Jacksonville Tree Commission

TASK FORCE ON URBAN TREE PLANTING BEST PRACTICES
March 20, 2025 11:00am - 3:00pm
Ed Ball Building, 10th Floor, Conference Room 5
and Zoom Webinar

All agenda materials will be available at *https://www.jacksonville.gov/departments/public-works/tree-commission* by Wednesday, March 19th, 2025 under the meeting link (Task Force Urban Tree Planting Best Practices Meeting Notice* March 20th, 2025 11:00am - 3:00pm)

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
Michael Buonvino, Resiliency office

Advisors:

Jonathan Colburn, Urban Forestry Manager
Justin Gearhart, City Arborist
Carla Lopera, 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 Position Discussion
        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- Mitigation by Degree of Urbanization**
        i. Proposed Water Availability Standard
        ii. Inspection Schedule
        iii. Vertical Constraints
        iv. Soils in Right of Way
        v.
7. **Proposed Project Application (form)**

8. **Project Reality – Application of Approach to Project Examples**
    - **a.** Stakeholders and Attendees apply Proposed Urbanization Score to Typical Projects

9. **Amendments to the Approved Tree Planting List**
    - **a.** Potential Species Characteristics to be added to adopted table:
        i. Planting Zone
        ii. Mature Height and Spread
        iii. Root Characteristics (invasive?)
        iv. Wetness Tolerance
        v. Suitability as a street tree adjacent to pedestrians
        vi. Suitability as street tree without pedestrian adjacency
        vii. Maintenance Score
        viii. Wind Resistance
        ix. Water requirements Optimum
        x. soil volume (min / optimum)
        xi. Lifespan
        xii. Crown shape

OLD BUSINESS:

13. Meeting Dates for April - May 2025

April 20th 10am -2pm

May 14th 10am -2pm

14. The Good, the Bad and the Ugly – Photo Gallery

15. ADJOURNMENT

Task Force on Urban Tree Planting Best Practices

Minutes
Tuesday February 19th, 2025, – 10:00am
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)
William Burke (Mayor Appointee; 2023-0695-A)

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

Advisors:
Jonathan Colburn - Urban Forestry Manager
Justin Gearhart - City Arborist
Shannon MacGillis - 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
William Burke

Quorum present (4, in person): Yes

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. Prior Meeting Minutes.

Issue: The minutes from January 27, 2025, APPROVED

Motion: Approve, as presented.
Moved by: Nina Sickler
Second: William Burke
Vote: November minutes approved, unanimous.

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.

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

Fraser: How-to for use of matrix with detailed examples.
Overview of specific problems relevant to current Jacksonville processes.

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

March 20th 11am -2pm
April 17th 11am -2pm
May 14th 11am -2pm

ADJOURNMENT

END OF MEETING 3:32PM

TECH BRIEF

PERMEABLE INTERLOCKING CONCRETE PAVEMENT

This TechBrief presents an overview of permeable interlocking concrete pavement (PICP) and its use. General information is provided on PICP composition with a summary of benefits, limitations, and characteristics. Important considerations, such as hydrologic design, structural design, construction, and maintenance, are also provided. This Tech Brief supersedes FHWA Publication No. FHWA-HIF-15-007, JANUARY 2015.

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All photos and figures were provided by ICPI and used with permission.

DISTRIBUTION AND AVAILABILITY
This Tech Brief can be found at https://www.fhwa.dot.gov/pavement under "Publications."

KEY WORDS
Permeable pavement, permeable interlocking concrete pavement, permeable pavement design, construction, maintenance, LEED® credit, maintenance, pavement design, pavement construction, permeability, pervious concrete, porous concrete, stormwater, sustainability.

FHWA-HIF-19-021
APRIL 2019

U.S. Department of Transportation
Federal Highway Administration

INTRODUCTION

Permeable interlocking concrete pavement, also referred to as PICP, consists of solid concrete paving units with joints that create openings in the pavement surface when assembled into a pattern. The joints are filled with permeable aggregates that allow water to freely enter the surface. The permeable surface allows flow rates as high as 1,000 in./hr (2,540 cm/hr) (Borst 2010). The paving units are placed on a bedding layer of permeable aggregates that rests over a base and subbase of open-graded aggregates. The concrete pavers, bedding and base layers are typically restrained by a concrete curb in vehicular applications. The base and subbase store water and allow it to infiltrate into the soil subgrade. Perforated underdrains in the base or subbase are used to remove water that does not infiltrate within a given design period, typically 48 to 72 hours. Geosynthetics such as geotextiles, geogrids, or geomembranes are applied to the subgrade depending on structural and hydrologic design objectives. Separation geotextiles are used on the sides of the base/subbase to prevent entrance of fines from adjacent soils.

Figure 1 illustrates PICP components. The figure shows a partial infiltration design with drainage to accommodate some water that does on enter low infiltration soils. PICP over high infiltration subgrade soils may not require an underdrain(s) and these are called full infiltration designs. Other designs over expansive or fill soils or close to buildings may enclose the pavement structure with geomembrane (impermeable liner). An outlet pipe provides temporary storage and outflow control. This design approach also can be used for water harvesting or for horizontal ground source heat pumps. The use of a geomembrane to restrict infiltration into the soil subgrade is often called a no infiltration design.

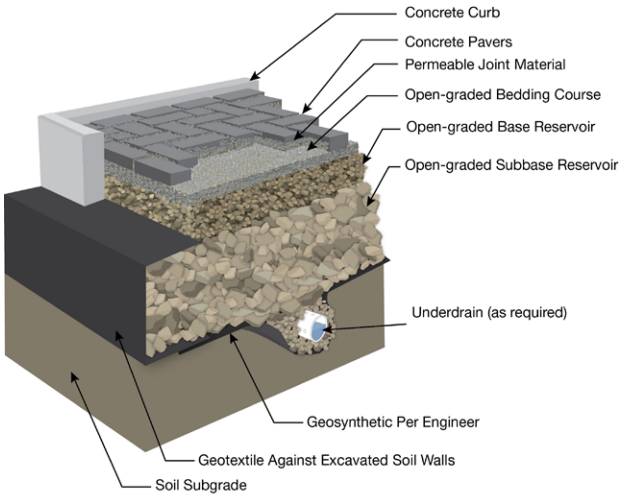

Figure 1. Typical permeable interlocking concrete pavement cross section.

BENEFITS

PICP may help achieve compliance with many national, provincial, state, and local regulations as well as transportation agency design requirements for stormwater runoff control. These requirements may include the following:

- National Pollutant Discharge Elimination System (NPDES) permit compliance.
- Runoff volume and pollutant control for new development and redevelopment.
- Limits on impervious cover (i.e., roofs and pavements) and resulting runoff.
- Runoff volume storage and/or infiltration to reduce overflows, especially combined sewer overflows.
- Meeting total maximum daily load (TMDL) requirements for receiving waters.
- Managing water quality volume capture and or quantity storm events, typically expressed as a percentile; e.g., 85th percentile storm depth, or the 95th percentile storm depth as required for U.S. Federal government facilities in Section 438 of the Energy Independence and Security Act.
- Building code requirements. Examples include CALGreen in California, the International Green Construction Code, ASHRAE Standard 189.1, or other codes that require compliance to Leadership in Energy and Environmental Design (LEED®) or similar sustainable design and construction rating systems.

There are non-regulatory drivers that influence PICP use. These include economics that often make PICP a lower-cost alternative to conventional drainage system designs, gaining stormwater utility fee credits, and project-owner preference for conformance to sustainable rating systems for roads/transportation infrastructure. Examples of rating systems include the Institute for Sustainable Infrastructure's Envision™ evaluation system, Greenroads, GreenPave or the Federal Highway Administration INVEST or Infrastructure Voluntary Evaluation Sustainability Tool.

PICP benefits are listed as follows (Smith 2017):

Construction

- Paving materials require no time-sensitive site forming
- Immediately ready for traffic upon completion, no time needed for curing
- Can be installed in freezing temperatures if subgrade and aggregates remain unfrozen
- Capable of wet weather (light rain) installation

Reduced Runoff and Improved Water Quality

- 100% surface runoff reduction
- 100% infiltration depending on the design, inflows, and soil subgrade infiltration rate
- Capable of installation over or next to plastic underground storage vaults or crates
- Can be designed with water harvesting systems for site irrigation and gray water uses
- Reduces nutrients, metals and oils (Collins 2008) (TRCA 2007) (TRCA 2012) (Fassman 2010) (Brattebo 2003) (Clausen 2007)
- Does not raise runoff temperature, which can damage aquatic life (Wardynski 2013)

Site Utilization

- Reduces or eliminates unsightly detention/retention ponds and related liability
- Increased site and building utilization
- Conservation of space and reduction of impervious cover
- Preserves woods and open space that would have been destroyed for detention/retention ponds
- Promotes tree survival by providing air and water to roots (roots do not heave pavement)

Drainage System

- Reduced downstream flows and stream bank erosion due to decreased peak flows and volumes
- Increased groundwater recharge
- Decreases risk of salt water incursion and drinking water well pollution in coastal areas
- Reduced peak discharges and stress on storm drainage pipes
- Reduces combined sanitary/storm sewer overflows

