Engineering & Public Works Operations

Streetscape Standards

Republished

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SECTION 1

INTRODUCTION

INTRODUCTION

The purpose of this manual is to provide uniform minimum standards for the design, installation and maintenance of all landscape within streets and roads under the jurisdiction or permitting control of Palm Beach County.

The standards established by this manual are applicable to all new development and where feasible, to existing public rights of way where landscape improvements have been designed. These standards will be applied to the extent that legal, economic and environmental considerations allow.

OBJECTIVES

Provide uniform minimum standards for landscape within streets and roads under the jurisdiction or permitting control of Palm Beach County and general information for landscaping in state road rights of way as required to meet specific development approval conditions imposed by the Board of County Commissioners. Contact the Florida Department of Transportation Palm Beach Operations Center, Permit Department (561) 432-4966 - for specific details and requirements for planting in state road rights of way.

Provide guidelines to assist in the protection of the health, safety and welfare of the public using the roadway system.

Provide a planning tool for the development of landscaping within road rights of way throughout Palm Beach County.

Provide Landscape Architects, County Officials, related professionals and other interested parties with guidelines for landscaping within road rights of way off of the state highway system
Provide Palm Beach County Engineering Department guidelines for reviewing right of way landscape plans as submitted by the public or other government agencies.

Provide safe landscape installation and maintenance procedures.

LANDSCAPE MATERIAL CONSIDERATIONS

The landscape architect and designer should be sensitive to the geographic area in which they are working. Material that does well in the southern part of the county may not do well in the northern and western parts of the county.

The trees and palms were chosen for their commercial availability, longevity and growth characteristics. The shrubs and ground covers should be selected based upon their overall height. The height restriction within the sight triangle area for shrubs is 30", as measured from the adjacent roadway. Plants that grow taller than 30", but can be maintained at the required height, may also be planted within the sight triangle. Outside the sight triangle, shrubs may be used that reach a greater overall height than 30". In all cases, plant materials shall be Florida Grade No. 1 or better (as defined by the July, 2022 edition of Grades and Standards).

Desirable Plant Characteristics

The following plant characteristics are desirable and should be considered when selecting plant material..

Strong wood
Limited leaf drop
Slow growth
High Drought Tolerance
Florida Native
Low Maintenance

Undesirable Plant Characteristics

The following plant characteristics are undesirable and should be considered when selecting plant material.

Weak and brittle wood
Excessive leaf, fruit and flower drop
Invasive root system
Edible fruit
Rapid growth
Low Drought tolerance
High Maintenance
Wildlife Attractors

Trees prohibited by Palm Beach County Unified Land Development Code shall not be used. These include Melaleuca, Brazilian pepper, Australian Pine and Earleaf acacia. Ficus, Silk Oak and Rosewood, classified as controlled plant species, shall not be used. In those medians and roadsides that are being upgraded, these species should be removed and more suitable plant material be installed in their place.

Recommended locations for plantings in proximity of utility lines are available in Florida Power & Light Company's Plant the Right Tree in the Right Place publication.

Royal Palms have large heavy fronds that can cause significant property damage. The fronds can cause vehicle accidents, and/or injuries when they fall into the travel lanes of the adjacent roadway below. Therefore, in County road rights of way, Royal Palms may be used only in situations when:

- They can be located such that required clear zone setbacks and spacing between trees within sight lines can be provided.

- and -

- They can be located where they will be set back a distance equal to the average mature frond length, plus 100% of the average mature frond length, to allow an area for fronds to fall to the ground without falling into the travel lanes of the roadway.

- or -

- There is a formal commitment on the part of the permittee to provide the level of maintenance (regular removal of older fronds) necessary to significantly reduce the likelihood of any fronds falling. The Engineering Department will have the final authority to approve or disapprove the use of Royal Palms in this type of situation.

SECTION 2

PALM BEACH COUNTY ROAD CRITERIA

PALM BEACH COUNTY ROAD CRITERIA

The following criteria shall be considered when designing landscape plans for streets and roads under the jurisdiction or permitting control of Palm Beach County. The County Engineer shall retain final authority to approve or disapprove any street and right of way landscape plans and maintenance requirements with respect to safe and proper engineering practices. All approvals shall be subject to any conditions imposed by the Department of Engineering and Public Works.

PERMITTING

Permitting for projects within Palm Beach County rights of way shall be applied for through the Land Development Division, E-Permit Process. The following list sets forth the minimum requirements for submitting plans to landscape within Palm Beach County maintained rights of way.

1. One application, available from the Land Development Division, Permit Section. The applicant shall submit the following sets of plans through the E-permitting process: (see https://discover.pbc.gov/engineering/Pages/Permitting.aspx)

    a. Signed and sealed manifest and scan copies (or pdf's) of plans. Maximum plan size is 24" x 36" with initial application.

2. The plans shall be drawn to a scale of 1" = 20' (1" = 30') to 1" = 40' (which ever coincides with the related Palm Beach County roadway plans) and indicate the right of way lines, existing pavement, curbing, intersecting streets and names, driveways, drainage facilities, traffic control devices, and utilities, including underground and above ground utilities within the project boundaries. Exceptions to the required scale are to be approved by the County Engineer. In all cases, plans are to be prepared in a continuous format with match lines.

2. The plans shall indicate type, size and location of proposed and existing landscape. Horizontal dimensions of the landscape from the edge of pavement or face of curb shall be provided. Typical sections are to be provided showing all of the relevant information required of this manual.

3. The plans shall be signed and sealed by a landscape architect, authorized to practice in the state of Florida, and indicate on each plan sheet "All landscape and above and below ground structures shown hereon are designed and are to be installed and maintained in accordance with Palm Beach County Streetscape Standards Manual."

4. All sight distance lines at intersections (including driveways) and roundabouts shall be indicated on the plans and dimensioned, as determined by FDOT Green Book, FDOT Design Manual and Chapter 9 of the NCHRP Report #672. Examples of sight lines can be found on pages __2-4_____ to __2-9____. However, sight lines shall be calculated. Landscaping within sight distance lines shall provide a clear sight distance between 30" and 8', measured from the adjacent road pavement. Required spacing between trees and/or palms shall be provided 40' on center on PBC maintained ROWs and per FDOT Index 546 on State ROWs

PERMITTING – Continued

5. In all cases NO CUTS SUNSINE 811 shall be contacted and all utilities located prior to beginning construction. All plants specified for Palm Beach County roadways shall be Florida grade, No. 1 or better as specified in the most recent adopted manual of Grades and Standards for Nursery Plants, published by the Florida Department of Agriculture, Division of Plant Industries.

6. Trees and plants placed within the right of way shall conform to the desirable growth characteristics per the FPL Plant The Right Tree guide, subject to approval by the office of the County Engineer. Special attention should be given to the appropriate species planted under or over utility lines. Adequate growth area shall be provided for all plant materials.

7. Grouped plantings (including tree trunks) shall be arranged so they do not collectively present sight distance obstructions.

8. Indicate on the plans the proposed method of irrigation. *

9. Submit a cost estimate (materials and installation) for the landscape. Provide a cost estimate for the irrigation system, if one is proposed.

10. Copy of maintenance of traffic plan for installation and maintenance operation shall be submitted with permit application.

11. Include copies of plant maintenance and fertilization plan/schedule.

* If an irrigation system is proposed, submit a copy of the plans signed and sealed by a landscape architect authorized to practice in the state of Florida or a Florida certified irrigation designer. The irrigation plans shall indicate the items as noted in #2 and include Irrigation specs.

Should there be any question regarding the above information, contact the Land Development Division, Permit Section, (561) 684-4086.

SAFE SIGHT DISTANCE

Safe sight distance triangles shall be provided in accordance with this manual and the Florida Department of Transportation, Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Green Book current edition) criteria, FDOT Design Manual and Chapter 9 of the NCHRP Report #672 (current edition). Sight distance shall be provided for the ultimate roadway section, as appropriate.

All landscaping within the required safe sight distance triangle areas of **County maintained ROWs** shall be planted and maintained as follows:

SAFE SIGHT DISTANCE – Continued

1. Safe sight distance triangle areas shall be planted and maintained in a way that provides unobstructed visibility at a level between 30" and 8' above the pavement surface of the adjacent roadway. The effects of changes in elevations in the roadway cross section shall be considered when determining the adequacy of sight distance. Required spacing between trees and/or palms shall be provided no closer than 40’ on center for trees greater than 4” in caliper (30’ on center for trees less than 4’ in caliper) at maturity when measured at 6” above Grade

2. Vegetation located within safe sight distance triangle areas shall be trimmed so that no canopy limbs or foliage extend into the required visibility area, unless otherwise provided herein.

3. Within safe sight distance triangle areas, vegetation that obstructs visibility shall not be planted, nor shall improvements or devices such as bus benches or shelters or newspaper vending machines be installed in ways that create traffic hazards. The effects of vertical curvature shall be addressed in order to provide required crossing and turning sight distances.

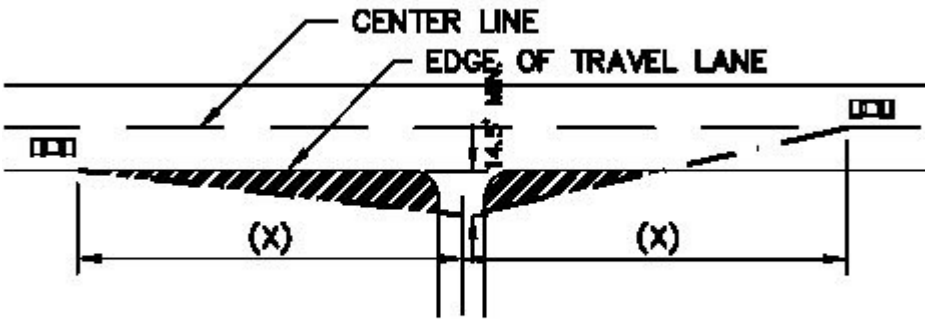
4. All landscaping planted within the safe sight distance triangle area shall be perpetually maintained by permittee to conform to the requirements of the permit and this manual.

The County Engineer reserves the right to impose extended sight distance requirements as deemed necessary to provide for the health, safety and welfare of the public.

Required safe sight distances shall be provided using the following diagrams as examples. In all cases, safe sight distance shall be calculated using FDOT Design Manual, Green Book and Chapter 9 of the NCHRP Report #672 criteria for each proposed roadway landscape design.

SAFE SIGHT DISTANCE – Continued

USE FOR 2 LANES UNDIVIDED



= AREAS FREE OF SIGHT OBSTRUCTIONS

Notes:
If no center line striping exists, measure to the centerline of the pavement.

Stated distances apply to both "T" and four way intersections. Stated distances do not apply at signalized intersections that never go on a 'flash' operation.

If the design speed is higher than the posted speed limit, use the design speed for calculating required sight distance.

2 LANES UNDIVIDED

Posted Speed Limit	Required Side Street/Drive Sight Distance (X)
45 MPH**	500'
40 MPH	445'
35 MPH	390'
30 MPH *	335'

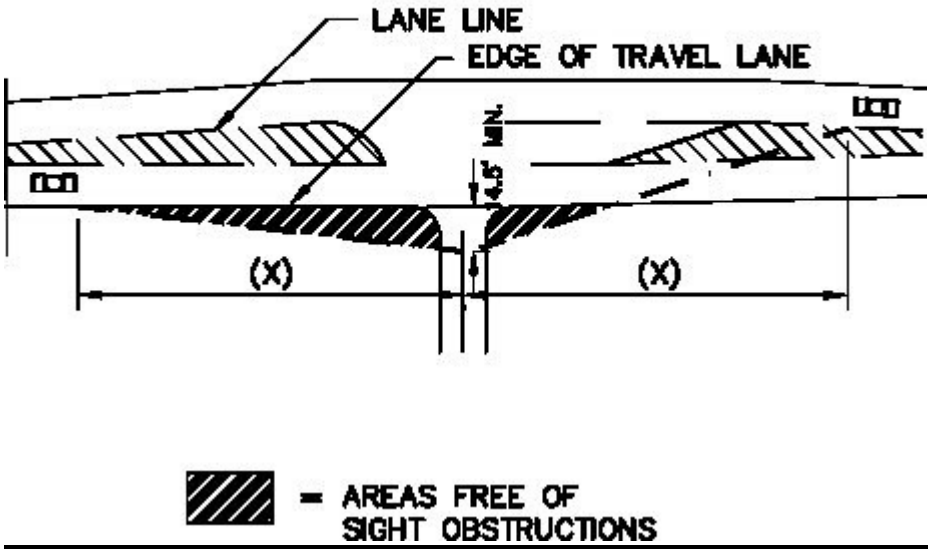
* Assume 30 MPH if speed limit on a local street is not posted.
In certain situations on residential streets, providing 335' of sight distance may be impossible due to existing conditions. In these situations, this reduced sight distance may be used, if approved by the County Engineers.

** For speeds greater than 45 MPH, required sight distance is to be calculated using Green Book criteria.

Source: Florida Department of Transportation, FDOT Design Manual

SAFE SIGHT DISTANCE – Continued

USE FOR 3 LANES UNDIVIDED



Notes:

If sight line extends beyond the limits of the turn lane pavement widening, measure to the centerline or edge of pavement, as appropriate.

Stated distances apply to both "T" and four way intersections. Stated distances may not apply at signalized intersections that never go on 'flash' operation.

If the design speed is higher than the posted speed limit, use the design speed for calculating required sight distance.

3 LANES UNDIVIDED

Posted Speed Limit	Required Side Street/Drive Sight Distance (X)
45 MPH**	530'
40 MPH	475'
35 MPH	415'
30 MPH *	355'

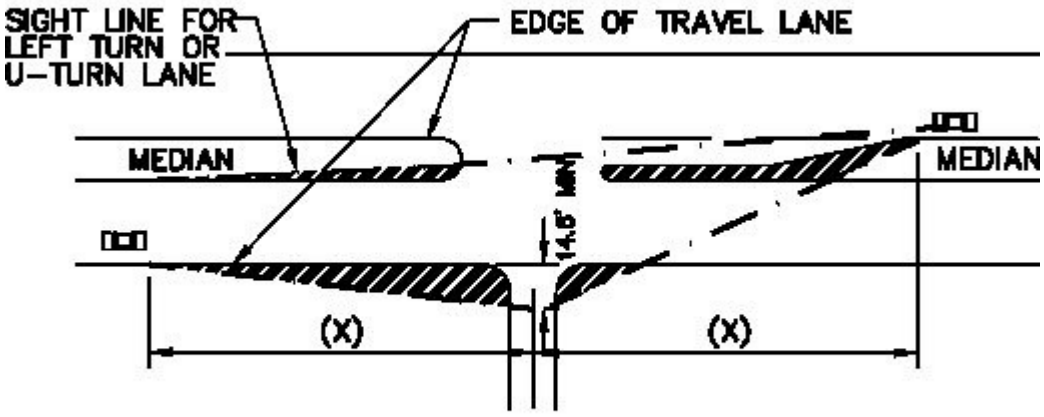
* Assume 30 MPH if speed limit on a local street is not posted.

** For speeds greater than 45 MPH, required sight distance is to be calculated using FDOT Design Manual – Exhibit 212-4

Source: Florida Department of Transportation, FDOT Design Manual

SAFE SIGHT DISTANCE- Continued

USE FOR 4 OR 6 LANES DIVIDED



Notes: = AREAS FREE OF SIGHT OBSTRUCTIONS

Stated distances apply to both "T" and four way intersections. Stated distances do not apply at signalized intersections that never go to 'flash' operation.

If the design speed is higher than the posted speed limit, use the design speed for calculating required sight distance.

6 LANE DIVIDED

Posted Speed Limit	Required Side Street/Drive Sight Distance (X)
45 MPH*	625'
40 MPH	555'
35 MPH	485'
30 MPH	415'

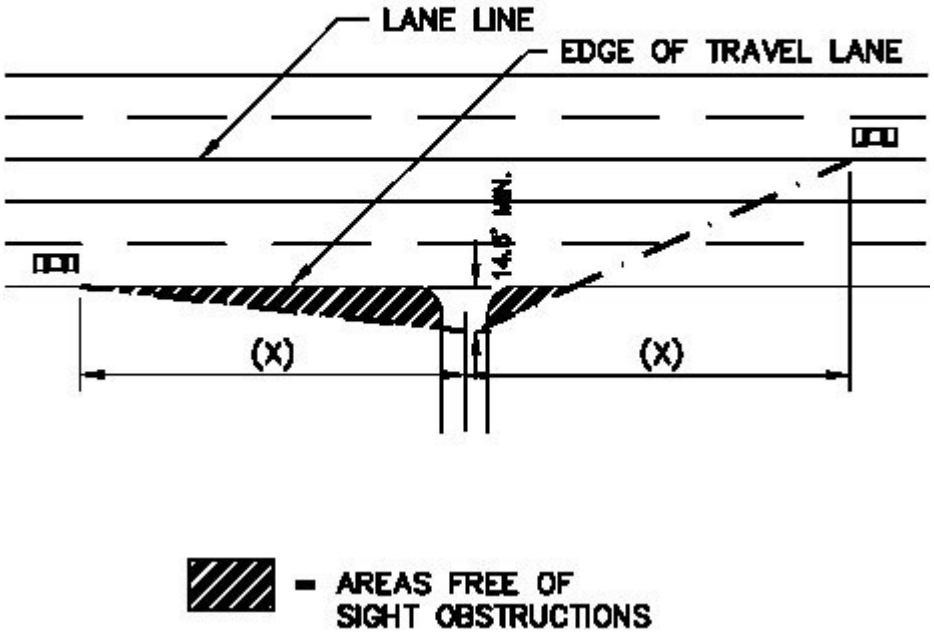
4 LANE DIVIDED

Posted Speed Limit	Required Side Street/Drive Sight Distance (X)
45 MPH*	590'
40 MPH	525'
35 MPH	460'
30 MPH	395'

* For speeds greater than 45 MPH, required sight distance is to be calculated using FDOT Design Manual – Exhibit 212-4

Source: Florida Department of Transportation, FDOT Design Manual

USE FOR 5 LANES UNDIVIDED



Notes:

Stated distances apply to both "T" and four way intersections. Stated distances do not apply at signalized intersections that never go to 'flash' operation.

If the design speed is higher than the posted speed limit, use the design speed for calculating required sight distance.

