SECTION 32 9300

PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plants.
2. Imported Planting Mix
3. Mulch
4. Compost for amending existing soils
5. Fertilizers

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1.2 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

F. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

G. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

H. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

I. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

J. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

K. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.3 SUBMITTALS

A. Submittals for Review

1. Provide certificates of inspection accompanying the invoice for each shipment of plants as may be required by law for transportation. File certificates with the Landscape Architect prior to acceptance of the material. Inspection by federal or state authorities at the place of growth does not preclude rejection of the plants at the site.

2. Manufacturers data for each type of product indicated, including soils.

3. Soils samples: submit samples of all topsoil, soil mixes, mulches and organic materials. Samples shall weigh 2 lbs. and be packaged in plastic bags. Samples shall be typical of the lot of material to be delivered to the site and provide accurate indication of color, texture, and organic make-up of the material.

4. Plant photographs: submit color photographs of representative specimens of each type of tree, shrub, and groundcover on the plant list. Photos shall be 3x5 in. taken from an angle that depicts the size and condition of the typical plant to be furnished. A scale rod or other measuring device shall be included in the photograph.

5. Nursery sources: submit a list of all nurseries that will supply plants, along with a list of the plants they will provide and the location of the nursery.

6. Soil Test: Submit soil test analysis report for each sample of imported planting mix from a soil testing laboratory approved by the Landscape Architect.

7. Provide a particle size analysis, including the following gradient of mineral content:

USDA Designation	Size in mm
Gravel	+2 mm
Very course sand	1-2 mm
Coarse sand	0.5 -1 mm
Medium sand	0.25-0.5 mm
Fine sand	0.1-0.25 mm
Very fine sand	0.05-0.1 mm
Silt	0.002-0.05 mm
Clay	smaller than 0.002 mm

8. Provide a chemical analysis, including the following:

a. pH and buffer pH

b. Percentage of organic content by oven-dried weight.

c. Nutrient levels by parts per million, including phosphorus, potassium magnesium, manganese, iron, zinc, and calcium. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil based on the requirements of horticultural plants.

d. Soluble salt by electrical conductivity of a 1:2, soil: water, sample measured in millimho per cm.

e. Cation exchange capacity (CEC).

9. Material Testing: Submit the manufacturer's particle size analysis, and the pH analysis and provide a description and source location for the content material of all organic materials.

C. Close-out submittals:

1. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Instructions shall be submitted to the Landscape Architect for review and approval prior to submission to the Owner for review/approval.

2. During Maintenance Period, maintain a log of maintenance activity and submit a monthly report to the Owner containing all maintenance activities. Following the Maintenance period, compile a summary of activities that have taken place during the Maintenance Period.

1.4 QUALITY ASSURANCE

A. Landscape planting and related work shall be performed by a firm with a minimum of five years experience specializing in this type of work.

B. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Pesticide Applicator: State licensed, commercial.

C. Soil Analysis: For each imported soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.

1. The soil-testing laboratory shall oversee soil sampling.
2. Report suitability of tested soil for plant growth.

a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.
c. Report presence of soil compaction and recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

E. Pre-installation Conference: Conduct conference at job trailer at least three weeks in advance of installation.

1.5 PROJECT CONDITIONS

A. Planting shall be done within the following dates:

1. Trees, shrubs and groundcover: January to June and October to December.

2. Variance: if special conditions exist that warrant a variance in the above planting dates, a written request shall be submitted to the Landscape Architect stating the special conditions and the proposed variance. Permission for the variance will be given if warranted in the opinion of the Landscape Architect. Any variance in the planting season will not affect the guarantee period.

B. Utility verification

1. The Contractor shall contact the local utility companies for verification of the location of all underground utility lines in the area of work. The Contractor shall be responsible for all damage resulting from neglect or failure to comply with this requirement.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Should the roots be dried out, large branches broken, balls of earth broken or loosened, or areas of bark torn, the Landscape Architect may reject the injured tree(s)and order them replaced at no additional cost to the Owner. Provide protective covering of plants during shipping and delivery including tarpaulin or canvas. Loads that are not protected shall be rejected. Do not drop plants during delivery and handling.

B. Handle planting stock by the root ball and using belts or lifting harnesses of sufficient width to support the soil ball to avoid damaging it. In no instance shall the tree trunk be used to lift or handle the trees.

C. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1.7 WARRANTIES

A. Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Death and unsatisfactory growth, except for defects resulting from abuse incidents that are beyond Contractor's control.
   b. Structural failures including plantings falling or blowing over.

2. Warranty Periods from Date of Planting Completion.
   a. Trees, Shrubs, Vines, and Ornamental Grasses:12 months.
   b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
   c. Annuals: 12 months.

1.8 MAINTENANCE SERVICE

A. Initial Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period for Trees and Shrubs: 90 days from date of substantial completion.
2. Maintenance Period for Ground Cover and Other Plants: 90 days from date of planting completion.

PART 2 - PRODUCTS

2.1 NURSERY SOURCES:

A. Acceptable Sources for Large and Small Trees:

1. Glen Flora Farms, Glen Flora TX, 77443, 979-677-3342
2. Native Texas Nursery, Austin, 512-276-9801
3. Peerless Farms, Bigfoot, TX 830-663-3651

B. Acceptable Sources for Shrubs, Groundcovers Vines

1. McNeal Growers, Austin, 512) 280-2233 (particularly for Sedges)
2. Native Texas Nursery; Austin, 512-276-9801
3. Approved equal

2.2 PLANT MATERIAL

A. Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, root girdling abrasions, and disfigurement.

1. Trees with multiple leaders, unless specified, will be rejected. Trees with a damaged or crooked leader, bark abrasions, sunscald, disfiguring knots, insect damage, root girdling or cuts of limbs over ¾” in diameter that are not completely closed will be rejected.

B. Plants shall conform to the measurements specified, except that plants larger than those specified may be used if approved by the Landscape Architect. Use of larger plants shall

not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant.

1. Caliper measurements shall be taken on the trunk 6” above the natural ground line for trees up to and including 4 inches in caliper and 12 inches above the natural ground line for trees over 4 inches in caliper. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to branch tip. Plants shall be measured when branches are in their normal position. If a range of sizes is given, no plant shall be less than the minimum size, and no less than 50 percent of the plants shall be as large as the maximum size specified. Measurements specified are minimum sizes acceptable after pruning, where pruning is required. Plants that meet measurements but do not possess a standard relationship between height and spread, according to ANSI Z60.1

2. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of the root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting. Any plants with girdling roots shall be rejected.

C. Substitutions of plant materials will not be permitted unless authorized in writing by the Landscape Architect. If proof is submitted in writing that a plant specified is not obtainable, consideration will be given to the nearest available size or similar variety, with a corresponding adjustment of the contract price.

D. The Plant Schedule as shown in the drawings is for the Contractor’s information only, and no guarantee is expressed or implied that quantities therein are correct or that the list is complete. The Contractor shall ensure that all plant materials shown on the drawings are included in his or her bid.

E. All plants shall be labeled by plant name. Labels shall be attached securely to all plants, bundles, and containers of plant materials when delivered. Plant labels shall be durable and legible, with information given in weather-resistant ink or embossed process lettering.

F. Selection and Tagging:

1. Tree tagging: the Landscape Architect shall tag all trees at the Nursery prior to shipping. Prior to tagging, the Contractor shall submit photographs from three Nursery sources according to Section 1.3 E These photographs shall be submitted two weeks in advance of the tagging trip. Based on the submitted photographs, a Nursery shall be selected for tree tagging. The Nursery shall confirm in writing, one week in advance of the tree tagging trip, that it has the required quantities and qualities of trees representative of those shown in the photograph submittals in terms of species, form, height, and spread as noted in the Planting Schedule. Any proposed substitutions from those requirements noted in the Plant Schedule shall be supplied in writing one week prior to the tree tagging trip. Only those trees approved and tagged by the Landscape Architect shall be shipped to the site for installation. Any trees that have not been previously tagged will be returned to the Nursery at the Contractor’s expense. Any additional trips required due to the Contractor’s not adhering to the above requirements, will be at the Contractor’s expense.

2. Shrubs/Vines and Groundcover: all plants shall be subject to inspection for conformity to specification requirements and approval by the Landscape Architect at their place of growth and upon delivery. Such approval shall not

impair the right of inspection and rejection during progress of the work. A written request for the inspection of plant material at their place of growth shall be submitted to the Landscape Architect at least ten calendar days prior to digging. This request shall state the place of growth and the quantity of plants to be inspected. The Landscape Architect may refuse inspection at this time if, in his or her judgment, sufficient quantities of plants are not available for inspection.

