

LANDSCAPE NOTES

- LOCATE UTILITIES PRIOR TO COMMENCING LANDSCAPE OPERATIONS. ALL TREES SHALL BE FIELD POSITIONED AS TO AVOID CONFLICTS WITH EXISTING AND PROPOSED UTILITIES. NOTIFY LANDSCAPE ARCHITECT OF ANY CONFLICTS OR OBSTRUCTIONS.
- CONTRACTOR SHALL STAKE ALL PLANTING AREAS IN THE FIELD PRIOR TO PLANTING FOR APPROVAL OF THE OWNER OR THEIR REPRESENTATIVE.
- CONTRACTOR SHALL VERIFY ALL PLANT QUANTITIES PRIOR TO PLANTING. ANY DISCREPANCIES WITH THE PLAN SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT. THE PLAN QUANTITIES SHALL SUPERCEDE SCHEDULED QUANTITIES.
- ALL PLANT MATERIAL SHALL BE SPECIMEN QUALITY AND SHALL COMPLY WITH RECOMMENDATIONS AND REQUIREMENTS OF ANSI Z60.1 THE 'AMERICAN STANDARD FOR NURSERY STOCK'.
- ALL PLANTING BEDS & NATIVE GRASS STANDS SHALL BE EDGED AS SHOWN IN PLAN.
- PREPARE PLANTING BEDS AND INCORPORATE AMENDMENTS ACCORDING TO PLANS.
- SHREDDED HARDWOOD MULCH, PER SPECIFICATIONS SHALL BE USED AS A THREE INCH (3") TOP DRESSING IN ALL PLANTING BEDS AND AROUND ALL TREES. SINGLE TREES AND SHRUBS SHALL BE MULCHED TO THE OUTSIDE EDGE OF THE SAUCER OR LANDSCAPE ISLAND.
- ALL TREES SHALL BE STAKED PER DETAIL.
- ALL PLANT MATERIAL SHALL BE INSTALLED TO ALLOW A ONE FOOT (1') CLEARANCE BETWEEN PLANT AND ADJACENT PAVEMENT.
- THE LANDSCAPE CONTRACTOR SHALL NOT COMMENCE WORK UNTIL THE SITE IS FREE OF DEBRIS CAUSED BY ON-GOING CONSTRUCTION OPERATIONS. REMOVAL OF DEBRIS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. LANDSCAPE WORK SHALL NOT BEGIN UNTIL THE LANDSCAPE ARCHITECT AND OWNER HAVE GIVEN WRITTEN APPROVAL FOR SUCH. THERE SHALL BE NO DELAYS DUE TO LACK OF COORDINATION FOR THIS ACTIVITY.
- THE LANDSCAPE ARCHITECT AND OWNER SHALL APPROVE GRADES AND CONDITION OF SITE PRIOR TO SODDING/SEEDING OPERATIONS.
- ALL AREAS DISTURBED DURING THIS CONSTRUCTION AND NOT DESIGNATED FOR OTHER PLANTINGS OR HARDSCAPE SHALL BE SODDED WITH TURF TYPE FESCUE.
- ALL LANDSCAPE AREAS SHALL BE IRRIGATED. TURF AREAS SHALL BE IRRIGATED BY SPRAY OR ROTOR. PLANT BEDS SHALL BE IRRIGATED BY DRIP IRRIGATION. IRRIGATION SYSTEM SHALL INCLUDE AUTOMATIC RAIN-SENSOR DEVICE. IRRIGATION SHOP DRAWINGS SHALL BE PROVIDED BY THE CONTRACTOR FOR APPROVAL PRIOR TO CONSTRUCTION.

PLANT SCHEDULE

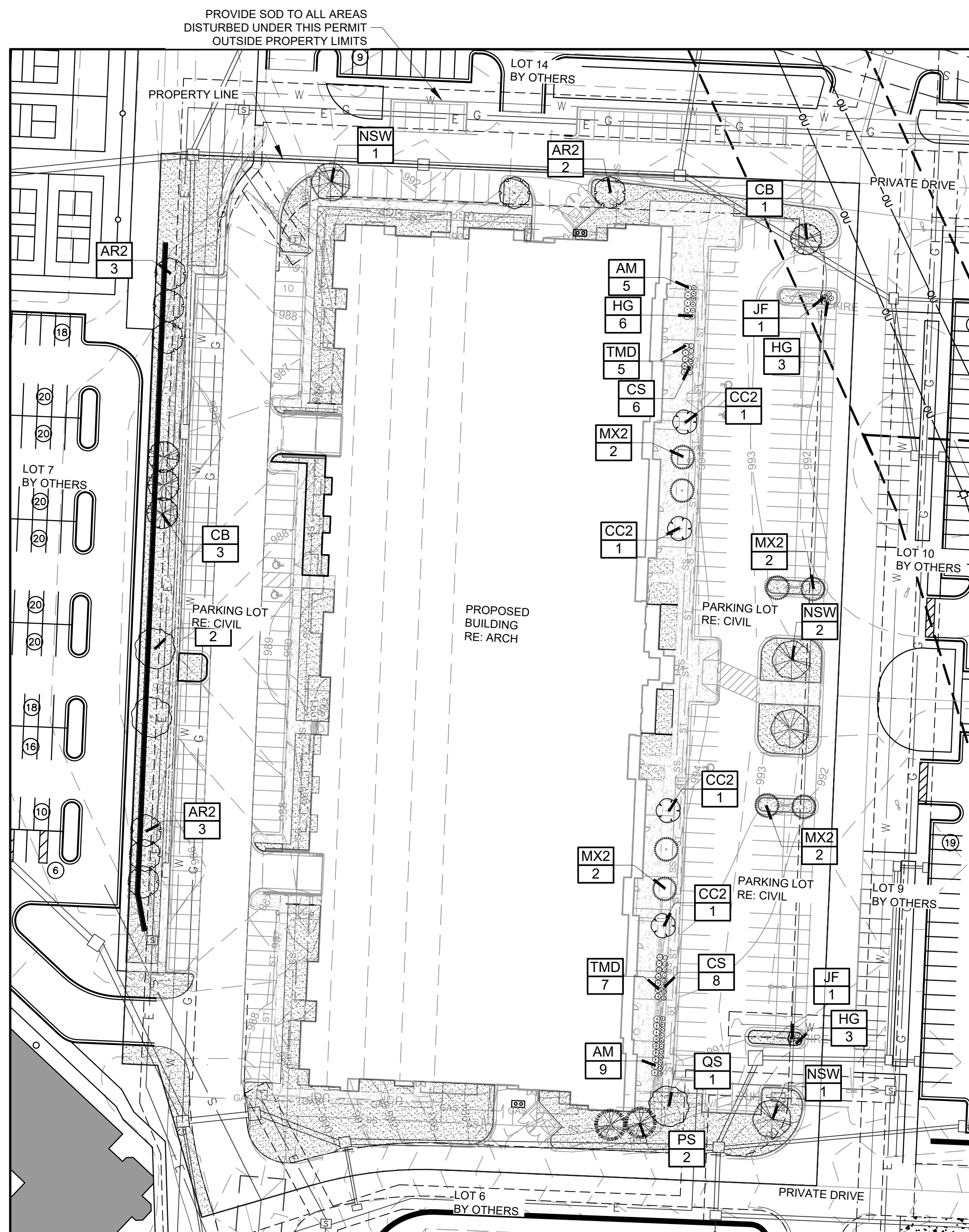
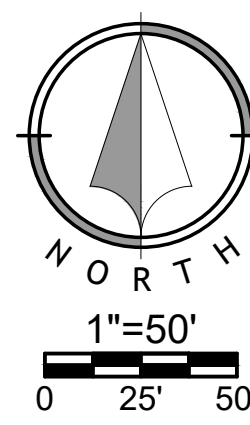
TREES	BOTANICAL / COMMON NAME	CONT	CAL	SIZE	QTY
AR2	Acer rubrum 'Autumn Blaze' / Autumn Blaze Red Maple	B&B	2.5" Cal.		8
CB	Carpinus betulus 'Fastigiata' / Pyramidal European Hornbeam	B&B	2.5" Cal.		4
CC2	Cercis canadensis 'Forest Pansy' TM / Forest Pansy Redbud	B&B	2" Cal.		4
MX2	Malus x 'Spring Snow' / Spring Snow Crab Apple	B&B	1.5" Cal.		8
NSW	Nyssa sylvatica 'Wildfire' / Black Gum	B&B	2.5" Cal.		4
PS	Pinus strobus / White Pine	B&B		6' Ht. Min.	2
QS	Quercus shumardii / Shumard Red Oak	B&B	2.5" Cal.		3
SHRUBS	BOTANICAL / COMMON NAME	CONT			QTY
AM	Aronia melanocarpa 'Morton' TM / Iroquois Beauty Black Chokeberry	5 Gal.			14
CS	Cornus stolonifera 'Arctic Fire' / Arctic Fire Dogwood	5 Gal.			14
HG	Hypericum frondosum / Golden St. John's Wort	3 Gal.			23
JF	Juniperus chinensis 'Sea Green' / Sea Green Juniper	5 Gal.			2
TMD	Taxus x media 'Densiformis' / Dense Yew	5 Gal.			12
GROUND COVERS	BOTANICAL / COMMON NAME	CONT		SPACING	QTY
	Turfgrass Sod Fescue Mix; RE: Notes / Fescue Sod	SOD			39,093 sf