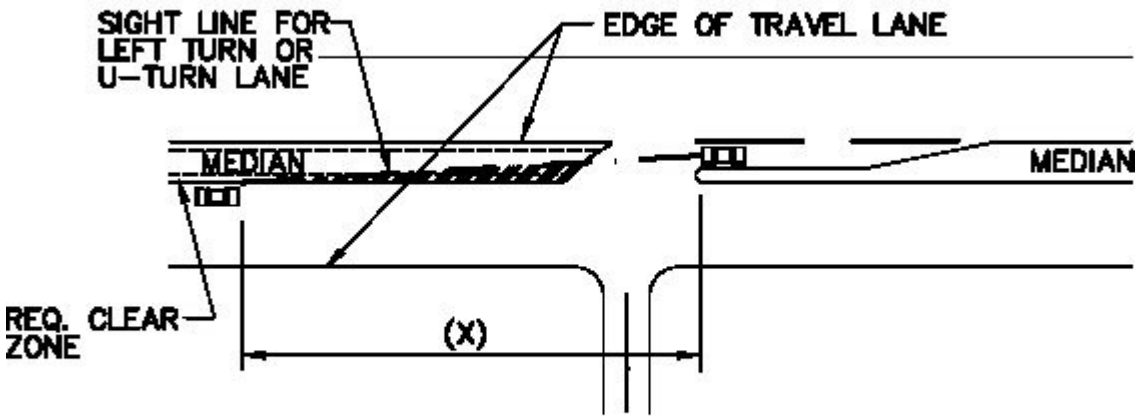
5 LANE UNDIVIDED

Posted Speed Limit	Required Side Street/Drive Sight Distance (X)	
	Left	Right
45 MPH	600'	430'
40 MPH	530'	360'
35 MPH	460'	330'
30 MPH	400'	280'

Source: Florida Department of Transportation, FDOT Design Manual

SAFE SIGHT DISTANCE- Continued

USE FOR CHANNELIZED MEDIAN OPENINGS



Notes: = AREAS FREE OF SIGHT OBSTRUCTIONS

If the design speed is higher than the posted speed limit, use the design speed for calculating required sight distance.

6 LANE DIVIDED

Posted Speed Limit	Required Side Street/Drive Sight Distance (X)
45 MPH*	430'
40 MPH	385'
35 MPH	335'
30 MPH	290'

4 LANE DIVIDED

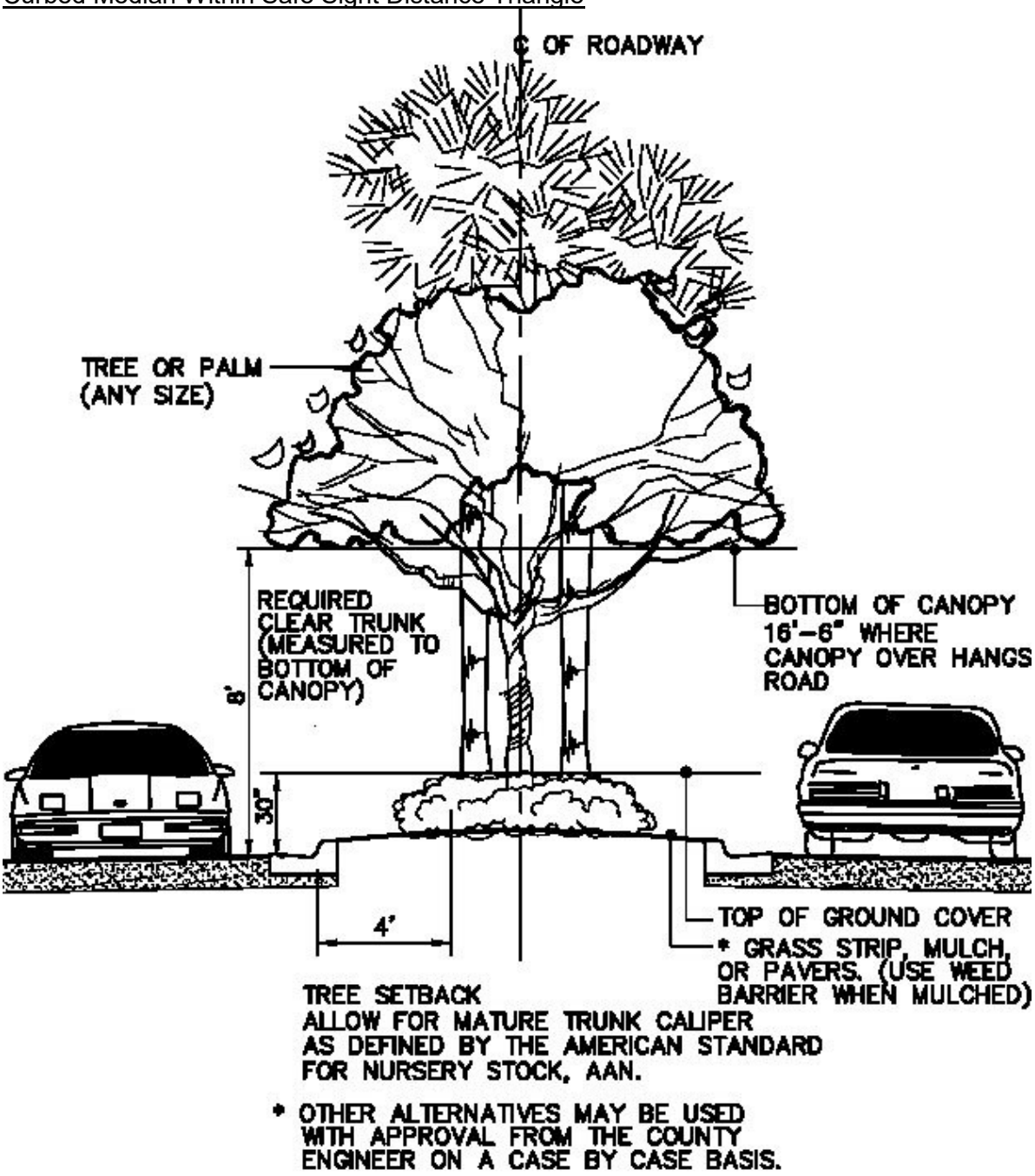
Posted Speed Limit	Required Side Street/Drive Sight Distance (X)
45 MPH*	400'
40 MPH	355'
35 MPH	310'
30 MPH	265'

* For speeds greater than 45 MPH, required sight distance is to be calculated using Green Book & FDOT Design Manual criteria.

Source: Florida Department of Transportation, Green Book & FDOT Design Manual (refer to Table 212.11.11 Sight Distances for Left Turn from Highway)

PLANTING STANDARDS

Curbed Median Within Safe Sight Distance Triangle



TYPICAL SECTION

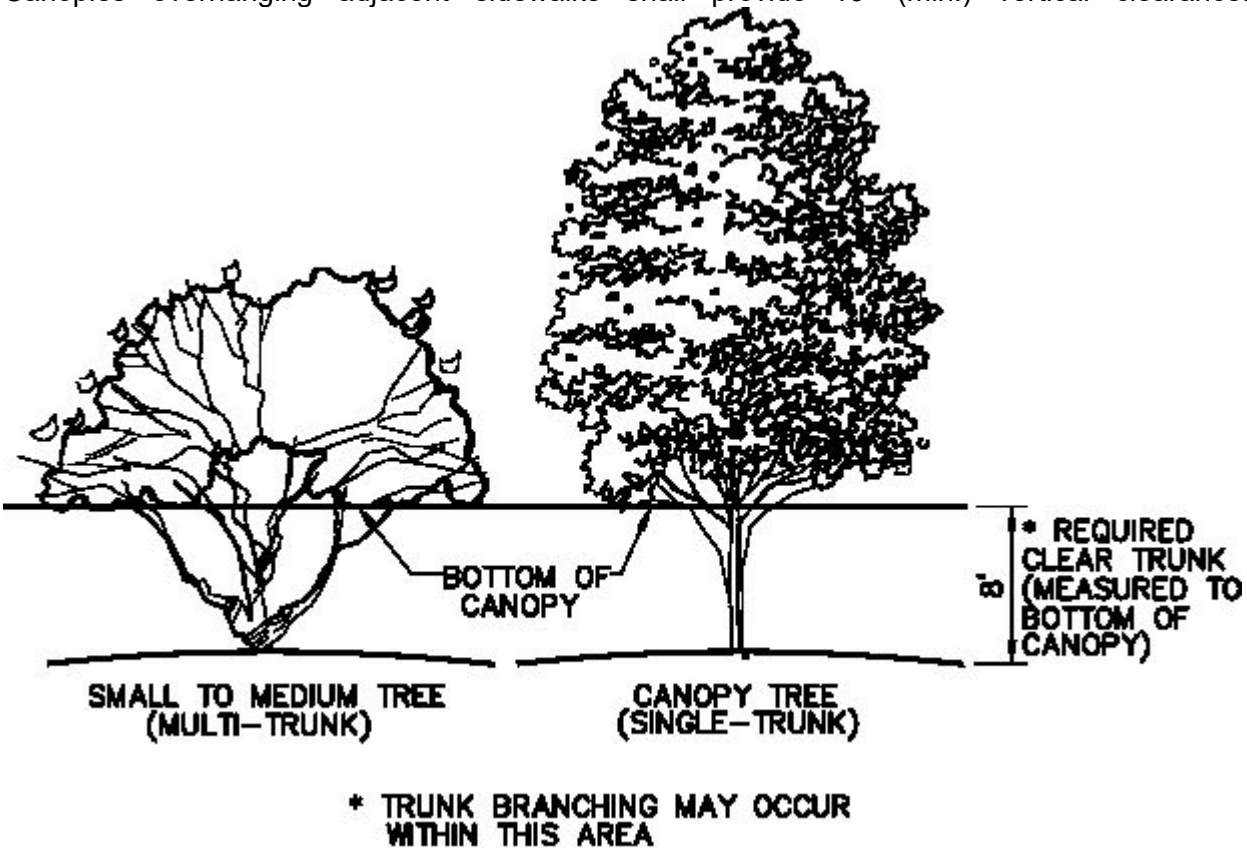
Landscaping within sight triangles requires that the plants do not block visibility. The diagrams illustrate in section and plan view a typical median that falls within a sight triangle. Drivers of vehicles on the crossroads and within the sight triangle must be able to see each other throughout the entire limits of the sight triangle. The effects of vertical curvature shall be addressed when designing to provide these sight distances.

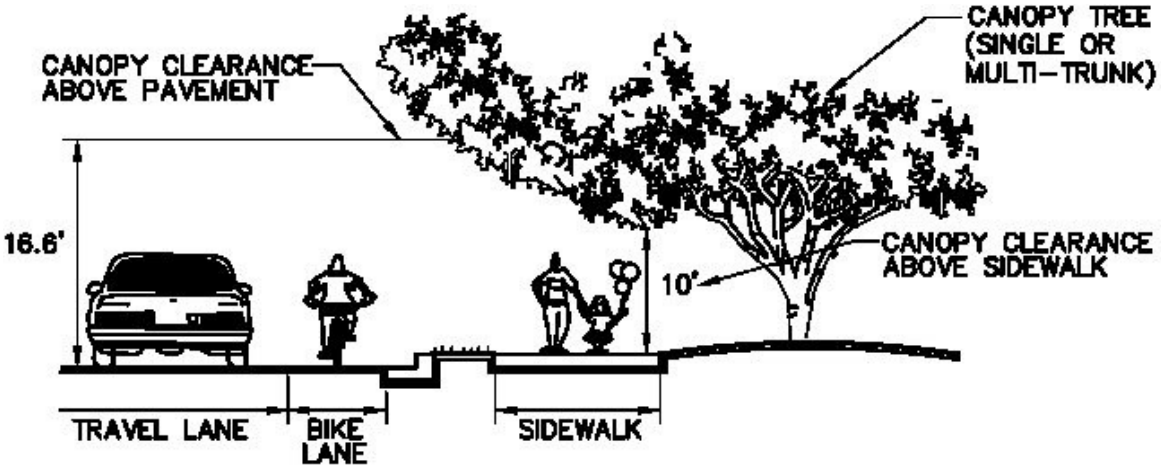
PLANTING STANDARDS - Continued

Curbed Median Within Safe Sight Distance Triangle - Continued

Trees and palms of any caliper, as long as they can meet all the setback requirements, may be used within sight triangles. They shall be spaced no closer than 40' on center. Trees and palms with mature trunk calipers less than 4" can be planted 30' minimum, on center within sight triangles. Consideration for mature canopy and trunk caliper shall be taken into account when planting large shade trees and palms. They may need to be spaced further apart to allow for future canopy development. The bottom of the canopy shall be maintained at 8' of clear trunk as measured from the pavement adjacent to the median or roadside, as appropriate. (See below.) **Canopies overhanging adjacent travel lanes on two lane roadways shall be mounted to a height of 18.5' (min) above the pavement. On multilane roadways where 18.5' (min.) is an alternative then canopies overhanging adjacent travel lanes can be reduced to 16.5' (min.)**

Canopies overhanging adjacent sidewalks shall provide 10' (min.) vertical clearance.





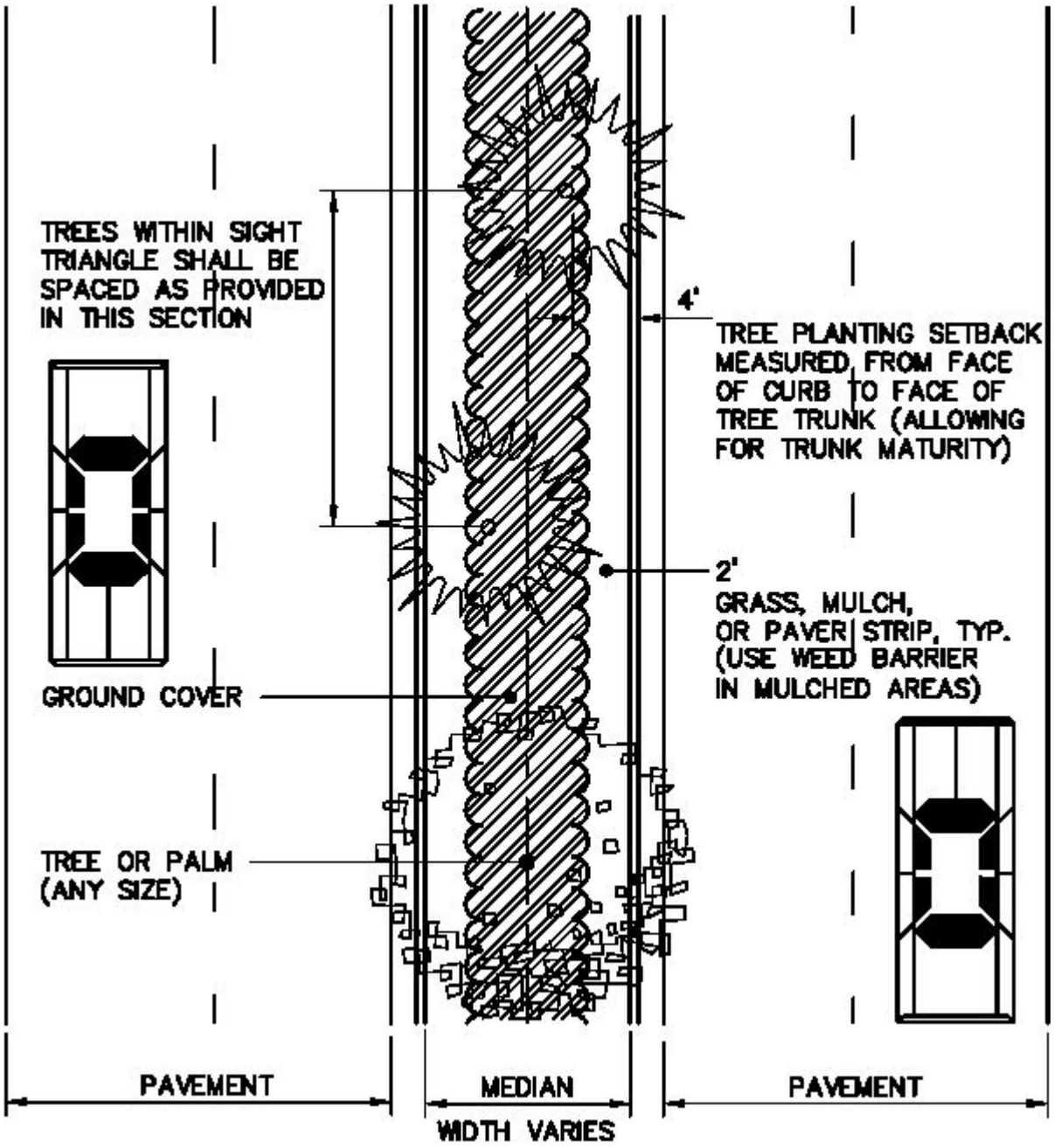
BIKE LANE SECTION

Ground covers and shrubs shall be low growing, which at time of maturity will not exceed 30" in height or shall be varieties that can be appropriately maintained at 30" or less.

Grass or mulched strips (with weed barriers) or pavers shall be a minimum width of 2' for maintenance of planting areas. This area will allow maintenance workers a safe area in which to perform routine maintenance operations and shall be provided on the roadway side of all planting areas.