Reduced Operating Costs

- Reduced overall project costs due to reducing or eliminating storm sewers and drainage appurtenances
- Lower life-cycle costs than conventional pavements (COE 2009)
- Capable of integration with horizontal ground source heat pumps to reduce building heating and cooling energy costs (Coupe 2009)
- Enables landowner credits for stormwater utility fees

Paver Surface/Units

- Produced in a factory and testing to ASTM standards prior to placement
- 50-year concrete material life based on field performance
- ADA compliant
- Colored units can mark parking stalls and driving lanes
- Eliminates puddles on parking lots, walkways, entrances, etc.
- Capable of plowing with municipal snow removal equipment
- Concrete units resist freeze–thaw and degradation from deicing materials
- Reduces ice and deicing material use/costs and related liability due to faster ice melt and surface infiltration
- Provides traffic calming
- Paver surface can be coated with photocatalytic materials to reduce air pollution
- High solar reflectance index (SRI) surface helps reduce micro-climatic temperatures and contributes to urban heat island reduction

Ease of Maintenance and Repairs

- Paving units and base materials can be quickly removed and reinstated
- Utility cuts do not damage/decrease pavement life
- Capable of winter repairs
- No unsightly patches from utility cuts
- Surface cleaning with standard sweeping or vacuum equipment
- Clogged surfaces may be restored with vacuum equipment to reinstate infiltration rates

APPLICATIONS AND LIMITATIONS

PICP is used for walkways, driveways, parking lots, alleys, low-speed roads, and road shoulders. Figures 2, 3, and 4 illustrate vehicular applications. PICP is intended for areas with posted vehicle speeds no greater than 35 mph (50 kph). PICP is generally used in areas exposed to less than 1 million 80 kN lifetime equivalent single axle loads (ESALs; or Caltrans Traffic Index < 9). These applications use unstabilized open-graded aggregates. Open-graded bases stabilized with cement or asphalt, or the use of pervious concrete or porous asphalt bases, can provide higher lifetime ESALs; and accommodate heavier load applications. PICP has seen limited use in heavy load applications with permeable asphalt stabilized bases (Knapton 2003, Sieglen 2004). Design guidance for heavy loads can be found in overseas sources (Knapton 2007, 2012).

Figure 2. Parking lot in Elmhurst, IL.

Figure 3. PICP used to reduce combined sewer overflows in Richmond, VA.

PICP should not be used in areas subject to loading/unloading or storage of hazardous materials. It is generally not placed in areas with high depth to seasonal water tables (i.e., less than 2 ft or 0.6 m), although it has been used in coastal areas with sandy soil subgrades in Maryland, Virginia, South Carolina, and Georgia. Like all permeable pavements, PICP should not be used on extremely dirty sites where there is uncontrolled waterborne sediment or windborne dust that can rapidly clog the surface.

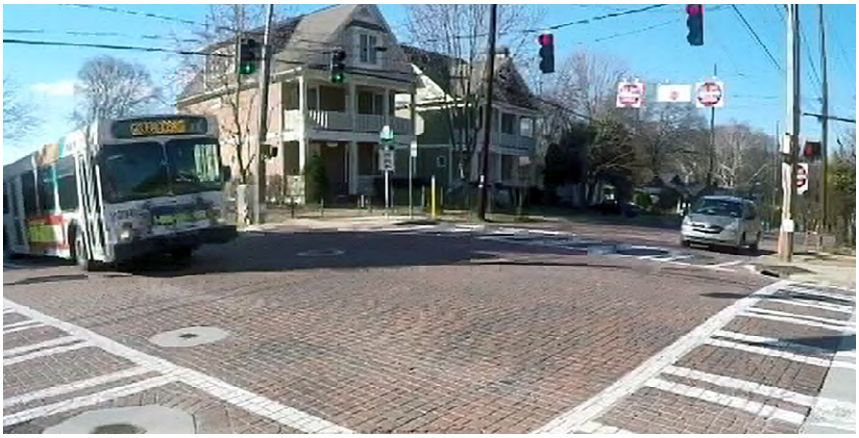

Figure 4. PICP streets in Atlanta, GA.

TYPICAL PROPERTIES AND CHARACTERISTICS

Concrete Paving Units and Jointing Materials

Concrete pavers conform to ASTM C936 Standard Specification for Solid Interlocking Concrete Paving Units. Minimum 3 1/8 in. (80 mm) thick units are used in vehicular areas and pedestrian areas may use 2 3/8 in. (60 mm) thick units. Depending on joint widths, they are filled with permeable, small-sized aggregates, such as ASTM No. 8, 89 or 9 stone per ASTM D448 Standard Classification for Sizes of Aggregate for Road and Bridge Construction or AASHTO M-43 Sizes of Aggregate for Road and Bridge Construction.

Open-Graded Bedding Course

This permeable layer is typically 2 in. (50 mm) thick and provides a level bed for the pavers. It consists of small-sized, open-graded aggregate, typically ASTM No. 8 stone or similar-sized material.

Site Characteristics

Table 1. Site characteristics, hydrologic, and structural design considerations.

Feature	Description
Drainage Path	Assess drainage patterns in the surrounding area to determine possible impact on PICP.
Traffic Type and Patterns	Assess traffic type and composition. Avoid using PICP in high-traffic areas such as high bus or heavy truck repetitions. Avoid use where traffic will contaminate the pavement surface with dirt, oils, and grease.
Winter Maintenance	Avoid winter sand, which may clog the pavement, and if used, remove in the following spring. Limit use of deicing chemicals.
Groundwater Depth	PICP is generally not used in areas where the groundwater is within 2 ft (0.6 m) of the bottom of the pavement.
Subsurface Conditions	Underground utilities, presence of bedrock, etc., may require special considerations. Utility lines in the base or subbase may require encasement.
Surrounding Land Use	Avoid use of high sediment and/or contaminant-generating activities.
Rainwater Capture and Re-Use	Limit use of deicing chemicals or other contaminants for systems where stormwater is captured for re-use.

Structural Design

Full-scale accelerated load testing of PICP base and subbase aggregates on dry and saturated subgrades to validate mechanistic modeling was conducted by the University of California (Davis) Pavement Research Center (UCPRC) (Li 2014). The research provides a design method to determine the subbase thickness that accounts for the number of days per year the subgrade is saturated. This design method has been incorporated into ASCE/ANSI 68-18 *Permeable Interlocking Concrete Pavement* (ASCE 2018) and adopted by Caltrans (Caltrans 2016). AASHTO 1993 may be used, but it may calculate thicker subbases than would those derived from using the UCPRC method. If using the AASHTO 1993 method, special consideration should be given to using layer coefficients for open-graded aggregate base/subbases that are lower than those typically used for dense-graded bases. The PICP design process includes an analysis of the expected axle loads, followed by characterization of subgrade strength and evaluation of the surface and subbase thickness to support the design traffic for the life of the PICP.

Table 1. Site characteristics, hydrologic, and structural design (continued).

Feature	Description
Traffic	Consider current and future expected traffic types and frequency and convert to ESALs.
Subgrade Characteristics	Carefully evaluate subgrade structural capacity and assume values in "soaked" condition, which can characterize a saturated, worst case condition. Determine infiltration capacity with field testing. Assess need for compaction to uniform density and assess infiltration in compacted state if required for structural support.
Surface	PICP pavers with the bedding layer use an AASHTO layer coefficient of 0.3. Carefully assess impact of construction conditions and equipment on the stability of the surface.
Base/Subbase	Determine layer coefficients and structural capacity, which may be less than that of conventional, dense-graded base materials. Select durable, crushed materials (LA Abrasion < 40) to maximize structural capacity and porosity for water storage. Select clean materials with < 2% passing the No. 200 (0.075 mm) sieve.
Reliability	Assess design reliability and select appropriate value for intended traffic and maintenance activities. 80% is typically used.

Table 2. Hydrologic design considerations.

Feature	Description
Design Storm	Determine expected storm duration, frequency and intensity and depth.
Surface	Determine initial surface infiltration and long-term if subject to sediment loads.
Surface Slope	Typically < 5 %, although higher slopes have been successfully used.
Subgrade Slope	Maintain < 1% for full- or partial-infiltration designs. Consider berms or other intermittent structures for subgrades exceeding 3% slope.
Contributing Area Runoff	Determine runoff- volume, velocity, etc., from contributing areas. Consider potential sediment loads and design to capture before reaching the PICP surface.
Supplemental Surface Drainage	Design supplemental surface drainage (overflow) for high-intensity storms. The PICP surface should not be designed as a detention area as this can mobilize sediment and other pollutants captured in the surface.
Subgrade Infiltration	Determine potential for infiltration based on soil type and density. Subgrade compaction is desirable to support vehicular traffic but lower compaction is desired to provide maximum infiltration capability. Designer must balance these to achieve design objectives.
Underdrains	For partial- or no-infiltration designs, determine the type, location, and need for underdrains. Specify outlet details and cleanout(s).
Outflow Details	Design outflow from underdrains to meet detention goals. Ensure detailing of outflow elements meets stormwater capture and release goals.
Observation Well	Place capped, vertical perforated pipe near lowest elevation to monitor drain down time.
Geosynthetics (geotextile, geogrid, geomembrane)	Assess the need and/or benefit for geosynthetics for separation, filtration, containment, reinforcement, etc.

