation.
C. Remove existing vegetation throughout the entire limit of multiple plant beds and within the required circumference of each individual tree or palm bed.
D. In plant beds free of surface roots from existing trees remove existing vegetation with a sod cutter or other equipment with blades of sufficient depth to remove the entire plant and root system in one operation. DO NOT REMOVE EXISTING VEGETATION WITH A ROTOTILLER OR OTHER MACHINE THAT WILL BREAK THE ROOTS IN SMALL PIECES DURING THE OPERATION.
E. Where living vegetation still remains in the new plant beds containing extensive surface roots of existing trees, remove all top growth and roots of existing vegetation in a manner that will not damage existing tree roots.
F. Do not remove existing vegetation with a rototiller or other machine that will break the roots into small pieces.

3.8 EXCAVATION OF EXISTING SOIL IN PLANT BEDS WITHIN MEDIANS AND PARKING LOT ISLANDS

A. Excavation of Tree & Palm Plant Beds: After a plant bed is clear of all vegetation, excavate the existing soil within each individual tree or palm location to the depth of the root ball less 2" and a width equal to the root ball diameter plus 24". and multiple plant bed so that the soil level in the bed is 12" below the finish level of the adjacent turf, pavement, or curb. Remove surplus soil, limerock, stones over 1½", sticks, roots, rubbish, and other extraneous matter exposed by this operation. Extend excavation below the location of each tree as detailed if the root ball vertical dimension is greater than 26".

B. Excavation of Plant Beds in Medians and Parking Lot Islands: Extend excavation of existing soil to a depth of 24 inches.
C. Notify the Engineer if the existing soil at the bottom of the tree pit is contaminated with limerock or other debris detrimental to plant growth. After the Engineer's review, excavate the contaminated soil underneath each tree root ball equal to the diameter of the root ball plus 2' and to the depth approved by the Engineer. Remove and replace with yellow sand or topsoil. Soil replacement shall be paid at the unit price established in the proposal.

3.9 PLANT BED PREPARATION

A. After the existing soil has been removed, backfill each bed with topsoil so that the topsoil layer is 17" deep. Adjust the level of the topsoil by excavation or by the application of additional soil in plant beds so that after the application of the soil conditioner, and grading, the soil mix layer at the edge of the beds is 4" below adjacent turf, pavement, or curbs.
B. Spread soil conditioner throughout all individual and multiple plant beds to a minimum depth of 3" (9.2 cub. yds. per 1000 sq. ft.). Obtain Engineer's approval before proceeding further.
C. The application and incorporation of soil conditioner into individual tree and palm beds may be delayed until after the plant has been placed, so long as the finish soil level is 2" below the top of the root ball and 4" below adjacent turf, pavement or curbs.
D. After the Engineer has approved the application of soil conditioner, mix soil conditioner into the top 9" of topsoil to achieve a uniform mixture of 1/4 soil conditioner and ¾ topsoil to a depth of 12". In areas free of tree surface roots, use a rototiller to mix soil amendments into existing soil. In areas with surface roots, mix soil amendments into existing soil by hand.
E. Add or remove soil mix necessary to remove ridges and fill depressions so that the soil mix layer at the edge of the plant beds is 4" below adjacent turf, pavement, or curbs. Rake to a smooth, even surface with a loose, uniformly fine texture.
F. If the soil is very dry before planting, water soil sufficiently to moisten the prepared areas. Do not create a muddy soil condition.

SECTION 601
LANDSCAPING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The scope of work includes all labor, materials, appliances, tools, equipment, facilities, transportation, and services necessary to perform all operations required to supply, deliver, and install plants ("landscaping") complete as shown on the drawings and as specified herein.

1.2 DEFINITIONS

A. **"Initial Acceptance" or "Substantial Completion**": The date when the Engineer issues a notice of Substantial Completion after construction work, including punch-list items, has been completed in accordance with of the contract documents and to the satisfaction of the Engineer.

B. **"Final Acceptance":** The point when the landscape maintenance work required after Initial Acceptance, including all punch list items from the Final Inspection, has been completed to the satisfaction of the Engineer.

C. **"Nursery Grown" Plants:** Plants grown in the nursery from liners or collected.

D. **Container Plants:** Plants that are grown in and/or are currently in a container including boxed trees.

E. **"Tree":** Hardwood or conifer trees, not including palms.

F. **"Palm":** an unbranched evergreen tree with a crown of long feathered or fan-shaped leaves, and typically having old leaf scars forming a regular pattern on the trunk.

G. **"Hardened Off" or "Cured" Field Grown Tree or Palm:** Nursery field grown trees that have been dug, balled and burlapped, and then grown for 4 to 52 weeks in the original hole, a new hole or out of the ground in a holding area until fibrous roots are seen growing through the burlap on the sides of the root ball.

H. **"Hardwood or Conifer Tree Caliper":** Diameter of trunk measured at 6" above the ground if the tree has a trunk diameter of 4½" or less and measured at 12" above the ground if the trunk diameter is greater than 4½".

I. **"Palm Caliper":** The diameter of widest portion of the palm trunk measured 3' above the top of the root ball. Existing dead leaf bases or boots are not included in this measurement.

J. **"Cropped" or "Hurricane Cut" Cabbage Palm:** Cabbage palm collected in the wild and then stripped of all leaves before shipment to the job site.

K. **"Regenerated Cabbage Palm":** A collected cabbage palm, which has some type of root ball containment, that is maintained until (1) there are a minimum of 4 new, fully expanded "excellent leaves" and, (2) there are round, whitish-yellow roots with tapered ends that have emerged from all sides of the root ball initiation zone.

L. **"Booted":** The retention of the dead leaf bases that naturally remain affixed to the palm trunk.

M. **"Root Bound" or "Pot Bound":** Root balls from containers which have large or numerous roots encircling the surface of the root ball.

N. **"Spaded Trees":** Field grown trees dug, immediately transported, and installed in the final growing site using tree spade equipment.

O. **"Single Leader" Tree"** Tree with one single trunk growing as a single leader to the top of the tree crown.

P. **"Root Collar":** The point where the top-most structural roots meet the trunk. This location may be associated with a swelling of the trunk depending upon the tree species and age.

1.3 REFERENCED DOCUMENTS: The latest editions of the following publications, specifications, and standards, plus addenda, when referenced, form a part of this specification. If the requirements of the referenced documents below conflict with this specification section, the requirements of this specification shall prevail. If the requirements of the referenced documents conflict with each other, then the more stringent requirement as determined by the Engineer shall prevail.

A. Florida Grades and Standards for Nursery Plants, (Grades and Standards) Florida Department of Agriculture and Consumer Services, Division of Plant Industry.

B. ANSI Z60.1-2004: American Standard for Nursery Stock.

C. ANSI A 300 – Standard Practices for Tree, Shrub and other Woody Plant Maintenance, most current edition and parts.

D. Manual of Woody Landscape Plants; Michael Dirr; Stipes Publishing, Champaign, Illinois.

E. City of Jacksonville Ordinance Code, Chapter 366 (Groundwater and Surface Water Resource Management), Part 6- Fertilizer Application.

1.4 REGULATORY REQUIREMENTS

A. Obtain all permits related to landscape work unless previously excluded elsewhere in the contract documents.

B. Comply with all laws and ordinances bearing on the operation of the work as drawn and specified. Promptly notify the Contract Manager in writing if there is a conflict between the regulatory requirements and the work shown in the contract documents. Include, in the written notice, the description of the necessary changes and resultant costs, if any.

C. Comply with regulatory agencies requirements established for fertilizer and pesticide composition.

D. Application of Pesticides: Strictly comply with the manufacturer's specimen label and safety data sheet for each pesticide used, and the pest control regulation of the State of Florida and the EPA. The pesticide application shall not interfere with other construction activities or with the public.

1.5 VERIFICATION OF PLANS

A. All scaled dimensions on the drawings provided for a project are approximate. Therefore, carefully check and verify all dimensions and quantities before proceeding with work. Immediately inform the Engineer of any discrepancies between the information on the drawings and the actual site conditions. Do not proceed with work in areas where discrepancies are found until the Contract Manager has resolved the conflicts and approves work in the affected area.

B. If there is a discrepancy between the plant quantities shown on the plans and the quantities noted in the plant call outs, plant list or plant schedule, then the number of individual plant symbols shown on the plans shall prevail. In multiple plant beds where individual plants are not shown, then the number of plants shall be determined by taking the square footage of each bed area and dividing it by the specified on-center spacing.

1.6 QUALITY ASSURANCE

A. Comply with regulatory agencies requirements established for fertilizer and pesticide composition.

B. Application of Pesticides: Strictly comply with the manufacturer's specimen label and safety data sheet for each pesticide used, and the pest control regulation of the State of Florida and the EPA. The pesticide application shall not interfere with other construction activities or with the public.