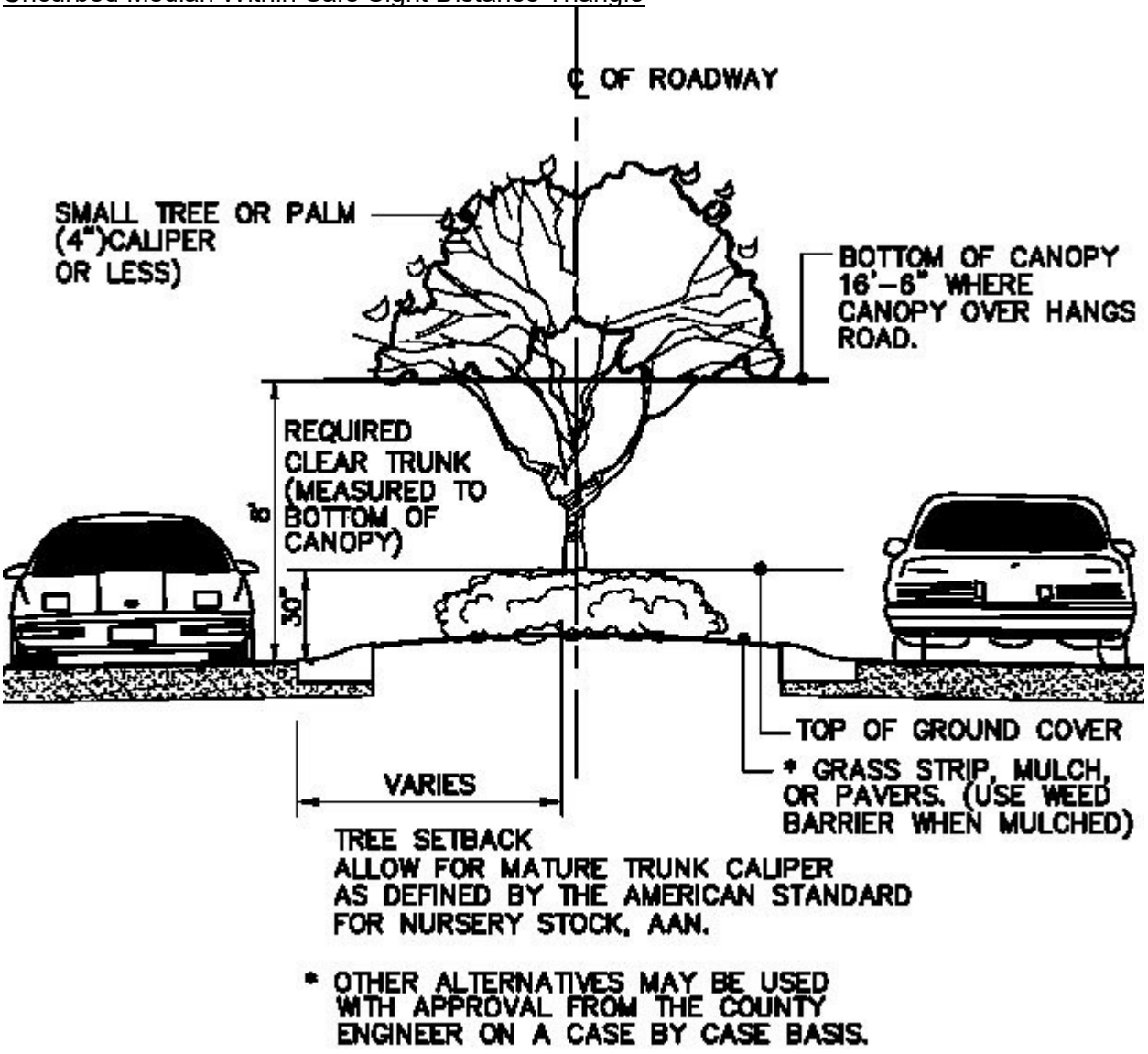
PLANTING STANDARDS – Continued

Curbed Median within Safe Sight Distance Triangle



PLANTING STANDARDS – Continued

Uncurbed Median Within Safe Sight Distance Triangle

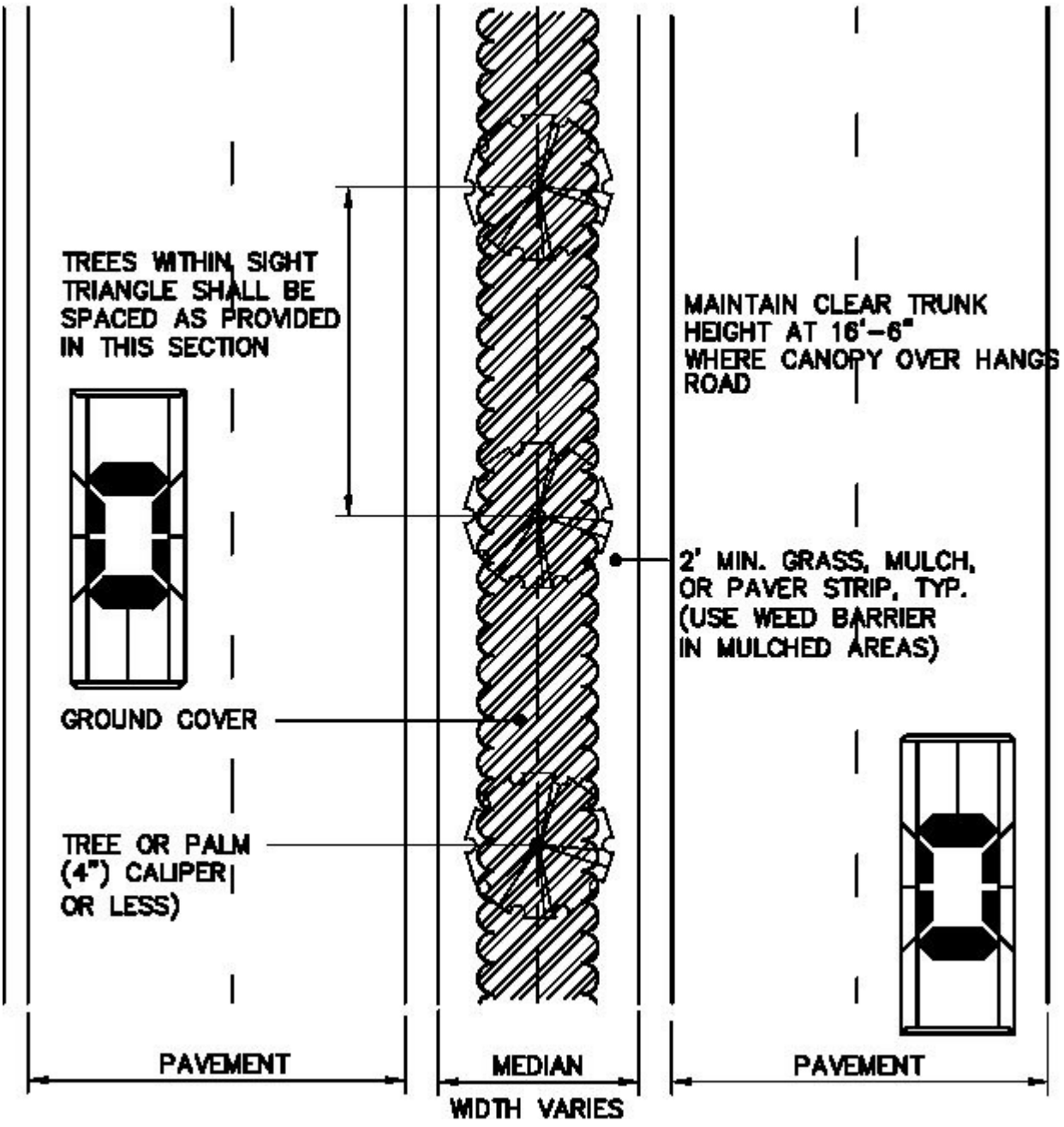


TYPICAL SECTION

When proposed small trees and palms shall be used within uncurbed medians. Tree and palms that are 4" in caliper or less at maturity measured at 6” above grade shall be considered small and frangible and may be used within the medians. Any portion of the tree that overhangs the travel lanes shall be maintained with a 16'-6" or 18’-6” vertical clearance as appropriate. Otherwise, no encroachment will be permitted.

PLANTING STANDARDS – Continued

Uncurbed Median Within Safe Sight Distance Triangle



PLANTING STANDARDS – Continued

Roadside Clear Zone

The roadside clear zone is that area outside the traveled way, available for use by errant vehicles. Vehicles frequently leave the traveled way during avoidance maneuvers and due to loss of control by the driver or due to the collisions with other vehicles. The primary function of the clear zone is to allow space and time for the driver to regain control of vehicle and avoid or reduce the consequences of collision with roadside objects. This area also serves as an emergency refuge location for disabled vehicles.

The width of the clear zone should be as wide as it is practicable. The minimum permitted widths shall be in accordance with the Florida Department of Transportation's "Green Book"

In rural areas it is desirable and frequently economically feasible, to substantially increase the width of the clear zone. Where traffic volumes and speeds are high, the width should be increased. The clear zone on the outside of horizontal curves should be increased due to the high probability of vehicles leaving the roadway at a high angle.

PLANTING STANDARDS – Continued

Swale Areas at Roadside

Swale areas that may be planted must adhere to the minimum width of clear zone, and clear visibility when in a sight distance triangle. All previous requirements apply as to non-mountable and mountable curb areas. In all cases, plantings are to be at least 2' behind the invert of swale, allowing for growth to maturity. Tree canopies shall be maintained at a height of 10' (min) over side walk and pedestrian paths.

Outside Sight Triangle

Medians and roadsides that do not fall within sight distance triangles must adhere to the same tree planting clear zone setbacks. Trees may be planted closer together and do not have to maintain 8' of clear trunk. Shrubs and ground covers may exceed 30". Placement of trees in these areas shall take into account the mature canopy and caliper. Such plantings shall not encroach on required sight lines.

Utility Clearance

Important consideration shall be given to the location of overhead and underground utility lines that may pass over or below the areas to be landscaped. They directly impact tree and site selection. Large palms should be planted at the average frond length plus 2' for minimum clearance from utility lines. Large trees shall be setback 30' from power lines. Medium trees shall be setback 20' from power lines, depending on the tree selected. Small trees and small palms can be planted adjacent to and under power lines. (See Florida Power and Light Company's Plant the Right Tree in the Right Place for more information). Careful consideration shall be taken when selecting plant material. Trees planted in the wrong location can cause a wide variety of problems, most of which can be alleviated by taking into account the mature size of the tree selected. Exceptions to these standards shall be approved in writing by the affected utilities and specifically approved by the County Engineer.

Underground utilities within 10' of proposed tree shall also be given careful consideration. Drainage pipes, exfiltration trenches, water lines, fiber optic cable, etc. are just as important and shall be shown on the plans and field located prior to any installation of plant material. Offsets from these utilities will be reviewed on a case by case basis. Tree type and placement are critical to the project being approved. Every effort shall be taken to be sensitive to the location of the existing utilities. Root barriers are required, 15' on center – 42" deep in special circumstances when appropriate clearances to underground utilities cannot be achieved or as determined by the Utility Owner and the County Engineer.

Irrigation

Irrigation systems shall be designed so that they meet the "Palm Beach County Water and Irrigation Conservation Ordinance." Irrigation shall be restricted to the hours of 4:00 P.M. to 10:00 A.M. The system shall be operated in such a manner as not to waste water by over spraying impervious areas. Automatic irrigation systems shall be equipped with a water-sensing device that will automatically discontinue irrigation during periods of rainfall. High flow shutoff valves are recommended to be installed, so that a break at the head would cause a disrupted flow to the damaged head. This would help conserve water and minimize the water in the roadway, but still allow maintenance workers to locate the damaged equipment.

Source: My.sfwmd.gov and PBC Water & Irrigation Conservation Ordinance # 93-030

PLANTING STANDARDS – Continued

Landscaping in Roundabouts

Landscape should be an integral part of the design of roundabouts. Both the central island and the approach roadways present opportunities for landscaping. This landscaping should be designed to increase the efficiency of the roundabout while improving safety and enhancing the aesthetics of the area.

The central island of a roundabout provides an opportunity for landscaping enhancements that other intersection treatments would not provide. However, the landscaping must be designed to optimize the safety and operation of the roundabouts. In accomplishing this, consideration must be given to the types of facilities on which the roundabouts are located.

On any roundabout, the landscaping of the central island and approach areas should:

1. Meet the desirable plant characteristics outlined in Section 4
2. Enhance visibility of the layout of the roundabout;
3. Not introduce a hazard to the intersection;
4. Maintain minimum stopping and turning sight distances;
5. Maintain minimum horizontal clearance and clear zone requirements;
6. Not obscure the view of signs and other vehicles in the roundabouts;
7. Clearly indicate to the driver that they cannot pass straight through the intersection;
8. Improve the aesthetics of the area while complementing surrounding streetscapes as much as possible; and
9. Discourage pedestrian traffic through the center island.

Safety Issues Related to Landscaping Roundabouts

Carefully planned landscaping can enhance the safety of the intersection by making the intersection a focal point and by lowering speeds. Special care should be taken to insure that plant materials adhere to minimum height requirements to insure visibility of the layout of the roundabout and of sight distances within the roundabout. Trees shall have a minimum of 8’ clear trunk and a diameter 4” or less measured 6” above grade. Shrubs and ground covers must be under 30” at maturity, measured from the adjacent pavement surface. Landscaping must be designed to minimize damage in vehicle run-off areas. These areas include

splitter islands (if they are large enough to landscape), the central island opposite the entry approach lanes and the right perimeter of the circulating roadway downstream of the entry points. Landscaping outside of clear sight zone may be planted as otherwise allowed by these standards.

Landscaping should require minimal maintenance because of the disruption to the traffic flow created by maintenance vehicles and workers.

Source: Florida Department of Transportation, Florida Roundabout Guide, Current Edition; NCHRP Report # 672 “Roundabouts: An Informational Guide

Tree Grates

Tree grates may be permitted in situations where sidewalks and urban development provide limited area for “streetscaping.” Tree grates provide protection and compliment trees in a hostile environment such as the urban settings. Proposals for such plantings will be considered on a case-by-case basis, as there may be locations where trees are not desirable.

All tree grates shall be cast iron and shall conform to A.S.T.M. A-48, Class 35 or better. Tree grades in pedestrian areas shall comply with the requirements of the Americans with Disability Act.

SECTION 3

ENGINEERING WIDE SPECIFICATIONS FOR LANDSCAPE & IRRIGATION

ENGINEERING WIDE GENERAL PROVISIONS

SECTION 580
LANDSCAPE INSTALLATION

580-1.00 General

580-1.01 Scope of Work

Provide all labor, Materials, Equipment and incidentals required to prepare site to final grade, install landscape trees, plants, sod and irrigation systems in accordance with the Plans and as specified. These Specifications are inclusive of a required guarantee, replacements, clean-up, maintenance services, and maintenance of traffic, all of which shall be included in the unit Bid price for each tree. These Specifications apply to all projects throughout Palm Beach County assigned to the Contractor.

580-1.02 Related Work Specified Elsewhere

Section 585 – Site Maintenance: These provisions shall apply to all Work in Section 580 - Landscape Installation as appropriate.

580-1.03 General Requirements

Refer to the Florida Dept. of Transportation Standard Specifications for Road and Bridge Construction, 2024-2025, as the general operating specification document, however Section 580 Landscaping is deleted and replaced with these Specifications for LANDSCAPE INSTALLATION (SECTION 580) and the SITE MAINTENANCE (SECTION 585). Maintenance of traffic requirements are described in the Contract Documents.

- Comply with all applicable federal, state, county and local codes, ordinances and regulations governing this work.

- The Work shall be coordinated with other trades to prevent conflicts.

- All planting shall be performed by personnel familiar with planting and maintenance of traffic procedures and under the supervision of a qualified landscape foreman, who shall be on-site at all times during the Work.

- Finish Grade: The Contractor shall verify with the Department that final grade has been achieved and shall perform fine grading if so directed by the Department. The Contractor is responsible for any trees or palms that are planted prior to achieving final grade.

- Prior to commencing Work, the Contractor shall visit the site and ascertain all site conditions, including utilities, structures, slopes, access and available Work space to preclude any misunderstandings and to ensure a trouble-free installation. It shall be the Contractor's

responsibility to avoid conflicts with existing underground and overhead utilities and structures. The Contractor shall examine available utility Plans and notify the Department of any conflicts and needed adjustments.

- The Contractor shall notify all utilities servicing the Work area at least 48-hours prior to any excavation so that underground utilities may be located. The Contractor has the responsibility to contact **Sunshine State One-Call of Florida, Inc. at 1-800-432-770** to schedule marking locations of the utilities which subscribe to their service.

- The Contractor shall also call (561) 641-3429 for Palm Beach County Water Utility Locations and call (561) 233-3900 for Palm Beach County Traffic Control Utility Locations. In general, the location of trees will be adjusted rather than adjusting the location of utilities or structures. Refer to 580-3.02 for related requirements.

- Prior to the preparation of planting holes, the Contractor shall ascertain the on-site location of, and take necessary precautions to avoid damage to, all above-ground and underground utilities, underdrain trenches, electrical cables, conduits, utility lines, oil tanks, supply lines, pavement, curbing, traffic control devices, pedestrian signals, building structures, or waterproofing. The Contractor shall properly maintain and protect all such improvements. The Contractor shall be responsible for the cost to repair all damages to such improvements caused by his operations.

- The use of mechanical Equipment within five (5') feet of any building or structure to move plants or Materials shall be approved by the Department prior to its use.

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580-1.04 Applicable Documents

A. Plant nomenclature shall conform to the names given in "The New Royal Horticultural Society Dictionary of Gardening", which is the source cited by the current July, 2022 edition of Florida Grades and Standards for Nursery Plants, by the Florida Dept. of Agriculture and Consumer Services, Division of Plant Industry (henceforth called Florida Grades and Standards).

1. Names of varieties not included therein shall conform generally with names accepted in the nursery trade.

2. Substitutions will be permitted only upon submission of proof that any specified plant is not obtainable or suitable for the location as specified on the plan and upon written authorization of the Department.

B. The Contractor is obligated to be familiar with and understand the following documents in order to comply with the requirements therein to properly perform the Work contemplated in this Contract:

1. All Plans and documents within the Bid package set.

2. The Florida Grades and Standards, (July, 2022 edition).

3. The Florida Dept. of Transportation Standard Specifications for Road and Bridge Construction, (2024-2025 edition – as general operating specification document, excluding Section 580, Landscaping).

4. The Florida Dept. of Transportation, Roadway, and Traffic Design Standards, (FY 2024-2025 edition).

5. The Palm Beach County Streetscape Standards Manual, (current edition).

6. The Manual of Uniform Traffic Control Devices for Streets and Highways, by the Federal Highway Administration, (current edition).

7. The State of Florida Manual on Traffic Control and Safe Practices, (current edition).

8. The Manual of Uniform Minimum Standards for Design, Construction, and Maintenance of Streets and Highways, by F.D.O.T. (current edition).

9. NCHRP Report 672, Roundabouts: An Informational Guide, (TRB, 2010)

580-1.05 Quality Control

A. Substitution of Materials and products specified herein, including those meeting "or accepted equal" clauses, shall not be permitted without written authorization from the Department.

B. Plants shall have a habit of growth that is normal for the species and shall be sound, healthy, vigorous and free from insect pests, fungi plant diseases and injuries. No sod with obvious chinch bug or mole cricket damage will be accepted. Any sod roots that appear to be diseased or the detected presence of grubs or other insects within the soil base will result in the sod being rejected.

C. Trees (other than palms) shall be heavily branched and shall have a dominant leader and no crossing branches.

D. All single-trunked palms shall have straight vertical trunks, not re-curved trunks, unless otherwise specifically directed in writing by the Department.

E. Turf grass to be used is St. Augustine "Floratam" and/or Argentine Bahia, Paspalum notatum 'argentine' as indicated in the Plans and pay item notes. Seed and sod shall conform to Section 981 of the FDOT 2021 Standard Specifications for Road and Bridge Construction. The sod must be obtained from a sod farm that has been inspected and certified by the Florida Dept. of Agricultural and Consumer Services, Division of Plant Industry, as free of burrowing nematodes. The sod must exhibit a dark green color and be free of weeds and foreign matter. It must have a leaf blade density of at least 90% and be free of any diseased or insect-damaged leaf tissue. The soil base of the sod must be a minimum of ¾" thick and a maximum of 2" thick and contain a healthy root system as indicated by turgid feeder roots that are white in color.

   The Contractor shall be responsible to become familiar with the site and shall match adjacent properties with similar species of sod, or as otherwise specified on the Plans. The cost for the varied species of sod will be paid under the unit price for Sodding, SY. Such price and payment shall be full compensation for all Work and Materials (top soil, fertilizer and water) specified in this Section, including the excavation of the trench for the sod, and the satisfactory disposal of excavation material.

F. Plant material shall be Florida Grade No. 1 or better as outlined under the current edition of Florida Grades and Standards.

   1. All plants not listed in Florida Grades and Standards, shall conform to a Florida Grade No. 1 as to: (1) health and vitality; (2) condition of foliage; (3) root system; (4) freedom from pest or mechanical damage; (5) heavily branched and densely foliated according to the accepted normal shape of the species.

   2. Undersizing plant Materials or substituting one species or cultivar for another are Contract violations, but have no bearing on plant grading. Undersizing or substituting species or cultivars may be permitted only if authorized by the Department in writing.

3. Verification of specified grades are to be determined at the time of delivery (even for trees inspected, accepted, and tagged by the Contractor with the Department at respective nurseries). Grades determined at the time of delivery inspection or during the course of conducting a regrading inspection shall be based on the growth characteristics and condition of the plant at the time of grading. The grade shall not be based on any future or predicted growth potential of the plant. Each tree shall be maintained by the Contractor to Florida Grade No. 1 standards until the date of written Final Acceptance by the Department for that tree. The Department is the final authority to determine if a tree does or does not meet Florida Grade No. 1 standards, including health and vigor of the tree.