Open-Graded Base Reservoir

This is an aggregate layer 4 in. (100 mm) thick and made of crushed stone primarily 1 in. down to 1/2 in. (25 mm down to 13 mm). Besides storing water, this highly permeable layer provides a structural transition between the bedding and subbase aggregate layers. The stone size for the base is typically ASTM No. 57 or similarly sized material.

Open-Graded Subbase Reservoir

The stone sizes are larger than those in the base, primarily 3 in. down to 2 in. (75 mm down to 50 mm), typically ASTM No. 2, 3, or 4 stone. Like the base layer, water is stored in the spaces among the stones. The subbase layer thickness depends on water storage requirements and traffic loads. A subbase layer may not be required in pedestrian or residential driveway applications. In such instances, the base layer thickness is increased to provide water storage and support.

Geosynthetics

These consist of geotextiles, geogrids or geomembranes. Geotextiles can separate the subbase from the subgrade and help prevent migration of soil into the aggregate subbase or base. When applied horizontally, they should be designed for subsurface drainage applications be carefully selected and evaluated for clogging potential. Separation geotextiles should be applied vertically to the sides of the base/subbase in designs that do not use full depth curbs or are against other structures. Geotextiles should conform to AASHTO M-288 Geotextile Applications for Highway Applications, subsurface drainage. Geogrids or geocells can be used to support the subbase in very low strength soils, i.e., CBR < 2%. Geomembrane material encases the pavement structure and is used for no infiltration designs. Geosynthetic manufactures should be consulted for recommended material selections and thicknesses.

Design

As with all permeable pavements, site characteristics are initially reviewed, then consideration is given to hydrologic design for stormwater management and to structural design to support anticipated vehicle axle loads and repetitions. The thicker of the two bases from structural and hydrologic designs is selected. These design considerations are briefly described in Tables 1 and 2.

CONSTRUCTION CONSIDERATIONS

The list on the following page provides a construction checklist for project use. The engineer should edit according to specific project requirements. In recognition of the special construction requirements of PICP, the Interlocking Concrete Pavement Institute developed a program designed to educate, train, and recognize individual contractors in PICP construction. This is called the *PICP Specialist Course*. Project specifications should state that the project foreman holds a record of completion in this course. (See ICPI website for more information).

Most PICP projects are machine-installed to accelerate construction time over manual installation. Figure 5 illustrates a machine that lifts and places about a square yard (m^2) of concrete pavers in their final laying pattern. The units are placed on the screeded bedding layer of aggregate, the joints are filled with aggregate, and the paver surface is swept clean and compacted.

Figure 5. Mechanical installation of concrete paving units for PICP.

Construction Checklist

Pre-Construction Meeting

- Walk through the site with builder/contractor/subcontractor to review erosion and sediment control plan/ stormwater pollution prevention plan (SWPPP)
- Determine when PICP is built in project construction sequence and confirm specified measures for PICP protection and surface cleaning
- Aggregate material storage locations identified (hard surface or on geotextile)
- Sediment management
- Access routes for delivery and construction vehicles identified
- Vehicle tire/track washing station (if specified in erosion and sediment plan/SWPPP) location/maintenance

Excavation

- Utilities located and marked by local service
- Excavated area marked with paint and/or stakes
- Excavation size and location conforms to plan
- Excavation hole used as sediment trap: cleaned immediately before subbase stone placement and runoff sources with sediment diverted away from the PICP, or all runoff diverted away from excavated area
- Protect temporary soil stockpiles from erosion from water and wind
- Ensure linear sediment barriers (if used) are properly installed, free of accumulated litter, and built up sediment against them
- No runoff enters PICP until soils stabilized in area draining to PICP

Foundation Walls

- At least 10 ft (3 m) from foundations with no waterproofing or drainage

Water Supply

- At least 100 ft (30 m) from municipal water supply wells

Soil Subgrade

- Rocks and roots removed; voids refilled with open-graded aggregate
- Soil compacted to specifications (as required) and field-tested with density measurements per specifications
- No groundwater seepage or standing water

Geosynthetics

- Meet specifications for materials, placement, and down slope overlap
- Sides of excavation covered with separation geotextiles prior to placing aggregate base/subbase
- No tears or holes
- No wrinkles, pulled taught, and secured during construction
- Geomembrane placement, field welding, and seals at pipe penetrations meet specifications
- Drain pipes/observation wells
- Size, perforations, locations, slope, and outfalls meet specifications and drawings
- Verify elevation of overflow pipes

Subbase, Base, Bedding, and Jointing Aggregates

- Sieve analysis from quarry conforms to specifications
- Spread (not dumped) with a front-end loader to avoid aggregate segregation
- Storage on hard surface or geotextile to keep sediment-free
- Thickness, placement, compaction and surface tolerances meet specifications and drawings
- Testing and written field verification of subbase/base deflection of less than 0.5 mm using a light weight deflectometer per ASTM E2835 prior to placement of bedding layer

Edge Restraints

- Elevation, placement, and materials meet specifications and drawings

Permeable Interlocking Concrete Pavers

- Meet ASTM C936
- Elevations, slope, laying pattern, joint widths, and placement/compaction meet drawings and specification
- No cut paver subject to tire traffic is less than 1/3 of a whole paver
- All pavers within 6 ft (2 m) of the laying face fully compacted at the completion of each day
- Surface tolerance of compacted pavers deviate no more than ±3/8 in. (10 mm) under a 10 ft (3 m) long straightedge

Final Inspection

- Surface swept clean.
- Elevations and slope(s) conform to drawings.
- Transitions to impervious paved areas separated with edge restraints.
- Surface elevation of pavers no greater than 1/4 in. (6 mm) above adjacent drainage inlets, concrete collars or channels.
- Lippage: no greater than 1/8 in. (3 mm) difference in height between adjacent pavers.
- Bond lines for paver courses: 1/2 in. (±15 mm) over a 50 ft (15 m) string line.
- Stabilization of soil in area draining into PICP.
- Drainage swales or storm sewer inlets for emergency overflow. If storm sewer inlets are used, confirm overflow drainage to them.
- Runoff from non-vegetated soil diverted from PICP surface.
- Test surface for infiltration rate per specifications using ASTM C1781 Standard Test Method for Surface Infiltration Rate of Permeable Unit Pavement Systems. This minimum acceptable rate should be 2,500 mm/hr (100 in./hr).
- Contractor to revisit site 6 months from date of substantial completion to re-inspect joint fill material and refill as required; replace any paver areas not conforming to specifications.

MAINTENANCE

PICP inspections should be completed 1 to 2 times annually (preferably after a storm event). Inspection tasks should include the following:

- Review maintenance and operations records and incidents to determine indictors of maintenance.
- Document general site features, take pavement photographs, etc.
- Note obvious sources of surface contaminants such as sediment.
- Identify the extent and severity of any damage or deficiencies (settlement, ponding, cracked pavers, etc.). Structurally related conditions can be documented and a pavement condition index created using ASTM E2840 Standard Practice for Pavement Condition Index Surveys for Interlocking Concrete Roads and Parking Lots.
- Identify any changes in adjacent land use that may impact contributing area runoff for potential sources of contaminants that may reduce system permeability.
- Inspect vegetation around PICP perimeter for cover and soil stability.
- Inspect edge restraints to ensure continued functionality.
- Check observation well(s) and outlet drain(s) to ensure continued water drainage from the pavement structure.
- Check surface for buildup of sediment in joints. Buildup typically occurs near adjoining impervious pavements. If water ponds on the PICP and remains longer than one hour after a rainstorm, then conduct ASTM C1781 to determine surface infiltration rate.

The results of the inspection should be documented and used to assist in updating the maintenance plan for the PICP system. The information should be used to assist in predicting future maintenance needs and be part of an overall management system for the pavement. Based on the results of the inspection, it may be appropriate to conduct remedial maintenance particularly if the surface has not been vacuumed regularly.

Routine Maintenance

The following provides a checklist for PICP routine maintenance:

- Inspect, and if necessary, clean the surface using regenerative air equipment to remove debris and sediment in the spring and late fall.
- Repair/replant vegetative cover for areas up slope from the PICP.
- Replenish aggregate in joints if more than 1/2 in. (13 mm) from paver chamfer bottoms.
- Repair all paver surface deformations exceeding 1/2 in. (13 mm).
- Repair pavers offset by more than 1/4 in. (6 mm) above/below adjacent units or curbs, inlets etc.
- Replace cracked paver units impairing surface structural integrity.
- Clean and flush underdrain system if slow-draining.
- Clean drainage outfall features to ensure free flow of water and outflow.

Remedial Maintenance

- If ASTM C1781 test results are below 10 in./ hr, vacuum surface to remove sediment jammed into joints and soiled aggregate (typically 1/2 to 1 in. or 13 to 25 mm deep) using a full or true vacuum machine (not regenerative air) (Chopra 2010). Refill joints with clean aggregate, sweep surface clean, and test infiltration rate again per ASTM C1781 to minimum 50% increase or minimum 10 in. /hr (250 mm/hr).
- Repair and/or reinstatement of damaged edge restraints and resulting movement in the pavers; this may require removal and reinstatement of adjacent paving units.
- Repair localized settlement greater than 1/2 in. (13 mm) and rutted pavement areas.
- Repair outflow features, piping, energy dissipaters, erosion protection systems, etc., as required.