G. Container Plants:

1. Plants grown in containers shall be of appropriate size for the container as specified in the most recent addition of ANSI Z60.1 and shall be free of circling roots on the exterior and interior of the root ball.

2. Container plants shall have been grown in the container long enough to have established roots throughout the growing medium.

2.3 IMPORTED PLANTING SOIL MIX

A. Imported Planting Soil Mix: Basis of Design: Whittlesey Garden Mix or approved equal.

1. Imported planting soil mix shall meet the following criteria. Soil shall be a mixture of 40% Compost and 60% Native Soil.

2. Native soil shall meet be locally available and meet the following criteria:
   a. free of trash, weeds, deleterious materials, rocks and debris.
   b. 100% shall pass through a 1.5-inch (38-mm) screen.
   c. Native soil shall be loamy material that meets the following textural criteria in accordance with the USDA textural triangle.

Textural Class	Minimum	Maximum
Clay	10%	15%
Silt	25%	35%
Sand	50%	60%

d. PH range 7.3 to 7.9
e. Organic Matter Content: 3-6% dry weight basis
f. Moisture Content: 30-60%
g. Soluble salt concentrations shall not exceed 1.5 dS/m
h. Sodium adsorption ratio (SAR) shall be <5
i. Sufficient structure to give good tilth and aeration
j. An infiltration rate of 3 inches per hour
k. Soil shall not be compacted beyond the maximum allowable bulk density of 1.60 g/cm^3 or 75 - 82 percent Standard Proctor.

2.4. COMPOST

A. Compost

1. Basis of Design: Geogrowers Poultry Compost.

2. Approved equal

B. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:

1. Compost shall come from local feedstock manufactured within 50 miles of the project site.

2. Feedstock: leaf and yard waste

3. Reaction: pH 5.5 to 8.0

4. Soluble-Salt Concentration: Shall not exceed 1.5 mS/cm

5. Organic-Matter Content: The organic material shall contain at least 40% organic matter (dry basis) and shall have 100% passing a ½ inch or smaller screen. Debris particles such as metal, glass, plastic, wood, asphalt, or masonry shall not exceed 10 mm jn size and shall not total more than 2% dry weight.

6. The carbon to nitrogen ration shall be between 11/1 and 22/1.

7. Maturity shall be greater than or equal to 6 “curing compost and very stable” as measured in a colormetric based maturity test (Woods End Research Laboratory, or equivalent).

8. The composed material shall not produce any unpleasant residual odor such as hydrogen sulfide, ammonia, or others.

9. The material shall contain some nitrogen, phosphorus, potassium, calcium, magnesium, sodium, and micronutrients including iron, copper, boron, manganese and molybdenum so that heavy applications of fertilizer are not required to sustain growth.

10. Concentrations of zinc, mercury, cadmium, lead, nickel, chromium, and copper must be below EPA and Texas Commission on Environmental Quality standards for applications to soils with human activity.

2.5 MULCHES

A. Organic Mulch: Shredded Texas Native Hardwood Mulch

1. Basis of Design: Whittlesey 512-351-4077

2. Approved equal

2.6 PESTICIDES

A. Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application.

2.7 FERTILIZERS

A. Develop a list of organic or slow-release fertilizer products for use on the project site. Submit the list to the Owner’s Designated Representative for approval prior to use.

B. Only organic fertilizers shall be used. All fertilizers shall be certified by Organic Material Review Institute (OMRI).

C. Composition: Macro and micro soil nutrients in amounts recommended in soil reports from a qualified testing agency.

D. Chelated Iron: In amounts recommended in soil reports from a qualified testing agency. Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

PART 3 - EXECUTION

3.1 PLANTING AREA ESTABLISHMENT

A. Mark utilities prior to start of work.

B. See Planting Plan notes for existing soil amendment execution requirements. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Spread planting soil as needed to meet finish grades after natural settlement. If additional planting soil is needed to meet finish grades shown in drawings, use imported planting mix per section 2.3 of this specification. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

E. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade the surface of all planted to meet finish grade. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.2 EXCAVATION FOR TREES AND SHRUBS

A. Locations for plants and/or outlines of areas to be planted are to be staked out at the site. Locate and mark all subsurface utility lines. Approval of stakeout by the Landscape Architect is required before excavation begins.

B. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately five times as wide as ball diameter.
2. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball. If the planting area under any tree is initially dug too deep, the soil added to bring it up to the correct level should be thoroughly tamped.

C. Subsoil and topsoil removed from excavations may not be used as planting soil.

D. Detrimental soil conditions: the Landscape Architect is to be notified, in writing, of soil conditions encountered, including poor drainage, that are detrimental to the growth of plant material. When detrimental conditions are uncovered, planting shall be discontinued until instructions to resolve the conditions are received from the Landscape Architect.

E. Obstructions: if rock, underground construction work, utilities, tree roots, or other obstructions are encountered in the excavation of planting areas, alternate locations for any planting shall be determined by the Landscape Architect.

3.3 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.

B. Remove injured roots by cutting cleanly; do not break.

C. Set stock plumb and in center of planting pit or trench with root flare 2-3 inches above adjacent finish grades.

1. Use specified planting soil for backfill.
2. Container-Grown: Carefully remove root ball from container without damaging root ball or plant.
3. Set plants on flat-tamped or unexcavated pads. Plants must be set plumb and braced in position until planting soil has been placed and tamped around the base of the root ball. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Note: Improper compacting of the soil around the root ball may result in the tree settling or leaning. Plants shall be set so that they will be at the same depth and so that the root ball does not shift or move laterally one year later.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

E. Remove any excess soil, debris, and planting material from the job site at the end of each workday.

F. Form watering saucers 4” high immediately outside the area of the root ball of each tree as indicated in the drawings.

3.4 STAKING AND GUYING

A. Stake or guy a tree only when necessary for the specific conditions encountered and with the approval of the Landscape Architect. Trees that settle out of plumb due to inadequate soil compaction either under or adjacent to the root ball shall be excavated and reset. In no case shall trees that have settled out of plumb be pulled upright using guy wires.

B. When required, staking and guying methods shall be approved by the Landscape Architect. If no staking or guying requirements appear on the drawings, submit for approval a drawing of the staking or guying method to be used. Stakes, anchors, and wires shall be of sufficient strength to maintain the tree in an upright position that overcomes the particular circumstances that initiated the need for staking and guying. Guy wires shall be galvanized, multi-strand, twisted wire.

C. Where guy wires are attached around the tree, the trunk shall be protected with 3/4" rubber hose, black in color, and of sufficient length to extend past the trunk by more than 6 inches.

D. Stakes and guys shall be installed immediately upon approval of the planting, and shall be removed at the end of the first growing season. Any tree that is not stable at the end of this time shall be rejected.

3.5 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape. Healthy lower branches and interior small twigs should not be removed except as necessary to clear walks and roads. In no case should more than one quarter of the branching structure be removed. Retain the normal and natural shape of the plant.

B. All pruning shall be completed using clean, sharp tools. All cuts shall be clean smooth, with the bark intact with no rough edges or tears.

C. Except in circumstances dictated by the needs of specific pruning practices for specific tree species, tree paint shall not be used unless approved by the Landscape Architect. Tree paint, where required, shall be paint specifically formulated and manufacturing for horticultural use.

D. Pruning of large trees shall be done from a hydraulic man-lift such that it is not necessary to climb the tree.

3.6 GROUND COVER PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in drawings in even rows with triangular spacing.

B. Use planting soil as specified for backfill.

C. Dig holes large enough to allow spreading of roots.

D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

G. Do not plant groundcover within the root ball area of newly planted trees. For groundcover within the dripline of formerly transplanted trees, the Contractor shall acquire

written approval from the Landscape Architect before proceeding with plantings within the dripline area to assure that transplanted trees are deemed healthy and well-established prior to planting.

3.7 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 36-inch radius around trunks or stems. Do not place mulch within 6 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.8 ACCEPTANCE

A. The Landscape Architect shall inspect all work for acceptance upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection. Acceptance of plant material shall be for general conformance to specified size, character, and quality and shall not relieve the Contractor of responsibility for full conformance to the Contract Documents, including correct species. Upon completion and re-inspection of all repairs or renewals necessary in the judgment of the Landscape Architect, the Landscape Architect shall verify in writing that the work has been accepted.