C. Ship landscape materials with certificates of inspection required by governmental authorities. All trees and palms shall be FLORIDA NO. 1 or better, as described in the "Florida Grades and Standards for Nursery Plants" and as modified herein.

D. Plant substitutions are not allowed without the Engineer's approval (see Submittals requirements below).

E. Landscape Contractor Qualifications: The Landscape Contractor must have been in business for least the last 5 years and must have successfully completed 3 installations of similar scope during that time.

F. Landscape Contractor's Field Personnel Qualifications

1. Field Supervisor: The field supervisor shall have a minimum of five years' experience as a field supervisor interpreting landscape and irrigation plans and specifications, installing plants of the type, quality, and scale of the proposed project, and who can communicate in English. The field supervisor shall be at the project site when landscape work is in progress.
2. Landscape Crew: The landscape crew shall have a minimum of 3 years' experience in the installation of planting soil, trees, palms and other plants and Irrigation, where applicable.

1.7 SUBMITTALS

A. Landscape Contractor, Field Supervisor, and Field Crew Qualifications: Submit landscape contractor qualifications before award, if requested. Include the date the business was established and a list of three 3 landscape installations of similar scope successfully completed in the past 5 years. Include location; name and address of owner; and date when each project was completed.

B. Nursery Sources: List of nurseries providing plants for the project at the pre-construction conference. Include name and location of each grower and the names and quantity of plants each grower is providing. Submit a photograph taken at the grower's nursery that shows an example of each specified plant species, variety, and size.

C. Plant Substitutions: When a plant as specified is not obtainable, submit at the pre-construction conference proof of non-availability and a written proposal for use of equivalent material.

D. Soil test report of soil with recommendations for pH adjustment of soil.

E. Inspection Certificates, Manufacturer's Data: Submit copies of certificates of inspection required by governmental authorities. Submit manufacturers or vendor's label, certified analysis, and application or installation instructions for the materials noted below. Submit other data requested to substantiate that materials comply with specified requirements. Submit vendors invoice for the materials below, if requested. The invoice shall include the type and quantity of each material delivered to the Contractor.

1. Fertilizers.
2. Pesticides and Herbicides used.
3. Portable water bags and/or the temporary irrigation system components, depending upon what water system is chosen.
4. Tree root ball anchoring and palm staking system components.

F. Plant Certification: Submit the following when requested by the Contract Manager.

1. Certification from each grower providing B & B Trees and Palms for a work order, stating that the B&B Trees and Palms, (except for collected cabbage palms) have been "hardened off" or "cured" before shipment and that the burlap wrap is a natural biodegradable fiber.

2. Date Palm Variety Certification: Provide with delivery, the supplier's invoice and the supplier's certificate of date palm variety. Include on the certificate the following statement:

a. I, (name), on behalf of (supplier), certify that the palms sold to (landscape contractor name) on Invoice # _____ are the following variety: genus, _____, species_____, sub-variety _____. signature and date.

G. Samples of Topsoil, Yard Sand, Soil Conditioner, and Mulch. Submit one quart of each item used, if requested.

H. Site Visit reports during the maintenance period.

1.8 ENGINEER'S OBSERVATION OF WORK

A. The Engineer may observe the work at any time and remove samples of materials to determine conformity with the specifications. Immediately remove rejected materials from the site and replace with the specified materials. The Contractor shall pay the cost of testing the materials that fail to meet the specifications.

B. Keep the Engineer informed about the work progress so the work may be observed at the following key times during the landscape construction process. Schedule each site visit in advance with the Engineer. Failure of the Engineer to make field observations does not relieve the Contractor from meeting all the requirements of this specification. Site visits will include the following.

1. Review of soil and drainage conditions before planting preparation.
2. Review of plant layout before plant installation.
3. Review of plant quality either at the time of delivery to the nursery or to the job site.

1.9 NURSERY SOURCES

A. Submit a list of plants that will be provided by each grower, as well as a photograph taken at the grower's nursery that shows a typical example of each specified type and size of tree and palm. Also, submit photographs showing a typical example of other plants listed on the price proposal. Include the name and location of each grower.

B. Include in the photograph of each tree and palm an adult person holding a pole longer than the specified height or spread of the plant and marked in 1-foot increments clearly readable in each photograph. Place pole on top of the root ball when measuring heights.

C. Label each photograph with a complete description of the typical plant shown, including botanical and common name, caliper, height and/or spread, B&B root ball diameter or container size, and other details included in the plant schedule.

D. Include with each group of photographs a statement from the grower that plants supplied will conform to the description attached to each photograph, as well as meet the "Florida Fancy" grade for trees and palms established by the *Florida Grades and Standards for Nursery Plants*. Other plants will conform to the "Florida No. 1" grade or better.

E. Do not ship plants from growers until photographs are approved.

1.10 PLANT SUBSTITUTIONS

A. If a plant specified in the plant schedule becomes unavailable, then submit proof of non-availability at least 30 business days before the scheduled plant installation date. Include a list of nurseries contacted in the search for the originally specified plant.

B. Recommend a substitution for the unavailable plant, the name of the nursery source, and how the plant differs from the original plant specified. The substitution may be a smaller or larger size, a different shape or habit, the same genus and species but different cultivar, or other characteristics that may be different from the specified plant. Include a photograph of a typical plant to be used as a replacement.

C. The Engineer will issue a change order for the approved substitutions. However, such replacements will be at no additional cost to the City.

1.11 INSPECTION OF PLANTS BEFORE INSTALLATION

A. Photograph Submittal

1. Include in the photograph of each tree and palm an adult person holding a pole longer than the specified height or spread of the plant and marked in 1-foot increments clearly readable in each photograph. Place pole on top of the root ball. For other plants, show a close-up photo of each type of plant with a person holding a yard stick measuring the spread and then the height above the root ball.
2. Include with each photograph, a complete description of the typical plant shown, including botanical and common name, caliper, height and/ or spread, B&B root ball diameter or container size, and other details included in the plant schedule. Do not ship plants from growers until photographs are approved.
3. Also include with each group of photographs a statement from the grower that plants supplied will conform to the description attached to each photograph, as well as the following grades established by the "Grades and Standards for Nursery Plants." Trees and palms will conform to the “Florida Fancy” grade and other plants will conform to the “Florida No. 1” grade or better.

B. Plant Inspection at the Contractor’s nursery or at the Job site prior to planting.

1. The Engineer may inspect plant material at the contractor’s nursery and/or at the job site to determine conformance with the specifications. If the Engineer identifies a defect and determines that the defect can be corrected to conform with the specifications, the Contractor may proceed with the mutually agreed remedy before or after planting, so long as the result is in conformance with the specifications. Otherwise, the defective plant will be rejected.
2. The Engineer may also remove soil from the top of the root ball to determine the depth of the root collar and presence of encircling roots. Observation

may be as frequent and as extensive necessary to verify that the plants meet the requirements of the specifications.

1.12 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged materials: Deliver packaged materials in original containers and protect from deterioration.

B. Plant Shipment

1. Grower shall water root balls just before shipping. Label at least one representative plant of each specified species and variety with a securely attached waterproof tag bearing the botanical and common name, if requested.
2. Ship cabbage palms specified as “hurricane cut” or “cropped” with all fronds removed. Ship regenerated cabbage palms and other palms with dead fronds and fronds below horizontal removed (up to 2/3 of the oldest fronds can be removed). Lift-up remaining fronds in an upright position and tie fronds into a bundle with biodegradable twine. Keep frond bundle tied until after the palm planting is completed and for the additional time recommended by the palm supplier.
3. Provide protective covering over trees and palms during shipment. Tie down trees and palms to the trailer bed to prevent rolling during shipment. Ship other plants in enclosed trucks. Do not bend or bind-tie plants in such a way that will damage bark, break branches, or destroy natural shape. Do not leave plants in trucks parked in the sun during hot weather unless air-conditioned.
4. Do not lift trees by the trunk when unloading. Lift B&B trees under the root ball or by the wire loops if there is a wire basket. Lift large, containerized trees with a forklift under the container. Lift smaller plants by the root ball or by the lips of the container, not by stems or trunks. Keep container grown stock in containers until planting time.
5. Do not free-fall, drag, roll, strain the bud or otherwise abuse palms. Mechanically lift and relocate palms with a protective device around the trunk to prevent damage to the bud and trunk.
6. Place plants in an irrigated holding area either at the grower’s nursery, at the landscape contractor’s yard, or at the project site if plants are stored out of the ground for more than 6 hours. Set plants in an erect position. If B&B, cover root balls with mulch or straw. Irrigate plants to keep roots moist and to prevent wilting until planting.
7. Deliver plants to the job site only after planting preparations have been completed.