4. If at any time during plant installations, the Department believes that any trees are not of the specified grade, the Department may, at their discretion, request a regrading inspection by the Division of Plant Industry. Upon the findings provided thereby, the Department may seek further remedy by requesting replacement of plant Materials or other corrective actions, including, but not limited to, legal redress.

G. The Department shall have the right, at any stage of the operations, to reject any and all Work and Materials, which, in the Department's opinion, do not meet the requirements of these Specifications or aesthetically do not comply with design intent. Trees that are scarred or damaged during delivery or off-loading will be rejected.

H. Plant Materials, as proposed by the Contractor, are required to be inspected, accepted and tagged at the respective nurseries by the Contractor with the Department prior to any delivery to the project site, unless waived by the Department in writing. If such waiver is granted, the Department will inspect and approve representative plant material samples at the project site or at the respective nurseries prior to delivery to the project site. Waivers will only apply to the specific projects (Work Orders) and species designated by the Department. Certificates of Nursery Origin may be required for plant Materials not tagged by the Contractor with the Department.

580-1.06 Certificate of Inspection:

A. All shipments of plant material shall originate from state registered nurseries which have undergone regular inspections by the authorized State Agencies prior to delivery to the project site.

B. State inspection certificates certifying respective plant nurseries of origin shall accompany the bill of lading or invoices. Any certificates of inspection required by the state for specific species also will be provided additionally. Any required transportation documents are to be submitted with invoices as back-up.

C. Contractor shall furnish the Department with copies of manufacturer's literature, labels, samples, certifications, Material Safety Data Sheets and Laboratory analytical data for fertilizers, mulch, planting soil backfill mix, chemicals, staking/guying Materials and other products as appropriate, prior to use or application on any project.

D. Monitor turf areas and remove all competing vegetation, pest plants, and noxious weeds (as listed by the Florida Exotic Pest Plant Council, Category I "List of Invasive Species", Current Edition, http://www.fleppc.org). Remove such vegetation regularly by manual, mechanical, or chemical control means, as necessary. When selecting herbicides, pay particular attention to ensure use of chemicals that will not harm desired turf or wildflower species.

580-1.07 Measurements:

A. The minimum acceptable size of all plants measured after pruning, with branches in normal positions, shall conform to the measurements as shown on landscape Plans and conform to the Florida Grades and Standards. Deviations from these measurements must be approved in writing by the Department.

B. The caliper (diameter) of tree trunks is measured six (6") inches above ground level for trees with calipers up to and including four (4") inches in caliper, and twelve (12") inches above the ground for larger trees.

C. The caliper (diameter) of palm tree trunks is to be taken at the widest portion of trunk measured between 1' and 3' above the soil line.

580-1.08 Shipment and Delivery:

A. Contractor shall notify the Department, a minimum of 48-hours in advance (excluding weekends and Holidays), of all plant material deliveries. Contractor shall be responsible for delivery, storage, and security of all Materials specified.

B. Plant Materials shall be protected from sun-scalding and weather and adequately packed to prevent breakage and drying during transit and storage.

C. The Department will exercise its option to inspect, select and assist the Contractor with the tagging of plant Materials at the nursery proposed by the Contractor unless waived as in ITEM 580 -1.05 H.

D. Tamper-resistant identification tags supplied by the Contractor and placed on all trees and palms selected for installation, shall show no evidence of tampering upon inspection for Initial Acceptance (of installation). These tags shall be removed following the Department's Initial Acceptance (of installation).

E. Plants which do not meet Specifications for quality or size herein stated, or plants that show improper handling, or arrive on-site in an unsatisfactory condition (as described in Florida Grades and Standards), will be rejected. Rejected plants shall immediately be removed, disposed of, and replaced with accepted nursery stock of like variety, size, and age. These plants shall be replaced without additional cost to the Department.

F. Initial acceptance of plant material for initial payment will be given only after material is planted and after meeting requirements prescribed herein.

G. Plant materials may be reserved in advance by the Department from nursery sources provided by the Contractor for predetermined amounts of time prior to shipment and delivery. The reserve period will be designated by the County Department issuing the work order and will begin upon the issue date of the work order. Designated time periods will be 1-90 days, 1-180 days, and 1-270 days. The County will compensate the Contractor a percent of the unit price for each unit of plant material reserved in advance of shipment and delivery. This percentage amount is as follows:

Reserve Period	Percent of Unit Price Paid for Reservation of Plant Material
1 - 90 Days	10%
1 - 180 Days	25%
1 - 270 Days	50%

All advance payments shall be applied to the balance owed to the Contractor by the Department upon the completion of any applicable warranty periods. All post- installation guarantees, as specified in ITEM 585 - 1.11, shall apply to all plants held in reserve by the Contractor with no period of reserve time serving as a replacement for any warranty periods specified within the current contract. The Contractor shall select and maintain all plant materials reserved by the Department in a manner and condition designated in ITEM 580 - 1.05. Reserved plant materials shall conform to the type and quality specification listed in ITEM 580 - 2.02. The Department may, at its discretion, reserve plant materials that are less than the caliper, height, spread, clear trunk or rootball size, as designated in the Bid Item description for each unit listed. However, all plant materials must meet the stated specifications prior to shipment and delivery by the Contractor, unless given a written waiver by the Department. The Contractor shall not accept reserve payment for any plant materials that it knowingly cannot provide at the end of the designated reserve period. The Contractor shall notify designated Department representatives within 24 hours if plant materials reserved for any designated period become unavailable. The Contractor shall make available to the Department like species of acceptable specifications if any reserved plant materials are sold to other parties or otherwise rendered substandard during the designated reserve period. In the event that like species of similar quality are not made available by the end of the designated reserve period, the Contractor shall issue a credit or refund any reserve payments for that quantity of plant materials, at the discretion of the Department. The Department shall forfeit any reserve payments made to the Contractor if the Department elects to delay the scheduled shipment and delivery beyond the reserve period contracted for. The Contractor shall grant the Department a reserve time extension, based on additional payment issued within ten (10) days of the end of the contracted reserve period, unless the Contractor can show that any reserved plant materials would exceed the specifications as listed in the Bid Item description for each unit of plant material during the extension of the reserve period.

580-1.09 Tree Transplanting:

A. The Contractor shall provide tree transplanting services as requested by the Department. This service is to be performed by the Contractor within an agreed upon period of receipt of a Work Order. Trees transplanted within 90 days of original installation by the Contractor shall carry the balance of the warranty as specified in ITEM 585 -1.11. No warranties shall apply to trees installed more than 90 days prior to transplantation or trees installed by other parties.

B. Transplanted trees shall be watered for the balance of the warranty period or for a period of 30 days for non-warrantied trees. Watering procedures must adhere to the Specifications designated in ITEM 580 -2.06 and SECTION 585 -SITE MAINTENANCE.

C. Palm tree transplanting procedures include digging, loading, transporting, re-planting with Project Engineer approved backfill material and restaking. The original planting hole must be backfilled and sodded.

D. Hardwood tree transplanting procedures include root pruning of established trees, digging, loading, transporting, replanting with approved backfill material and restaking. The original planting hole must be backfilled with suitable material at the direction of the Project Engineer.

E. Use machinery that is designed to root prune tree/palm roots with a clean cut. Do not use machinery that will tear or shred the root system. Cut the root system in quarter sections to allow for new feeder roots to develop. If hand root pruning, use sharp cutting instruments to provide clean cuts (no Tearing or Shredding) to the existing root system. Allow a minimum of 18-24" of space to cleanly cut the roots and fill the root pruned area with proper backfill as specified in LI-Part Two-Products LI- Section 2.01- Subsection A – D (Planting Soil Backfill Mix). Reuse native clean fill mixed with topsoil to promote new root development.

F. Large Hardwoods trees exceeding 8" Cal. shall be transported/moved by the following method.

1. To protect the integrity and health of the hardwood to be transplanted, a Certified Arborist or Landscape Architect must be consulted "Prior to Relocation" through the County designated representative to determine the best methodology to relocate the designated transplant material. I.E; "A large Live Oak could be relocated by drilling the trunk with a minimum of a 1-1/2" wood drilling core bit to eliminate damage to the main cambium layer, inserting a 1" solid steel rod through the trunk to attach strapping material to and lifting the tree with no stress on the cambium layer.," or a 90" Tree Spade, or Crane method. These are examples of recommended relocation methods but not inclusive of all methods to relocate material. This is written as a guideline only.

580-2.00 Products

580-2.01 Planting Soil Backfill Mix

A. All planting areas (except as directed by the Project Engineer) shall be backfilled with a mixture of prepared plant soil mix as shown below to be accepted by the Department prior to use on each project site. Terrasorb AG (super-absorbent water retainer as manufactured by Industrial Services International, Inc.), or similar product accepted in writing by the Department, shall be added to all non-irrigated planting soil backfill mixes at the rate specified by the manufacturer.

B. This Work shall consist of removing surface debris and then excavating a planting hole and blending compost with the excavated soil to improve soil quality and plant growth. The Planting Soil Backfill Mix shall be created on the project site by uniformly mixing compost with the excavated soil of the planting hole at a 1:3 ratio (25% compost: 75% excavated soil). Backfill and firm the soil blend around the rootball within the planting hole, as described under Part III – Execution. This specification applies to all types of containerized and balled and burlapped plant material.

C. Compost shall be a stabilized mixture derived from organic wastes such as food and agricultural residues, animal manure, mixed solid waste and biosolids (treated sewage sludge) that meet all State Environmental Agency requirements. The product shall be well composted (mature compost, not green compost), free of viable weed seeds and nematodes and contain material of a generally humus nature capable of sustaining growth of vegetation, with no Materials toxic to plant growth.

   Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture content	35% - 55%
C:N ratio	15 – 30:1
Organic matter	> 50%
Particle size	< 1 inch
Soluble salts	< 4.0 mmhos (dS)
Bulk density	< 1000 lbs/cuyd
Foreign matter	< 1% by weight

D. This specification covers the properties of **AllGro ™** as distributed by: **AllGro**, 4 Liberty Lane West, Hampton, NH 03842, telephone (800) 662-2440. The Contractor shall utilize **AllGro** compost, or Department-accepted equal, as directed above.

580-2.02 Plant Material

A. The words "Plant Materials" or "Plants" or "Trees" refer to and include trees and palms. "Plant Materials" shall also refer to accent plants, ground covers and woody ornamentals. When the words "palms" or "palm trees" are utilized, no reference to other tree types is intended. When the words "trees (excluding palms)" are utilized, no other reference to palm trees is intended.

B. Plant species shall conform to those species and cultivars indicated on the Plans and in the Specifications.

C. Plants shall be sound, healthy, vigorous, free from plant diseases, insect pests or their eggs and shall have healthy normal growth and root systems. Tree trunks shall have the specified caliper, straight with no fresh cuts, fissures, scrapes, or scars, and shall have the specified clear trunk height, overall height, spread, and rootball size, as applicable. Container grown plant Materials shall be "Florida Fancy" as described in Florida Grades and Standards, Shrubs, Groundcovers and Vines.

D. The species and varieties furnished by the Contractor shall include those listed below and/or substitutions mutually agreed upon by the Contractor and the Department. The basis to be used for comparison of plants to be substituted in the respective categories shall be plant descriptions and wholesale prices as described in Betrock Information Systems' PlantFinder.

E. Trees are required to be one of the following:

1. Container Grown

    a. Plastic containers: Trees grown in plastic or other rigid containers shall be well established and in the container for at least 60 days, and not root-bound. Minimum container size guidelines will follow those established by Florida Grades and Standards.

    b. Fabric containers: Minimum rootball size will follow the guidelines established in Florida Grades and Standards. Trees grown in fabric bags should be properly root-pruned and hardened-off in the nursery following harvesting for 45-90 days.

    c. All slash pines and wax myrtles are required to be container-grown for entire lives before planting on project sites.

2. Field Grown: Shall have the appropriate root ball size based on the tree's trunk diameter (caliper) and/or height as established by the Florida Grades and Standards. Rootball depth on balled and burlapped (B&B) stock (excluding palms) shall be at least 2/3 of the rootball diameter shown. Field grown trees should be properly root-pruned and hardened-off in the nursery for a period of 45-90 days, and will be inspected by the Department for new root growth.

a. Field grown balled and burlapped (B&B) trees are usually specified on the unit Bid price plant list, however upon Department approval, well established non-root bound container plants may be substituted for B&B material, when all other requirements, Specifications, and unit Bid prices of B&B trees are adhered to.

b. Natural fabric burlap is to be utilized. Synthetic woven plastic fabrics and wire baskets are prohibited unless the Department provides written approval.

F. Collected plants shall not be used unless specifically called for in the Specifications or accepted in writing by the Department. The type, size, and availability of specific species will be the basis of selection of any collected plants.

G. All plants for this project are to be secured from state registered nurseries within the south and central Florida areas (as defined by Betrock Information Systems' PlantFinder geographic regions) unless authorized in writing by the Department.

580-2.03 Quantities

A. The quantities shown in the leader call-outs in the Plans govern the required installed quantities. The Plant List summarizing quantities is provided as a reference only. The Contractor is responsible for his own take-off. Discrepancies must be brought to the Department's attention, in writing, at the time of ordering plant Materials.

B. The Department reserves the right to adjust the number and locations of the designated types and species of plants to be used at any of the locations shown. The Department shall make payment based on the actual quantities installed as approved in writing by the Department.

580-2.04 Fertilizer for Plantings

A. Provide commercial grade granular fertilizer uniform in composition, dry and in a free-flowing condition for application by suitable Equipment, delivered in unopened bags or containers, each fully labeled and complying with Florida State fertilizer laws.

B. Provide a complete fertilizer with proper ratio of nitrogen (N), phosphorus (P), and potassium (K) for the species, including micronutrient trace elements of iron, manganese, zinc, copper, and boron. Provide acid-based, slow-release (sulfur coated) formulas with at least 50% slow-release of nitrogen and potassium.

C. For non-flowering trees, use 13-3-13 high sulfur, iron, and potash; and for flowering trees, use 15-4-11 high sulfur, iron, potash, magnesium, and manganese – both to be acid based, slow-release nitrogen (sulfur coated) to include minor elements (or accepted equal).

D. For palm trees use a 'palm special type' 8-4-10 to include minor elements, very high sulfur, manganese, magnesium, and iron; 50% slow-release nitrogen and potassium; and acid-based (sulfur coated) or accepted equal.

E. For accent plants, ground covers and woody ornamentals, use 16-4-8 that includes micro nutrients, 25% sulfur coated area, 50% slow release nitrogen, or accepted equal.

580-2.05 Top Mulch

A. Mulch shall be recycled, not harvested wood, and made entirely from the wood and bark of the Melaleuca quinquenervia tree, eucalyptus tree, cypress tree milling by-product, or mixed hardwoods. NO CYPRESS MULCH SHALL BE USED ON STATE ROADS. The mulch shall be shredded, cleaned, sized, and aged (heated) to destroy weed seeds, pathogens, and insects. It shall not contain more than 10% (by volume) bark. Shredded pieces of mulch shall not be larger than ¾" diameter and 1-1/2" in length. Mulch shall be free of weeds, seeds (including Melaleuca spp. seeds), soil, and any other organic or inorganic material.

B. Prior to its delivery, mulch shall have been inspected and certified by the Florida Dept. of Agriculture and Consumer Services, Division of Plant Industry, as free of burrowing nematodes. All proof of delivery shall bear official State of Florida stamp of inspection and certification (Grade AA or A). Deliver in bags or bulk by the cubic yard.

C. All material specified shall be processed specifically for use as mulch around trees and plant beds. The use of construction wood or wooden pallets (which do not decompose and/or may harbor pests), the use of fresh-wood mulch (which deprives surrounding plants of nitrogen), or the use of color dyed mulches, is prohibited.

580-2.06 Water

Contractor shall provide water, labor, and Equipment (including a self-canceling nozzle with a diffuser) necessary to distribute water as required for all installed Materials using hand-watering methods. Existing or proposed irrigation systems will not be relied on to provide water for newly planted Materials. Use water free of elements toxic to plant and/or animal life. Refer to SECTION 585 – SITE MAINTENANCE for detailed watering Specifications.

580-2.07 Guying and Staking Material

A. Support stakes, braces, battens, and anchor stakes pads shall be structurally sound, #2 grade, yellow pine, or #2 cedar; free of knot holes, splinters, checks, or cracks, and sized and arranged as per details on plan.

1. Minimum nominal size of vertical stakes: 2"x4" with the length adjusted as appropriate for proper staking relative to tree height or as per Specifications/details.

2. Minimum nominal size of angled braces: 2"x4" with the length adjusted as appropriate for proper staking relative to tree height as per Specifications/details.

3. Anchor stake pads for braces to be 2"x4" and a minimum of 12" long.

4. Battens for braces to be 2"x 4" and a minimum of 12" long.

B. Banding at brace battens for heavy trunked palms and specified trees shall be minimum 1" steel manufactured specifically for banding – minimum two (2) bands per palm. Wrap palm trunks (excluding Washington palms) with minimum of five (5) layers of heavy nursery grade, burlap cloth before installing battens.

C. For small trees using vertical support stakes, trunks shall be secured to such stakes with guying material that is wide, smooth, sturdy and flexible plastic or rubber such as Wellington tape or accepted equal. Guying tape to connect trunk to support stake at 90°. This flexible tape shall replace the traditional guy wire and hose method in order to avoid damage to trunk and branches.

D. Unless the appropriate painting Bid item is included in the applicable Work Order, then all vertical stakes, angled braces, anchor stake pads, and/or battens shall be provided and installed as natural, unpainted wood. When the appropriate painting Bid item number is included in the applicable Work Order, then the wood for all vertical stakes, angled braces, anchor stake pads, and/or battens shall be painted Forest Green using Behr exterior grade flat latex paint, or accepted equal, such that there is complete coverage of all surfaces. This painting shall be done prior to delivery of the wood staking and bracing material to the planting site. The only painting allowed at the planting site will be minor touch-up by brush only for saw cuts, abrasions, nicks, etc. There shall be no spray painting at the planting site. Care shall be exercised to avoid wet paint coming into contact with the tree/palm, Wellington tape, banding, or burlap.

E. To the extent that painted vertical stakes, angled braces, anchor stake pads, and/or battens are proposed by the Contractor for re-use, then in addition to meeting other specification requirements, they shall receive a fresh, complete coat of the above specified paint. This complete paint coverage shall be maintained in good condition until staking and bracing Materials are removed from the planting site. The Department reserves the right, at its discretion, for the Department to paint staking and bracing material.

580-2.08 Root Barrier Material

The Contractor shall provide and install rigid root barrier, DeepRoot UB 48-2 by Urban Landscape Products, or flexible fabric root barrier, Typar Biobarrier Root Control System as manufactured by Reemay, Inc., or accepted equal, as directed by the Department or as indicated in the Plans or as required by the permitting agencies. All safety precautions and installation procedures prescribed by the manufacturer shall be adhered to.

580-3.00 Execution

580-3.01 General

A. The Contractor's Work shall conform to accepted horticultural practices as used in the trade, unless specifically directed to the contrary by the Contract Documents or otherwise by the Department.