3.9 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease in accordance with the Specification.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use practices to minimize the use of pesticides.

D. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

E. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

END OF SECTION 32 9300

SECTION 32 84 00 - IRRIGATION

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide an underground irrigation system as shown and specified. The work includes:

1. Automatic irrigation system including piping, fittings, sprinkler heads, controller, and accessories.

2. Valves, backflow preventer, and fittings.

3 Testing.

4. Excavating and backfilling irrigation system work.

5. Associated exterior plumbing, and accessories to complete the system

6. Pipe sleeves.

B. Related Work:

1. Plants - Section 32 93 00

1.02 QUALITY ASSURANCE

A. Installer’s qualifications: Minimum of 3 years experience installing irrigation systems of comparable size. Contractor shall be a licensed and bonded Irrigator.

B. Materials, equipment, and methods of installation shall comply with the following codes and standards:

1. Texas Commission On Environmental Quality (TCEQ) Chapter 34, Texas Water Code; Chapter 344 Rules for Irrigators.

2. National Fire Protection Association, (NFPA): National Electrical Code.

3. American Society for Testing and Materials, (ASTM).

4. National Sanitation Foundation, (NSF).

5. City of Austin Applicable Plumbing Code

6. City of Austin Uniform Development Code

C. Excavating, backfilling, and compacting operations: Comply with requirements and as specified.

D. Obtain Owner's acceptance of installed and tested irrigation system prior to installing backfill materials.

1.03 SUBMITTAL

A. Submit for approval, manufacturer's product data for all equipment and materials specified herein or proposed for use on this project. Provide information for, but not limited to:

1. Sprinklers, spray and rotary.
2. Nozzles
3. Check Valves for all sprinklers. (Check valves are required for all sprinklers).
4. Piping
5. Pipe Fittings
6. Swing Joints
7. Pipe Cement
8. Controller
9. Wire
10. Wire Splice Kits
11. Remote Control Valves
12. Gate or Manual Valves
13. Quick Coupler Valves
14. Backflow Prevention Devices
15. Valve Boxes (Remote control valves, backflow prevention devices, quick coupler, wire splice location, gate/manual valves, etc.)
16. And any other equipment or product necessary to properly complete the work as shown on the drawings and specified herein.

B. **On each copy of the submittal, circle in red or highlight in yellow, each specific product proposed for use. <u>COPIES NOT SO MARKED WILL BE REJECTED</u>.**

C. Upon irrigation system acceptance, submit written operating and maintenance instructions. Provide format and contents as directed by the Landscape Architect.

D. Provide irrigation system record "as-built" drawings:

1. During the course of installation, legibly mark all changes on drawings to record actual construction.

2. Upon completion of the installation, transfer the record data to a clean professional quality base drawing and submit to the Landscape Architect for approval.

   a. Indicate horizontal and vertical locations referenced to permanent surface improvements.

   b. Identify field changes of dimension and detail and changes made by Change Order.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver irrigation system components in manufacturer's original undamaged and unopened containers with labels intact and legible.

B Deliver plastic piping in bundles, packaged to provide adequate protection of pipe ends, both threaded or plain.

C. Store and handle materials to prevent damage and deterioration. Do not store PVC pipe in direct sunlight for more than 48 hours.

D. To prevent installation delays provide secure locked storage for valves, sprinkler heads, and similar components that can not be immediately replaced.

1.05 PROJECT CONDITIONS

(Water to be sourced from lake water)

A. Known underground and surface utility lines are indicated on the utility survey. Verify locations of all known underground and surface utilities by contacting the appropriate utility companies.

B. Protect existing trees, plants, lawns, and other features designated to remain as part of the final landscape work.

C. Promptly repair damage to adjacent facilities caused by irrigation system work operations. Cost of repairs at contractor's expense.

D. Promptly notify the Owner of unexpected sub-surface conditions.

E. Irrigation system layout is diagrammatic. Exact locations of piping, sprinkler heads, valves, and other components shall be established by contractor in the field at time of installation. Proposed piping layout within tree drip lines will be reviewed by Architect prior to installation. Obtain Architect's approval prior to installation.