LANDSCAPE DATA - LOT 8

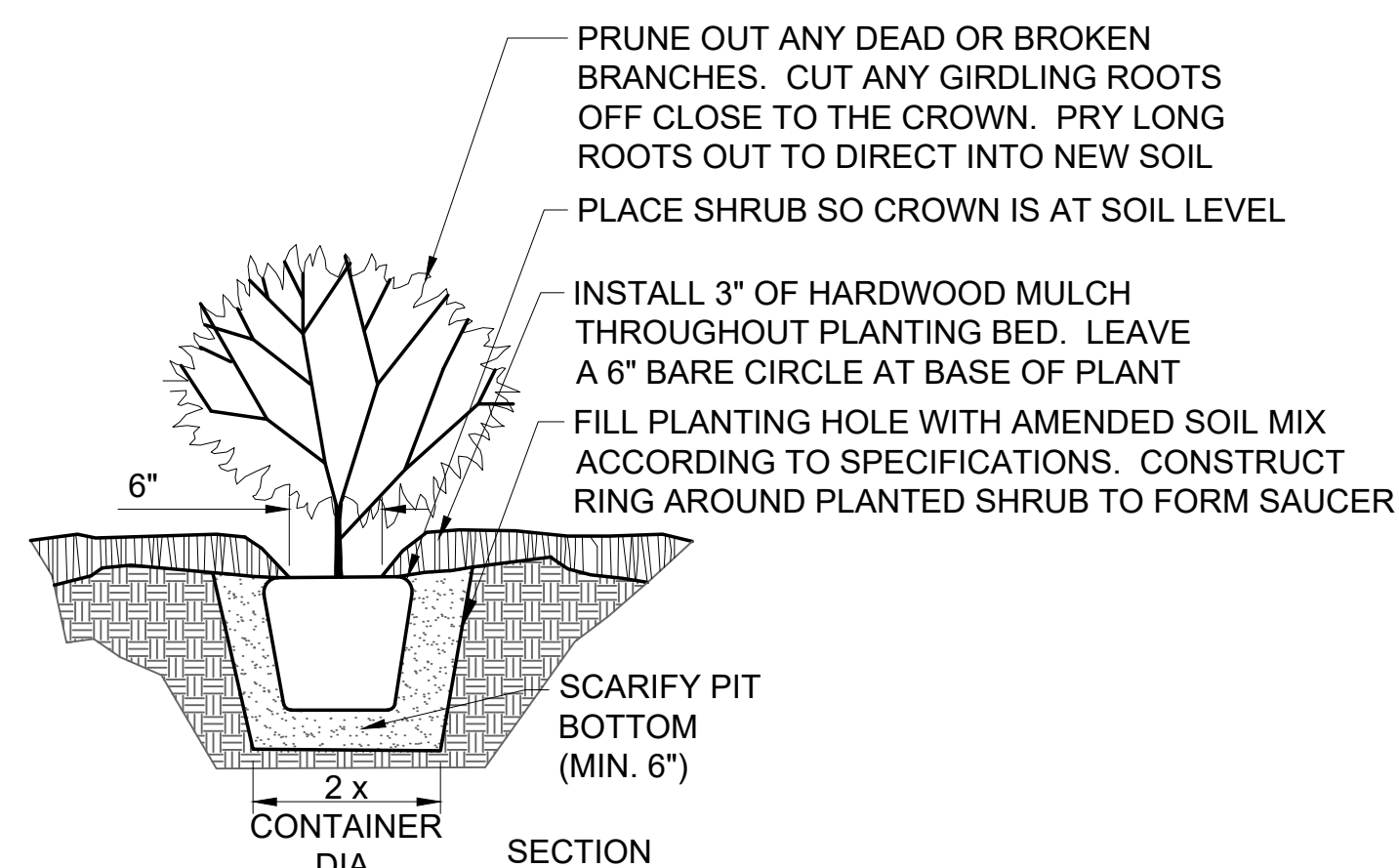
Open Yard Area - 161,502sf Total Lot Area - 268,862sf Building Area - 107,360sf
 Required Trees: 1 / 5,000sf Open Yard Area = 32.30 Provided Trees: 33
 Required Shrubs: 2 / 5,000sf Total Lot Area = 64.6 Provided Shrubs: 65

Parking Lot Screening - no street frontage
 Required Hedge: N/A Provided Hedge: N/A