B. Plants shall be protected upon arrival at the site by being thoroughly watered and properly maintained until planted. Plants shall be provided complete shade until installation, unless directed differently by the Department. If a balled and burlapped (B&B) tree is not planted within 12-hours of delivery then the rootball shall be kept covered with a moist material to prevent drying of root growth tips until planting. Plants shall not remain unplanted on-site for a period exceeding 24-hours. All sod must be installed within 72 hours of harvest from the source farm. Any sod which is not planted within 24 hours after cutting shall be stacked in an accepted manner and maintained in a properly moistened condition. Any sod left on the Work site for more than 48 hours before installation will be rejected. All sod delivered to the Work site will be contained on 48" x 48" wooden pallets and individual pieces be no smaller than 12" x 24".

C. The Contractor shall install and maintain all plants (through final acceptance) in accordance with the requirements of the project Plans, Bid documents/Specifications, and applicable standards as listed under ITEM 580 -1.04 B.

580-3.02 Layout of Planting Holes

A. The approximate location of some existing above-ground and underground utilities, structures, and other improvements are shown on the landscape Plans for general information purposes only, and are not to be relied upon nor regarded as relieving the Contractor of responsibility for verifying exact field locations. All such improvements shall be investigated and verified in the field before starting Work. Refer to ITEM 580 -1.03 F for other applicable requirements.

B. Should the Contractor encounter overhead or underground obstructions, Median modifications, or other conditions which interfere with the specified locations for plantings, then the Contractor shall immediately notify the Department and alternate planting locations or plan modifications will be selected and approved by the Department. Trees which cannot be adjusted to accommodate such conditions and still adhere to clear sight spacing and clear zone requirements, will be eliminated.

C. Before digging of planting holes, the location and arrangement of the planting shall be marked by the Contractor. The Contractor shall notify the Department a minimum of 48-hours in advance (excluding weekends and/or Holidays). The Department shall reserve the right to approve or reject all marked tree locations which shall conform to the requirements of the Specifications, Plans, and details unless otherwise addressed above.

580-3.03 Tree and Palm Installation

A. All planting holes shall be excavated to size and depth specified herein and in accordance with the Plans and details, and backfilled with the prepared Planting Soil Backfill Mix as specified or as directed by the Project Engineer. The general planting procedures for all trees and palms, whether B&B or container grown, are similar except as noted below.

1. Container-grown trees and palms:

   (a) Any container-grown (CG) plants which have become pot-bound or for which the top system is too large for the size of the container, shall be rejected.

   (b) CG plants shall not be removed from the container until immediately before planting, and with all due care to prevent damage to the root system. At such time, all containers shall be cut and opened fully, in a manner that will not damage the root system.

   (c) Trees in containers shall be carefully removed from the pots, cans, boxes, or other containers in a manner not to damage the roots or the rootball of soil formed by the container. Scraping the rootball on the sides and bottom to stimulate new root growth outside of the existing rootball should be performed prior to placement into the hole.

2. Balled and Burlapped Trees and Palms: Always move B&B plants (except heavy trunked palms) by the rootball only. Never use the trunk as a handle to pick up or move these plants. Care should be taken not to disturb the rootball, as this would severely damage the root system. Removal of all the burlap before planting is not necessary (if it is biodegradable fabric), although the top one-third (1/3) of the burlap shall be pulled back and cut off.

   If accepted for use under ITEM 580-2.02 E.2.b, synthetic fabrics and wire baskets require special attention. Remove woven plastic fabrics and nylon twine completely after setting the plant in the hole since such nondegradable Materials can girdle stems and roots as they expand through the material. However, this practice may not be feasible when moving large trees that have been sleeved in woven plastic Materials before being placed in wire baskets. Slice the material through the wire basket and remove as much as possible to facilitate healthy root growth into the landscape soil. Once the tree is set in the planting hole, cut off all of the wire basket (that is not under the rootball) before backfilling.

3. Palms: Generally, procedures for planting balled and burlapped trees are suitable for palms. Palms shall be harvested with a rootball appropriate for the size and species of palm per the current Florida Grades and Standards. Foliage of all palm species except Sabal palmetto shall have the leaves tied with a biodegradable twine or burlap in a bundle around the bud. Fronds shall be untied by the time of the first quarterly inspection, unless the Contractor deems this to be detrimental to the palm. Complete leaf removal at the time of digging is required when planting Sabal palmetto, however, protection is required for heart frond and bud.

B. Circular planting holes with vertical sides shall be excavated for all trees. The diameter of planting holes for all trees shall be a minimum of 1.5 times larger than the rootball, per planting details, unless prevented by site obstructions or otherwise authorized in writing by the Department. The depth of each planting hole shall be not less than 6" deeper than the height of the root ball or container as applicable and as per planting details.

C. Trees shall be set in planting holes on the specified prepared planting soil mix backfilled and brought to a height to permit the top of the rootball to be 2" above the surrounding finish grade at the completion of tree installation. This allows for some settling such that the final planting will be at the same depth the plants grew in the nursery. All trees shall be planted in a vertical position (plumb). All trees shall be handled by a padded nylon strap around the rootball for lifting purposes. Heavy-trunked palms may be lifted by the trunk provided the lifting strap is padded.

D. After placing the tree in the hole, the planting soil specified herein shall be slowly watered into place in layers and then firmly tamped to eliminate voids and air pockets and to ensure the backfill mixture is surrounding the rootball. Do not overly compact the soil to the point that it would be detrimental to the tree's health. All tamping shall be such that no trees will settle below their original growing height and the surrounding finish grade. Do not mound any soil over the roots.

E. For water retention, a minimum 6" high circular earthen berm (water ring) shall be formed around each tree such that the inside edge is located at the perimeter of the 6' wide planting hole.

F. All trees shall be thoroughly watered at the time of planting and kept adequately watered to ensure healthy Florida Grade No. 1 trees until time of final acceptance. No allowances will be made for tree or palm losses due to lack of adequate or proper watering. Following initial acceptance, the watering requirements of ITEM 585-3.01 C shall be complied with.

G. Pruning shall be done on-site after planting (with due regard to the natural form and growth characteristics of each specie) to remove damaged limbs, to remove branches falling within the required clear site window, or as directed to improve overall plant appearance. Do not remove more than 15% of branches unless otherwise approved by the Department in writing. Pruning methods shall follow standard horticultural practices using appropriate tools. Lopping, shearing, or topping of plant material will be grounds for rejection. Damaged, scarred, frayed, split, or skinned branches, limbs, or roots shall be pruned back to live wood, unless such damage, once so corrected, causes the tree to not meet the Florida Grade No. 1 standard, thus requiring tree replacement at no additional expense to the Department. The central leader or bud shall be left intact unless severely damaged, in which case the tree will be replaced at no additional expense to the Department. Remove any tree leader dowels and fasteners at the time of planting.

H. During the course of planting, excess and waste Materials shall be removed by the end of each day's operations. When planting in an area has been completed, all debris from planting operations shall be removed and the area maintained in this finished state until final acceptance.

580-3.04 Fertilizing

After planting tree, and prior to mulching the saucer, apply the recommended types and quantities of fertilizer appropriate for tree type according to the manufacturer's recommended rate Specifications for new plantings. Apply fertilizer to the soil surface within the saucer area such that the granular fertilizer is mixed into the top 6" of soil around the edge of the root zone to the perimeter of the saucer berm and then watered in. Never allow fertilizer to touch the trunk of the tree to avoid burning by soluble salts. The use of tablet-type fertilizers such as "Agri-Form" or equal, to be placed in the planting hole prior to backfilling is also acceptable.

580-3.05 Mulching

A. Prior to mulching the saucer area around each tree, remove all weeds, debris, and rocks (over 1" diameter), and then level the soil inside the saucer area surrounded by the circular berm without covering the top of the rootball.

B. A 3" layer of the specified biodegradable mulch, suitable to the Project Engineer, shall be placed around all newly planted trees within earth berms surrounding saucers as defined in ITEM 580-3.03 E and as shown on drawings and as specified. For individual plants, the mulch shall be spread to entirely cover the saucer area within the circular earth berm. Mulch shall be installed and maintained a minimum of 3" away from the trunks of all trees. Once in place, the mulch is to be watered until saturated.

C. This 3" mulch layer shall be maintained around each tree by the Contractor until its final acceptance in order to buffer soil temperature, reduce weed competition, conserve moisture, and increase soil nutrient availability.

580-3.06 Guying and Staking

A. Guy and stake plant Materials as specified and detailed to assure upright form, and in accordance with the following:

    1. All trees with calipers smaller than 2-1/2" shall be staked with three (3) vertical stakes 120° apart. All trees with calipers between 2-1/2" and 4-1/2" inclusive shall use four (4) vertical stakes 90° apart. All stakes shall be 2"x4" (with length sized relative to tree height such that stakes reach the height of major branching), set vertically at least two (2') feet into the ground, and at least 12" deep into undisturbed soil, and also set against the planting hole wall. The tree shall be centered within the stakes and held firmly in place by Wellington Tape (or accepted equal), and tied to the stake and the tree to prevent slippage. Tighten guying tape as necessary to ensure tree is secured in upright position.

    2. Heavy-trunked palm trees and trees with calipers over 4-1/2" shall be braced with a minimum of four (4) 2"x4" wood braces (with length sized relative to tree height), toe-nailed to 2"x4"x12" minimum battens which are tightly secured at two points to the tree (with 1" steel banding), at a point at least 1/3 the clear trunk height. Provide one (1) batten

per brace minimum with additional battens as needed to prevent banding from touching trunk. The braces shall be set at an angle between 45° and 60° to the ground. The trunk shall be padded with five (5) layers of burlap under the battens (except for Washington palms). Braces shall be approximately 90° apart and secured underground by 2"x4"x12" minimum anchor stake pads hammered such that the deepest point is at least ten (10") inches below finish grade. Anchor stake pads shall not be exposed more than 2" above finished grade and be located no farther from the trunk than 6" from the outside toe of the earth berm around the saucer. The tree shall be centered within the braces.

B. All trees and palms shall be staked/braced on the same day as installed, and at no time shall any newly planted tree or palm remain without stakes for more than 24-hours after installation. The Department may prohibit completion of any further Work until all plant material has been appropriately staked. The Contractor's guying and staking shall prevent trees from falling or being blown over (including by high winds). The Contractor shall re-straighten, replant, and restake all trees which lean or fall, and remove all trees which are damaged due to lack of proper guying and staking within two (2) Working Days of notification by the Department. The Department will determine if the fallen tree is damaged and is to be replaced. Such decision shall not be cause for additional expense to the Department. Damaged trees shall be replaced and guyed or staked at no additional cost to the Department within 30 Calendar Days of notification occurring at quarterly inspections.

C. All guys and stakes found to be too loose or damaged shall be repaired, tightened, and/or replaced within two (2) Calendar Days of notification by the Department at no cost to the Department. Guys and stakes shall be fully maintained to provide adequate structural support for the plant providing a neat, orderly and clean appearance. In cases of stake or brace damage caused by circumstances beyond those covered in the Contract, such as vehicular accidents, the Contractor shall replace damaged stakes as specified by the Department at Bid price.

D. At the Contractor's discretion, all guying and staking material should be removed between the sixth (6^{th}) and twelfth (12^{th}) months following planting. At the Contractor's option, the anchor stake pads shall be either completely removed or driven into the ground such that the top of the stake is a minimum depth of 4" below grade. The Contractor shall notify the Department fifteen (15) Calendar Days prior to removing guying and staking material. Removal of guying and staking Materials shall not relieve the Contractor of any responsibilities of any warranted Materials that may be in place.

580-3.07 Maintenance Prior to Initial Acceptance (At Installation)

The Contractor's maintenance shall commence after each plant is planted and shall continue until initial acceptance (at installation), after which the formal minimum twelve (12) month maintenance/guarantee period shall commence. All maintenance operations before and after Initial Acceptance (at installation), shall be conducted consistent with Specification SECTION 585 -SITE MAINTENANCE, which includes the guarantee and replacement requirements.

The Contractor shall maintain Florida Grade No. 1 quality until final acceptance. This plant maintenance shall include watering, pruning, weeding, cultivating, mulching, fertilizing, repairing or replacing stakes and guys, replacement of sick or dead plants, resetting plants to proper grades or upright position, restoration of the circular earth berm around the saucer, protection from insects and diseases, and all other care required for proper growth and health of the plants. Proper protection of grassed areas shall be provided and any damages resulting from planting or maintenance operations shall be repaired promptly. If determined to be necessary by the Department, disturbed areas shall be re-sodded to match existing turf at no additional cost to the Department.

580-3.08 Sod Installation and Maintenance Prior to Initial Acceptance

A. Elimination of Existing Turf Cover: **Certified applicator** must be licensed with the Florida Department of Agriculture and Consumer Services Department as list under Chapter 482 and 487 Florida Statutes. The certified applicator must provide State of Florida certification license to use restricted pesticides and herbicides. Existing vegetation cover is to be sprayed with a non-selective herbicide such as Glyphosate (Roundup) or equivalent. Herbicide is to be applied at a rate of active ingredient per gallon as specified on the product label. All spraying must be done with a low volume / low pressure sprayer and applied in a manner that will minimize drift and contact with adjacent plant Materials or vehicular traffic. No spraying will be allowed under inclement weather conditions or wind in excess of 10 miles per hour. If an indicator dye is used in the spray mixture, it must not come into contact with the curb, gutter, traffic separator, or other concrete surfaces. The Contractor is responsible for the removal of any stains caused by indicator dyes to these surfaces. The resulting dead vegetation is to be raked and removed.

B. Site Preparation: The site is to be prepared for sodding by the removal of debris such as sticks, rocks, roots and litter and the establishment of final grade. The location of any existing irrigation systems are to be noted and all sprinkler heads flagged prior to the beginning of site preparation Work. All holes and depressions are to be filled with backfill material that consist of 50% sand and 50% organic soil. Existing high spots in the site surface are to be leveled with the resulting grade facilitating the sheet-flow of water to the curb line. The soil perimeter at the inside curb line is to be excavated to a depth of ¾" to 2" to allow the top of the base of the installed sod to be flush with the top of the curb. Any soil that is spilled outside of the Median must be removed immediately.

C. Sod Installation: The sod is to be placed onto the prepared site in a pattern with staggered seams. All sodding must be done in contiguous areas with no large gaps between planting sites. Each piece of sod must be abutted against the one adjacent to it. All gaps between pieces of sod will be filled with partial sod pieces or topsoil. No gaps greater than ½" in the seams between the individual pieces of sod will be accepted. All parts of the sod must be in firm contact with the soil surface and any corners or edges that overlap other pieces of sod must be trimmed. The sod must be kept 2 feet away from the trunks of any existing trees with a symmetrical circle of bare ground being established around each tree. All sod shall be top dressed with screened soil mixture of 75% organic soil and 25% sand that is free of rocks sticks

or other debris. After the topdressing operation is completed the sod is to be compacted with a 1,000 lbs. roller.

D. Site Cleanup: All wooden pallets, partial sod pieces, piles of backfill material, Equipment and debris must be removed from the job site prior to the approval of substantial completion.

E. Irrigation: As soon as the area covered by a single zone of irrigation is sodded, the system should be activated and 0.10" to 0.25" of water applied to the sod. The newly planted sod is to be irrigated twice a day between the hours of 10:00 a.m. and 2:00 p.m., unless watering restrictions are in effect, for a period of 10 days or until a root system has been established as evidenced by substantial resistance when the sod is pulled away from the soil base.

F. Mowing: The Contractor is responsible for an initial mowing of the sod with St. Augustine "Floratam" mowed at 3" and Bahia "Argentine" at 3.5" with a rotary type mower. If the mower is equipped with a side-delivery chute a deflection device should be used to eliminate the discharge of grass clippings into Roadway lanes.

580-3.09 Installation of Accent Plants, Ground Covers and Woody Ornamentals

A. Elimination of Existing Vegetative Cover: shall conform to the Specifications contained within ITEM 580 -3.08 A.

B. Site Preparation of Planting Beds: The site is to be prepared for planting by the removal of debris such as sticks, rocks, roots and litter. The area to be planted shall be excavated to a depth of 18" and backfilled to a level of final grade with a soil mix comprised of 50% sand and 50% screened organic material such as screened muck or compost, guaranteed as weed free. All excavated material is to be removed from the planting site or reused on site at the discretion of the county representative.

C. Installation of Plant Materials: Plant Materials shall be removed from containers prior to planting. Any rootballs containing regions of compacted or encircling roots shall be loosened by making vertical cuts to the root mass. Plant Materials shall be placed in holes that are slightly larger than the diameter of the rootball with the top of the rootball to be at or slightly above finished grade. "Terrasorb AG", or accepted equal, is to be added to the planting hole at a rate of ¼ oz. (1 tsp.) per gallon of rootball being installed, prior to backfilling. Backfilling shall be made with the specified soil mixture and shall be firmly compacted and watered-in, so that no air pockets remain.

D. Pre-emergent Herbicide Application and Mulching: The planted bed shall receive a pre-emergent granular herbicide application using "Ronstar G", or accepted equal, applied using methods and rates as specified on the manufacturer's label prior to the application of mulch. Mulch products used in bed plantings shall conform to the Specifications as listed in ITEM 580 -2.05.

580-3.10 Basis of Payment

All cost associated with the performance of this Work under this Contract including but not limited to all Materials, labor, and Equipment required to successfully establish the plant material and to complete the incidental Work shall be included in the unit Bid item price for the individual plant material.

Payment for these items shall be on an ‘each’ basis.

END OF SECTION

SECTION 585
SITE MAINTENANCE SPECIFICATIONS

SECTION 585 IS ADDED TO THIS SPECIFICATION

585–1.00 General

585-1.01 Work Included

A. The maintenance Work consists of providing all labor, Materials, Equipment, permits, MOT (Maintenance Of Traffic), and incidentals necessary to perform all required landscape maintenance commencing after each tree is planted and continuing until final acceptance at the end of the maintenance/guarantee period. These Specifications apply to all projects throughout Palm Beach County assigned to the Contractor.

B. Grassed areas beyond the perimeter of the earth berm/watering saucers will be maintained by others.

585-1.02 Related Work Specified Elsewhere

Section 580 – Landscape Installation: These provisions shall apply to all Work in Section 585 Site Maintenance as appropriate.

585-1.03 General Operating Specification

Refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, (2021 edition), as the general operating specification document, however Section 580, Landscaping is deleted and replaced with the Specifications for LANDSCAPE INSTALLATION (SECTION 580) and the SITE MAINTENANCE (SECTION 585) herein. Maintenance of traffic requirements are described in the Contract Documents.

585-1.04 Protection

Protect all plants, wildlife, site furniture, paved surfaces, and buildings during maintenance procedures and the application of chemicals. When using Equipment and chemicals, use according to manufacturer's directions and Specifications. Repair or replace any items damaged through improper use of Equipment or application of chemicals at no cost to the Department. Contractor shall submit a copy of the applicable pest control licenses to the Department and Material Safety Data Sheets for all products to be used for this Work. Apply all chemicals after 48-hours' notice to the Department and at a time and in such a manner that the public will not be in contact with nor have any real or imagined harm done to them by the application including, but not limited to, herbicides, insecticides, and fungicides.