1. Space sprinkler components as designed, not to exceed manufacturer recommendations.

2. Minor adjustments in system layout will be permitted to clear existing fixed obstructions. Final system layout shall be acceptable to the Architect and Owner.

F. Cutting and patching: (if necessary)

1. Cut through concrete and masonry with core drills. Jack hammers not permitted.

2. Material and finishes for patching shall match existing cut surface materials and finish. Exercise special care to provide patching at openings in exterior walls watertight.

3. Methods and materials used for cutting and patching shall be acceptable to the Owner.

1.06 WARRANTY AND GUARANTEE

A. Materials and workmanship shall be fully guaranteed for one (1) year after substantial completion.

B. Backfilling of all excavation shall be guaranteed for the one (1) year guarantee period. Repair trenches which have settled.

C. Raise or lower heads to compensate for settling of lawn areas.

D. Provide a one (1) year warranty against material, installation and operation defects. Repairs, adjustments and replacement of defective irrigation system materials, including materials which have been installed on the work during the warranty period shall be at Contractor’s expense.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer

1. Hunter
2. Rainbird
3. Weathermatic
4. Armor Access Boxes
5. Lasco
6. KBI

7. Spears
8. Netafim

B. If contractor chooses to install alternate equipment he shall submit to Architect for acceptance the following:

1. Equipment specifications and product literature

2. Pressure loss calculations including all lateral sections

2.02 MATERIALS

A. General:

1. Provide only new materials, without flaws or defects and of the highest quality of their specified class and kind.

2. Comply with pipe sizes indicated. No substitution of smaller pipes will be permitted. Larger sizes may be used subject to acceptance of the Architect. Remove damaged and defective pipe.

3. Provide pipe continuously and permanently marked with manufacturer's name or trademark, size schedule and type of pipe, working pressure at 73deg F. and National Sanitation Foundation (NSF) approval.

B. Plastic pipe, fittings, and connections;

1. Polyvinyl chloride pipe: ASTM D2241, rigid, unplasticized PVC, extruded from virgin parent material. Provide pipe homogenous throughout and free from visible cracks, holes, foreign materials, blisters, wrinkles, and dents.

a. 1/2-inch diameter: SDR 13.5, Class 315.

b. 3/4-inch diameter and over: SDR 21, Class 200.

c. Main line is SCH 40.

2. PVC pipe fittings: ASTM D2241 schedule 40 PVC molded fittings suitable for solvent weld or slip joint ring tight seal. For any threaded connections use only Schedule 80 PVC. Fittings made of other materials are not permitted.

a. Size slip fitting socket taper to permit a dry un-softened pipe end to be inserted no more than halfway into the socket. Saddle and cross fittings are not permitted.

b. Schedule 80 PVC for all threaded fittings.

c. Use PVC male adapters for plastic to metal connections. Hand tighten male adapters plus one turn with a strap wrench.

C. Sprinkler heads, valves, and associated equipment.

1. Refer to drawings for materials.

a. Spray type sprinkler heads: Turf: Rainbird 1804-SAM-P45 with MP Rotator nozzles where specified on plan. Shrub: 1806-SAM for all shrub heads and for tree bubblers. Heads in groundcover should be 1812-SAM.

b. HUNTER MSBN-50Q on 6" pop up

c. KBI FR-0500-6 Flex Riser.

e. Remote control valves: Weathermatic 11024FCR Contamination Resistant Series

f. Underground Splices. Wade WC 014 series

g. Valve access box: NDS

h. Drip Irrigation: Netafim

D. Controls:

1. EXISTING RAINBIRD ESP-LXD TWO WIRE SYSTEM.

E. Electric control wire:

1. Control wire shall be Maxi Cable by Rainbird or approved equal. 14 AWG, UF Classification, UL approved for direct burial.

2. For runs longer than 2000 feet, larger cable may be used provided it conforms to controller manufacturer’s specifications for both material specification and installation.

3. All wire splices shall be protected by a valve box. All wire splices shall be shown on “as-built” drawings. No splices will be allowed on runs of less than 500 feet.

2.03 ACCESSORIES

A. Drainage fill: No. 4 to 1/2-inch washed pea gravel.

B. Fill: Clean soil free of stones larger than 3/4-inch diameter, foreign matter, organic material, and debris.

1. Provide imported fill material as required to complete the work. Obtain rights and pay all costs for imported materials.