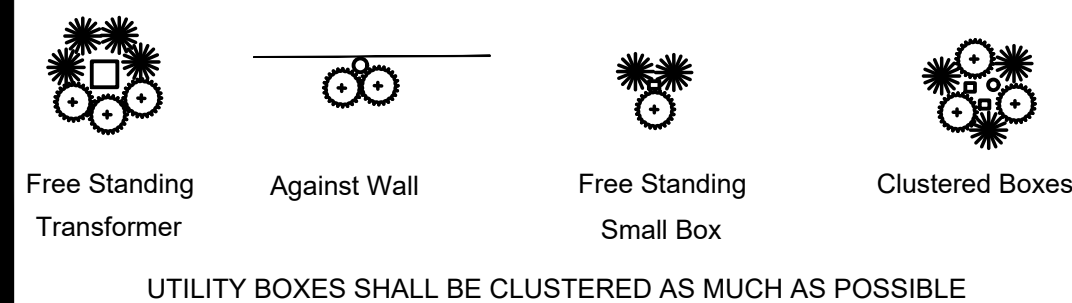
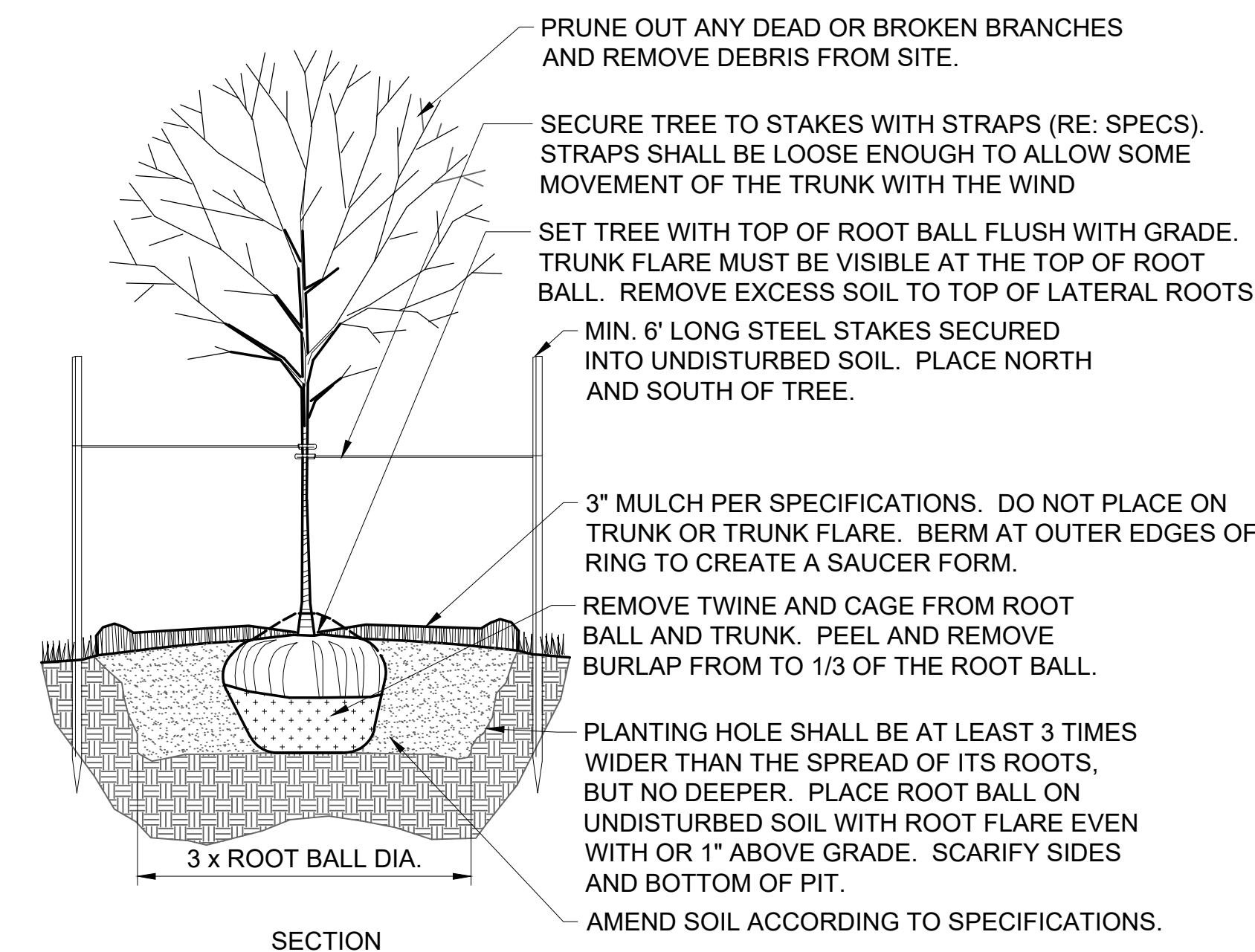
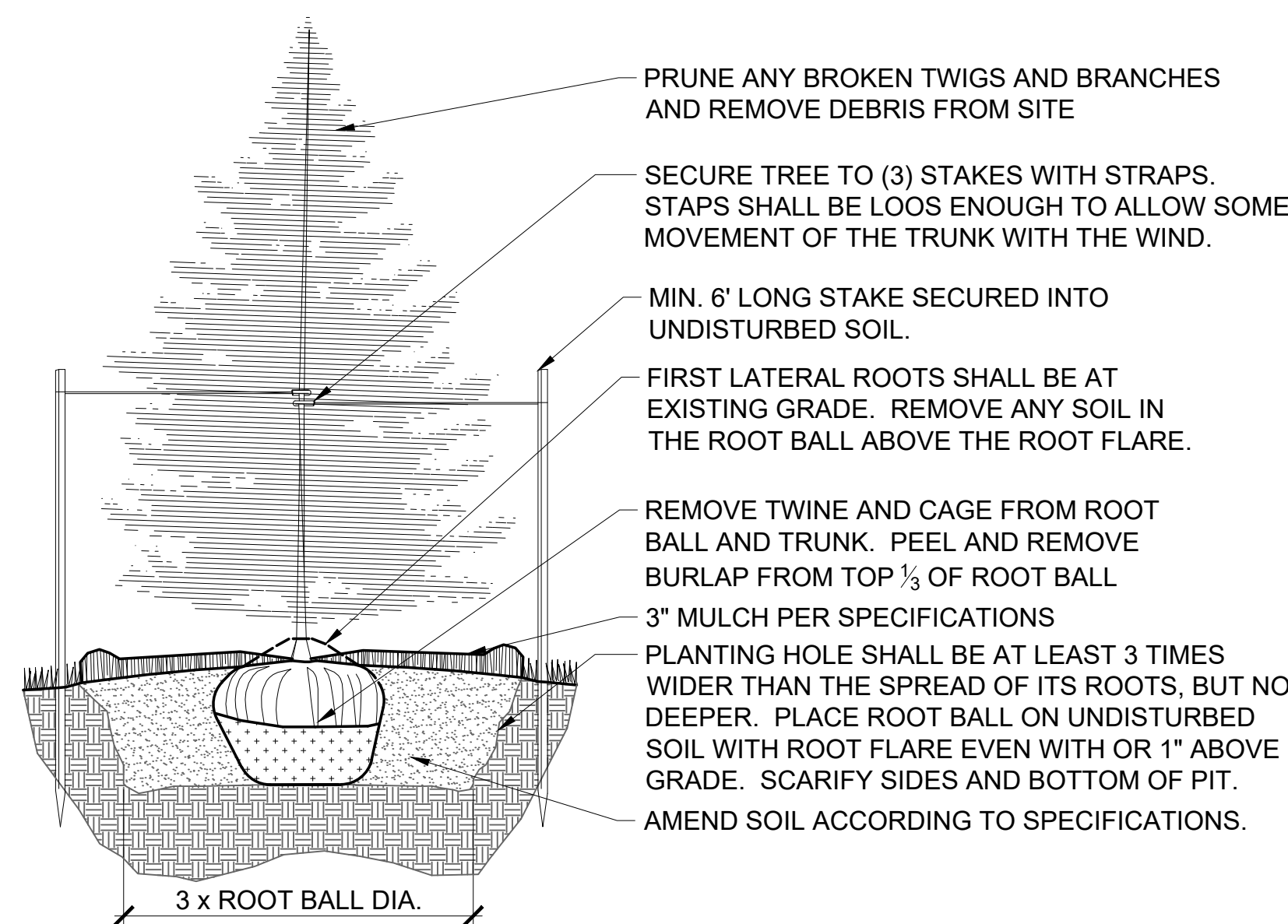
Parking Lot Interior - 103,132sf
 Island Area: minimum 5% of lot = 5,156.6sf Provided: 5,225.43sf