585-1.05 Coordination of Maintenance Schedule

Coordinate and schedule all Work through the Department. The Contractor shall submit a detailed maintenance schedule for the minimum twelve (12) month maintenance/guarantee period (divided into anticipated quarterly Work Plans) to the Department for review within fifteen (15) Calendar Days of receipt of Work Order and before Initial Acceptance (of installation).

585-1.06 Quality of Operation

Provide the maintenance services in a professional manner and keep all areas in a clean, orderly, and safe condition, satisfactory to the Department at all times. Abide by all applicable federal, state, and local laws, ordinances, and regulations.

585-1.07 Personnel

A. During all maintenance Work hours, provide a qualified, English speaking and competent person in the Work area who is authorized to supervise the maintenance operations and to represent and act for the Contractor.

B. All personnel shall be required to wear proper attire which, as a minimum, includes a standard shirt carrying company name and/or logo, present a good appearance and maintain a professional code of conduct.

C. All personnel shall take lunch breaks and use restroom facilities in appropriate areas off site.

585-1.08 Equipment

A. All vehicles shall be maintained in good working order, affixed with a company name/logo, painted, with no visible rust and shall be parked on pavement in public areas only. Provide protection of paving from loading ramps. Use tarps/plywood to protect from oil.

B. Fueling mowers, edgers, etc. shall be completed prior to unloading Equipment. Re-fueling, addition of oil, etc. shall be done with care and preferably over concrete. Any damage to asphalt or sod/planted areas from gas, oil or chemical spills shall be fully corrected by Contractor.

C. No storage or provision for storage shall be made on site for maintenance Equipment or Materials. Contractor shall be responsible for transporting Equipment and Materials to the site and off site in sealed or secured containers and vehicles as required, unless specifically allowed by written agreement.

585-1.09 Monthly Reports

On or before the tenth day of each month, submit for approval a written report describing in detail all Work performed by the Contractor under this Contract during the past month (including replacement, mulching, fertilizing, pruning, and chemical application activities). The report shall also include: dates of site inspection(s) by qualified personnel as described in ITEM 585 -1.07;

observations of the general health and vitality of all plantings; the locations and severity of any pests encountered; detailed descriptions of all chemical treatments applied; the general condition of areas maintained; descriptions of damage and vandalism; repair or maintenance recommendations; and the proposed general and landscape maintenance program to be performed by the Contractor during the next month. Department shall approve format of monthly reports, and require revised formats as necessary.

585-1.10 Routine Quarterly Inspections

During the minimum twelve (12) month maintenance period, the Contractor will be required to make maintenance inspections with the Department on a quarterly basis for weeks number 13, 26, and 39 from the date of Initial Acceptance (at installation) at a time scheduled by the Department. Problems identified during these inspections and corrective actions to be taken (with time frames) will be listed by the Contractor and be incorporated into an amended version of the upcoming quarter's Work plan, unless otherwise indicated by the Department.

585-1.11 Guarantee, Replacement, and Final Inspections

A. Guarantee: All Work shall be guaranteed during the minimum twelve (12) month maintenance/guarantee period during which all plants are to be maintained to meet Florida Grade No. 1 as per Florida Grades and Standards for Nursery Plants, by the Florida Dept. of Agriculture and Consumer Services (henceforth referred to as Florida Grades and Standards). All trees shall be alive, healthy, and in satisfactory growth throughout the guarantee period.

B. Replacements: The Department will be the authority to determine which "Replacement Category" described below applies to each tree and what, if any, action is to be taken.

    1. If, at any time during the minimum twelve (12) month maintenance/guarantee period, the Department identifies trees that are substandard, unhealthy, dead, damaged or otherwise in unsatisfactory condition, then such trees shall be removed and replaced/staked by the Contractor as per the following at no additional cost to the Department.

        a. Remove such trees within fifteen (15) Calendar Days of written notification by the Department, and fill planting holes immediately with soil to finish grade level. This notification may occur at any time in addition to quarterly inspections.

        b. Replace such trees within thirty (30) Calendar Days after the written notification occurring at quarterly inspections.

        c. The Department reserves the right to remove any unhealthy, substandard, damaged, or dead trees with prior notification to the Contractor, however, the Contractor shall replace such trees as per these Specifications.

    2. Fallen or leaning trees shall be removed (if damaged or otherwise substandard) or uprighted/restaked (if apparently healthy and meeting Florida Grade No. 1).

a. Those trees requiring removal shall be removed within two (2) Working Days of written notification by the Department. Planting holes of removed trees shall be immediately filled with soil to finish grade level.

b. Those trees requiring uprighting/restaking shall be corrected within 12 hours notification by the Department. The Department, without prior notification to the Contractor, reserves the right to remove, reposition, any fallen or leaning tree encroaching into a vehicular travel lane or creating any other situation affecting public health, safety, welfare.

3. Trees showing clear evidence of being damaged or knocked down by vehicular accidents will be removed by the Department and replaced by the Contractor on a unit cost basis within thirty (30) Calendar Days after the written notification occurring at quarterly inspections.

4. The Contractor shall notify the Department by written fax of each successfully completed tree removal and/or replacement and each shall be identified by station number location shown on the planting Plans.

5. All replacement trees shall become guaranteed for a minimum of twelve (12) months from the date of their initial acceptance for replacement installation, and follow the same maintenance/guarantee period requirements specified herein for originally planted trees.

C. Final Acceptance:

1. The Contractor shall notify the Department in writing fifteen (15) Calendar Days prior to presumptive completion of maintenance/guarantee period in order for the Department to schedule a semi-final inspection. Said maintenance/guarantee period shall be continued until the final inspection is complete and the final acceptance of the project is granted by the Department.

2. Within seven (7) Calendar Days of the notice in ITEM 585 -1.11 C.1, a semi-final inspection will be scheduled by the Department with the Contractor. Following the semi-final inspection, the Department will provide the Contractor with a list of deficiencies including necessary replacements and required time frames for completion. Replacements, including those in ITEM 585 -1.10 B, shall occur prior to final inspection and before final acceptance is granted. When the Work specified by the Contract is found to be completed to the Department's satisfaction, the semi-final inspection shall constitute a final inspection.

3. Upon satisfactory replacement of material and performance of required Work by the Contractor, another semi-final inspection shall be made. If the required material is found to have been replaced and the Work completed satisfactorily, then this shall constitute the final inspection.

4. When, upon completion of the final inspection, the Work is found to be completed satisfactorily, the Department shall give the Contractor written notice of final acceptance.

5. Notwithstanding the above, the Department reserves the right to accelerate the date of any final acceptance (thereby ending the maintenance/guarantee period) when the Department deems such action is in the Department's best interest.

6. Earth berm rings utilized to retain water within the saucer area of each tree (located at the perimeter of the planting hole, 1.5 times larger than the rootball) must be maintained at minimum 6" height throughout the entire guarantee period, but are to be knocked down to level grade just before the semi-final inspection for each tree. The grassed areas affected by the reshaped mulched areas shall be treated with an herbicide as per manufacturer's Specifications for weed-removal before applying mulch. A 3" layer of mulch shall be applied by the Contractor to the entire eye-shaped area before final acceptance. The mulch area of trees that are clustered in tight groupings may be merged to form one mulch bed if approved in writing by the Department.

585-2.00 Products

585-2.01 Landscape Maintenance Materials

A. Water: Use water free of elements toxic to plant and/or animal life. Contractor shall provide (within the unit cost for each tree) labor and Equipment necessary to distribute water as required for all installed Materials using hand-watering methods. Existing or proposed irrigation systems should not be relied on to provide water for newly planted Materials.

B. Replacement Trees: Conform to the type, species, grade, standard, size and method of installation as originally specified unless otherwise directed in writing by the Department. For replacement trees which differ from the original plants, the Contractor must obtain prior written approval by the Department, and submit a credit/debit statement, as appropriate.

C. Planting Soil Backfill Mix: As specified in SECTION 580 -LANDSCAPE INSTALLATION.

D. Fertilizer: As specified in SECTION 580 -LANDSCAPE INSTALLATION.

E. Top Mulch: As specified in SECTION 580 -LANDSCAPE INSTALLATION.

F. Herbicides: Use herbicides recommended for the control of the types of weeds encountered as recommended by the University of Florida Cooperative Extension Service.

G. Insecticides: Use insecticides recommended for the control of the types of insect pests encountered. Insecticides shall be EPA approved.

H. Fungicides: Use fungicides recommended for the control of the types of fungi encountered. Fungicides shall be EPA approved.

585-3.00 Execution

585-3.01 Landscape Maintenance

General: Maintain all plantings in a healthy, vigorous and attractive condition so as to maintain the required Florida Grade No. 1 for all plantings as per Florida Grades and Standards, commencing after each tree is planted and continuing until final acceptance at the end of the maintenance/guarantee period.

A. Tree and Palm Maintenance:

1. Pruning and Trimming:

    a. Trees (excluding palms): Prune all trees to remove dead, broken, or infected branches, suckers, vines and dead or decaying stumps and all other undesirable growth. Perform pruning to maintain Florida Grade No. 1 growth habit. To enhance the appearance of specific trees, the Department may request additional pruning. Perform all pruning in accordance with American Association of Arborists standards and recommendations and also those of Florida Grades and Standards. Do not remove more than 15% of branches unless otherwise approved in writing by the Department. Buckhorning (also called 'hat-racking') of any tree is not permitted.

    b. Palms: Prune all palms to remove dead or substantially brown fronds only.

    c. Debris Removal: Remove and properly dispose of off-site all clippings, leaves, branches, sticks, and twigs after each pruning.

2. Fertilization: Apply specified complete fertilizers that are accepted by the Department at manufacturer's recommended rates. Notify the Department 48-hours in advance of applications. Consistent with Contractor's submitted detailed maintenance schedule in ITEM 585 -1.05, fertilize all trees two (2) times per year between March and October (no closer than four (4) months apart). Broadcast fertilizer inside saucer area around the edge of the root zone. Fertilizer must not be allowed to touch the trunk.

3. Mulching:

    a. Maintain a three foot (3') radius ring with a three (3") inch layer of mulch in all plant beds around all trees. Replenish to specified depth prior to each quarterly inspection during the minimum 12-month maintenance/guarantee period. Maintain mulch at 3" clear from all tree trunks. Apply mulch after fertilizing, never before.

    b. The Contractor shall be responsible for re-mulching activities (including re-establishment of earth berm of saucer) necessitated by washouts, foot traffic, automobile damage or unforeseen circumstances.

4. Weed Control: On a monthly basis, remove weeds mechanically or by spot treatment with accepted herbicide in all plant beds (including the mulched saucer area and the surrounding earth berm). All herbicides, including pre-emergents, are to be used according to label Specifications during the maintenance period. All planting areas/mulched areas shall be weed-free for the final inspection.

5. Sucker Removal: Remove sucker growth monthly from all areas of the trunk, its base, and root zone.

6. Insect Control: Control insect pests which infest plant Materials, and control ant mounds which may occur in landscape areas. Record insecticides and other remedies on the monthly Work report.

7. Plant Replacement: Refer to ITEM 585 -1.11 B.

B. Watering for Plant Establishment:

1. All installed trees shall be hand-watered over the entire root zone with a slow soaking at 4-gallons per minute for deep root penetration and protection of surface roots, mulch, and earth berm around saucer. Contractor shall be responsible for adequate watering of all installed trees from the time of planting until final acceptance at the completion of the minimum twelve (12) month maintenance/guarantee period.

2. The following water guidelines have been established for Contractor's information only and shall be considered only as an estimate of water need. Depending on climate, rainfall, soil, and plant conditions, the Contractor shall adjust the water schedule and amount per application to meet optimum plant growth conditions. The Contractor shall be responsible for monitoring climate and plant soil moisture conditions, and determining if watering beyond or less than the watering guideline described below shall be applied. Water shall not be paid for separately, but shall be included in the unit cost per tree.

Water Use Guidelines			
Amount of Water Applied: Trees and Palm Trees: Apply a minimum of 15-gallons water per tree at each application. Water applied should be a slow soaking at 4-gallons per minute maximum.			
Minimum Frequency Guidelines for Hand-Watering:			
Material	Day	Frequency	No. Applications
Trees	1 – 30	Daily	30

“	31 – 180	Every 3rd Day	50
“	181 – 325	Every 7th Day	20
“	326 – 361	Every 12th Day	3

3. Frequency and number of applications may vary due to climate, rainfall, soil, and plant conditions. Less water may be used during wet, cool periods whereas more water may be needed during hot, dry periods. Contractor shall adjust as needed for optimum plant health. The minimal frequencies suggested above shall not limit the Contractor’s responsibility for providing adequate watering and acclimation for the proper establishment of all trees.

4. Damage resulting from erosion, gullies, washouts, or other causes shall be repaired by the Contractor by filling with topsoil, reshaping earth berm and saucer, tamping to re-stabilize slopes, and replacing lost fertilizer and mulch at no additional cost to the Department.

5. Contractor to use a self-canceling nozzle with a spray diffuser on the end of the hose to ensure water is applied gently so as not to displace mulch or expose root systems.

6. Proof of watering, in the form of receipts, meter readings or other written documentation, shall be presented with the Contractor’s monthly reports.

C. Monthly Reports: Complete monthly reports as described in ITEM 585-1.09.

D. All cost associated with the performance of Work under this Contract including but not limited to all Materials, labor, and Equipment shall be included in the unit Bid item price for each tree, shrub and or ground cover/turf.

END OF SECTION

SECTION 590
IRRIGATION SYSTEM CONSTRUCTION

SECTION 590 IS ADDED TO THE SPECIFICATION AS FOLLOWS:

590–1.00 General

590-1.01 Scope of Work

A. Irrigation systems shall be constructed using sprinklers, valves, piping, fittings, controllers, wiring, etc. of sizes and types as shown on the drawings and as called for in these Specifications. The system shall be constructed to grades and conform to areas and locations as shown on the drawings.

   Sprinkler lines, valves, piping, wiring, etc. are essentially diagrammatic. Minor adjustments in location to suit field conditions are anticipated. Major relocations shall have prior approval of the Department.

   Unless otherwise specified or indicated on the drawings, construction of the irrigation system shall include furnishing, installing and testing of all mains, laterals and fittings, furnishing and installing of sprinkler heads, gate valves, control valves, controllers, and control wires, etc.; all necessary specialities and accessories such as backflow preventers, pump stations, excavation and backfill, and all other Work in accordance with the Plans and Specifications as required for a complete system.

B. The Contractor shall obtain all permits and pay required fees to any governmental agency having jurisdiction over the Work. Inspections required by local ordinances shall be arranged as required. Upon completion of the Work, satisfactory evidence that all Work has been installed in accordance with the ordinances and code requirements shall be furnished to the Department.

C. While working on Medians or on the roadside, proper traffic control shall be used to protect workers and the public. Traffic control operations for installation and for future maintenance shall be in accordance with the Palm Beach County Streetscape Standards Manual, current edition, and as stated in the Maintenance of Traffic Section in these Contract Documents. All Work shall be done in accordance with all local and state codes and standards. All above ground apparatus and structures that are installed shall be kept a minimum of 6’ from the adjacent travel lane.

590–2.00 Products

590-2.01 General

All Materials to be incorporated in this system shall be new and without flaws or defects and of the quality and performance as specified and meeting the requirements of this section. All material to be incorporated into an irrigation system that utilizes re-use water shall have the appropriate labels and bear the proper color (lavender) as required by the service provider. All

material overages at the completion of the installation are the property of the Contractor and are to be removed from the site.

590-2.02 Pipe and Fittings

Pipe sizes shall conform to those shown on drawings. No substitutions of smaller pipe sizes will be permitted but substitutions of larger sizes may be approved. All pipe damaged or rejected because of defects shall be removed from the site at the time of said rejection.

A. Polyvinyl Chloride (PVC)

1. All plastic pipe shall be continuously and permanently marked with the following information:
   a. manufacturer's name
   b. pipe size
   c. schedule number, class or SDR number
   d. type of material
   e. code number

2. Unless otherwise noted on the drawings, all plastic pipe fittings shall be Schedule 80 polyvinyl chloride free from manufacturing defects.

3. Solvents used for joining must comply with the requirements of ASTM-D-2466 and be recommended by the manufacturer of the plastic pipe used.

4. All PVC main lines 2 ½" or larger shall have provision for expansion and contraction provided in the joints. All joints shall be designed for push-on connection. A push-on joint with a coupling manufactured as an integral part of the pipe barrel consisting of a thickened section with an expanded bell with a groove to retain a rubber sealing ring of uniform cross section similar and equal to Johns-Manville Ring-Tite and Ethyl Bell Ring or made with a separate twin gasket coupling similar and equal to Certainteed Fluid-Tite are acceptable. Circular gaskets shall conform to the requirements of ASTM designation F477. All O-ring pipe shall be Class 200.

5. All tees and elbows connecting to the o-ring mainline shall be ductile iron manufactured for use with PVC O-ring pipe, Harco or accepted equal.

6. Underground detectable marking tape shall be Line Guard or accepted equal.

7. When directional bore is chosen as the method by which to install sleeves, the main line pipe shall be smooth continuous HDPE SDR 11 with appropriate fittings for connection to Rigid PVC O-ring main line. Manufacturer shall be KAF-FLEX, (800) 451-7646 or accepted equal.

8. Main line, 2" or smaller, shall be Schedule 40 PVC or HDPE with Schedule 80 PVC fittings.

9. All lateral lines shall be Schedule 40 PVC.

B. Galvanized Steel: Galvanized steel pipe shall conform to the requirements of ASTM Designation A 120, Schedule 40. At threaded joints between PVC and metal pipes, the metal shall contain the socket end and the PVC side, the spigot. A metal spigot shall not, under any circumstances, be screwed into a PVC socket.

C. HDPE SDR 11: HDPE SDR 11 shall conform to the requirements of ASTM, ANSI, AWWA, etc., standard specification is incorporated by reference in these Specifications, the reference standard shall be the latest edition and revision

590-2.03 Risers

A. All sprinklers shall have a flexible riser assembled by the use of flexible polyethylene pipe. The inside diameter of the polyethylene pipe shall be the same diameter as the sprinkler head inlet.

B. Swing joints used with rotor and spray bodies shall be by Lasco or accepted equal.

590-2.04 Valves

A. Backflow Preventer (used only for potable water supply): The backflow preventer shall be a Reduced Pressure Zone (RPZ) type, as accepted by Palm Beach County Water Utilities Department, capable of having a flow rate that is greater than or equal to that which comes from the meter.

The backflow preventer body shall be constructed of bronze and the internal parts of stainless steel. A backflow preventer is not required for reclaimed water (gray water), but a check valve of the same size as the delivery line is required.

B. Manual Valves: All zone shut-off valves of sizes 2" or smaller shall be all bronze double disc wedge type with integral taper seats and non-rising stem. Those in-ground shall be installed in a separate valve box. Gate valves shall be NIBCO, T-113-K or equal American made, conforming to MSS SP-80 @ 200psi/13.8 Bar

C. Automatic Control Valves: Shall be Irritrol 100P-1.5 FC with omni-reg pressure regulator, Toro P-220-27-0-6 (pressure-regulated angle type), or accepted equal. All remote control valves are to have standard solenoid to be compatible with the Two-Wire control system and the irrigation controller, as per plans, details and specifications. All control valves shall be provided with an equal sized gate valve installed upstream from the control valve and included in the same valve box.