Winter Maintenance

Avoid the use of winter sand for traction; if used, remove with regenerative air cleaning equipment in the spring (regenerative equipment does not evacuate jointing materials).

- Remove snow with standard plow/snow blowing equipment.
- Stockpile plowed snow onto turf or other vegetated areas and not on the PICP.
- Monitor temperatures and apply anti-icing/deicing materials such as sodium chloride, calcium chloride or magnesium calcium acetate.

PERFORMANCE

Properly designed, constructed, and maintained PICP will provide decades of service in reducing stormwater runoff and pollutants while supporting pedestrian and vehicular traffic. Pavement stability and winter durability has been documented with PICP use in a Chicago parking lot (Attarian 2010), as well as in Toronto (TRCA 2008) (TRCA 2012) and Durham, NH (UNHSC 2013). Additional experience has been gained with PICP in alley projects in Los Angeles and Sacramento, CA; Richmond, VA; Longmont, CO; St. Louis, MO; Lancaster, PA; and Dubuque, IA. In addition, PICP streets in Warrenville, IL; Moline, IL; and Charles City, IA, have solved stormwater problems in a cost-effective manner.

SUMMARY AND FUTURE NEEDS

PICP use has seen increased use since its introduction from Germany to the US in the mid-1990s. The water volume and pollution reduction capabilities are well-established from research. Winter durability and maintenance procedures have been established through research and experience (Smith 2017).

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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.

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Soil pH and Tree Species Suitability in the South

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Introduction

Soil properties largely determine the tree species that will grow on a site. Among the many soil properties, soil pH is one of the most important. Soil pH provides a good indication of the chemical status of the soil and can be used in part to determine potential plant growth. This publication will help landowners and foresters gain a better understanding of soil pH and species site relationships across the south.

What is soil pH?

Soil pH, by definition, is a measure of the activity of hydrogen ions in the soil solution. Neutral soils have a pH of 7.0 (6.5-7.5), acid soils have a pH ≤ 6.5 and basic soils have a soil pH ≥ 7.5. The pH range of most soils lies between 3 and 9. Most foresters believe that pines grow best on acidic soils while hardwoods prefer slightly acidic to neutral soils. While there is some truth in this, most tree species will grow well over a broad range of pH values (Williston and LaFayette, 1978).

Why is soil pH important in forestry?

Soil pH influences nutrient uptake and tree growth. The availability of many plant nutrients in the soil changes as a result of reactions in the soil, which are largely controlled by soil pH. Trees may or may not be able to use nutrients because of these reactions. Soils with a pH of 6.0-7.0 typically have high concentrations of available nutrients (Williston and LaFayette 1978). However, the vast majority of commercially important tree species can live in a broad range of soil pH values so long as the proper balance of essential nutrients is available.

Extremes in soil pH (<4.5 and > 8.5) can make some nutrients toxic and others unavailable to plants. At low pH levels (<4.5), aluminum, iron, and manganese are very available for plant uptake. At high pH levels (>7.5), calcium and potassium are over abundant. In these situations, many plants will take up too much of these nutrients, while absorbing insufficient amounts of the others. Table 1 shows a range of soil pH values and the availability of selected nutrients within those pH ranges.

An opportune time to check soil pH levels on your site is prior to planting. In this way, a landowner can select a species that best meets their management goals and is adapted to growing under the soil pH conditions present.

How do you determine the pH of the soil on your property?

The most accurate way to determine soil pH on your property is to collect a sample of soil and have it analyzed. Your state extension service can do this for you, usually for a modest fee. For routine testing to determine the pH of the topsoil (upper 7 inches), use the following procedure.

1. Obtain a Soil Survey map of your area: These maps are available from the Natural Resources Conservation Service (NRCS) office in your county. If a map is not available, draw a sketch of your property with the areas your interested in highlighted. On the map or sketch, divide your property into timber stand types or fields. A timber stand type is an area of trees with a common characteristic, such as species composition, age, or size. Within each stand type or field, outline several 5- to 10-acre sampling sites.

2. Collect the soil samples: Within each soil types on a NRCS soils map, or within each stand type on your "homemade" map, designate each different soil or stand type with a number. Each of these numbered soil or stand types must be sampled separately for good soil sample accuracy. From each of these numbered areas, collect 15 to 20 soil samples; then combine these samples into one larger sample for each site. Samples should be taken to a depth of 7 inches, using a spade, trowel, auger or soil tube. If you use a spade, dig a V-shaped hole to the plow depth and remove a 1/2-inch thick slice of soil from one side of the hole. Then trim from each side of the spade all but a thin ribbon of soil down the center of the spade face. Collect both the "slice" and the "ribbon" as the sample. Put this sample into a paper bag and record the soil or stand type number on the bag. When the samples are dry, mix them thoroughly. Remember that samples from each soil or stand type that you delineated need to be composited separately.

3. Have the samples analyzed: Take your soil samples to your county extension office. Be prepared to furnish information on the site history. Such things as past and present land use and vegetation will be useful. Soil test results can be interpreted by county extension service or NRCS personnel. Keep the results of soil tests with your forest management plan for future reference.

Although less accurate than laboratory tests, there are other methods available for determining soil pH. Soil pH kits are available from numerous outdoor forestry equipment companies or lawn and garden stores. These kits use color charts with different colored pH indicators. This method usually has an accuracy of 0.2-0.5 pH units. When using these kits, remember that the soil sampling scheme described earlier is still applicable.

You can also estimate soil pH by looking in your county soil survey manual. Your local NRCS office can provide you with copies of the manual, as well as assistance in using it. These manuals provide additional information, including drainage, fertility, best tree species to plant/manage and construction guides.

Fortunately, many trees successfully grow and survive over a range of soil pH levels. Nevertheless, most tree species will grow better at a given soil pH. Tables 2 and 3 list softwood and hardwood tree species common to the southern United States and the soil pH levels at which they grow best.

Table 1: Soil pH effects on soil nutrient availability. Columns with dark fill show the greatest nutrient availability, light spaces represent moderate nutrient availability, and blank spaces represent limited nutrient availability for that pH level. Adapted from Brady and Weil, 1999.

	pH	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
Nitrogen (N)												
Phosphorus (P)												
Potassium (K)												
Calcium & Magnesium (Ca & Mg)												
Sulfur (S)												
Boron (B)												
Copper (Cu)												
Zinc (Zn)												
Molybdenum (Mo)												
Iron & Manganese (Fe & Mn)												
Aluminum (Al)												
	pH	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0

Table 2: Preferred soil pH ranges for selected southern softwood forest tree species*. (Adapted from Burns and Honkala, 1990a and Williston and LaFayette, 1978).

Softwoods					
Common Name	Scientific Name	pH Range	Common Name	Scientific Name	pH Range
Baldcypress	*Taxodium distichum*	4.6-7.5	Pine, Shortleaf	*P. echinata*	4.5-7.0
Pine, E. White	*Pinus strobus*	>4.0	Pine, Scots	*P. sylvestris*	4.5-6.0
Pine, Loblolly	*P. taeda*	4.5-7.0	Pine, Slash	*P. elliottii*	4.5-7.0
Pine, Longleaf	*P. palustris*	4.5-7.0	Pine, Virginia	*P. virginiana*	4.6-7.9
Pine, Pitch	*P. rigida*	3.5-4.5	Redcedar, Eastern	*Juniperus virginiana*	6.0-7.5

* The pH values provided above are to serve as a guide. These species will often grow on soils outside the pH limits set above. The pH values listed indicate where these species may have the best growth potential.

Conclusions

Soil pH is a measure of the acidity or alkalinity of soil. It can be used as a general guide for determining nutrient availability and therefore the species that may grow on a given site. This publication should be used as a guide to determine the appropriate tree species for your site based on pH. However, soil pH is only one factor affecting tree survival and growth. There are other soil conditions that affect tree growth, such as soil texture, drainage, and topographic position. For more information, contact your state forestry agency, extension forester, or consulting forester.

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Table 3: Preferred soil pH ranges for selected southern hardwood forest tree species*. (Adapted from Burns and Honkala, 1990b and Williston and LaFayette, 1978).