1.13 JOB CONDITIONS

A. Coordination: Coordinate all landscape work with the Engineer and other Contractors. Plant only after final grades are established.

B. Location of Underground Utilities: Determine location of underground utilities before excavating; hand excavate where required to avoid damage to utilities. After the locations of transplanted trees, new trees and beds have been staked, contact utility-locating services at least 72 hours before any excavation. The utility location service for most utilities is the Florida Utility Locating Service at 800-432-4770.

C. Notification of FDOT and City Traffic Engineering: If work is within a street right-of-way, coordinate work and maintenance of traffic with the appropriate agency. If work is within state highway right-of-way, notify the FDOT Inspector Coordinator at 360-5658. If work is located in the City right-of-way, contact the City Traffic Engineer at 387-8894. Notification shall occur at least 48 hours before starting work in the right-of-way.

D. Maintenance of Traffic: Comply with the FDOT Manual of Traffic Control when working in a FDOT right-of-way and with the maintenance of traffic requirements of the City Traffic Engineer when working in a City right-of-way.

E. Clean Up and Protection

1. During landscape work, store materials and equipment where directed. Keep pavements clean and work area in an orderly condition.
2. Protect vehicular and pedestrian traffic, existing vegetation, above ground and underground utilities and structures during construction by using signs, barricades and/or fencing. In addition, post signs or barricades required by the City. Maintain protection until Initial Acceptance of the landscaping.
3. Protect landscape work from damage by landscape operations, operations by other contractors and trespassers until Initial Acceptance.
4. Maintain grade stakes set by others until all parties agree that the stakes can be removed.
5. Repair or replace all damage to existing improvements caused by the Contractor’s operations on the project property, right-of-way, or adjacent property. Repair or replace as directed by the City, and at no cost to the City.

1.14 PLANTING SEASON:

A. Landscape work may proceed at any time or season agreed upon by the Contractor and the Engineer. However, schedule and perform landscape work only when weather and soil conditions are suitable in accordance with local

practice. Do not install plant material when temperatures may drop below 35 degrees or above 95 degrees Fahrenheit, nor when wind velocity exceeds 10 miles per hour, unless approved by the Engineer.

B. During periods of extreme drought, the Engineer may instruct the Contract to delay plant installation until the rainfall returns to normal.

PART 2 MATERIAL

2.1 PLANTS

A. Provide state inspected, nursery-grown plants, unless otherwise specified. Conform to the plant schedule, the "Grades and Standards for Nursery Plants," local landscape ordinance, and, where applicable, to ANSI Z60.1. Trees and Palms shall conform to the FLORIDA FANCY grade; all other plants shall conform to the FLORIDA NO. 1 grade or better.

B. Provide healthy, vigorous plants with the color, shape, size and distribution of trunk, stems, branches, buds and leaves normal for the specified plant. Plants shall be free from disease, insects and injury; well branched; with a solid healthy root ball of vigorous, fibrous roots, but not excessively root bound. Plants shall have green, live foliage, except deciduous plants when planted in the dormant season.

C. Provide plants that are true to variety, cultivar, species, quality, size, and flower color.

D. Plants installed during the growing season that show signs of “shock” (plants with dead or dying leaves) soon after planting are subject to rejection.

E. Plants that do not conform to the referenced standards shall be rejected. Plants that have been cut back from larger sizes to meet certain specified requirements are also subject to rejection unless approved by the Engineer.

F. Plants larger than specified may be approved to the Engineer, but at no increase in the contract price. If larger plants are accepted, provide root ball size to meet the requirements of the Grades and Standards. Larger root balls will not be acceptable if the resulting root ball cannot fit into the required or available planting space.

G. If the Engineer approves the substitution of a smaller plant than specified, then a credit will be due the City.

H. Container Plants: Provide healthy, vigorous, plants with a well-established root system reaching the sides of the plastic or wood container that will maintain a firm root ball after removal from the container but shall not be root bound (excessive root growth encircling the inside of the container). Root-bound plants will be rejected unless corrective root pruning is approved by the Engineer. Container size shall conform to the “Grades and Standards” for each size and type of plant.

2.2 TREES AND PALMS

A. General

1. Trees and palms may be specified as container grown, balled and burlapped, or tree spaded; other plants are to be container grown.
2. Trees and palms with wounds or bark injuries on the major trunks will be rejected.
3. Single Trunk Trees and Palms: Provide trees and palms with single, straight trunks unless otherwise specified as multi-trunk. The specified trunk caliper is the minimum acceptable caliper size.
4. Multi-trunk Trees and Palms: The specified number of trunks of multi-trunk trees and palms shall originate from the root ball. The specified trunk caliper is the minimum acceptable caliper size of each trunk.
5. Balled and Burlapped (B&B) Trees and Palms

    a. Provide field grown balled and burlapped trees and palms firmly wrapped with biodegradable twine, burlap cloth, and a wire basket.
    b. The grower shall dig trees and palms and then hold them at the grower’s nursery until the plants are “harden-off or “cured” prior to shipping. Dig plants with a firm root ball. Provide ball sizes complying with the "Grades and Standards for Nursery Plants" unless otherwise specified. Plants with cracked or loose balls will be rejected.

6. Spaded Trees and Palms: Provide trees spaded from a commercial nursery field. Use tree spades capable of appropriately moving trees up to the caliper shown. Dig plants with firm balls of earth sufficient in diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Increase root ball diameter to at least 8” greater than the sizes recommended by the “Grades and Standards for Nursery Plants,” unless otherwise specified.
7. Fabric Container Grown Trees: Fabric container grown trees are not allowed.

B. TREES: Provide a “Florida Fancy” tree conforming to the following.

1. Single Trunk Tree: A tree with a single, relatively straight, vertical trunk of the specified caliper growing with a single leader to the top of the tree crown

unless specified as muti-trunked. If the leader was headed, a new leader (with a live terminal bud) at least one-half the diameter of the pruning cut shall be present. The specified trunk caliper is the minimum acceptable caliper size. If the trunk divides into 2 equal diameter stems in the top 10% of the tree, the tree is still considered Florida Fancy. A tree specified as single trunk with multiple leaders in the lower 90% of the tree height will be rejected.

2. Multi-trunked Tree: A tree with the specified number of trunks, each trunk originating from the root ball and extending to about the same height as the other trunks to create a uniform shaped crown. The Contract Manager may approve additional trunks, if requested.
3. Trunk

    a. Free of wounds that penetrate to the wood (properly made pruning cuts, closed or not, are acceptable and are not considered wounds), sunburned areas, conks (fungal fruiting bodies), wood cracks, sap leakage, signs of boring insects, galls, cankers, girdling ties, or lesions (mechanical injury).
    b. Caliper and taper are sufficient so that the lower five feet of the trunk remains vertical without a stake. An auxiliary stake may be used to maintain a straight leader in the upper half of the tree.
    c. Tree clear trunk is not more than 40% of the total tree height.

4. Tree Crown: The form and density of crown is typical for a young single trunk or multi-trunk specimen of the species or cultivar.
5. Leaves: The size, color, and appearance of leaves is typical for the time of year and stage of growth of the species or cultivar. Tree shall not show wilted, shriveled or dead leaves, which is an indication of prolonged moisture stress or over watering.
6. Branching:

    a. Shoot growth (length and diameter) throughout the crown is appropriate for the age and size of the species or cultivar.
    b. Tree is free of dead, diseased, broken, distorted, or otherwise injured branches.
    c. Branch diameter is no larger than two-thirds (one-half is preferred) the diameter of the central leader measured 1 inch above the branch union.

       The major lateral branches (scaffold branches) are free of “V’ crotches of included bark where the branches are attached to the trunk, or where two main trunks are attached. Trees with a natural growth habit that produce numerous V crotches (i.e., winged elm. Chinese elm) may be accepted.

7. Roots:

    a. Roots are reasonably free of scrapes, broken or split wood and injury from biotic (insects and pathogens) and abiotic (e.g., herbicide toxicity and salt injury) agents.
    b. There are a minimum of three structural roots reasonably distributed around the trunk (not clustered on one side); two of the structural roots reaching the edges of the root ball.
    c. The root collar is no more than 2 inches below the root ball soil.
    d. The root system is reasonably free of stem girdling roots or kinked roots.