D. Pressure Relief Valves: The pressure relief valve shall maintain constant upstream pressure by passing or relieving excess pressure, and shall maintain close pressure limits without causing surges. The pressure relief valve shall be a fast opening, slow closing, 125 class flanged globe type valve. See Plans for size (1" minimum) and opening pressure.

E. Air/Vacuum Relief Valves: The air/vacuum relief valve shall be a 2" AR Series Combination Air and Vacuum Release Valve by BERMAD, or accepted equal. Install a 1" gate valve to allow isolation of relief valve for periodic cleaning and maintenance. The relief valve shall be installed in an approved valve box on a 1 2/" 'swing joint' vertical riser affixed to a saddle tap at the top of the mainline at the highest location in the system in both directions from the source or as directed. Install in a traffic rated valve box per section 590-2.05.

590-2.05 Valve Box

To be polymer concrete with fiberglass reinforcement with a minimum "Tier 15" or Tier 22 traffic rated cover, embossed with the word 'Irrigation", as certified by the manufacturer. Recommended manufacturers are CDR systems Corp., Ormond Beach Florida and Quazite, Lenoir City, Tennessee, or accepted equal. Optional sizes shall be a minimum of 18" X 12"x12" or 18" X 18"x12" or larger if more than 1 ACV is to be installed with cover (no metal). The appropriate valve zone numbers shall be tagged or stenciled on the underside of the lids. Color of valve box to correspond with type of water used.

590-2.06 Sprinkler Heads

A. Quick Coupler Valves: Quick coupler valves shall be two-piece heavy duty brass with locking vinyl cover. Rainbird Model #33 DL RC or accepted equal to be used where specified on the drawings. Provide (2) Model 2049 cover keys with (2) swivel hose ell adapters, Model SH-O or those suitable for use with equal manufacturer. Any quick-couples used with reclaimed water or surface water must be permanently labeled "Do Not Drink" in English and in Spanish.

B. Sprinkler Heads: Toro 570Z PRX, or accepted equal shall be provided where specified on the drawings. Rotor heads shall be Hunter I-20 with stainless steel risers, K-Rain Pro-Plus, Toro EZ Adjust, or accepted equal. All heads located on slopes shall be equipped with a Check Valve Seal.

C. Bubbler Heads: Bubbler heads shall be adjustable with a full circle delivery pattern. Rainbird 1300 A-F, Toro 514-20, Irritrol 533 or accepted equal, shall be provided where specified on the drawings.

590 - 2.07 Electrical Control Wiring

All electrical control wiring shall be UF which has been approved for direct underground burial.

A. Ground/common wire shall be American wire gauge size 12.

B. Control wire shall be American wire gauge size 12, or as specified on the drawings.

C. Electrical control wire Two-Wire system cable decoder cables between the controllers and the decoders shall be Hunter 1D1 GRY, 1D1PUR, 1D1YWL, 1D1ORG, 1D1BLU and/or 1D1TAN Twisted Blue and Red insulated solid copper conductors, 14 Gauge, 14/2 AWG A.K.A Paige P7313D Direct Burial Decoder Cable Part Number 1701116RB with high density polyethylene insulation as manufactured by Paige, Two-Wire Control System wiring between the single decoders and the zone valve shall be 14/2 AWG Paige DTS Cable.

D. Insulation shall be 075" thick minimum covering for positive waterproof protection of 14/2 AWG.

E. Waterproof 3M DBY and DBR-6 wire connectors shall be used for all wire connections per the details.

590-2.08 Pump Station

A. Pump shall be as specified on the drawings.

1. Submersible pump requires the following:

    a. A cased well of appropriate size and depth as specified on the drawings to accept the specified pump and motor (see well Specifications).

    b. A submersible pump and motor as specified in the drawings ranging from 2 HP to 10 HP. Pump shall be Goulds, Sta-Rite, Aerometer or accepted equal to be installed with a pressure relief valve. Submit performance curves prior to installation.

    c. One 6" thick concrete, below-ground vault, Model #PB4848-48 by Oldcastle Precast, Inc., or accepted equal. Required inside dimensions shall 48" x 48" x 48" deep. Vault shall have a concrete bottom containing drain hole(s) and an Aluminum 48" x 48" cover. 300 PSF load rating, Model #ADP300 by U.S.F. Fabrication, Inc., or accepted equal. The vault shall be core drilled as necessary to connect tanks to discharge pipe (see Item d below).

    d. One rust control tank and one fertigation tank. Tanks shall be 55-gallon capacity, 20" dia. x 38" deep seamless molded plastic, minimum 1/8" thick, Model # TC2038IA by Chem Tainer Inc., or accepted equal. Tanks shall have piped connections to two injector pumps then to the discharge side of the pump. Injector pumps shall be wired

to pump control and be capable of delivering between 10 and 100 parts per million. Pumps shall be a solenoid driven metering pump by LMI Unidose, Model # UO42-281, or accepted equal.

e. Electrical Equipment shall be mounted on an aluminum, unistrut rack (3" x 1'-4" U-Channel uprights with 2" x ¼" L- Channel cross braces). The rack shall contain the irrigation controller and motor control/starter in a NEMA 4x enclosure, injector pumps (see Item d above) and a NEMA 4x circuit breaker panel with manual shut-off. A rain switch, Rainsensor Series # RS1000 by Irritrol, or accepted equal shall be required. Connection from the irrigation controller to the rain switch shall be via a conduit adapter mounted on a pole, per code, or through the integration of a wireless rain cut-off. All electrical Work must be performed by a licensed electrician. Electrical service meter shall be mounted 36" above grade on its own unistrut rack at the base of the pole where the riser has been installed and provided with a 2P3W Fused NEMA 4X rated stainless steel Manual Disconnect with UL Class RK-5 Fuses, all sized per applicable codes for the pump being installed.

f. For pumps 5 HP and larger, an Ames C1a Valve, or accepted equal pressure regulating and pressure sustaining valve, pressure gauge followed by a gate valve, both of the same size as the main line.

g. A Coast Guardshack cage fabricated from expanded steel, or accepted equal, to enclose the well head and both valves, mounted on a concrete pad as per the manufacturer's Specifications.

h. Concrete vaults shall contain sump pumps wired to the power panel. Pumps shall be ¼ hp, Myers, Model # 525VI, 115 V, or accepted equal. Install PVC discharge pipe just below grade for a minimum distance of ten feet with a 4" PVC pop-up discharge blow off cover by NDS or accepted equal.

2. Centrifugal pump station requires the following:

a. A cased well of appropriate size and depth as specified in the drawings (see well Specifications).

b. A centrifugal pump and motor as specified in the drawings ranging from 2 HP to 10 HP. Pump shall be Flint & Walling with brass impeller (for all 3hp or smaller pumps), Goulds, Sta-Rite, Sullivan Electric or accepted equal, to be installed with a pressure relief valve and Hot Stop or similar emergency shut-off device. Submit performance curves prior to installation.

c. Concrete vault as described in Item 2.08-A1c above.

d. Rust control and fertigation tanks as described in Item 2.08-A1d above.

e. Electrical Equipment and mounting as described in Item 2.08-A1e above.

f. Pressure regulating valve with a pressure gauge as described in Item 2.08-A1f above.

g. A pump enclosure, Canal Screens, Inc., or accepted equal, sized to house the pump and the pressure regulating valve and gate valve if applicable, set on an aluminum skid and anchored to a concrete pad of the size recommended by the enclosure manufacturer.

h. A check valve on the intake side of the pump of the same size as the intake pipe installed either inside or outside of the pump enclosure.

3. Potable, reuse or surface water supplies require the following:

a. Plans shall be submitted to the appropriate water utility for review. Contractor shall pay any plan review fees. Palm Beach County will arrange for water service and tap, and will pay any service initiation fees.

b. An RPZ backflow preventer, as accepted by Palm Beach County Water Utilities Department, Ames Cla Valve or accepted equal, pressure regulating and pressure sustaining valve, pressure gauge followed by gate valve installed by a licensed plumber beyond the water meter.

4. When reclaimed water is used, the requirements are the same as those for potable water, except that a check valve shall be installed instead of the RPZ backflow preventer.

5. When the water source is surface water such as a lake or canal, the requirements are the same as those for a centrifugal pump station except for the well. In addition, the suction pipe shall be fitted with a Plum Creek, Aqua Queen or accepted equal, self-cleaning intake screen installed as per manufacturer's Specifications.

B. Pipes, valves, fittings, etc., shall be galvanized steel in sizes and locations as shown on the Plans. No PVC shall be used above ground.

590-2.09 Controller

Shall be Sentinel Field Satellite as manufactured by Toro, or accepted equal, in stainless steel wall-mounted cabinet, mounted on an aluminum unistrut (see Item 2.08-A1e above). Provide an additional 120V, 15 AMP electrical outlet for auxiliary power and a Data Industrial Model IR-PR flow sensor (size determined by size of mainline). Flow sensor shall be located as indicated in details within a 11" x 11" x 18" polymer concrete box with fiberglass reinforcement and fitted with a locking traffic rated cover. Provide each satellite controller with a hand held radio and radio port, one surge protection board, antenna or Aircard, U.L. approved ground rod/plate protection (separate grounding protection is required from the pump station) and pump start. Contractor shall be responsible for hook up and verification of positive connection to Central Controller. Pump controls shall be mounted on aluminum unistrut with fused shut-off, meter and rain sensor. Electrical service shall be U.L. approved, installed by a licensed electrician and provided with a molded breakaway plug and connector installed in a traffic rated approved in ground pull box.

Toro Sentinel "Water Management System" central controller, or approved equal. This unit shall communicate with the central, and have a mother-board and one 96 Station daughter-board which is compatible with a two-wire communication path with Toro ISP decoders.

For information and prices, contact Hector Turf at (954) 429-3200.

590-2.10 Communication Tower

Shall be a freestanding tripod G-25 by ROHN, or accepted equal, with 12" spacing. Antenna shall be installed per manufacturer's directions in the location indicated in the Plans or as directed by Department personnel. The number of sections required to provide positive communications shall be determined at the time of installation.

590–3.00 Execution

590-3.01 Surface Conditions

A. Inspection

1. Prior to all irrigation Work, the Contractor shall carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.

2. The Contractor shall coordinate Work with electrical and paving Contractors, as needed.

3. The Contractor shall verify that irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original designs, the referenced standards, and the manufacturers' recommendations.

4. The Contractor shall call Sunshine State One-Call of Florida, Inc. at 1-800-432-770 to verify utility locations at least 48 hours prior to digging. The Contractor shall be responsible for contacting or locating other utilities. The Palm Beach Water Utilities Department also must be contacted at (561) 641-3429, or the appropriate water utility having jurisdiction over the project area, to verify locations and depths of underground utilities.

5. If the irrigation system is damaged as a result of improper construction or coordination on the part of the Contractor, the damage shall be repaired by the Contractor at no expense to the Department.

B. Discrepancies

1. In the event of a discrepancy, the Contractor shall immediately notify the Department. 100% coverage and 100% overlap is required regardless of any site changes.

2. The Contractor shall not proceed with the installation in areas of discrepancy until such discrepancies have been fully resolved in writing by the Department.

590-3.02 Field Measurements

The Contractor shall make all necessary measurements in the field to insure precise fit of items in accordance with the Specifications found in the drawings. The final layout of the project must be approved by the Department before any Work commences.

590-3.03 Trenching and Backfilling

A. Trenching for plastic pipe shall be excavated to sufficient depth and width to permit proper handling and installation of pipe and fittings. The backfill shall be thoroughly compacted and leveled off to adjacent soil level. The backfill shall contain no lumps or rocks larger than 3 inches. The top six inches of backfill shall be free of rocks larger than 1", subsoil or trash. Pipe trench shall be sodded if placed in an existing sodded area and shall not settle after backfilling.

B. Minimum Depth of Cover:

1. The minimum depth of cover for main lines shall be 24" with a layer of Line Guard installed at a depth of 6".

2. For lateral lines on the discharge side of the E.R.C.V., minimum depth of cover shall be 18".

3. For Line Guard (main lines only), minimum depth of cover shall be 6".

4. Requirements of the FDOT Utility Accommodation Manual and the specific Utility Permit Conditions shall take precedence over the above standards for work in State Roads

590-3.04 Installation of Piping

A. Inspection of Pipe and Fittings

The Contractor shall carefully inspect all pipe and fittings before installation, removing all dirt, scale, and burrs, and reaming as required. Install all pipe with all markings up for visual inspection and verification.

B. The Contractor shall coordinate Work with Site Contractor to locate sleeves of size and location as shown on the drawings.

C. Plastic Pipe

1. The Contractor shall exercise care in handling, loading, unloading, and storing plastic pipe and fittings; store plastic pipe and fittings under cover until ready to install; transport plastic pipe only on a vehicle with a bed long enough to allow the pipe to lay flat to avoid bending and concentrated external load.

2. The Contractor shall repair all dented and damaged pipe by cutting out the dented or damaged section and rejoining with a coupling.

3. In joining, use only the specified solvent and make all joints in strict accordance with the manufacturer's recommended methods. Give solvent welds at least 15 minutes set up time before moving or handling and 24 hours curing time before filling with water.

4. For plastic-to-steel connections, Work the steel connection first; use a non-hardening pipe dope on all threaded plastic-to-steel connections and use only light wrench pressure.

D. Galvanized Pipe

1. Make all cuts to galvanized pipe square with all cuts thoroughly reamed and all rough edges or burrs removed.

2. Make all pipe threads sound, clean-cut, and well fitting.

3. Use pipe dope on male fittings only.

4. Make all screwed joints tight with all the necessary wrenches, but without handle extensions.

E. Pavement Crossings:

1. Sleeves under decorative paving or sidewalks are to be HDPE or Schedule 40 PVC and installed at depth of 24".

2. Sleeves under vehicular paving are to be HDPE or Schedule 80 PVC or hot-dipped galvanized steel with a minimum wall thickness of .237" and installed at a depth of 36" of cover on County roads and per the FDOT Utility Accommodation Manual on State roads .

3. Installation under existing pavement is to be by jack and bore or directional bore. Ends of the bore shall be marked with 3 M detectable 'buttons' to assist future locations. Upon completion of the bores, the Contractor shall provide documentation of the bore construction by means of bore logs and in addition, on State Roads, plan and profile sheets. Any pavement, curb, sidewalk, or other surface damaged during boring shall be replaced to Palm Beach Department and F.D.O.T. Specifications.

4. The contractor shall provide the GPS State Plane Coordinates for location of all landscape irrigation sleeve (Both Active & Abandoned) ends and provide plan, & profile as-built's, bore logs, and install 3M Electronic markers at the sleeve ends during construction.

590-3.05 Installation of Equipment

A. Manual Control Valves and Electric Remote Control Valves

The Contractor shall install manual and electric remote control valves in control boxes where indicated on the drawings, a minimum of 18" from back of curb, in accordance with the manufacturer's recommendations.

B. Motor, Pump, Pressure Control Valves, Check Valves and Main Shut-off Gate Valves

Install where indicated in the drawings, in accordance with drawings and with manufacturer's recommendations.

C. Air Relief Valves

Install where indicated on the drawings at highest elevation, in accordance with manufacturer's recommendations.

D. Pressure Relief Valves

Install where indicated in the drawings, in accordance with drawings and with manufacturer's recommendations.

E. Sprinkler Heads

Installation of Irrigation Heads: Heads shall be placed to finished grades. Locate sprinkler heads a minimum of 12" from back of curb. Upon installation heads shall be flagged by colored markers for positive identification in field. Prior to operation of heads, the Contractor will lay an area 2' x 2' of sod around each head. Sod shall be laid so that it is even with the finished grade. Heads must be firmly set so as to withstand being driven over with soft tire Equipment without damage. Rotor heads require swing joint assemblies.

F. Thrust Blocking

1. In general, thrust blocks are required on the main line at the following locations:

    a. Where the pipe changes direction of the water (i.e., ties, elbows, crosses, wyes and tees).
    b. Where the pipe size changes (i.e., ties, elbows, crosses, wyes and tees)
    c. At the end of the pipeline (i.e., caps and plugs).
    d. Where there is an in-line valve.

2. Blocks shall be concrete, having a calculated compressive strength of 3,000 psi. Install as shown on details.

G. Controllers

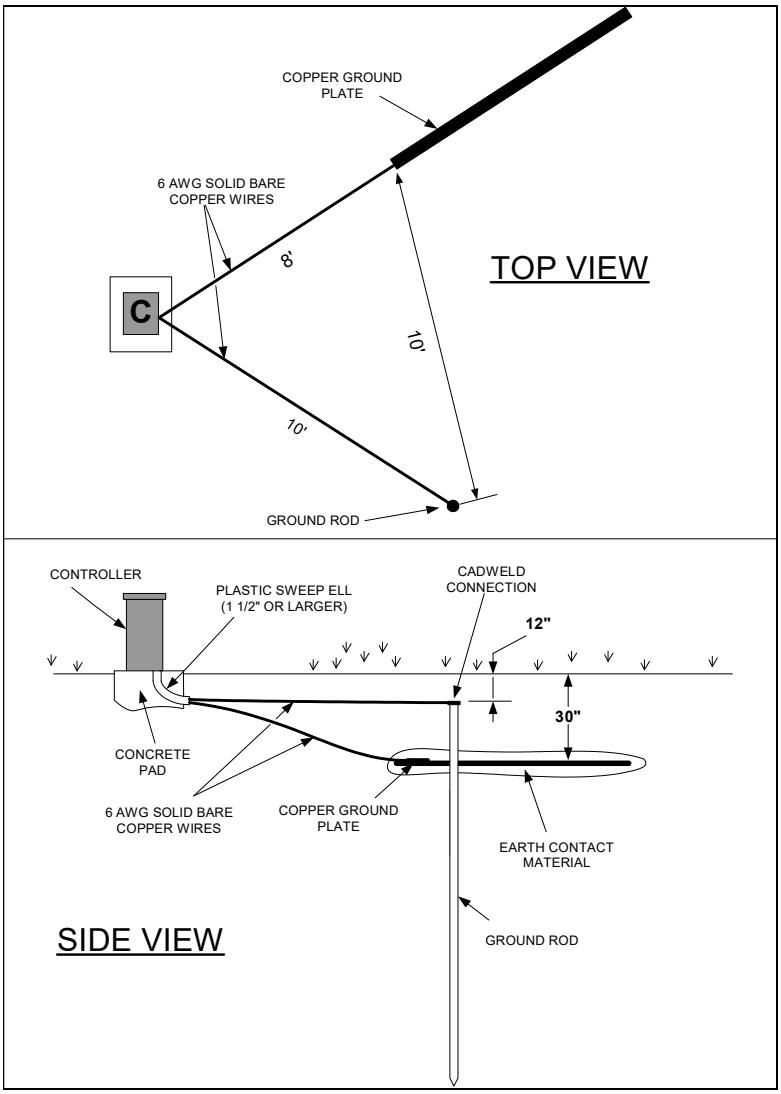
The Contractor shall install controllers at locations as shown on plan according to manufacturer's recommendations.