- NOTES:
- TREES THAT DO NOT MEET THE SIZE REQUIREMENT WILL BE REJECTED
 - TREES SHALL BE INSPECTED BY OWNERS REPRESENTATIVE PRIOR TO INSTALLATION.



- NOTES:
- REFER TO SPECIFICATIONS FOR TOPSOIL BACKFILL MIX.
 - CONTRACTOR TO WATER THOROUGHLY AFTER PLANTING
 - INSTALLATION TO BE IN ACCORDANCE WITH PLANTING SPECIFICATIONS



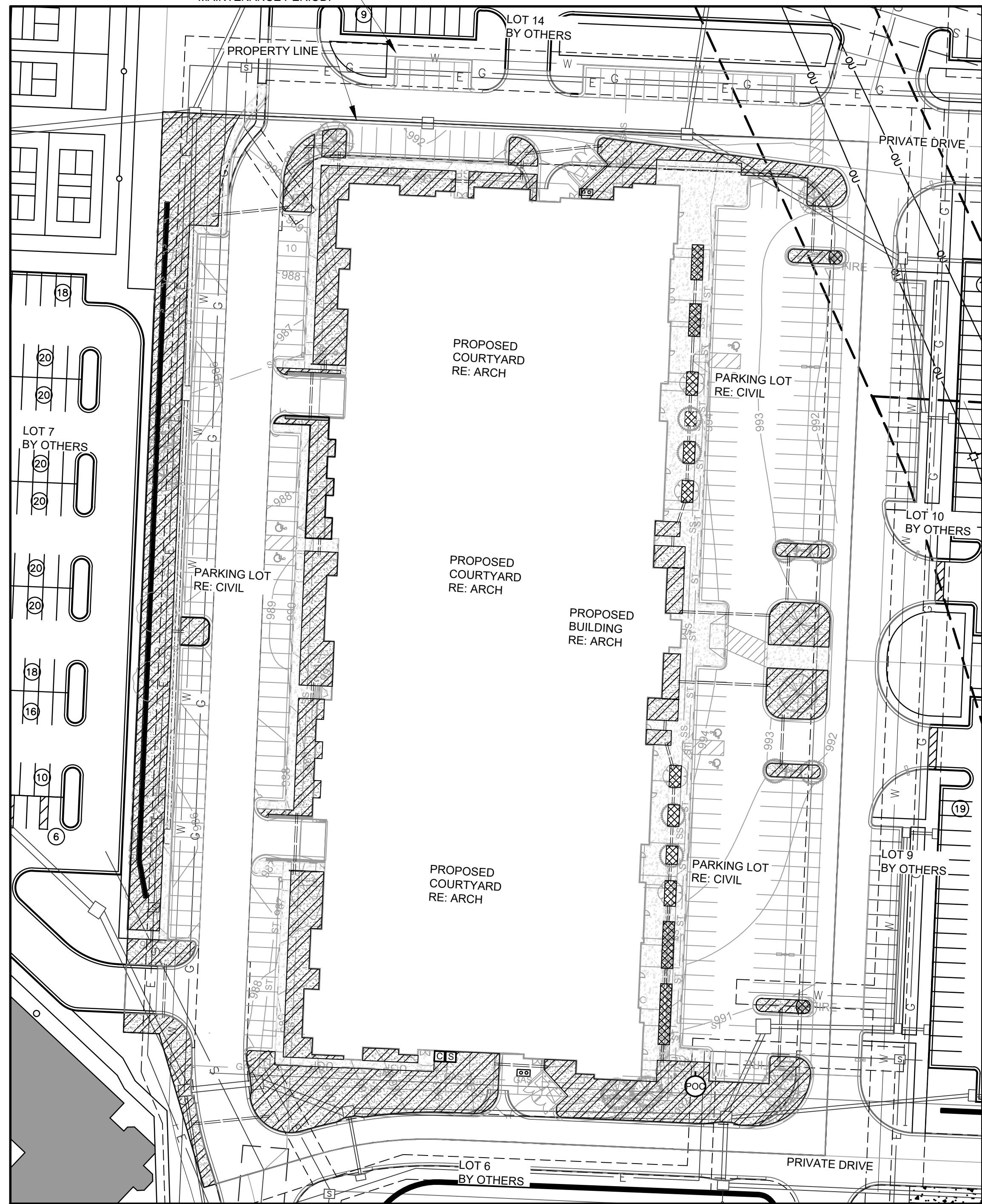
TYPICAL UTILITY BOX SCREENING DETAILS - NTS

SHRUB PLANTING DETAIL - NTS



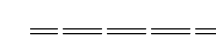



EVERGREEN TREE PLANTING DETAIL - NTS

DECIDUOUS TREE PLANTING DETAIL - NTS

ALL AREAS SODDED DUE TO DISTURBANCE, BUT OUTSIDE OF THE IRRIGATION LIMITS SHALL BE HAND WATERED BY THE CONTRACTOR DURING THE MAINTENANCE PERIOD.