2. Suitable excavated materials removed to accommodate the irrigation system work may be used as fill material subject to the Landscape Architect's review and acceptance.

C. Clamps; Stainless steel, worm gear hose clamps with stainless steel screws or ear type clamps.

D. Low Voltage wire connectors: 3M DBY or WC 014 splice kit by Wade Enterprises.

E. Valve access boxes: Tapered enclosure of rigid plastic material comprised of fibrous components chemically inert and unaffected by moisture corrosion and temperature changes. Provide lid of same material, black or green in color. Provide 10-inch Round Valve Box for remote control valves. Use valve box extensions as necessary to maintain proper level relative to grade. Provide 10-inch Valve Box for wire splices.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine final grades and installation conditions. Do not start irrigation system work until unsatisfactory conditions are corrected.

B. This contractor to verify existing and proposed locations of all site utilities (i.e., gas, water, electric, telephone, sanitary and storm sewers, etc.) prior to any trenching and laying of pipe. In addition, this contractor shall coordinate all irrigation work with that of all other site work trades and contractors, as applicable.

3.02 PREPARATION

A. Lay out and stake the location of each sprinkler head and sprinkler valve. Obtain Architects acceptance of layout prior to excavating.

B. Remove existing paving for sleeve installation if required. Saw cut existing paving to provide uniform straight transition at new to existing paving.

3.03 INSTALLATION

A. Excavating and backfilling:

1. Excavation shall include all materials encountered, except materials that cannot be excavated by normal mechanical means.

2. Excavate trenches of sufficient depth and width to permit proper handling and installation of pipe and fittings as shown on Details.

3. Pulling method will not be allowed on this project. .

4. Excavate to depths required to provide earth fill or sand bedding for piping as shown on plans.

5. Fill to match adjacent grade elevations with approved earth fill material. Place and compact fill in layers not greater than 4-inch depth.

   a. Provide approved sand to a point 4-inches above the top of pipe.

   b. Provide clean top soil fill free of rocks and debris for top 5-inches of fill.

6. Except as indicated, install irrigation mains with a minimum cover of 10 inches based on finished grades. Install irrigation laterals with a minimum cover of 8-inches based on finished grades.

7. Excavate trenches and install piping and fill during the same working day. Do not leave open trenches or partially filled trenches open overnight.

8. Replace paving of same materials, using joints and patterns to match existing adjoining paving surfaces. Removal of paving or wall material and replacement thereof shall only occur when it is determined by the Architect that the sleeves installed cannot be located and other methods (i.e., jacking under the construction or re-routing piping) are not able to be executed.

B. Plastic Pipe

1. Install plastic pipe in accordance with manufacturer's installation instructions. Provide for thermal expansion and contraction.

2. Saw cut plastic pipe larger than 2" Use a square-in sawing vice to insure a square cut. Remove burrs and shavings at cut ends prior to installation.

3. Make plastic to plastic joints with solvent weld joints or slip seal joints. Use only solvent recommended by the pipe manufacturer. Install plastic pipe fittings in accordance with pipe manufacturer's instructions. Contractor shall make arrangements with pipe manufacturer or distributor for all necessary field assistance.

4. Make plastic to metal joints with plastic male adapters.

5. Make solvent weld joints in accordance with manufacturer's recommendations.

6. Allow joints to set at least 24 hours before pressure is applied to the system.

7. Maintain pipe interiors free of dirt and debris. Close open ends of pipe by acceptable methods when pipe installation is not in progress.

C. Sprinkler, fittings, valves, and accessories:

1. Install fittings, valves, sprinkler heads, risers, and accessories in accordance with manufacturer's instructions, except as otherwise indicated.

2. Set sprinkler heads perpendicular to finished grades, except as otherwise indicated.

3. Provide pop-up spray heads (with internal check valve) with an adjustable swing joint riser assembled as shown on details.
Pre-fabricated swing joint risers shall be schedule 80 rated.

4. Obtain Architect's review and acceptance of height for proposed sprinkler heads and valves prior to installation.

5. Locate sprinkler heads to assure proper coverage of indicated areas. Do not exceed sprinkler head spacing distances indicated.