H. Lightning Arrestor

The Contractor shall install an arrestor at each controller location shown on the plans to provide lightning protection on both primary and secondary sides of all controllers in accordance with Article 250 of the National Electrical Code (NEC.) Grounding, bonding, and shielding components will include the items described in the following paragraphs, at a minimum.

EARTH GROUNDING

Use grounding electrodes that are UL listed or manufactured to meet the minimum requirements of Article 250-52 of the 2002 edition of the NEC. At the very minimum, the grounding circuit will include a copper clad steel ground rod, a solid copper ground plate and 100 pounds of PowerSet® earth contact material, as defined below and per the following detail. This detail is the minimum requirement for supplementary grounding of any electronic equipment. Other details, for a multitude of field situations, are available from the American Society of Irrigation Consultants, ASIC Guideline 100-2002 (www.asic.org, "Design Guides".)



Ground rods are to have a minimum diameter of 5/8" and a minimum length of 10 feet. These are to be driven into the ground in a vertical position or an oblique angle not to exceed 45 degrees at a location 10 feet from the electronic equipment, the ground plate, or the wires and cables connected to said equipment, as shown in the detail above. The rod is to be stamped with the UL logo [Paige Electric part number 182007.] A 6 AWG solid bare copper wire (about 12 feet long) shall be connected to the ground rod by the installer using a Cadweld GR1161G "One-Shot" welding kit [Paige Electric part number 1820037.] This wire shall be connected to the electronic equipment ground lug as shown in the detail above.

The copper grounding plate assemblies [Paige Electric part number 182199L] must meet the minimum requirements of Article 250-52(d) of the 1999 NEC. They are to be made of a copper alloy intended for grounding applications and will have minimum dimensions of 4" x 96" x 0.0625". A 25-foot continuous length (no splices allowed unless using exothermic welding process) of 6 AWG solid bare copper wire is to be attached to the plate by the manufacturer using an approved welding process. This wire is to be connected to the electronic equipment ground lug as shown in the detail of page 1. The ground plate is to be installed to a minimum depth of 30",

or below the frost line if it is lower than 30", at a location 8 feet from the electronic equipment and underground wires and cables. Two 50-pound bags of PowerSet® [Paige Electric part number 1820058] earth contact material must be spread so that it surrounds the copper plate evenly along its length within a 6" wide trench. Salts, fertilizers, bentonite clay, cement, coke, carbon, and other chemicals are not to be used to improve soil conductivity because these materials are corrosive and will cause the copper electrodes to erode and become less effective with time.

Install all grounding circuit components in straight lines. When necessary to make bends, do not make sharp turns. To prevent the electrode-discharged energy from re-entering the underground wires and cables, all electrodes shall be installed away from said wires and cables. The spacing between any two electrodes shall be as shown in the detail of page 1, so that they don't compete for the same soil.

The earth-to-ground resistance of this circuit is to be measured using a Megger®, or other similar instrument, and the reading is to be no more than 10 ohms. If the resistance is more than 10 ohms, additional ground plates and PowerSet® are to be installed in the direction of an irrigated area at a distance of 10', 12', 14', etc. It is required that the soil surrounding copper electrodes be kept at a minimum moisture level of 15% at all times by dedicating an irrigation station at each controller location. The irrigated area should include a circle with a 10-foot radius around the ground rod and a rectangle measuring 1-foot X 24-feet around the plate.

All underground circuit connections are to be made using an exothermic welding process by utilizing products such as the Cadweld "One-Shot" kits. Solder shall not be allowed to make connections. In order to ensure proper ignition of the "One-Shot", the Cadweld T-320 igniter must be utilized [Paige Electric part number 1820040.] The 6 AWG bare copper wires are to be installed in as straight a line as possible, and if it is necessary to make a turn or a bend it shall be done in a sweeping curve with a minimum radius of 8" and a minimum included angle of 90°. Mechanical clamps shall be permitted temporarily during the resistance test process, but are to be replaced with Cadweld "One-Shot" kits immediately thereafter.

Proof of effectiveness of lightning arrestor shall be in accordance with manufacturer's guidelines. A maximum of 10 ohms of resistance is allowable.

I. Backflow Preventer

RPZ Backflow Preventer shall be installed by licensed plumber in a location approved by the appropriate water utility department.

590-3.06 Electrical Control Wiring

A. Installation of electrical control cable shall be of the size specified and shall be taped to the bottom of the main line. Expansion joints in the wire to be provided at 200-feet intervals by making 5 to 6 turns of the wire around a piece of ½" pipe. Where it is necessary to run wire in a separate trench, the wire shall be within a PVC sleeve and have a minimum cover of twelve (12) inches.

B. All wire connections at remote control valves, within valve boxes, and at all wire splices, shall be left with a 6' minimum "slack" so that in case of repair, the valve bonnet or splice may be brought to the surface without disconnecting the wires. Waterproof splice to be Rainbird or equal

C. All pump station wiring shall be done by a licensed electrician.

D. All electric control wire shall be sized as recommended by the controller, valve, Two-wire control system and grounding manufacturer, except as otherwise specified. It shall be encased in an orange 1-1/4" HDPE pipe conduit installed in the piping trenches wherever possible and be placed along side of the main line. All Two-Wire cable between decoders/electric wire boxes, along the entire wire paths and into the bottom of the controller or control wire junction box at edge of the pump station shall be encased in the orange HDPE pipe conduit.

E. At all wire connections at remote control valves, decoders and at all wire splices, the wire shall be left with sufficient slack so that in case of repair the valve bonnet, decoder or splice may be brought to the surface without disconnecting the wires. See Zone Valve/Decoder Wiring/Grounding Detail for lengths (30"-60"). All splicing of wire shall take place in valve boxes. All splicing of wires shall be made using UL listed waterproof wire connectors as recommended by the wire manufacturer and per the valve and decoder details which specify 3M BDY and DBR-6 waterproof wire connectors.

F. Each remote control valve shall be connected to a single station decoder shall have wire sizes and coded colors per the Zone Control Valve/Decoder Wiring/Grounding Detail and as recommended by the manufacturer, except as otherwise specified. All decoders, which are connected to the same controller, shall be connected to the Two-Wire path Control System using Decoder Wire, which shall be Hunter 1D1GRY, 1D1PUR, 1D1YWL, 1D1org,1D1tan Twisted blue and red insulated solid copper conductors, 14 Gauge, 14/2 AWG Paige P7313D Direct Burial Decoder Cable part Number 170116RB with high density polyethylene insulation as manufactured by Paige. Each individual controller shall have a separate Two-Wire Path/s wire control system entirely independent any wire system of all other controllers. Only those remote control valves, which are being controlled by one specific controller, shall be connected to that controller's two-wire control system.

G. Two-Wire Control System wiring between the single decoders and the zone valves shall be 14/2 AWG Paige DTS Cable, color coded with each pair being different colors than the other solenoid wires within the group of solenoids per the Zone Control Valve/Decoder Wiring/Grounding Detail. The decoders shall be installed in a Gray rectangular valve box with "Electric" logo per the Remote Control Valve/Decoder Wiring/Grounding Detail.

590-3.07 Testing and Inspection

A. Closing in Uninspected Work

The Contractor shall not allow or cause any of the irrigation Work to be covered or enclosed until it has been inspected, tested, and approved by the Department. Any Work which has been covered shall be exposed for inspection.

B. Flushing

Before backfilling the main line, and with all control valves in place before lateral pipes are connected, completely flush and test the main line and repair all leaks; flush out each section of lateral pipe before sprinkler heads are attached.

C. Testing

1. Make all necessary provisions for thoroughly bleeding the line of air and debris.

2. Before testing, fill the line with water for a period of at least 24 hours.

3. After valves have been installed, test all main lines for leaks at a pressure of 100 psi for a period of 4 hours with all couplings exposed and with all pipe sections center-loaded. No more than 5 psi loss will be acceptable.

4. Furnish all necessary testing Equipment and personnel.

5. Correct all leaks and re-test until accepted by the Owner.

D. Final Inspection:

1. The Contractor shall thoroughly clean, adjust and balance all systems.

2. The Contractor shall demonstrate the entire system to the Department, proving that all remote control valves are properly balanced, that all heads are properly adjusted for radius arc of coverage and overspray, and that the installed system is workable, clean, and efficient. No irrigation water shall enter the Roadway.

590-3.08 Instructions

A. Remote Control Legend: Attach a typewritten legend inside each controller door that states the areas covered by each remote control valve.

B. Maintenance Personnel: After the system has been completed, inspected and approved, the Contractor shall instruct the Owner's maintenance personnel in the operation and maintenance of the irrigation system.

C. Provide all manuals, product literature, Warranty Certificates, keys, etc. to the Department - Streetscape Section.

590-3.09 Plans

Substantial deviations from piping layout (2' or more) shall be recorded as Work progresses and an as-built plan of the sprinkler system shall be furnished to the Owner as a condition of completion of Work. Forward all bore logs and profiles, tests results and permit copies to the Department - Streetscape Section.

590-3.10 Guarantee

All equipment, material, and labor shall be guaranteed by the Contractor for a period of one (1) year after substantial completion of the project. Any defects found, either in Materials or workmanship, during the period shall be immediately corrected at the Contractor's expense.

590–3.11 Basis of Payment

Irrigation system shall include all labor and material cost to install and restore a fully functional irrigation system, provide and install ground rod protection to the satellite controller(s) and pump station(s). Cost shall include the protection and rehabilitation of any existing wells and service points, establishing service points, satellite controllers, pump stations and wells as indicated in the Plans and per Palm Beach County Streetscape Section's Specifications, or approved equals. Cost shall include the integration of the system into the central universal interface software program operated by the Palm Beach County streetscape section including all designated frequencies and the providing of manuals, keys, hand held remotes (two per installed station) and ancillary items required for a fully functional irrigation system with 100% coverage and 100% overlap. Irrigation system shall be paid as a LUMP SUM basis.

END OF SECTION

SECTION 595
IRRIGATION WELL CONSTRUCTION

SECTION 595 IS ADDED TO THIS SPECIFICATION

595–1.00 General

595-1.01 Related Documents and General Conditions

Drawings and General Provision of Contract, including General Supplementary Conditions apply to Work of this Section. The Contractor shall keep a copy of all Contract Documents on-site at all times including drawings, all Specifications and Codes mentioned above, and copies of all logs, and correspondence. All Work shall be done in accordance with all applicable ordinances, laws, codes and regulations. Any changes required by these ordinances, laws, codes and regulations shall be made at no additional expense to the Owner.

595-1.02 Scope of Work

The Work covered by this Section of the Specifications shall include, but not be limited to, the following:

A. All labor, Equipment, material, and operations necessary for construction, development, and testing of the proposed 5" well (see SECTION - 590 IRRIGATION SYSTEM CONSTRUCTION SPECIFICATIONS).

B. All labor and Materials necessary to connect 5" well to a specified pump (see SECTION - 590 IRRIGATION SYSTEM CONSTRUCTION SPECIFICATIONS).

C. Drill 5" well to a depth as necessary to achieve the required water flow and water quality.

D. The Contractor shall apply for and pay for all permits and licenses required for execution of the Work. Any required signatures by Department officials will be provided. The Contractor shall arrange for, and be present during, all required inspections. Any required additional Work or Materials resulting from inspections under the above permits shall be provided at no cost to the Owner.

595-1.03 Quality Assurance

A. The Contractor shall inspect the site to determine conditions to be encountered during construction noting all existing and /or proposed utilities (see SECTION–590 IRRIGATION SYSTEM CONSTRUCTION SPECIFICATIONS for underground utility location procedures).

B. The Contractor shall be responsible for any damage that occurs as a result of the construction. This shall include, but not be limited to, the Owner's property, underground utilities, and

vehicular traffic. The Contractor shall keep the Work area neat and orderly, continually removing rubbish, waste material and temporary structures.

C. Protecting Water Quality

Take precautions to prevent contaminated water or water having undesirable physical or chemical characteristics from entering the stratum from which well is to draw its supply. Prevent contaminated water, gasoline, etc., from entering well, either through the opening or by seepage through ground surfaces.

If well becomes contaminated or water having undesirable physical or chemical characteristics enters the well due to neglect, provide casings, seals, sterilizing agents or other Materials to eliminate contamination or shut off undesirable water. Provide remedial Work at no cost to the Owner.

Exercise care in performance of Work to prevent breakdown or caving-in of strata overlaying that from which water is to be drawn. Develop, pump or bail well until water pumped from the well is substantially free from sand.

Protect Work to prevent either tampering with the well or entrance of foreign matter during well development. Upon completion, provide a temporary well cap.

D. Driller's Requirements: An experienced foreman or driller who has authority to take orders from the Department is to be constantly in control of the well site. Upon request, the driller shall furnish well drilling information desired by the Department.

E. The Contractor shall guarantee the water well for one (1) year from the date of initial acceptance by the Department. This shall include all material, workmanship, and well performance.

595-1.04 Abandonment of Drilling

A. If it becomes necessary to abandon drilling operations before completion of a water producing well, the Contractor shall follow all regulations for abandonment of the well as required by local authorities having jurisdiction.

B. Should abandonment of drilling be necessary due to poor workmanship or negligence on the part of the Contractor, no compensation will be allowed.

C. Should abandonment of drilling be necessary due to inadequate water supply or for another reason that is deemed to be no fault of the Contractor by the Department, payment for the Work shall be based upon the actual vertical footage completed and shall be paid at the Contract Unit Price for Additional Well Depth In Excess Of Base Depth, or as agreed upon.

595-1.05 Submittals

A. Prior to starting construction of the well, the Contractor shall submit to the Department for approval an estimated schedule of the Work to be accomplished and a description of the methods and Equipment to be used during construction. The description shall include methods he will use to drill, develop and test the well.

B. The Contractor shall keep accurate logs of the irrigation well and samples of Materials drilled through. Take samples of substrata formation at ten foot intervals and/or changes in formation throughout the entire depth of the well.

   Provide the following information to the Department for record purposes:

   1. Casings: Diameter, thickness, weight per foot of length, depth below grade.

   2. Pumping Test: Static water level, maximum safe yield, drawdown at a maximum yield.

   3. Drilling Log: Log indicating strata encountered.

   4. Alignment: Certification that the well is aligned and plumb within specified tolerances. The Contractor shall keep an accurate record of the order, number, size and length of the individual pieces of pipe as assembled in the well. The records shall be delivered to the Department upon completion of the Work.

C. The Contractor shall provide to the Department a physical and chemical analysis of water from the finished well. Make the analysis, certified by an approved testing Laboratory, in accordance with local requirements, to include the following: total dissolved solids, silica, iron, pH, sulfur, chloride, and salt content.

595–2.00 Products

595-2.01 Materials

A. Casings

   The irrigation well casing shall be new black steel pipe, Schedule 40, minimum of 6” opening, or as specified in the drawings. The joints may be welded or threaded coupling.

B. Grout

   Grout shall be ANSI/ASTM C150, type shall suit project conditions.

595–3.00 Execution

595-3.01 Well Construction

A. Annular space shall be continuously filled with grout, with process being completed in a single operation. Subsequent Work in the well, such as drilling or other operations, shall be suspended for 72 hours after grouting of casing. The only exception shall be when quick-setting cement is used, when Work may proceed after 24 hours.

B. Install permanent casing with a temporary well cap. Installation of the well cap shall be coordinated with the pump system installer.

C. The well shall be of sufficient size to produce a continuous supply of water at an acceptable quality and specified capacity.

D. If subterranean formations/conditions require, the well shall be supplied with an alternate gravel pack with 20' minimum of stainless steel slotted screen and TREMI piped gravel pack.

595-3.02 Well Development

A. The well shall be developed by such methods that will effectively extract, from a water bearing formation, the maximum practical quantity of sand, drilling mud and other fine Materials in order to bring the well to maximum yield per foot of drawdown and to a sand-free condition. This Work shall be performed in a manner that does not cause any undue settlement or disturbance of the strata above the water bearing formation, nor disturb the seal around the well casing, thereby reducing the sanitary protection otherwise afforded by the seal.

B. Development of the well shall continue until water pumped from the well, at a maximum test pumping rate, is clear and free from sand and other debris that is larger than 0.030" in diameter. The water shall be considered sand-free when no samples taken during the test pumping contain more than 2 parts per million of suspended solids per weight. The Contractor shall submit to the Department certification from an approved testing Laboratory that indicates the results of the "Non-Filterable Residual" (total suspended solids) test, as specified in the EPA Manual, Section 160.2. A sufficient amount of water to insure a detection limit of less than 2 PPM (mg/L) must be filtered.

595-3.03 Testing of Well for Plumbness and Alignment

A. Set casing plumb and true to line. At a minimum, tests for plumbness and alignment shall be made after construction of the well and before its acceptance. Additional tests may be required during the performance of the Work.

B. Test alignment of the well by lowering a pipe approximately 40 feet in length to a depth of 90 feet. The pipe used for the alignment test shall be not more than ½" smaller in diameter than the portion of casing or hole being tested at the time. The pipe must pass freely through the casing or hole.

C. The well casing shall not be out of plumb more than □ of the diameter of the casing per 100' of length. If the well does not pass this test, the Contractor shall be responsible for repair or replacement of the well.

595-3.04 Testing Well for Yield and Drawdown

A. Final pumping tests shall be conducted only after the well has been fully constructed, cleaned out and depth of well accurately measured.

B. A variable capacity test pump shall be provided that has a minimum capacity of the maximum expected yield at total head equal to drawdown in the well, plus the head loss in the pump column and discharge piping.

B. The Contractor shall provide enough discharge piping for pumping unit to conduct water to a point of disposal that will avoid a nuisance or endangerment to adjacent property. Provide and maintain any Equipment needed for measuring flow of water such as a weir box, orifice or water meter. The elevation of the water level in the well will then be measured.

C. All labor, power and other necessary Materials, Equipment and supplies required to operate the pumping unit shall be supplied by the Contractor. The final testing for each well shall consist of four (4) hours of continuous pumping after maximum drawdown has been reached. After completion of the final test, foreign matter such as sand, stones or other debris shall be removed from the well by bailing, sand pumping or other approved methods.

D. After the test pump and auxiliary Equipment have been installed, the Department shall be notified a minimum of 3 days prior to the start of any test pumping. Conduct test pumping as follows:

1. Record initial water elevations in the well.

2. Start test pump and make adjustments to bring pump to required pumping rate.

3. Record readings of water level in the well and pumping rate at 30 minute intervals.

4. Water samples shall be taken for analysis at the beginning and at the end of the pump test.

E. Upon completion of the pumping test, record the returning levels in the well at 15 minute intervals until 95% of the well capacity is reached. Prepare notations so that a curve of the recovery rate may be plotted.

F. Provide all test results and other required submittals to the Department.

595-3.05 Disinfection of Well

A. Use disinfection procedures as required by local government agencies. The well must be cleaned of foreign substances after all development Work has been completed and it has been

satisfactorily tested. Casings should be swabbed, using alkalis if necessary, to remove foreign substances.

B. The well shall be disinfected with a chlorine solution of sufficient strength to provide a minimum chlorine to water ratio of 100 parts per million within the well. The chlorine solution shall be introduced into the well using gravity, pump or drop feeder. A contact period of 24 hours shall be attained; then the well shall be pumped until the chlorine residual is less than 0.2 parts per million.

END OF SECTION

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