C. PALMS: Provide "Florida Fancy" palms conforming to the following:

1. A Single, straight trunk with the specified clear trunk height measured from the original soil line to the point in the canopy where the trunk caliper begins to taper abruptly. **Measure palm trunk caliper 3 feet above the top of the root ball.** The practice of either burying taller palms below the original soil line of the root ball or raising short palms by exposing part of the root ball above the original soil line to achieve the specified height is not allowed. Ship cabbage palms with a "hurricane cut," unless specified as a "regenerated" cabbage palm."
2. Palm Minimum Leaf Count and Root Ball dimension (Florida Fancy Grade): A minimum leaf count of excellent leaves and root ball measurements listed below unless modified by the plant schedule. Palm root ball measurement is the horizonal distance from the lowest part of the trunk or trunks exclusive of exposed roots or persistent leaf bases to the outside edge of the root ball. The total root ball diameter is the trunk diameter at the lowest part of the trunk plus two times the root ball dimensions shown below.

    a. Sabal Palmetto, Cropped: No leaves and 2-inch root ball measurement.
    b. Sabal Palmetto, Regenerated: Minimum 4 leaves and 4-inch root ball measurement.
    c. Washingtonia Robusta: Minimum 8 leaves and 12-inch root ball measurement
    d. Phoenix dactylifera: Minimum 29 leaves and a 12-inch root ball measurement.
    e. Phoenix decora or decipiens: Minimum 29 leaves and a 12-inch root ball measurement.
    f. For other palms refer to Table 1 in the Florida Grades and Standards for the minimum leaf count and root ball measurement.

3. A minimum root ball depth of 3.5 feet. Provide palm root balls with a flat bottom perpendicular to the trunk.

2.3 TOPSOIL

A. Fine sand or loamy fine sand indigenous to the area suitable for plant growth that is free of weeds, roots, stumps, rocks larger than ½" diameter, organic muck, hard pan, toxic substances detrimental to plant growth, and construction debris such as limerock, concrete, and asphalt pieces. Deliver in a normally moist condition, neither muddy nor wet. Soil used for topsoil shall meet the following criteria measured in accordance with the appropriate AASHTO and ASTM standard:

1.	USDA Texture:	Fine Sand, Loamy Fine Sand
2.	AASHTO Classification:	A-3
3.	pH	5.0-7.5
4.	Deleterious Material	0-2% maximum by mass
5.	(rocks, roots, sod)	
6.	Organic Matter Content	1-10% by mass
7.	Sand Content	80-96% by mass
8.	Silt & Clay Content	3-10% by mass

B. Submit a one-quart sample of the topsoil to the Engineer before beginning planting and obtain approval. If requested by the Engineer, submit a soil test report from a commercial soil testing laboratory to verify compliance with the above criteria.

2.4 EXISTING SOIL: Use existing soil in plant pits if the soil complies with the standard for topsoil, unless the soil is contaminated with limerock, clay, brush, weeds, roots, stumps, stones larger than 1 1/2 inches in any dimension, litter and other extraneous or toxic matter harmful to plant growth. Remove contaminated soil and replace with acceptable stockpiled existing soil or new topsoil.

2.5 YARD SAND: Coarse, clean yellow sand, commonly called "yard sand" that is free of limerock, clay, silt, brush, weeds, roots, stumps, gravel, litter and other extraneous or toxic matter harmful to plant growth.

2.6 SOIL CONDITIONER: Provide 100% organic soil conditioner, free of limerock, clay, brush, weeds, roots, stumps, gravel, litter and other extraneous or toxic matter harmful to plant growth. Soil conditioner shall be one of the following:

A. Pine Bark Fines. 100% pine bark fines screened from other pine bark products.in accordance with standards of the Mulch & Soil Council (Web: www.mulchandsoilcouncil.org) with a maximum of 15% pine wood content and at least 90% of particle size 1/4" or less.

B. Compost: A commercially blended and ground mixture of yard waste, tree trimmings, manure, and other biodegradable materials composted at a temperature and for the time necessary for the biological decomposition of the material, which significantly reduces the viability of pathogens and weed seeds, stabilizes carbon, produces high fungal material to benefit plant growth. Compost shall meet the following US Compost Council STA/MECC criteria.

Stability:	≤2 mg CO2-C per G OM per day
Maturity:	90-100% seed emergence and vigor
Moisture Content	35-60% wet weight
Organic Matter Content	35-60% dry weight
Particle Size	3/8”-1/2” screen size to pass through
pH	6.0-7.5
Soluble Salts	Max. 5 dS/m (mmhos/cm) dry weight basis
Physical Contaminants	≤0.5% dry weight basis
Chemical Contaminants	meet or exceed US EPA Class A standard, 40CFR § 503.13 Tables 1 and 3
Biological Contaminants	meet or exceed US EPA Class A standard 40CFR § 503.32(a)

C. Soil Mix: Soil Mix #3 by “Mulch Masters, Inc. Landscape Supply Company” or approved equal.

2.7 FERTILIZER

A. General Use: Granulated commercial grade fertilizer with a ratio of nitrogen (N), phosphorous (P), and potassium (K) recommended by the soil test. The fertilizer shall contain minor elements of iron (Fe), manganese (Mn), and sulfur (S), and trace amounts of zinc (Zn), copper (Cu) and boron (B). Provide 30-50% of N in slow-release form. If a soil test is waived by the Engineer, then the fertilizer shall contain a ratio of N/P/K close to 1/0/1.

B. Palm Fertilizer: Commercial grade fertilizer of nitrogen (N), phosphorous, (phosphate) (P), potassium (potash) (K) and magnesium (Mg) in a ratio of 8/4/12/4 or 8/2/12/4. The fertilizer shall also contain 1-2% iron (Fe), 1-2% manganese (Mn) and trace amounts of Zink (Zn), copper (Cu) and boron (B). Provide 50% of N, K and Mg in slow-release form.

2.8 SURFACE MULCH: Wood and/or bark mulch free of weed seeds, and other organic or inorganic materials. Provide mulch noted on the drawings. If not noted on the drawings, then the mulch can be one of the following.

A. Pine Bark: Ground bark nuggets derived from the genus Pinus with particle size from 0.75” to 1.75” and maximum wood content of 15%.

B. Pine Straw: Pine needles harvested from pine grooves and then baled with a maximum wood content of 5%.

C. Eucalyptus Mulch: Shredded and screened wood and bark of the genus Eucalyptus with no fillers or sawdust.

D. Melaluka Mulch: Wood and bark of the melaleuca quinquenervia tree shredded and chipped to a particle size not larger than ¾ inch diameter and a length of 1½” and then cured at a high temperature to kill seeds. Bark content not to exceed 10% by volume. Provide *Florimulch* manufacture by Forestry Resources Inc. or approved equal.

2.9 ROOTBALL ANCHORING SYSTEM

A. Anchor System 1:

1. Four 2 x 2 untreated pine posts, pointed on one end or four steel u-channel fence posts with a length equal to the depth of the root ball plus 2 feet into undisturbed soil.
2. Two 2 x 2 untreated pine horizontal anchor boards with a length equal to the diameter the root ball.
3. 3” long galvanized wood screws to connect the stakes and the horizontal boards.

B. Anchor System 2 and 3:

1. “Terra Toggle” Root ball Anchor System by *Tree Stake Solutions* (407) 913-7077 or approved equal.
2. Each anchor includes: two plastic or metal toggles rated at 1000 lb. pull out strength, a ¾” wide, orange UV stabilized woven polyester strap rated at 2400 lb. break strength, one ¾” dichromate coated wire cinch buckle, and one 2 x 4 or 2 x 6 untreated pine plank with a length equal to the diameter of the root ball.
3. Installation tools: tensioning tool, metal water jet, or drive rod driven with slide hammer.

2.10 GUYING AND STAKING MATERIAL – SLOPES OF 4:1 OR GREATER

A. Tree stakes: Three 15" steel eye anchors, 1" dia. eye opening

B. Guy Straps: Green, 3/4 inch wide flat woven green polypropylene straps with a 900 lb. break strength. Use "ArborTie" manufactured by *Deep Root Green Infrastructure* (info@deeproot.com) or approved equal.

2.11 PRE-EMERGENT OR POST-EMERGENT HERBICIDE: Granular or liquid herbicide approved by the Engineer that will control annual grasses and many broadleaf weeds and that is labeled safe for use with the plants in the project.

2.12 NON-SELECTIVE HERBICIDE: Non-selective liquid herbicide, such as 'Roundup, that will kill live vegetation and roots.

2.13 PORTABLE WATERING BAG: Nylon-reinforced, 12mil, UV treated polyethylene portable watering bag or other alternative watering bag system which is wrapped around the trunk of a tree or palm that can slowly apply a minimum of 15 gallons of water through slow-release emitters with each application.

2.14 TEMPORARY IRRIGATION SYSTEM: A run of PVC pipe and emitters with a water truck connection constructed to deliver water from the water truck to a cluster of installed plants. System is typically removed at the end of the maintenance period.

2.15 WATER

A. Provide water of suitable quality for healthy plant growth.

B. If a new automatic irrigation system is included with the construction of the landscaping, then the contractor shall pay for all irrigation water consumption during construction and until Initial Acceptance of the landscaping. The City shall pay for irrigation water consumption beginning on the date of Initial Acceptance, during the plant establishment period and until Final Acceptance of the landscaping.