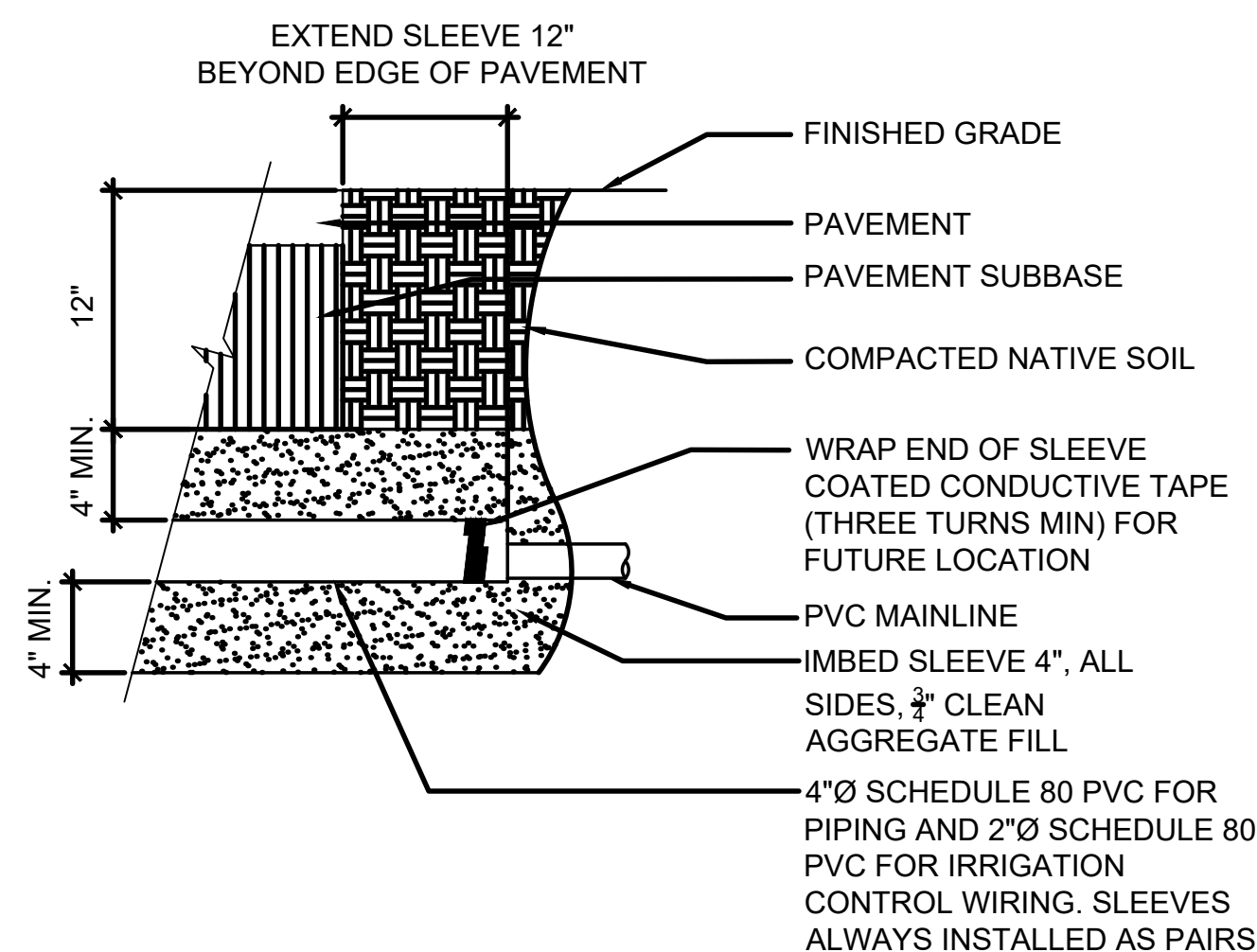
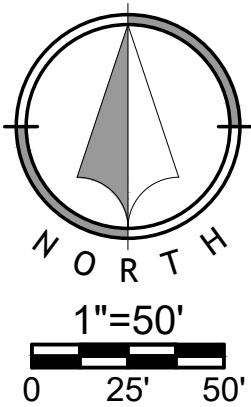


LEGEND

-  Drip Irrigation Area
-  Spray/Rotor Irrigation Area
-  Irrigation Sleeve
-  Point of Connection
-  Weather Sensor
-  Controller

IRRIGATION NOTES:

1. THIS PLAN IS GRAPHICAL IN NATURE AND ONLY REPRESENTS THE IRRIGATION COVERAGE AND TYPE. THE IRRIGATION CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AN IRRIGATION SHOP DRAWING FOR APPROVAL PRIOR TO CONSTRUCTION. THE IRRIGATION CONTRACTOR SHALL BE RESPONSIBLE FOR ALL IRRIGATION TAPS, CONNECTIONS, ROUTING AND ELECTRICAL SUPPLY. REFER TO IRRIGATION SPECIFICATIONS, SHEET L05.
2. REFER TO SHEET L01 FOR GENERAL NOTES & DETAILS.
3. REFER TO SHEETS L03-L05 FOR SPECIFICATIONS.



SLEEVE NOTES

1. IRRIGATION SLEEVES SHALL BE INSTALLED AS A PAIR OF SLEEVES AT EACH LOCATION AND SHALL BE INSTALLED BENEATH PROPOSED ROADWAY AND PARKING AREAS PRIOR TO BEGINNING SURFACE CONSTRUCTION.
2. PIPE SLEEVE TO BE 4"Ø SCHEDULE 80 PVC FOR PIPING AND 2"Ø SCHEDULE 80 PVC FOR IRRIGATION CONTROL WIRING.
3. IMBED PIPE 4", ALL SIDES, WITH 3/4" CLEAN AGGREGATE FILL. ALLOW 48 HOURS TO SETTLE; BACKFILL & COMPACT WITH NATIVE SOIL.
4. MINIMUM TRENCH WIDTH TO BE 12".
5. CONTRACTOR SHALL INSTALL IRRIGATION SLEEVES IN ACCORDANCE WITH APPLICABLE MISSOURI PLUMBING CODES AND JOPLIN LOCAL UTILITY AND WATER MANAGEMENT DISTRICT REGULATIONS.
6. CONTRACTOR SHALL MARK ALL SLEEVE LOCATIONS AT EACH END TO AID FUTURE IRRIGATION INSTALLATION. CONTRACTOR SHALL BE RESPONSIBLE FOR DOCUMENTING AND MAINTAINING ALL SLEEVE LOCATIONS AND MARKERS DURING THE CONSTRUCTION PERIOD.
7. COATED CONDUCTIVE TAPE SHALL BE INSTALLED DIRECTLY ABOVE THE SLEEVE AND SHALL BE PRE-PRINTED WITH REPEATED WARNINGS: "CAUTION WATER LINE BURIED BELOW", OR AS OTHERWISE APPROVED BY THE PROJECT ENGINEER.
8. SLEEVES ARE ALWAYS INSTALLED AS A PAIR.
9. CONTRACTOR SHALL COORDINATE WITH EXISTING IRRIGATIONS SYSTEM AND NEW CONSTRUCTION AREAS TO ENSURE ALL LANDSCAPE AREAS ARE COVERED WITH IRRIGATION.

NO.	BY	DATE	REVISION
1	JMM/AG	07/26/19	ORIGINAL SUBMITTAL

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MO Certificate of Authority: E-201003930

STATE OF MISSOURI
ANDREW GABRETT
NUMBER LA-2007013478
LANDSCAPE ARCHITECT

SECTION 329300 LANDSCAPING - PLANTS

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes the following:
1. Furnishing trees, shrubs & plants.
2. Preparation of planting pits and beds, including excavation, backfilling, and disposal of surplus and unsuitable excavated material.
3. Planting of plants (trees, shrubs, groundcovers, vines & perennials), including fertilizing, mulching, trimming, guying, and wrapping.
4. Maintenance of plants.