6. Install backflow prevention valve, fittings, and accessories as shown or required to complete the system.

7. Install the specified controller in the location shown on the drawing, with lockable weatherproof controller housing. Controllers shall be pedestal mounted as directed by the owner. Install per manufacturer's recommendations.

a. Provide rigid conduit from controller down into grade to accommodate valve wires (see details).

b. This contractor shall pull valve wires, program controller by labeling station position for zones, and put controller in operation.

8. Install in-ground control valves in a valve access box as indicated.

9. Install valve access boxes on a suitable base of gravel to provide a level foundation at proper grade and to provide drainage of the access box. Factory valve box extensions shall be required to be used if necessary.

10. Seal threaded connections on pressure side of control valves with Teflon tape. Do not use pipe joint compound.

D. Control wiring

1. Install electric control cable in the mainline piping trenches wherever possible. Place wire in trench adjacent to pipe. Install wire with slack to allow for thermal expansion and contraction. Provide expansion joints at 100 foot intervals by making 5-6 turns around a piece of 1/2-inch pipe. Where necessary to run wire in a separate trench, provide a minimum cover of 12-inches. When more than one wire is placed in a trench the wire shall be taped together at intervals of 50 feet.

2. Provide sufficient slack (expansion coil consisting of 5-6 turns around a 1/2" piece of pipe) at remote control valves in control boxes, and at all wire splices to allow raising the valve bonnet or splice to the surface without disconnecting the wires when repair is required.

3. Connect remote control valve to one station of a controller only.

4. Make wire connections to remote control electric valves and splices of wire in the field, using wire connectors and in accordance with manufacturer's recommendations.

E. Sleeves:

1. Utilize existing sleeves if available for installation of the irrigation system.

2. Provide new sleeves for all locations where existing sleeves are not indicated. Install new sleeves prior to paving installation wherever possible.

3. Install pipe sleeves under existing concrete or asphalt surfaces where cutting is necessary. Obtain Owner's permission before cutting existing concrete and asphalt surfaces. Where piping is shown under paved areas which are adjacent to turf areas, install the piping in the turf areas.

F. Flushing, testing, and adjustment:

1. In the presence of the Architect or his Representative, hydrostatically test the mainline piping system in place, before backfilling. Test period shall be not less than four hours at 130 PSI. Test is acceptable if no leakage occurs during test period.

2. After sprinkler piping and risers are installed and before sprinkler heads are installed, open control valves and flush out the system with full head of water.

3. Perform system testing upon completion of each section. Make necessary repairs and retest repaired sections as required.

4. Adjust sprinklers after installation for proper and adequate distribution of water over the coverage pattern. Adjust for the proper arc of coverage.

5. Tighten nozzles on spray type sprinklers after installation. Adjust nozzle-adjusting screw on sprinklers as required for proper radius. Interchange nozzle patterns as directed by the Architect, to give best arc of coverage.

6. Adjust all electric remote control valve flow control stems for system balance and optimum performance.

7. Test and demonstrate the controller by operating appropriate day, hour, and station selection features as required to automatically start and shut down irrigation cycles to accommodate plant requirements and weather conditions.

8. Backflow device, shall be tested and certified before substantial completion will be issued.

3.04 SPARE PARTS

A. DECLINED BY OWNER

3.05 DISPOSAL OF WASTE MATERIAL

A. Stockpile, haul from site, and legally dispose of waste materials, including unsuitable excavated materials, rock, and debris.

B. Maintain disposal route clear, clean, and free of debris.

3.06 SUBSTANTIAL COMPLETION

A. An inspection of the irrigation system will be made by the Landscape Architect upon request for Application of Substantial Completion by the Contractor. The irrigation system must be sufficiently complete so that all plant material can be sustained by the system.

B. Contractor will be required to train maintenance personnel on the use and basic upkeep of this system. If this responsibility is not fulfilled, the cost of obtaining this training by the Owner shall be shown as a deduction in the final payment.

C. The Contractor shall attach a reduced scale of the area controlled by the controller on the inside of the controller door identifying the location of the valves and the station assigned to each.

3.07 FINAL COMPLETION

A. An inspection of the irrigation system will be made by the landscape architect upon request for Final Completion by the Contractor. Provide notification of at least ten (10) working days before requested inspection date.

3.08 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from irrigation system installation.

END OF SECTION 32 84 00