C. If landscaping is not covered by a permanent irrigation system, the contractor shall pay for all irrigation water consumption during construction, through the Initial Acceptance of the landscaping, during the plant establishment period, and until Final Acceptance.

PART 3 EXECUTION

3.1 PLANT BED LAYOUT AND INSPECTION:

A. Notify the Project Manager 5 business days before the scheduled plant layout. Do not begin planting work until the layout is approved.

B. Identify with wood stakes, survey flags, or paint the location of each individual tree and palm and the limits of multiple plant beds. When completed, request a layout inspection by the Engineer. Make minor adjustments to the layout requested by Engineer during the inspection.

3.2 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged materials: Deliver packaged materials in original containers and protect from deterioration.

B. Plant Shipment

1. Grower shall water root balls just before shipping. Label at least one representative plant of each specified species and variety with a securely attached waterproof tag bearing the botanical and common name, if requested.
2. Ship cabbage palms specified as “hurricane cut” or “cropped” with all fronds removed. Ship regenerated cabbage palms and other palms with dead fronds and fronds below horizontal removed (up to 2/3 of the oldest fronds can be removed). Lift-up remaining fronds in an upright position and tie fronds into a bundle with biodegradable twine. Keep frond bundle tied until after the palm planting is completed and for the additional time recommended by the palm supplier.
3. Provide protective covering over trees and palms during shipment. Tie down trees and palms to the trailer bed to prevent rolling during shipment. Ship other plants in enclosed trucks. Do not bend or bind-tie plants in such a way that will damage bark, break branches, or destroy natural shape. Do not leave plants in trucks parked in the sun during hot weather unless air-conditioned.
4. Do not lift trees by the trunk when unloading. Lift B&B trees under the root ball or by the wire loops if there is a wire basket. Lift large, containerized trees with a forklift under the container. Lift smaller plants by the root ball or by the lips of the container, not by stems or trunks. Keep container grown stock in containers until planting time.

5. Do not free-fall, drag, roll, strain the bud or otherwise abuse palms. Mechanically lift and relocate palms with a protective device around the trunk to prevent damage to the bud and trunk.
6. Place plants in an irrigated holding area where plants are protected from sun and wind whether at the grower's nursery, at the landscape contractor's yard, or at the project site if plants are stored out of the ground for more than 24 hours after delivery to the Contractor or to the site. Set plants in an erect position. Cover root balls of B&B plants with mulch or straw. Irrigate plants to keep roots moist and to prevent wilting until planting.
7. Deliver plants to the job site only after the planting preparation for a landscape area has been completed and when there is adequate storage space for the delivered landscape material. If a suitable remote staging area is needed, provide at no additional cost to the City.

3.3 COMMENCEMENT OF LANDSCAPE WORK: Commence landscape work once the following tasks are complete.

A. the permanent irrigation system is operational in the areas to be planted or an approved alternative means of watering has been provided.

B. The Engineer has inspected and approved the plants either at the holding area or job site.

C. The Engineer has approved the plant layout or has waived the inspection.

D. Work by others that may damage the landscaping is completed.

E. Work necessary for proper landscape installation is completed.

3.4 TREE PLANTING DEMONSTRATION: Before planting begins, the Engineer will select a tree planting site shown on the landscape plan for a demonstration tree planting. With the Engineer present, demonstrate the ability to install a tree in accordance with the planting specifications, including soil replacement, soil amendments, root ball correction, (removal of soil and roots above root collar and deflected structural roots), placing tree, backfilling, watering, root ball anchoring, and mulching. After requested adjustments are made, this tree will be used as a standard for all other tree planting. If site conditions require the planting of trees on mounds in areas with poor drainage or on slopes 4:1 or greater, a demonstration tree planting for each condition is also required.

3.5 CORRECTION OF SOIL COMPACTION DURING PLANT DELIVERY AND INSTALLATION:

A. Minimize soil compaction in landscaped areas during delivery to planting sites, digging plant holes, and installing plants.

B. Complete the installation of trees and palms before soil preparation and tilling if heavy mechanized equipment is used for delivery and planting.

3.6 CORRECTION OF CONDITIONS DETRIMENTAL TO PLANT GROWTH

A. When conditions detrimental to plant growth, such as poor drainage, hardpan of clay or silt, rubble fill, obstructions, limerock, petroleum products, and construction debris are encountered during the landscape work, cease landscape work in the affected area and immediately notify Engineer.

B. After the Engineer's review, excavate the area of contaminated soil to the depth approved by the Engineer. If the soil is contaminated by the Contractor's construction operations, then remove and replace with topsoil or yard sand at no additional cost to the City. If contaminated soil is discovered that appears by the Engineer to be pre-existing before the beginning of construction operations, and not identified for removal by the contract documents, then the cost of removal of contaminated soil and replacement with new topsoil or yard sand will be in accordance with the price established by the contract documents.

3.7 REMOVAL OF EXISTING VEGETATION AND DEBRIS IN PLANT BEDS

A. Remove bottles, boards, construction materials, limerock, and other debris to a depth of 6 inches inside all plant beds.

B. If there is no vegetation in plant beds, proceed to bed preparation.

C. Remove existing vegetation throughout the entire limit of multiple plant beds and within the required circumference of each individual tree or palm bed.

D. In plant beds free of surface roots from existing trees remove existing vegetation with a sod cutter or other equipment with blades of sufficient depth to remove the entire plant and root system in one operation. DO NOT REMOVE EXISTING VEGETATION WITH A ROTOTILLER OR OTHER MACHINE THAT WILL BREAK THE ROOTS IN SMALL PIECES DURING THE OPERATION.

E. Where living vegetation still remains in the new plant beds containing extensive surface roots of existing trees, remove all top growth and roots of existing vegetation in a manner that will not damage existing tree roots.

F. Do not remove existing vegetation with a rototiller or other machine that will break the roots into small pieces.

3.8 EXCAVATION OF EXISTING SOIL IN PLANT BEDS WITHIN MEDIANS AND PARKING LOT ISLANDS

A. Excavation of Tree & Palm Plant Beds: After a plant bed is clear of all vegetation, excavate the existing soil within each individual tree or palm location to the depth of the root ball less 2" and a width equal to the root ball diameter plus 24". and multiple plant bed so that the soil level in the bed is 12" below the finish level of the adjacent turf, pavement, or curb. Remove surplus soil, limerock, stones over 1½", sticks, roots, rubbish, and other extraneous matter exposed by this operation. Extend excavation below the location of each tree as detailed if the root ball vertical dimension is greater than 26".

B. Excavation of Plant Beds in Medians and Parking Lot Islands: Extend excavation of existing soil to a depth of 24 inches.

C. Notify the Engineer if the existing soil at the bottom of the tree pit is contaminated with limerock or other debris detrimental to plant growth. After the Engineer's review, excavate the contaminated soil underneath each tree root ball equal to the diameter of the root ball plus 2' and to the depth approved by the Engineer. Remove and replace with yellow sand or topsoil. Soil replacement shall be paid at the unit price established in the proposal.

3.9 PLANT BED PREPARATION

A. After the existing soil has been removed, backfill each bed with topsoil so that the topsoil layer is 17" deep. Adjust the level of the topsoil by excavation or by the application of additional soil in plant beds so that after the application of the soil conditioner, and grading, the soil mix layer at the edge of the beds is 4" below adjacent turf, pavement, or curbs.

B. Spread soil conditioner throughout all individual and multiple plant beds to a minimum depth of 3" (9.2 cub. yds. per 1000 sq. ft.). Obtain Engineer's approval before proceeding further.

C. The application and incorporation of soil conditioner into individual tree and palm beds may be delayed until after the plant has been placed, so long as the finish soil level is 2" below the top of the root ball and 4" below adjacent turf, pavement or curbs.

D. After the Engineer has approved the application of soil conditioner, mix soil conditioner into the top 9" of topsoil to achieve a uniform mixture of 1/4 soil

conditioner and ¾ topsoil to a depth of 12". In areas free of tree surface roots, use a rototiller to mix soil amendments into existing soil. In areas with surface roots, mix soil amendments into existing soil by hand.

E. Add or remove soil mix necessary to remove ridges and fill depressions so that the soil mix layer at the edge of the plant beds is 4" below adjacent turf, pavement, or curbs. Rake to a smooth, even surface with a loose, uniformly fine texture.

F. If the soil is very dry before planting, water soil sufficiently to moisten the prepared areas. Do not create a muddy soil condition.

3.10 EXCAVATION OF TREE OR PALM PLANTING PITS: Excavate pit with a surface diameter 2 feet larger than the diameter of the root ball and with a depth that will leave top of the root ball 2" above the soil mix layer. If planting date palms, excavate the pit 12" deeper to allow for a layer of yellow sand below the root ball.