1.02 REFERENCE:

- B. Applicable Standards:
1. American National Standards Institute (ANSI):
a. Z601.1 Nursery Stock.

1.03 SUBMITTALS:

- A. General: Upon completion of the installation, deliver to Landscape Architect the following in accordance with the Conditions of the Contract and Division 1 Specification Sections.
B. Include, but not limited to, the following:
1. Product Certification: Certificate of inspection as may be required by governing authorities.
2. Manufacturers Literature: Submit three (3) copies of fertilizer manufacturer's literature along with schedule of maintenance program...
3. Label data substantiating that trees and shrubs comply with specified requirements.
4. Materials List: Within 15 days after award of contract, and before any materials are delivered to the job site, submit to Landscape Architect a complete list of all plants including the sizes ordered and the type of equipment to be used on this project.
5. As-Built Drawings: During course of installation, carefully record in red line on a print of the planting drawings all changes made to the planting system layout during installations; approved by the Landscape architect.
6. Planting Schedule: Proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site.
7. Maintenance Instructions: Typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year.

1.04 QUALITY ASSURANCE:

- A. Installers Qualifications: Engage a single firm specializing in landscape work with a minimum of 5 years experience who has completed landscaping work similar in material, design, and extent to that indicated for this project and with a record of successful landscape establishment.
1. Installers Field Supervision: Require installers to maintain an experienced full-time Supervisor on the project site during times that landscaping is in progress.
2. Source Quality Control.
1. General: ship landscape materials with certificates of inspection required by governing authorities.
2. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Landscape Architect, together with proposal for use of equivalent material.
3. Topsoil: ASTM 5268, pH range 5.5 to 7.
4. Plant Material: Provide plant material of quantity, size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of (ANSI Z601.1-1986) "American Standard for Nursery Stock" for number one grade nursery stock as adopted by the American Association of Nurserymen.
5. Label at least one tree and one shrub of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.
C. Inspection: The Subcontractor shall notify the Landscape Architect of the location of plant materials to be used and allow the Landscape Architect the opportunity to inspect them either at the place of growth or at the site before planting.
D. Preinstallation Conference: Subcontractor to conduct conference at Project Site prior to installation.

1.05 OBSERVATIONS:

- A. In addition to normal progress observations, schedule, and conduct the following formal observations to verify compliance with the specifications, giving the Landscape Architect at least 24 hours prior notice of readiness for observation.
B. Plant Material: The Landscape Architect shall observe the plant material at site before planting for compliance with requirements for genus, species, variety, size, and quality.
1. If the Subcontractor requests, the Landscape Architect may observe plant materials at place of growth or storage.
2. The Subcontractor shall notify the Landscape Architect 72 hours in advance of when plant material is to be delivered and shall furnish an itemized listing of the actual quantities and size of plant materials to be observed at the point of delivery.
3. Landscape Architect retains the right to further observe plant material for size and conditions of balls and root systems, insects, injuries, and latent defects, and to reject unsatisfactory or defective material at any time during progress of work.
4. Landscape Architect further retains the right for:
a. Observation of labels and the condition of all items delivered to the site.
b. Observation of any repairs or replacements necessary.
c. Observe the staking for all trees and shrubs prior to planting.
d. Observation of bed preparation prior to planting of trees and shrubs.
e. Observation of plant material at end of plant warranty period.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Provide freshly dug trees and shrubs. Do not prune prior to delivery. Provide adequate protection of root systems and balls from drying winds and sun.
B. Packaged Material: Deliver packaged material to the site in their original container with all labels showing weight, analysis, and name of manufacturer intact and legible.
C. Deliver plant material after preparations for planting have been completed, and plant immediately.
D. Replacements: In the event of damage or rejection, immediately make all repairs and replacements necessary to the approval of the Landscape Architect and at no additional cost to the Owner.

1.07 JOB CONDITIONS:

- A. Utilities: determine location of underground utilities and perform work in a manner which will avoid possible damage.
B. Excavation: When conditions detrimental to plant growth are encountered, such as pebble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before planting.

C. Sequencing an Scheduling:

- 1. Planting Time: Proceed with, and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.
2. All planting shall be performed during favorable weather conditions.
3. Dig, ball and burlap deciduous plants only when dormant (before March 15 and after October 15).
4. Recommended dates for tree and shrub planting shall be March 15 - May 31 and September 15 - October 31 or as approved by the Landscape Architect.
D. Plant trees and shrubs after final grades are established and prior to planting of lawns.
E. Correlate planting with specified maintenance periods to provide maintenance from date of Substantial Completion.
F. Coordination: All planting work shall be coordinated with all other work included in this contract and with work being done by others.
1.08 PROJECT WARRANTY:
A. General Warranty: Warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Subcontractor under requirements of the Contract Documents.
B. Special Warranty: Warrant the following living planting materials for a period of one (1) year after date of Substantial Completion, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by the Owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond the Subcontractor's control.
C. Replacements: The Subcontractor shall replace once, without cost to Owner, and as soon as weather conditions permit, and within a specified planting period, all dead plants and all plants not in a vigorous, thriving condition as determined by the Landscape Architect during and at the end of the warranty period.
D. Replacements shall closely match adjacent specimens of the same species.
E. Materials and Operations: All replacements shall be the same kind and size specified in the plant schedule.
F. The Subcontractor shall make all necessary repairs to other site and project features due to plant replacements.
G. Materials and Operations: All replacements shall be the same kind and size specified in the plant schedule.
H. Materials and Operations: All replacements shall be the same kind and size specified in the plant schedule.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. Provide nursery-grown trees and shrubs, grown in a recognized nursery in accordance with good horticultural practice, with healthy root systems developed by transplanting or root pruning.
B. Provide trees and shrubs of the sizes indicated in planting list and in accordance with dimensional requirements of ANSI Z601.1 for kind and size of trees and shrubs required.
C. Label each tree and shrub with a securely attached waterproof tag bearing legible designation of botanical and common name.
D. Nomenclature: Scientific and common names used for plants are generally in conformity with "Standardized Plant Names."
E. Plant material size and measurements shall conform to the "American Standard for Nursery Stock," ANSI Z601.1-1986.
F. Digging, wrapping, and shipping:
1. Plants shall be dug up and prepared for shipment in a manner that will not cause damage to the branches, shape and future development of the plants after replanting.
2.02 TREES:
A. Trees shall not be pruned before delivery.
B. All plants designated "B&B" in the Plant Schedule shall be adequately balled with firm natural balls of earth of a diameter and depth no less than that specified in ANSI 601.1-1986.
C. Protection against drying:
1. Root balls shall be adequately protected at all times from sun and from drying winds.
D. Where shade trees are required, provide single stem trees with straight trunk and intact leader.
E. Where small trees of upright or spreading type are required, provide trees with single stem, branched or pruned naturally according to species and type:
1. Where indicated as "multi-stem," provide trees with three canes starting from the ground.
F. Except as otherwise specified or indicated, provide bare root trees.
2.03 SHRUBS & GRASSES:
A. Provide shrubs of height and size indicated or specified.
B. Provide with not less than the minimum number of canes required by ANSI Z601.1 for the type and height of shrub required.
C. Except as otherwise specified or indicated, provide container grown shrubs.