Common Name	Scientific Name	pH Range	Common Name	Scientific Name	pH Range
American Beech	*Fagus grandifolia*	5.0-7.5	Oak, Cherrybark	*Quercus pagodafolia*	4.5-6.2
American Hornbeam	*Carpinus caroliniana*	4.0-5.6	Oak, Live	*Q. virginiana*	6.0-7.5
Ash, Green	*Fraxinus pennsylvanica*	3.6-7.5	Oak, Northern Red	*Q. rubra*	4.5-6.0
Ash, Pumpkin	*F. profunda*	4.6-7.5	Oak, Nuttall	*Q. nuttallii*	3.6-6.8
Ash, White	*F. americana*	5.0-7.5	Oak, Post	*Q. stellata*	5.0-7.5
Basswood	*Tilia americana*	4.5-7.5	Oak, Shumard	*Q. shumardii*	4.4-6.2
Birch, River	*Betula nigra*	4.5-6.0	Oak, Southern Red	*Q. falcata*	5.0-7.0
Birch, Yellow	*B. alleghaniensis*	5.0-6.5	Oak, Water	*Q. nigra*	3.6-6.3
Blackgum	*Nyssa sylvatica*	4.6-7.0	Oak, White	*Q. alba*	4.5-6.2
Black Cherry	*Prunus serotina*	3.0-5.0	Oak, Willow	*Q. phellos*	3.6-6.3
Black Locust	*Robinia pseudoacacia*	4.6-8.2	Osage Orange	*Maclura pomifera*	4.5-7.5
Cottonwood	*Populus deltoides*	3.6-7.5	Paulownia	*Paulownia tomentosa*	6.0-8.0
Dogwood	*Cornus spp.*	5.0-8.0	Pecan	*Carya illinoensis*	4.8-7.5
Eastern Hophornbeam	*Ostrya virginiana*	4.6-5.6	Persimmon	*Diospyros virginiana*	4.4-7.0
Hackberry	*Celtis occidentalis*	5.0-7.5	Sassafras	*Sassafras albidum*	6.0-7.0
Hickory	*Carya spp.*	4.5-7.5	Sugarberry	*Celtis laevigata*	6.0-6.8
Magnolia, Southern	*Magnolia grandiflora*	5.0-6.0	Sweetgum	*Liquidambar styraciflua*	3.6-7.5
Maple, Boxelder	*Acer negundo*	5.0-7.5	Sycamore	*Platanus occidentalis*	4.4-7.5
Maple, Red	*A. rubrum*	4.4-7.5	Walnut, Black	*Juglans nigra*	5.0-7.5
Maple, Silver	*A. saccharinum*	>4.0	Walnut, Butternut	*J. cinerea*	5.0-7.5
Maple, Sugar	*A. saccharum*	5.5-7.3	Yellow-poplar	*Liriodendron tulipifera*	5.0-7.0

* The pH values provided above are to serve as a guide. These species will often grow on soils outside the pH limits set above. The pH values listed indicate where these species have the best growth potential.

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

Potential Mitigation Strategies

Grading has occurred

Within any planting area, the elevation of the soil at planting is different than natural grade; or grading work has occurred even if grade is returned to original elevation. Include addition of off-site soil or relocation of soil on-site.

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

Compaction has occurred

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

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

Impervious Area

Impervious area is present within the mature canopy area upon project completion.

Less than 15%
15% to 50%
50% to 70%
70% to 90%
Greater than 90%

Use of pervious pavers with limited with open joints and max. xx% underlying compaction.

Apply Mitigation Strategies based on Urban Score(s) – See Matrix. Multiple Urban Scores may apply within a project boundary; strategies may differ for each planting area.

Soil Quantity Goal:

Provide enough soil of suitable quality to support the tree mass proposed.

Required Soil Volume (see Soil Volume Strategies for details):

Small Tree:	300 cubic feet**	Min. Planting Area:	150 sf
		Required Depth:	2 feet
		Min. Cut-out	4’ x 4’

Medium Tree:	1,200 cubic feet**	Min. Planting Area:	480 sf
		Required Depth:	2.5 feet
		Min. Cut-out	6' x 6'
Large Tree:	1,800 cubic feet**	Min Planting Area:	720 sf
		Required Depth:	2.5 feet
		Min. Cut-out	10' x 10'

1. *Plans and specifications demonstrate compliance with minimum soil volumes and cut-out based on tree size.*
2. *Plans and specifications demonstrate compliance with application of mitigation : S1, S2, S3, S4 or S5*

Drainage Goal:

Drainage adequate to obtain root growth in the soil.

1. *Plans and specifications demonstrate compliance with drainage mitigation based on percolation rate: D1.1, D1.2, D1.3, D2, D3.1, or D 3.2. Submit results of percolation test as specified.*
2. *Plans and specifications provide detail of final grade and slope from trunk for all tree planting areas with impervious area of greater than 50%.*

Aeration Goal:

Provide sufficient air to the root zone to address effectiveness of the available soil.

1. *Plans and specifications demonstrate compliance with aeration mitigation: A1, A2, A3.1, A3.2, or A4.*

Contributing Factors

Provide Additional Assessment as indicated.

Soil Texture- Very sandy, silty or clayey soils require recommendations of a soil scientist. Require ID of soils present to determine need for report/ consultation.

1. *Application identifies existing soils on site from USDA Websoilsurvey (WSS). https://websoilsurvey.nrcs.usda.gov/app. Identify soil type for each Planting Area. If hydric soils are indicated within planting area, limit tree selection or meet D1.3 requirements (raised planter).*
2. *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).*
3. *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 specific recommendations.

Soil Profile- Unusual soil profiles require special details (hardpan, shallow rock, underground structures).

1. *Plans identify location of underground utilities within all planting areas (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 an urban planting 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.*

Site History- Age of buildings and site work affects the likelihood of disrupted soil structure. Prior to 1940, site work resulted in less impact to the soil based on the way land was developed. Sites that have had several changes in configuration (grades or structures) may require more site modifications than indicated.

1. *Assume compacted soils 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.*

Maintenance – All constraint levels assume some minimal maintenance is available on a long term basis. This includes regular pruning, watering during initial grow-in periods, and some ongoing insect and disease control. Less maintenance will require more sire modification to grow similarly sized trees. More, particularly irrigation and fertilizer, will allow for slightly less site modification.

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. *Provide an enforceable maintenance agreement for post warranty maintenance. City maintained projects shall be subject to adopted standards for post warranty maintenance that are in compliance with terms of a non-city maintenance agreement.*

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.

Overhead electric (or other utilities) lie outside

1. *Plan and specifications demonstrate compliance with minimum building vertical setback for all planting locations.*
2. *Plan and specifications demonstrate compliance with overhead utilizes constraints established by the utility.*

Soil Volume Strategies

Soil Volume within a planting area may be achieved as follows:

Required Planting Depth for small or medium tree is 2 feet and 2.5 feet for large trees. Soil within the Planting Area to remain undisturbed below this depth.

1. If Required Planting Depth cannot be achieved, construct raised planter to achieve.
2. Install small or medium tree if large tree Required Planting Depth cannot be achieved.
3. Relocate obstructions within the Planting Area to the Required Planting Depth; utilizes may comprise no more than 10% of the Required Soil Volume and may not encroach on the Required Planting Depth within 5 feet of the tree trunk.
4. Relocate Planting Area if specifications cannot be met for tree species desired.

Minimum volume may be achieved as follows:

1. Planting Area to meet minimums:

    a. Large Tree 720 square feet; min 10 x 10 cut out
    b. Medium Tree 600 square feet; min 6 x 6 cut out
    c. Small Tree 150 square feet; min 4 x 4 cut out

    Grouping Medium and Large trees within a combined planting area allows for 25% reduction in required volume per tree within combined area.

2. Achieve planting area minimum with pervious pavers outside min. cut out area. Provide Water tubes at 8 feet on center when Planting Area exceeds 20 feet from tree truck.

3. Install Structural Soils or Soil Cell Support System (as required to meet weight requirements of surface) for area in excess of minimum cut out. This strategy requires provision of water and air to soil volume outside the cut out area (See Design Alternatives).

Design Alternatives

Requirements for Use of Soil Support System

In addition to provision of soil support system (SilvaCell, Structural Soil, etc., provide:

1. Open Joint Pavers (aka pervious pavers), no larger than 8 " x 8" OR surface paving , no larger than 4' x 4' with open joints a minimum of 4 inches in width along each surface paving edge over dimensions of the minimum Planting Area not within a cut out . See detail for open trench drains (preferred design approach).
2. Water Tubes at approx. 8 feet on center when planting area extends more than 20 feet from the tree (trunk).
3. Automatic irrigation shall not be permitted and may not substitute for 1 or 2 above.

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

To Be Completed By City of Jacksonville/Public Works Staff Only

Level 2 - Community Organization Tree Planting Program Staff Checklist

Total number of trees to be installed _____ **Project Title:** **Project is to be planted on Public Land**

Total number of trees to be removed _____ _____ **Project is located in Duval County**

	Activity	Complete
1	The species of trees are appropriately located.	
2	The number and placement of trees is appropriate.	
3	Trees being planted are approved pursuant to the *'Tree Commission Approved Tree Planting List.'*	
4	Shade Trees are preferred; if non-shade trees are proposed, the use is appropriated/acceptable.	
5	Less than 25% of the total species of trees being planted are palms.	
6	The planting will not interfere with utilities or sight line requirements.	
7	The project does not include incidental landscaping. If so, the applicant must justify the reason for its inclusion.	
8	Construction required? Yes ☐ No ☐ If yes, are costs reasonable?	
9	Irrigation installed? Yes ☐ No ☐ If yes, are costs reasonable?	
10	The cost of the species of trees selected do not outweigh the benefits of the trees.	
11	Low maintenance plants are utilized.	
12	Location of plant material and irrigation (if applicable) has minimum adverse impact over time on infrastructure such as walks and roads.	
13	Species of trees being planted are beneficial to the City's tree canopy.	
14	The project provides unique benefit to the neighborhood, Council District, or City.	
15	The project has been reviewed with and meets the needs of the requesting entity.	
16	The Councilmember has been notified of the project.	

COMMENTS:

LEVEL 2 COMMUNITY ORGANIZATION
TREE PLANTING PROGRAM

The form below provides individual citizens and organizations with the opportunity to suggest a location for a tree planting project within Duval County that proposes to use funds from the City of Jacksonville Tree Protection and Related Expenses Trust Fund. If a citizen or organization is interested in suggesting a planting location for the City to implement, then use this form.