3.11 PLANTING

A. General

1. Keep container grown stock in containers until planting time. Pick up plants by ball or container, not by stems or trunks.
2. Perform work in accordance with sound horticultural practice in North Florida.

B. Planting Trees

1. Root Ball Correction Before Planting

a. Container Grown Trees:

1) Remove container before planting. If the first root emerging from the trunk is not visible on the root ball surface, then remove the upper soil layer until the upper structural root is exposed. Remove secondary roots growing over the structural roots.
2) Shave off the outside 1" to 2" layer of roots from the top, sides and bottom of the root ball to remove all circling, descending, and matted root segments not growing radial to the trunk.

b. B&B Trees:

1) If the first root emerging from the trunk is not visible on the root ball surface, then remove the upper soil layer until the upper

structural root is exposed. Remove secondary roots growing over the structural root and the root collar.

2) Remove all plastic shrink-wrap, straps, and twine from the trunk and the root ball. Before planting, remove roots growing through the burlap and up, down or around the root ball. Also remove the burlap and wire cage from the top of the root ball and the top one or two bands of the wire basket down the sides of the root ball after the tree is properly placed in the pit. Do not bury synthetic fabric in the planting pit.

2. Set the tree plumb in the center of the pit and orient for best appearance.
3. Adjust the depth of the pit so that the top of the root ball is 2" above the soil mix layer.
4. Backfill tree pit with soil mix excavated from the pit. Backfill in 12-inch layers until the soil is 2" below the top of the root ball. Water in and compact each soil layer to eliminate voids. Apply at least 5 gallons of water per inch of trunk caliper during planting and backfilling.

C. Planting Palms

1. Do not free-fall, drag, roll or abuse palms or put a strain on the crown (bud area) at any time. Use a protective device around the trunk of the tree while lifting and relocating. Do not injure the bud, or scar or skin the trunk in any way.
2. For date palms only, place a compacted 12" layer of yellow yard sand in the bottom of the palm pit before planting the palm.
3. Set all palms plumb in the center of the pit and orient for best appearance. If the root ball is B&B, remove twine, shrink-wrap, burlap and wire cage as described for B&B trees. Adjust the depth of the pit so that the top of the root ball is 2" above the soil mix layer.
4. Where underground utilities interfere with the root ball, clear utilities by carefully notching the root ball around the utilities, not by raising the root ball above the finish grade.
5. If the first root emerging from the trunk is not visible on the root ball surface, carefully remove soil from the top of the root ball next to the trunk until the uppermost root is exposed or within 2" of the root ball surface. Pull away soil from the rest of the root ball surface down to the same point. Cut away exposed circling roots.
6. After the palm is set, backfill with soil mix excavated from the pit. Backfill pit with yard sand if the palm tree is a date palm. Backfill soil in 12" layers until the soil is level with adjacent soil mix. Water in and compact each layer to eliminate voids. Apply at least 5 gallons of water per inch of trunk caliper during planting and backfilling.

7. Contain water applied to the root ball with a 3-4” high temporary earthen dam immediately around the edge of the root ball.
8. After planting, remove excess soil and rake plant bed to a smooth even surface conforming to required soil grade, and so that the soil mix level at the edge of the plant bed is 4” below adjacent turf, pavement, or curbs.
9. Place a 3-4” high immediately apply at least 2" of water throughout each bed. If a temporary dam is desired around the edge of the root ball to help contain the water, then construct the dam with the mulch layer; do not use soil for the dam.

D. Planting Shrubs and Groundcovers.

1. Place shrubs and groundcovers where shown and as detailed, using the specified spacing and in accordance with the planting detail shown on the drawings.
2. If the plant is in a container, remove container before planting. If the plant is balled and burlapped, remove twine and burlap completely from the ball before planting. If the plant is in a 1-gallon container or larger, remove container and shave off the outside layer of roots from all sides and bottom of the root ball to remove root defects before planting. Excavate each pit to slightly larger than the root ball area and with slightly less depth than the root ball. Set plant plumb in center of the pit. If the plant has a root ball smaller than a 1-gallon pot, set the plant so that the top 10% of the root ball is above the level of the soil mix layer. If the root ball is equal to 1-gallon or larger, set the plant so that the top 1½” of the ball is above the soil mix layer. Backfill remainder of pit with excavated soil mix and compact to eliminate voids. Keep top of the root-ball free of any soil.
3. Immediately apply at least 2" of water throughout each bed. If a temporary dam is desired around the edge of each root ball to contain the water, then construct the dam with the surrounding soil.

3.12 PLANTING IN MARGINAL WET AREAS

A. If during the excavation of the plant pits water saturated soil is encountered in the very bottom of the pit, stop work and notify the Engineer. The Engineer may approve the planting if the bottom of the root ball can be raised at least 6” above the water table and no higher that two feet above the existing surrounding grades. In multiple plant beds, raise the entire plant bed to the height requested. Otherwise, the plant bed will be deleted or relocated on the site.

B. Fill the pit with existing soil until the entire root ball, when installed, will be above the water table.

C. After the plant is installed, place existing soil against the exposed sides of the root ball to create an earth mound around the root ball with a 4:1 maximum slope from the edge of the root ball to the edge of the bed.

D. Complete planting as specified for plants.

E. The City will pay for the labor and materials to raise the beds above existing grade with additional soil at the negotiated price for soil replacement or by the unit price established in the bid proposal.

3.13 PLANTING ON SLOPES: When planting on a slope, form a level platform by cutting into the slope on the back side of the tree and then using the cut soil as fill on the front side of the tree so that the volume of cut and fill are equal. The level platform for a shrub or groundcover shall be twice the diameter of the root ball; for a tree or palm, equal to the diameter of the root ball plus 1 foot.

3.14 FINISHING PLANT BEDS

A. After planting, remove excess soil and rake plant beds to a smooth even surface after plants are installed so that the soil mix grade at the edge of the plant beds is 4” below adjacent turf, pavement, or curbs to allow for a 3” layer of mulch, leaving 1” between the top of the mulch and the top of the adjacent turf, pavement or curb. Keep top of each root ball free of any soil.

B. Immediately apply at least 2” of water throughout each bed. DO NOT USE SOIL DAMS around the edge of the root ball. If a temporary dam is desired around the edge of the root ball to help contain the water, then form the dam with the thicker layer of surface mulch.

3.15 WATERING

A. General: Water plants sufficiently to keep roots moist, but not saturated and as needed for the healthy growth and to prevent wilting. (The Agriculture Extension Service recommends watering daily for at least one month after installation during the growing season when there is no rain). Following a rainfall, delay watering until all free moisture has drained from the soil.

B. After initial watering, where plants are not covered by an automatic irrigation system, provide temporary watering using water bags and/or a temporary irrigation system that will provide to each plant during each watering cycle.

C. If water bags are used to water trees and palms, place water bag around the trunk and fill with water in accordance with manufacturer's instructions to provide a slow water drip of at least 4 hours. Fill water bag with each subsequent watering.

D. If a temporary irrigation system is used, connect the system to a water truck or other water source and pump water until the specified volume of water in the tables below is delivered to each plant through emitters. Apply at a rate that will allow the water to soak into the root ball without runoff.

E. Maintain each water bag or temporary irrigation system in working condition throughout the installation and maintenance period and until final acceptance. Immediately repair or replace each water bag or temporary irrigation system that is damaged, stolen or malfunctioning.

3.16 PRUNING

A. Prune plants in accordance with standard horticulture practice and no less than once every six (6) months. Prune to remove suckers, dead, injured or diseased wood, and to achieve a uniform shape natural to each species. Required plant sizes are after pruning. Replace excessively pruned or malformed plants. Do not cut tree leaders except for tip pruning.

B. Prune crape myrtles, ligustrums, and other multi-trunked trees to remove suckers or water sprouts growing from the root ball and from the lower portion of the main trunks. Also remove small, twiggy growth that has developed underneath and within the tree canopy.

C. Crape myrtles: Cut back the tips of all stems approximately one foot to promote branching and blooming. Maintain upright branching character by removing branches that are drooping below a 30-degree angle from vertical. Extend pruning to create a very upright branching tree with a full, gently rounded crown.

3.17 TREE AND PALM ACHORING

A. General: Anchor trees and palms to maintain them in a vertical alignment.

B. Trees: Anchor tree root balls as detailed using "Anchor System 1 or 2."

C. Anchor palm root balls, except date palms, as detailed using Anchor System 1 or 2". Anchor date palms as detailed "Anchor System 2".