2.04 CONTAINER PLANTS

- A. Provide plants in containers as sized or specified.
B. Plants shall show a vigorous root system, visible when container is removed.
C. Root system shall not show excess signs of overgrowth.
D. Plants shall appear healthy, with no broken limbs.
2.05 TOPSOIL:
A. Soil Mix: ASTM D 5268, pH range of 5.5 to 7.4 percent organic material minimum, free of stones 1/2 inch or larger in any dimension, subsoil, clay lumps, roots, seeds, weeds, weed seed, and other extraneous or toxic materials harmful to plant growth.
B. Soil Source: Reuse surface soil stockpiled on the site where available.
2.06 SOIL AMENDMENTS:
A. Sphagnum Peat Moss: Peat moss shall be Canadian Sphagnum Peat Moss, which is a light brown, fluffy material.
B. Commercial Fertilizer: Fertilizer shall be of the grade, type and form specified below and shall comply with the rules of the local governing authority and the following requirements:
1. The grade of fertilizer will be identified according to the percentage of nitrogen (N), percent available phosphoric acid (P2O5) and percent water soluble potassium (K2O), in that order and approval will be based on that identification.
2. Fertilizer shall be of a type that can be uniformly distributed either by hand or application equipment.
3. Fertilizer may be furnished in dry form.
4. Fertilizer may be either homogenized or natural organic with at least 25 percent of the total nitrogen in a slow-release form.
5. Deliver fertilizer in original, unopened and undamaged containers showing weight, analysis and name of manufacturer.
D. Fertilizer applications shall be provided as follows:

- 1. For trees and shrubs: Fertilizer shall be Agriform 20-10-5 Planting Tablets or approved equal, and shall be incorporated according to the manufacturer's directions and at the following rates:
a. Trees: Use 1 21-gram tablet for each 1/2-inch of trunk diameter for each foot of height or spread.
b. Shrubs: Use 1 to 2 tablets for each 1 foot of height or spread of shrubs and large perennial grasses.
2.07 MISCELLANEOUS MATERIALS:
A. Steel Edging: Commercial steel edging fabricated in sections with loops pressed from or welded to face to receive stakes.
B. Shredded hardwood mulch: Double ground aged brown hardwood mulch.
C. Tree Wrap: Material used in wrapping tree trunks shall be waterproof crepe paper or burlap strips as made and sold for this purpose and shall not be less than 4" or more than 8" wide having qualities to resist insect infestation.
D. Pre-Emergent Herbicide: Provide pre-emergent herbicide Pre M 60 DG (granular).
E. Tree Stakes and Guys:
1. All trees shall be staked with a minimum of 2 metal "T" posts.
2. Tree Ties: An acceptable tree tie is one that is easily adjustable, strong in all weather, and is easily attached and removed.
F. Water: Upon request of the Subcontractor, the Owner may approve the use of water from existing hydrants or working irrigation system for this work.
G. Anti-Erosion Mulch: Provide clean, dry straw of winter wheat, rye, oats, or barley.
H. Anti-Dessicant: Emulsion type, film-forming agent designed to permit transpiration, but retard excessive loss of moisture from plants.
I. Biotstimulant: The Subcontractor shall utilize an organic, biological fungi for soil prep.
J. All other materials, not specifically described but required for a complete and proper installation or construction, shall be as selected by the Subcontractor subject to the approval of the Landscape Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
1. Prior to all landscape installation, 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. Weeds that have emerged or persisted shall be removed or eradicated.
3. Verify that planting may be completed in accordance with the original design and the referenced standards.
B. Discrepancies:
1. In the event of discrepancy, immediately notify the Landscape Architect.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PREPARATION FOR PLANTING OF TREES, SHRUBS AND PLANT BEDS:

- A. Planting Soil Preparation:
1. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
2. Loosen subgrade of planting areas to a minimum of 8 inches.
3. Mix soil amendments and fertilizers with topsoil at rates indicated.
4. Grade planting areas to a smooth, uniform surface place with loose, uniformly fine texture.
5. Schedule of Plantings Soil Mixture Requirements
a. For planting beds, provide not less than the following quantities of specified materials:
(1) Loose peat humus by volume: 1 part
(2) Well-rotted composted manure by volume: 1 part
(3) Topsoil (as defined in this specification): 2 parts
(4) Fertilizer: Incorporate 3 lbs/100sf
b. For backfill for trees provide specified materials in not less than the following quantities:
(1) Loose peat humus by volume: 1 part
(2) Well-rotted cow manure by volume: 1 part
(3) Topsoil (as defined in this specification): 3 parts
(4) Place Agriform tablet (or approved equal) in bottom of tree pit.
B. Unless directed by the Landscape Architect, the indication of a plant on the Planting Plan is to be interpreted as including the prepping the landscape bed, digging of a hole, furnishing of a plant of the specified size, the work of planting, wrapping and other activities where called for.
C. Planting Coordination:
1. Consult the Plant Schedule for type and size of plants.
2. The Subcontractor shall be responsible for selection and tagging at nurseries stocking the specified materials.
3. Subcontractor shall inform the Landscape Architect three (3) days in advance of when planting will commence, and of anticipated delivery date of material and will furnish an itemized listing of actual quantities of plant materials to be delivered.
D. Plant Location Staking:
1. The Subcontractor shall stake on the ground the beginning and ending points of all straight rows of plant materials.
2. The Subcontractor will stake locations of each plant in all random arrangements of plant materials (with the exception of groundcovers, and annual and perennial flowers) or may set the plants in their intended location, according to the arrangements shown on the plans.
3. The Landscape Architect will observe all plant locations.
4. In case underground obstruction or utilities are encountered, locations shall be changed under the direction of the Landscape Architect without extra charge to the Owner.

3.03 EXCAVATION FOR TREES AND SHRUBS

- A. Holes for trees and shrubs shall be per the detail. Thoroughly spade slice the walls and the floor of all planting pits.
B. Obstructions: If rock, underground construction, or other obstructions are encountered in excavation for planting of trees or shrubs, notify Landscape Architect.
C. Excavate pits, beds, and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage.
1. For bare-root trees and shrubs, make excavations as detailed.
2. For balled and burlapped trees and shrubs, make excavations as detailed.
3. For container grown stock, excavate as specified for balled and burlapped stock, adjusted to size of container width and depth.
D. Obstructions: If rock, underground construction, or other obstructions are encountered in excavation for planting of trees or shrubs, notify Landscape Architect.
E. Setting and Backfilling:
1. Set balled and burlapped stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades.
2. Set container grown stock as specified for balled and burlapped stock, except cut cans on two sides.
3. Train vines to climbing surface.

3.04 TREE, SHRUB & VINE PLANTING:

- A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.
B. Mix soil amendments and fertilizers with topsoil.
C. For pit- or trench-type backfill, mix planting soil prior to backfilling and stockpile at site.
D. Setting and Backfilling:
1. Set balled and burlapped stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades.
2. Set container grown stock as specified for balled and burlapped stock, except cut cans on two sides.
3. Train vines to climbing surface.