Requirements to utilize this program:

1. The location of the proposed planting must be:
    a. In Duval County; and
    b. On public property, such as a road right-of-way; a local, state or national park; Duval County School Board property, etc.

Complete the following information below:

1. Name/title of project:
2. Legal name of organization/citizen making suggestion:
3. Organization or citizen mailing address:
4. Contact phone number:
   Contact e-mail:
5. Location/address of planting project:
6. Has project information been shared with the Council Member of the district?
7. Rationale for project (include information about the public benefit of the project):
8. Description of project:

If a citizen/organization is interested in proposing a project that they want to administer and implement, a more comprehensive application (Level 3) can be found at the following link: http://www.coj.net/departments/public-works/tree-commission.

JACKSONVILLE TREE COMMISSION
LEVEL 3 TREE PLANTING PROGRAM

APPLICATION INSTRUCTIONS and PROCESS GUIDE

WHAT IS THE LEVEL 3 TREE PLANTING PROGRAM?

The Tree Commission, established by Section 94.106 *Ordinance Code*, is a City advisory body to the City Council, Mayor's Office, City staff, and community stakeholders, whose task is to develop policies and programs that encourage the preservation and restoration of the City's tree canopy.

The Level 3 Tree Planting Program (the "Program") was created by the Tree Commission as a way for the City to partner with and provide funding to a local community or not-for-profit organization to implement a tree planting project on publicly owned land within Duval County.

An organization interested in obtaining funding for such a project must complete a Level 3 Tree Planting Program application which describes the project and the amount of funds requested. The Tree Commission will review each tree planting application and then make recommendation to the Mayor's Budget Review Committee regarding approval of the project based upon the information submitted.

If a project is approved, an Agreement is entered into between the Applicant and the City of Jacksonville, which establishes the scope of the project and funding provided by the City.

FUNDING

Funding for an approved Project comes from the Tree Protection and Related Expenses Trust Fund (the "Tree Fund"), as authorized by Sec.111.760, *Ordinance Code*, and Sec. 25.04, *City Charter.* Funds deposited in the Tree Fund must be spent on the installation and maintenance of trees on public lands in Duval County.

WHO MAY APPLY FOR PROGRAM FUNDING?

1. Eligible 501(c)(3) Not-for-profit Organizations.
2. Local Community Organizations.
3. Other units of local governments operating in Duval County.

IF AN APPLICATION IS APPROVED, HOW IS FUNDING PROVIDED?

If the Project is approved by the Tree Commission and the Mayor, the work beginning with Pre-Application/Design Phase, Step 2 (Conceptual Design), will be reimbursed. All work prior to Staff approval of the Project at that point is not reimbursable. Once the Project and the associated fees and construction costs have received approval a contract is drafted that will outline the funding.

HOW DO I APPLY FOR AND OBTAIN FUNDING?

An organization interested in obtaining funding for the design and construction of a tree planting project will follow a three-phase process: (1) the Pre-Application/Design phase, (2) the Application phase, and (3) the Project Execution phase. The Project becomes more defined with each phase.

I. PRE-APPLICATION/DESIGN PHASE

The Pre-Application Phase procedure is a 4-step process.

During each step of the process, Staff may request additional information or adjustments to the scope or design of the project. Failure to provide such changes may result in the Staff's recommendation of denial of the project.

Communications between the Applicant and the Staff is intended to be an iterative process with the goal to determine the best solution that will enhance the City's tree canopy.

A. STEP 1 – PROJECT SCOPE

(1) **Identification of the Project Team**

a. Must include the Applicant, Landscape Architect, Project Manager for the Applicant, and any other known consultant or contractor.

(2) **Identification of Project Site**

a. Applicant identifies a site for a specific tree planting project and contacts the public agency that owns or manages the property to determine its interest in a tree planting project on the subject property or on another property selected by the Public Agency.

b. If the contacted Public Agency is not interested in a tree planting project, then the Applicant must identify another project site and repeat the procedure above.

(3) **Project Scope Base Sheet:** The landscape architect copies an aerial from the City GIS or other websites to use as a base sheet of the subject property. The aerial is reproduced at a scale that clearly shows existing property lines and site improvements such as buildings, parking lots, play areas, overhead powerlines, trees, and surface drainage features on the site. Property boundary lines can be obtained from the JaxGIS website (https://maps.coj.net/DuvalProperty/).

(4) **Project Scope Plan**

a. The Applicant and landscape architect, or a representative from the landscape architecture firm shall meet with the public agency representative at the site to determine where trees can be planted. Photographs are taken to show typical site conditions. Site limitations are also noted. The landscape architect will then transfer the field notes to the base sheet and draw a bubble diagram around each potential planting area and the estimated number and type of trees that could be planted in each area.

b. The Applicant submits the Project Scope Plan to the Public Agency for its review and requests written support for the proposed tree planting project.

c. The Applicant then revises the Project Scope Plan to incorporate any recommendations received from the Public Agency.

(5) **Project Scope Submittal:** The Applicant prepares the Project Scope submittal for Staff review once the Agency's approval is received. The Project Scope Submittal includes the following items.

a. The Public agency's written support of the project

b. Project Scope Plan

c. The Applicant's written description of the following:

1) How will the project benefit the neighborhood, Council District, or the City?

2) Is the project site highly used by or visible to the public and how?

3) Will the project be an enhancement of an underserved or blighted area? If so, how?

(6) **Rough Order of Magnitude of Professional and Administrative Fee.** An estimation of the professional and administrative fees, and the total construction and warranty cost that will be required to take the design through the entire Project Execution Phase will be required prior to Staff approval.

(7) **Project Scope Review Meeting**

a. Once the Project Scope submittal, including the Rough Order of Magnitude of the fees, is complete, the Applicant shall schedule a meeting with City Staff and the public agency representative to review the location and scope of the proposed project. The landscape architect, or representative from the landscape architecture firm shall also attend.

b. Staff will prepare a written summary of the meeting to all parties within 10 business days of the meeting. Also included will be a statement either approving the project scope, requesting additional information or revisions, approving with conditions, denial, or recommending selection of another project if issues with the proposed project are not easily resolved.

c. If the project suggestion is denied, this decision is appealable to the Tree Commission as final agency action.

d. Once the Project Scope is approved, or approved with conditions, the applicant can begin tracking the time spent on the project. The Applicant shall estimate the overall project budget on a cost sheet provided by the City. This lump sum amount shall not include the effort spent by the Applicant and /or their consultants time up to the time of the Project Scope meeting.

B. STEP 2: CONCEPTUAL DESIGN

(1) **Conceptual Planting Plan**

a. Landscape Architect prepares a conceptual design using the base map prepared for the Project Scope showing, in more detail, the buildings, parking lots, play areas, future construction sites, easements, overhead powerlines, identified underground utilities, and surface drainage features in and surrounding each proposed planting site. Incorporate recommendations from the owner's representative and City Staff resulting from the Project Scope Review Meeting or written summary into the Conceptual Planting Plan.

b. Show the following information on the plan:

1) The location of each tree to be removed identified by common name and trunk diameter at breast height (DBH).

2) The location of existing trees to remain with the edge of the tree canopy shown as a dashed line.

3) The location of each new tree identified by common name and tree caliper. Circle each tree with a solid line that represents the expected mature canopy spread of the species. Refer to the Tree Commission Approved Tree Planting List, which can be found on the Tree Commission webpage of the Public Works Department of the City of Jacksonville

(2) **Conceptual Design Submittal**

a. The Conceptual Design is due no later than ninety (90) business days after the project scope is approved. Upon receipt of the conceptual design submittal, the staff will set a meeting

date that will allow at least 10 business days for Staff to review the design before the meeting.

b. The Conceptual Design Submittal includes the following:

1) Conceptual design plan

2) Brief description of the work:

i. The level of Tree Removal.

ii. Is soil replacement required?

iii. Is Irrigation proposed for the project and what type?

iv. Will project include the use of volunteers, or other community involvement?

v. Is there an education component?

vi. Services provided by property owner/manager or others.

vii. The level of maintenance and the period of time required to establish the installed. 0trees.

viii. Rough cost estimate for improvements, i.e., tree removal, tree installation and maintenance, irrigation, soil replacement).

ix. Additional information requested by Staff in the Project Scope Review Meeting or that the Applicant feels may be needed.

(3) **Conceptual Design Review Meeting:** The Applicant meets with City staff, and the property owner/manager to review the Conceptual Planting Plan prepared by Applicant's Landscape Architect.

(4) **Staff Review:** Staff returns to the Applicant written review comments of the Conceptual Planting Plan within ten (10) business days after the review meeting.

(5) **Revised Conceptual Planting Plan (if necessary):** Any review comments are to be incorporated into a revised Conceptual Planting Plan for Staff approval.

(6) **Discussion with District Council Member:** The Applicant shall meet with and discuss the approved Conceptual Planting Plan with the District Council Member.

(7) The approved Conceptual Planting Plan shall be incorporated into the Schematic Planting Plan that is submitted with the Level 3 Application.