3.18 MULCHING: Apply sufficient mulch to maintain 3 inches of mulch in all beds. Rake to neat, finished appearance. Top of mulch to be 1" below adjacent top of pavement, curb

or lawn. Pull mulch 8” away from each tree and palm trunk and 3” away from the main stem of smaller plants.

3.19 FERTILIZING

A. Trees: Immediately after planting, spread 1 cup of tree fertilizer evenly over the root ball and 1’ beyond in accordance with manufacturer’s instructions.

B. Palms: Immediately after planting, spread 1 ½ pounds of palm fertilizer evenly in a 2’ band around the root ball in accordance with manufacturer’s instructions.

C. Multiple Plant Beds: Apply fertilizer at a rate to achieve 1 lb. of nitrogen per 1000 square feet of bed area.

3.20 APPLICATION OF PRE-EMERGENT HERBICIDE: Rake mulch smooth and apply pre-emergent herbicide throughout all beds. Apply herbicide at the recommended manufacturer’s rates and in strict accordance with the label instructions.

3.21 SUBSTANTIAL COMPLETION INSPECTION AND ACCEPTANCE

A. Inspection shall be made by the Engineer within ten days of written notification from the Contractor that installation is complete.

B. Plants shall be acceptable if in “healthy, vigorous condition” and are in compliance with both the specific specifications for each named plant and the general specifications for all plants.

C. Replace rejected work within 14 days of notification and continue specified maintenance until re-inspected and found to be acceptable. Remove rejected plants and materials promptly from project site.

3.22 MAINTENANCE PERIOD

A. See Specification Section 147-LANDSCAPE MAINTENANCE for specific maintenance requirements.

B. Begin maintenance of landscape work immediately after each area is planted and continue until Initial Acceptance, through the specified maintenance period, and until Final Acceptance of the landscaping.

3.23 LANDSCAPE WARRANTY IF LANDSCAPE MAINTENANCE IS INCLUDED DURING THE WARRANTY PERIOD

A. Warranty that all plants will remain in "healthy, vigorous condition" and meet specifications during the Warranty period from the date of of Substantial Completion until the date of Final Acceptance.

B. If the Final Inspection occurs in the dormant season, then the warranty of deciduous plants shall be extended until the deciduous plants are in full green leaf after dormancy and can be inspected and approved by the Engineer.

3.24 MONTORING OF LANDSCAPE MAINTENANCE BY OTHERS DURING THE WARRANTY PERIOD

A. If landscape maintenance during the Warranty period is not included in the bid price but is provided by the City, the Contractor's warranty remains in effect, so long as the City maintains the plants in a healthy, vigorous condition.

B. To ensure that the plants remain in "healthy, vigorous condition," the Contractor must monitor the City's landscape maintenance during the Warranty period. Make at least 1 visit per month to observe the Owner's maintenance. If maintenance, including watering, is not sufficient to maintain plants in a healthy condition, immediately notify the Engineer in writing describing the problems with the maintenance and the corrective action required so that the Engineer can take corrective action.

C. If the Contractor fails to visit the site and notify the Engineer, in writing, of the maintenance deficiencies, then the lack of maintenance cannot be used by the Contractor as grounds for voiding or modifying the provisions of the warranty.

D. If the City discovers conditions during the warranty period that are not in conformance with the landscape specifications, the Contractor shall take corrective action upon the Engineer's notification.

3.25 FINAL INSPECTION AND ACCEPTANCE

A. When maintenance work is complete, submit written notification to the Engineer. The Engineer shall conduct a final inspection within 10 days after receipt of the Contractor's notification.

B. Plants: Plants shall be acceptable if they are in "healthy, vigorous condition" and remain in compliance with both the specific specifications for each plant named and the general specifications for all plants.

C. Plant Beds: Plant beds shall be acceptable if the plant beds are free of weeds, are well drained and are covered by a uniform layer of mulch of the specified thickness.

D. Replace rejected work with 14 days of notification. Continue landscape maintenance until work is re-inspected and found acceptable.

3.26 MEASUREMENT AND PAYMENT: Measurement and payment of landscaping, completed and accepted, is established in the proposal either as a lump sum or on a unit price basis. The price includes all work specified in this section including materials, soil preparation, planting, watering, pruning, staking, mulching and landscape maintenance until the Initial Acceptance. The price also includes the cost of maintenance during the warrant period, if included in the scope of work.

3.27 REPLACEMENTS AND CONDITIONS

A. The specified plant warranty, including the maintenance, inspection, and acceptance provisions, shall apply to replacement plants. All plants that do not meet specifications or do not reflect a healthy, vigorous condition as specified under Section 144.11 Plants shall be rejected and replaced immediately. All plant material shall meet this criterion at the end of the maintenance period.

B. Replacements shall comply with specified requirements for new plants.

C. After the Substantial Completion acceptance date, the Contractor will not be responsible for damage to work resulting from: neglect by Owner; damage by others; abnormal weather conditions such as floods, excessive winds, severe freezing or abnormal rains; or activities by others beyond the Contractor's control.

END OF SECTION 601

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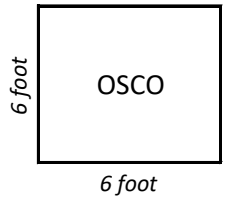
SMALL TREE
MINIMUM 300 CF of Soil Volume



OSCO is 6' x 6' = 36 SF
@ 2 foot depth = 72 CF

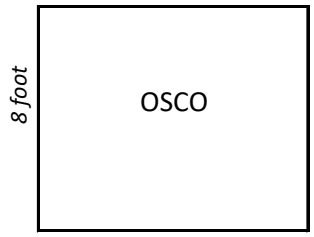
300 CF Req'd Soil Volume
SilvaCell = 114 sf @ 2' depth
SilvacCell = 228 CF @ $19 = **$4,332**

OSCO is 6' x 6' = 36 SF
@ 2.5 foot depth = 90 CF

300 CF Req'd Soil Volume
SilvaCell = 84 sf @ 2.5' depth
SilvacCell = 210 CF @ $19 = **$3,990**

OSCO is 6' x 6' = 36 SF
@ 3 foot depth = 108 CF

300 CF Req'd Soil Volume
SilvaCell = 64 sf @ 3' depth
SilvacCell = 192 CF @ $19 = **$3,648**



OSCO is 8' x 8' = 64 SF
@ 2 foot depth = 128 CF

300 CF Req'd Soil Volume
SilvaCell = 86 sf @ 2' depth
SilvacCell = 172 CF @ $19 = **$3,268**

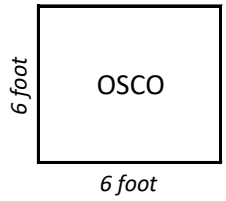
OSCO is 8' x 8' = 64 SF
@ 2.5 foot depth = 160 CF

300 CF Req'd Soil Volume
SilvaCell = 56 sf @ 2.5' depth
SilvacCell = 140 CF @ $19 = **$2,660**

OSCO is 8' x 8' = 64 SF
@ 3 foot depth = 192 CF

300 CF Req'd Soil Volume
SilvaCell = 36 sf @ 3' depth
SilvacCell = 108 CF @ $19 = **$2,052**

MEDIUM TREE
MINIMUM 1,200 CF of Soil Volume



OSCO is 6' x 6' = 36 SF
@ 2.5 foot depth = 90 CF

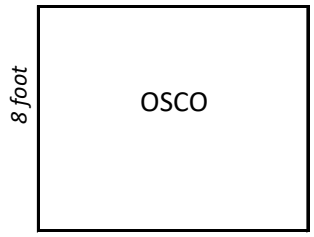
1,200 CF Req'd Soil Volume
SilvaCell = 444 sf @ 2.5' depth
SilvacCell = 1,110 CF @ $19 = **$21,090**

OSCO is 6' x 6' = 36 SF
@ 3 foot depth = 108 CF

1,200 CF Req'd Soil Volume
SilvaCell = 364 sf @ 3' depth
SilvacCell = 1,092 CF @ $19 = **$20,748**

OSCO is 6' x 6' = 36 SF
@ 4 foot depth = 256 CF

1,200 CF Req'd Soil Volume
SilvaCell = 236 sf @ 4' depth
SilvacCell = 944 CF @ $19 = **$17,936**



OSCO is 8' x 8' = 64 SF
@ 2.5 foot depth = 160 CF

1,200 CF Req'd Soil Volume
SilvaCell = 416 sf @ 2.5' depth
SilvacCell = 1,040 CF @ $19 = **$19,760**

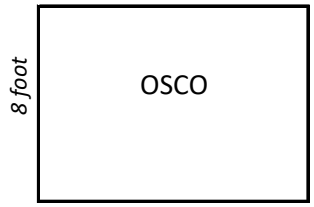
OSCO is 8' x 8' = 64 SF
@ 3 foot depth = 192 CF

1,200 CF Req'd Soil Volume
SilvaCell = 336 sf @3' depth
SilvacCell = 1,008 CF @ $19 = **$19,152**

OSCO is 8' x 8' = 64 SF
@ 4 foot depth = 256 CF

1,200 CF Req'd Soil Volume
SilvaCell = 236 sf @ 4' depth
SilvacCell = 944 CF @ $19 = **$17,936**

LARGE TREE
MINIMUM 1,800 CF of Soil Volume



OSCO is 8' x 8' = 64 SF
@ 2.5 foot depth = 160 CF

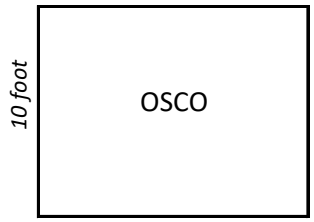
1,800 CF Req'd Soil Volume
SilvaCell = 656 sf @ 2.5' depth
SilvacCell = 1,640 CF @ $19 = **$31,160**

OSCO is 8' x 8' = 64 SF
@ 3 foot depth = 192 CF

1,800 CF Req'd Soil Volume
SilvaCell = 536 sf @ 3' depth
SilvacCell = 1,608 CF @ $19 = **$30,552**

OSCO is 8' x 8' = 64 SF
@ 4 foot depth = 256 CF

1,800 CF Req'd Soil Volume
SilvaCell = 386 sf @ 4' depth
SilvacCell = 1544 CF @ $19 = **$29,336**



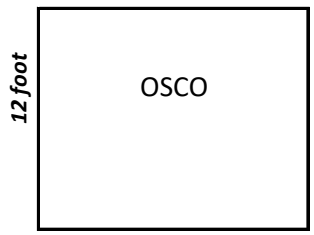
OSCO is 10' x 10' = 100 SF
@ 3 foot depth = 300 CF

1,800 CF Req'd Soil Volume
SilvaCell = 500 sf @ 3' depth
SilvacCell = 1,500 CF @ $19 = **$28,500**

OSCO is 10' x 10' = 100 SF
@ 4 foot depth = 400 CF

1,800 CF Req'd Soil Volume
SilvaCell = 350 sf @ 4' depth
SilvacCell = 1,400 CF @ $19 = **$26,600**

Live Oak



OSCO is 12' x 12' = 144 SF
@ 4 foot depth = 576 CF

1,800 CF Req'd Soil Volume

SilvaCell = 306 sf @ 4' depth
SilvacCell = 1,224 CF @ $19 = **$23,256**

Vertical Constraint Assessment - Tree Commission Approved Tree Planting List

	Tree Commission		Vertical constraint is 15' from CL trunk					Vertical constraint is 10' from CL trunk				
	Street Tree	**Mature SPRD**	SPRD = no prune	prune req'd? TC	prune extent	permitted tree?		SPRD = no prune	prune req'd? TC	prune extent	permitted tree?	
Small Trees						TC	656*				TC	656*
American Hornbeam	Y	30'	30'	N	0	Y	Y	20'	Y	5'	**N**	**Y**
Ashe Magnolia	**N**	20'					not street					not street
Eastern redbud	Y	25'	30'	N	0	Y	Y	20'	Y	2.5'	**N**	**Y**
Flatwoods Plum	Y	20'	30'	N	0	Y	Y	20'	N	0	Y	Y
Crape Myrtle	Y	25'	30'	N	0	Y	Y	20'	Y	2.5'	**N**	**Y**
Hawthorne	**N**	25'					not street					not street
Fringe Tree	Y	15'	30'	N	0	Y	Y	20'	N	0	Y	Y
Little Gem Magnolia	Y	10'	30'	N	0	Y	Y	20'	N	0	Y	Y
Yaupon Holly	Y	20'	30'	N	0	Y	Y	20'	N	0	Y	Y
Wax Leaf Ligustrum	Y	25'	30'	N	0	Y	Y	20'	Y	2.5'	**N**	**Y**
Wax Myrtle	Y	25'	30'	N	0	Y	Y	20'	Y	2.5'	**N**	**Y**
Walters Viburnum	Y	12'	30'	N	0	Y	Y	20'	N	0	**N**	**Y**
Medium Trees												
Althena Elm	Y	50'	30'	Y	10'	**N**	**Y**	20'	Y	15'	N	N
Bosque Elm	Y	50'	30'	Y	10'	**N**	**Y**	20'	Y	15'	N	N
Drake Elm	Y	50'	30'	Y	10'	**N**	**Y**	20'	Y	15'	N	N
Dahoon Holly	Y	12'	30'	N	0	Y	Y	20'	N	0	Y	Y
Eagleston Holly	Y	25'	30'	N	0	Y	Y	20'	Y	2.5'	**N**	**Y**
Japanese Blueberry	Y	40'	30'	Y	5'	**N**	**Y**	20'	Y	10'	N	N
Loquat	**N**	30'					not street					not street
East Palatka Holly	Y	25'	30'	N	0	Y	Y	20'	Y	2.5'	Y	Y
Sand Pine	**N**	40'					not street					not street
Sweetbay Magnolia	Y	50'	30'	Y	10'	**N**	**Y**	20'	Y	15'	N	N
Southern Red Cedar	Y	30'	30'	N	0	Y	Y	20'	Y	5'	N	N
Am Hophornbeam	Y	40'	30'	Y	5'	**N**	**Y**	20'	Y	10'	N	N
River Birch	Y	35'	30'	Y	2.5'	**N**	**Y**	20'	Y	7.5'	N	N
Winged Elm	Y	40'	30'	Y	5'	**N**	**Y**	20'	Y	10'	N	N

Vertical Constraint Assessment - Tree Commission Approved Tree Planting List

	Tree Commission		Vertical constraint is 15' from CL trunk					Vertical constraint is 10' from CL trunk				
	Street Tree	**Mature SPRD**	SPRD = no prune	prune req'd? TC	prune extent	permitted tree?		SPRD = no prune	prune req'd? TC	prune extent	permitted tree?	
Large Trees						TC	656*				TC	656*
Allee Elm	Y	60'	30'	Y	15'	**N**	**Y**	20'	Y	20'	N	N
Bald Cypress	Y	30'	30'	N	0	Y	Y	20'	Y	5'	N	N
Hickory	**N**	60'					not street					not street
Blackgum	Y	30'	30'	N	0	Y	Y	20'	Y	5'	N	N
Catalpa	**N**	60'					not street					not street
Live Oak	Y	120'	30'	Y	45'	**N**	**Y**	20'	Y	50'	N	N
Swamp Chestnut Oak	Y	50'	30'	Y	10'	**N**	**Y**	20'	Y	15'	N	N
Overcup Oak	Y	50'	30'	Y	10'	**N**	**Y**	20'	Y	15'	N	N
Laurel Oak	Y	60'	30'	Y	15'	**N**	**Y**	20'	Y	20'	N	N
Nuttall Oak	Y	50'	30'	Y	10'	**N**	**Y**	20'	Y	15'	N	N
Shumard Oak	Y	60'	30'	Y	15'	**N**	**Y**	20'	Y	20'	N	N
Persimmon	**N**	60'					not street					not street
Red Maple	Y	35'	30'	Y	2.5'	**N**	**Y**	20'	Y	7.5'	N	N
Loblolly Bay	**N**	70'					not street					not street
Leyland Cypress	Y	30'	30'	N	0	Y	Y	20'	Y	5'	N	N
Slash Pine	**N**	40'					not street					not street
Long Leaf Pine	Y	40'	30'	Y	5'	**N**	**Y**	20'	Y	10'	N	N
Southern Magnolia	Y	40'	30'	Y	5'	**N**	**Y**	20'	Y	10'	N	N
Sweetgum	Y	50'	30'	Y	10'	**N**	**Y**	20'	Y	15'	N	N
Sycamore	Y	70'	30'	Y	20'	**N**	**Y**	20'	Y	25'	N	N
Tulip Poplar	Y	50'	30'	Y	10'	**N**	**Y**	20'	Y	15'	N	N
Weeping Willow	**N**	70'					not street					not street

* City establishes standard for pruning in Section 656.1212, designating the pruning below the mature crown spread to be a code violation requiring tree replacement. Shade Tree mature crown spec referenced = 30 foot spread. Other trees = 15 feet.

Section 656.1212 - Maintenance and protection of landscaping and irrigation systems

(c) Required trees shall be allowed to develop into their natural habit of growth and shall not be topped, pleached or pruned into topiary, espalier or other unnatural shapes. Trees may be pruned to maintain health and vigor be removal or dead, damaged or crowded limbs, diseased and insect infested limbs, and branches which rub other branches. If trees are pruned in a manner which would prevent them from reaching the mature crown spread below the requirement of Section 656.1211 (e)(3), then the property owner shall provide for mitigation of such trees.