C. STEP 3: FEE PROPOSAL FOR SCHEMATIC PLANTING PLAN AND PROJECT IMPLEMENTATION

(1) The Applicant will submit a proposed overall budget to pay for the Schematic Planting Plan, cost estimation, preparation of the Application, and for general administrative, project management, and design services provided by the Applicant, the Landscape Architect and the Project Manager necessary to complete the Tree Planting Project. There are three parts to the Fee Proposal, one prepared by the Applicant, one by the Project Manager one by the Landscape Architect.

a. The Applicant's fee proposal includes the price to prepare the Level 3 Application and to provide general administrative services for the project. Work includes the general coordination with the user agency, City Staff, Project Manager, and Landscape Architect, and the preparation of billings and reports required by the City. If an employee of the

Applicant is qualified to act as Project Manager, then project management services are included in the Applicant's fee proposal.

b. The Project Manager's fee is for the detailed management and quality control of the Project from Schematic Design through bidding, construction and maintenance. Also included is the coordination with the City, the Applicant, the Landscape Architect, and the selected Landscape Contractor regarding the fulfillment of the Contract requirements between the Landscape Contractor and the Applicant, including established performance schedules.

c. The Landscape Architect's fee proposal includes the cost of design services to prepare the Schematic Planting Plan, final design drawings, and bid documents; to review bids; and to provide inspection services during the construction and maintenance period. If the Landscape Architect also serves as Project Manager, then the cost of those services will be included in its proposal.

(2) The City Staff will review the fee proposal within 10 business days and approve it or request modifications before acceptance. The Applicant can proceed with the Schematic Design once the Applicant receives written acceptance of the fee proposal.

(3) Funding Note: Depending on the scope of the Project, in order to receive funding for the Landscape Architect's professional fees the Applicant shall be required to select the Landscape Architect through a competitive bid qualification process if the aggregate of the design fees will be more than $35,000 or if the construction cost is over $325,000. Refer to Sec. 255.20, Florida Statutes, Sec. 287.055, Florida Statutes, and Chapter 126, Jacksonville Ordinance Code for these requirements. The Applicant is responsible for all required Notice to the public, keeping and providing Minutes of the selection process, and to document that they have followed the aforementioned statutes and the Ordinance Code.

D. STEP 4: SCHEMATIC PLANTING PLAN[1]

(1) The Landscape Architect shall prepare the Schematic Planting Plan based upon the approved Conceptual Planting Plan with any modifications requested by Staff as part of the Conceptual Design review phase. The Schematic Planting Plan shall also show the following:

a. A vicinity map showing the location of the Project.

b. Key Map if the Schematic Planting Plan is drawn on more than one sheet.

c. The Schematic Planting Plan base map shall be drawn to a scale of 1-inch equals 20, 30, 40, 50, 60 or 100 feet. The Plan must clearly show the existing site improvements. Show a graphic bar scale on each plan for reference.

d. A North arrow and a legend of symbols on each plan sheet.

(2) The drawings shall be reproducible and legible on 11x17 inch sheets.

(3) Submit to City Staff for review.

(4) The City Staff will have 20 business days to review the Schematic Planting Plan and the proposed fee schedule to ensure that all the requests or modifications generated from the Conceptual Design Review were incorporated.

[1] If the Conceptual Planting Plan contains all of the required information as the Schematic Planting Plan, then a separate drawing may be determined by Staff to be unnecessary.

a. If the submitted Schematic Planting Plan does not incorporate all the requests or modifications agreed upon by the Applicant and Staff, then Staff will return the drawings for resubmittal.

b. If the submitted Schematic Planting Plan incorporates all the comments agreed upon in the Conceptual Design Review, then the Applicant may include the Schematic Plan in the Application.

II. APPLICATION PHASE

A. SUPPORTING DOCUMENTATION. Include and label the following Exhibits with the Application. An explanation of each is given below.

Exhibit A-1: Location Map

Exhibit A-2: Narrative Project Scope

Exhibit A-3: Schematic Planting Plan

Exhibit A-4: Plant Schedule

Exhibit B: Project Performance Schedule

Exhibit C: Total Project Budget

Exhibit D: Project Team

Exhibit E: Proof of Eligibility

Exhibit F: Corporate Resolution Certification (if applicable)

Exhibit G: Agency Acknowledgement of Intent to Plant Trees

Composite Exhibit A: Project Design.

Exhibit A-1: Project Location Map. Provide a map to show the project location within the context of the City of Jacksonville.

Exhibit A-2: Narrative Project Scope. Give a brief overall description and purpose of the Project.

Exhibit A-3: Schematic Planting Plan. See description in the Pre-Application Phase.

Exhibit A-4: Plant Schedule. Provide a list of plants to be installed, that includes a description of each plant in accordance with the table below:

Botanical name	Common Name	Description	Quant.	Notes
Betula nigra	River Birch	__ Gal. or ___B&B, ___Caliper, __Ht., __ Spd., ___Min trunks, ___C.T	5	

Exhibit B: Project Performance Schedule. State the number of days to achieve each phase of work from beginning to end. Include the following phases in the Performance Schedule:

i The design phase, which includes final design and preparation of construction documents.

ii The bid phase, which includes bid solicitation, bid opening, and selection of the qualified low bidder, project award, and contract execution with the landscape contractor.

iii The construction phase, which includes the removal of obstacles, soil replacement, installation of irrigation, whether permanent or temporary, and the installation of the trees during a specified warranty period.

iv. Maintenance of the trees and irrigation system, if any.

Task	**Schedule**
Construction Drawings and Specifications	___ days after execution of Agreement
Bid Documents sent to 3 bidders	___ days after execution of Agreement
Bid Opening, Bid Award	___ days after delivery of bid documents to bidders
Selection of Contractor, Execution of Contract	___ days after construction contract award
Construction Completion, Initial Acceptance	___ days after contract execution
Maintenance Completion, Final Acceptance	___ months of maintenance after Initial Acceptance if not extended to cover warranty of replacement trees

Exhibit C: Total Project Budget. Provide estimated costs of all phases of the Project.

a. Estimated administrative/contract management fees with a detailed scope of services provided by the Applicant showing the estimated hours and hourly rates for each task, including, but not limited to, community outreach and/or programs, volunteer coordination, meetings, project coordination with the City and the Landscape Architect, and billing.

b. Estimated Design Consultant Services Fee, with a detailed scope of services provided by the consultant showing the estimated number of hours and hourly rates for each phase of service.

c. Estimated construction cost based on the Schematic Design, including, but not limited to, site preparation, soil replacement, performance/payment bond, maintenance of traffic, tree installation, construction of irrigation system, and maintenance of improvements during the selected warranty period of 3 months, 1 year or 2 years.

Exhibit D: Project Team

a. List the people and entities involved in the Project, including but not limited to the Applicant, any volunteers, the Landscape Architect, the Project Manager if different from the Landscape Architect, and any other consultants.

b. Describe the roles, responsibilities and tasks for each team member, such as who will:

i List the people and entities involved in the Project, (the "Participants") including the Applicant (which will become the "Contractor" described in Agreement), the City, any volunteers, the Project Manager, and the Landscape Architect.

ii Describe roles, responsibilities, and tasks of each Participant who will:

1. prepare the final design and bid documents, review bids, and provide oversight of construction and maintenance;
2. obtain final approval of the design from Tree Commission Staff;
3. oversee preparation of the Construction Documents by the Project Landscape Architect;
4. solicit bids from a minimum of three qualified bidders for construction of the Project;
5. coordinate with the City the selection of the landscape contractor; and
6. provide professional project management and quality assurance for the design, construction, maintenance, and warranty of the Project.

Exhibit E: Proof of Applicant Eligibility. This information is required to confirm that the Applicant is eligible to receive funding.

a. **501(c) not-for-profit organizations**

1. Attach a copy of the organization's IRS determination letter.
2. Attach a status of good standing certificate issued by the Florida Division of Corporations evidencing that the Applicant is in good standing and has been in existence for one (1) year prior to applying for the Level 3 Program. The certificate must be dated within 60 days of filing a complete application and list the requesting agency as a Florida non-profit corporation (requested from Florida Division of Corporations (http://dos.myflorida.com/sunbiz).
3. Attach a copy of the Florida Division of Corporations "Detail by Entity Name" webpage (http://dos.myflorida.com/sunbiz) to show that the applicant is currently operating in Duval County. If proof of operation in Duval County cannot be determined by the "Detail by Entity Name," attach evidence of current operations in Duval County by submitting at least one of the following:

i A list of notable projects or work completed in Duval County by the Applicant; or

ii A copy of media publicity identifying work conducted in Duval County (i.e. news article or blog post)

b. **Special District, or other unit of local government within Duval County**

1. Attach a copy of the enacted ordinance establishing the district or local unit and provide documentation that the unit is currently in compliance with all state and local requirements.

Exhibit F: Corporate Resolution Certification (if applicable): If the Applicant is a corporation, fill out and sign the Corporate Resolution Certification form included in the Application.

Exhibit G: Acknowledgement of Intent to Plant Trees. Have the manager of the public property on which the Project is located complete and sign the Acknowledgement form. This document confirms that the manager of the public property has authorized the Applicant to install the Project on its property. If information is needed regarding the property's ownership, contact the Real Estate Division at (904) 255-8700 for assistance. Obtain authorization from the following:

a. If the project is in the City Right-of-Way, obtain authorization from the Engineering Division of the Public Works Department of the City of Jacksonville

b. If in a City Park, obtain authorization from the Parks & Recreation Department of the City of Jacksonville;

c. If on School Board property, obtain authorization from the Assistant Superintendent of Facilities.

d. If on property controlled by any other governmental entity not described above, obtain the appropriate authorization from that agency

B. APPLICATION SUBMITTAL

Applicants must submit one (1) complete printed set of the Application materials, and a high-resolution electronic version. Transmit the application with an original signature cover letter on the Applicant's letterhead that includes a statement binding the Applicant to fulfill commitments made in the Application and identifies the key contact person. If there are partners to the Application, each partner must provide an original signature letter including the binding statement.

You may contact the Tree Commission staff via email at JGearhart@coj.net by phone (904) 255-4327, or by mail to Tree Commission Staff, 609 St. Johns Bluff Road North, Jacksonville, Florida 32225.

Submit the completed application and all supporting documents to:

The Jacksonville Tree Commission

in care of the Mowing and Landscape Maintenance Division

Department of Public Works

609 St. Johns Bluff Road North

Jacksonville, Florida 32225

Application Deadline: Forty-five (45) days prior to the next scheduled Tree Commission meeting so that Staff can review the application.

C. STAFF REVIEW OF APPLICATION

The following shall be considered for the Project in the Staff Report:

(1) **Review of Application Completeness**

a. The Staff will review each Application for completeness and notify the Applicant if the Application is considered complete or incomplete within ten (10) business days of submittal.

b. An Application is considered complete if all necessary information and documentary proof required by this document and the Application is provided and in the format requested. If the Application is deemed complete, the Staff will proceed with the review of the information provided.

c. If the Application is considered incomplete, the Staff will return the Application to the Applicant with list of deficiencies.

(2) **Review of Application**

a. The Staff will review the Project Application and prepare a report with a recommendation ("Staff Report") for (1) approval, (2) approval with conditions, or (3) denial.

b. The Staff Report will be sent to the Tree Commission, the District Council Member, the At-Large Council Member within whose residency area the Project is located, and the Applicant, at least ten (10) business days prior to the Tree Commission meeting when the Project will be presented to the Commission for an opinion.

c. The Staff Report will be based upon the Application and Exhibits and will include an analysis of each of the Project Evaluation Criteria, below.

D. STAFF PROJECT REVIEW CRITERIA

(1) **Design Criteria**

a. The species, number and placement of trees are appropriate for the site.

b. The proposed trees are on the "Tree Commission Approved Tree Planting List," and as amended from time to time. The list is available on the Tree Commission webpage of the Public Works Department of the City of Jacksonville.

c. The proposed trees are predominately shade trees. The use of non-shade trees as a significant portion of the trees planted will only be acceptable if the Applicant can justify a significant use of non-shade trees in terms of the overall Project.

d. Palms do not exceed 25% of total trees being planted unless justified by the Applicant.

e. The proposed locations of trees do not interfere with existing trees, buildings and other structures, utilities, or sight line requirements in road rights-of-way.

(2) **Cost Criteria**

a. Administrative costs are reasonable.

b. Project Manager's and Landscape Architect's fees are reasonable.

c. Construction costs are reasonable.

d. Permanent automatic or temporary irrigation system costs are reasonable, if irrigation is proposed.

e. The cost of the species and size of trees selected do not outweigh the benefits provided by such trees.

(3) **Maintenance and Impacts Criteria**

a. Low maintenance trees are utilized that will require minimum maintenance after the period of mandatory maintenance by the Applicant.

b. The location of trees and irrigation systems have a minimum adverse impact over time on infrastructure such as sidewalks and roadbeds.

(4) **Public Benefit Criteria**

a. The species of trees being planted are beneficial to the City's tree canopy.

b. The Project provides a unique benefit to the neighborhood, Council District, or City.

c. The Project serves high visibility areas.

d. The Project engages the Community though volunteers or education or other public engagement.

e. The Project is aesthetically pleasing and/or combats blight in blighted areas.

f. The Project supports Resiliency goals within the City.

(5) **Staff Review of Plan-It Geo Objective Criteria:** Staff will utilize the Plan-It Geo Web Tool to evaluate the existing conditions of the geographic area within the Census Block where the proposed Project is located. The ranking will measure the benefits provided by each census track and not the specific benefits of the proposed project.

a. The location will be evaluated based on the Census Block ranking (1- 488) developed by Plan-It Geo for the five (5) categories listed below:

i. Urban Tree Canopy Percentage

ii. Stormwater Benefits

iii. Urban Heat Island

iv. Socio-Economic Benefits

v. Overall-equally weighted criteria

1. 1st-25th percentile (1-122)

2. 26th- 50th percentile (123-244)

3. 51st-100th percentile (245-366)

4. 76th-100th percentile (367-488)

b. If a Project overlaps two or more census blocks, then the average of the census blocks will be applied to determine a "score."

E. TREE COMMISSION REVIEW AND RECOMMEDATION

(1) **Application Presentation**. All Applications will be presented at a scheduled public meeting held by the Tree Commission, for review, deliberation, and final recommendation. Special meetings may be held if needed at the discretion of the Tree Commission. Each Applicant will have 10 minutes to present its Application to the Tree Commission.

(2) **Tree Commission Review**.

a. When evaluating each Application, the Tree Commissioners will utilize the information contained in the Application, including the exhibits, Staff Report and all information obtained during the Applicant's presentation. The Tree Commission will recommend either:

1. Approval;
2. Approval with Conditions;
3. Denial of the Project; or
4. If more information is requested then the Application may be deferred by a vote of the Commission or unilaterally by the Chair of the Commission.

b. If the recommendation is Approval with Conditions and the Applicant agrees with the recommendation, the Applicant shall revise the supporting documents in the Application necessary to convey the intent of the recommendations by the Tree Commission for inclusion in the MBRC package.

c. If the recommendation is Approval with Conditions and the Applicant does not agree with the recommendation, then the result will be a recommendation for Denial.

d. The Tree Commission's recommendation will be forwarded to the Mayor's Office for processing through the Mayor's Budget Review Committee ("MBRC") for final review.

F. MAYOR'S BUDGE REVIEW COMMITTEE ("MBRC") REVIEW

(1) At the earliest MBRC meeting following the evaluation of the proposed Project by the Tree Commission and the receipt of any requested modifications to the Application, the Staff will submit the Project to MBRC for review and approval. Like the Tree Commission, MBRC shall either approve the Project, approve the Project with conditions, deny the Project, defer the decision until more information is received, or delay funding of the Project to a later date.

(2) If MBRC approves the Project as presented or as modified, it will direct the Office of General Counsel to prepare the Agreement. No additional action is required by the City Council.

(3) If the Project is denied by MBRC, no further action will be taken by the Tree Commission on the Project through the Level 3 Program. However, this does not limit the ability of a Council Member to file legislation to implement a Project utilizing the Tree Fund.

(4) If the MBRC decision is Approval with Conditions, and the Applicant agrees with the decision, the Applicant will revise the documents necessary to convey the intent of the decision for inclusion in the Agreement exhibits.

(5) If the decision is Approval with Conditions and the Applicant does not agree with the decision, then the result will be a Denial of the Project by the MBRC.

III. PROJECT EXECUTION PHASE

A. ENTERING INTO AGREEMENT

(1) Once the Project is approved by the MBRC, the Office of General Counsel will prepare a Tree Planting Program Level 3 Agreement (the "Agreement") between the Applicant and the

City of Jacksonville, which will set the funding provided by the City and describe the responsibilities of each party.

(2) We understand that the Applicant relies on consultants to assist with its Project. However, the Applicant is responsible for the Project and all that it encompasses. The Agreement for the funding is between the Applicant and the City of Jacksonville, so the Applicant is fully responsible for completion of the Project and will be held accountable for any deficiencies.

(3) Upon execution of the completed Agreement by all parties, the Applicant will be eligible for payment of funds in accordance with the Agreement.

(4) **It is imperative that the Applicant read and understand the Agreement and the obligations before entering into this Agreement with the City.**

B. PROJECT BIDDING & AWARD

(1) Landscape Architect prepares bid documents (tree planting plans and construction specifications) incorporating the requirements of the approved Application and the Agreement.

(2) Project Manager solicits bids from 3 landscape contractors.

(3) The Applicant awards the project after consultation with the City.

(4) Applicant prepares and executes a Contract between Applicant and the Landscape Contractor.

C. CONSTRUCTION

(1) Project Manager issues Notice to Proceed, establishes the construction schedule, coordinates with the Landscape Architect and City Staff, and provides overall project management during the construction and the maintenance period.

(2) Landscape Architect monitors construction and maintenance during the tree establishment period, inspects the completed work, submits reports, and reviews the contractor's invoices.

(3) Applicant prepares and submits invoices to the City for work completed the previous period or phases.

(4) The Applicant issues to the Contractor a letter of Final Acceptance when all work is completed and obtains the close out documents required by the Contract.

D. MAINTENANCE

(1) The Applicant shall maintain the Project throughout the warranty period as described in the Contract between the Landscape Contractor and the Applicant.

(2) Should a tree not meet specifications at any time within the warranty period, the Applicant must replace the tree and the warranty period begins again once that tree (or trees) is approved by City staff.

(3) Payments may be made in installments of 6 months.