- 4. Move or set large specimen trees with crane or other recognized tree moving equipment.
5. Plant Pits
a. Around the perimeter of the plant pit, build a watering saucer 4 inches above the crown of the plant and shape and slope the surface away from the top of the saucer, approximately 18 inches wide down to existing grade.
b. Treat entire plant pit or bed with Treflan in accordance with manufacturer's recommendations.
6. Mulching: Apply the specified mulch to a depth as shown on plans, evenly spread over the entire area of each soil basin or plant bed area.
7. Apply antidesiccant using power spray to provide an adequate film over twigs, branches, stems, and twigs for foliage.
8. Prune, thin out, and shape trees and shrubs in accordance with standard horticultural practice.
9. Remove and replace excessively pruned or misformed stock resulting from improper pruning.
10. Paint cuts over 13 mm (1/2 inch) in size with standard tree paint or compound, covering all exposed, living tissue.
11. Guy and stake trees immediately after planting and as indicated.
12. Wrap tree trunks of 50-mm (2-inch) caliper and larger.
PERENNIALS/ANNUAL PLANTING:
A. Prepare soil as stated in section 3.02
B. Set out and space plants in triangular spacing as shown in plan
C. Dig holes large enough to allow for spreading of roots
D. Work soil around roots to eliminate air pockets
E. Water thoroughly after planting
F. Apply shredded hardwood mulch over the entire area of each plant bed location using caution to not cover, bend, break or smother newly installed plants.

INSTALLATION OF MISCELLANEOUS MATERIALS:

- A. Shredded Hardwood Mulch:
1. Apply shredded hardwood mulch over the entire area of each soil basin, on all exposed soil surfaces within the perimeter of groupings or rows of trees or shrubs.
2. The Subcontractor shall determine his own quantities based on the area, the work and site investigations.
3. Provide a minimum depth per plans for all trees and shrubs.
B. Edging: Install specified edging at the locations indicated on the plans.
1. Trenched Edge shall be dug to 8" Depth and 8" Width.
2. Backfill Trenched Edge with shredded hardwood mulch to grade.
3. Steel Edging per manufacturer's recommendations.

3.07 MAINTENANCE:

- A. Begin maintenance immediately after planting. Maintenance shall continue until time of Substantial Completion, but in no case for less than a period of 90 days after Substantial Completion.
B. Maintain trees and shrubs by pruning, watering, cultivating, mulching, and weeding as required for healthy growth.
C. Remove and replace trees and shrubs found to be dying, dead, or in unhealthy condition during the warranty period.
D. During landscape work, keep pavements clean and work area in an orderly condition.
E. Protect landscape work and materials from damage due to landscape operations, operations by other subcontractors and trades, and trespassers.
F. Disposal of Surplus and Waste Materials: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

CLEAN-UP AND PROTECTION

- A. When landscape work is completed, including maintenance, Landscape Architect will, upon request, make an observation to determine acceptability.
1. Landscape work may be accepted for acceptance in portions as agreeable to Landscape Architect, provided each portion of work offered for observation is complete, including maintenance.
B. When observed landscape work does not comply with requirements, replace rejected work and continue specified maintenance until approved by Landscape Architect and found to be acceptable.
C. Trees, shrubs, groundcover, and all other specified plants are to be inspected to certify that all plants have been installed according to plans and are acceptable.

OBSERVATION AND ACCEPTANCE

- A. When landscape work is completed, including maintenance, Landscape Architect will, upon request, make an observation to determine acceptability.
1. Landscape work may be accepted for acceptance in portions as agreeable to Landscape Architect, provided each portion of work offered for observation is complete, including maintenance.
B. When observed landscape work does not comply with requirements, replace rejected work and continue specified maintenance until approved by Landscape Architect and found to be acceptable.
C. Trees, shrubs, groundcover, and all other specified plants are to be inspected to certify that all plants have been installed according to plans and are acceptable.

END OF SECTION 329300

Table with columns for DATE, TIME, and SIGNATURE. Includes fields for JMM, JAG, and JGD.

Table with columns for JMM, JAG, and JGD. Includes fields for ORIGINAL SUBMITTAL and REVISION.

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Professional seal for Andrew G. Gable, License Number LA-20070132076, State of Missouri Landscape Architect.

SECTION 328400 - IRRIGATION SYSTEMS

PART 1 - GENERAL

- 1.01 SUMMARY:
A. This Section includes piping, valves, sprinklers, specialties, and wiring for automatic-control irrigation systems.
1.02 REFERENCE STANDARDS
A. ASTM B32 - Standard Specification for Solder Metal; 2008.
B. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2010.
C. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2009.
D. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings; 2004 (Reapproved 2011).
E. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2009.
F. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2004 (Reapproved 2009).
G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
1.03 DEFINITIONS:
A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
B. Irrigation Main Piping: Downstream from backflow preventer to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
C. Service Line Piping: Downstream from point of connection to backflow preventer.
D. The following are industry abbreviations for plastic materials:
1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. FRP: Fiberglass-reinforced plastic.
3. PE: Polyethylene plastic.
4. PP: Polypropylene plastic.
5. PVC: Polyvinyl chloride plastic.
6. HDPE: High Density Polyethylene plastic.
1.04 SYSTEM REQUIREMENTS:
A. Location of Watering System and Specialties: Irrigation Contractor to provide shop drawings showing the minimum coverage per layout.
B. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties, unless otherwise indicated:
1. Irrigation Main Piping: 200 psig.
2. Circuit Piping: 200 psig.
1.05 SUBMITTALS:
A. Product Data: Include pressure ratings, rated capacities, and settings of selected models for the following:
1. General-duty valves, Specialty valves, Control-valve boxes, Irrigation specialties.
2. Controllers. Include wiring diagrams.
3. Control wiring. Include splice kits.
B. Shop Drawings: Irrigation Contractor shall provide design documentation for approval prior to installation.
C. Field quality-control test reports.
D. Operation and Maintenance Data: For irrigation systems, to include in emergency shut down, operation, and maintenance manuals.
E. As-Built Drawings: Irrigation Contractor shall submit as-built drawing showing valves, quick coupler & main line routing with coordinate locations & depth.
F. Extra Materials: Provide the following for Owner's use in maintenance of project.
1.06 QUALITY ASSURANCE:
A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.
1.07 DELIVERY, STORAGE, AND HANDLING:
A. Deliver piping with factory-applied end caps.
B. Store plastic piping protected from direct sunlight.
1.08 PROJECT CONDITIONS:
A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions.
B. If Existing Irrigation System is Present.
1.09 COORDINATION:
A. Coordinate timing of installation, location and installation of all sleeves under sidewalks or drives.
B. Coordinate power requirements and connection of controller as required.
C. Coordinate existing water supply requirements.
D. Coordinate with landscape installation.
E. Irrigation Contractor to attend on-site meeting at both project kick-off and prior to installation after approved shop drawings.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS:
A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified. All

- products of type shall be from a single manufacturer as listed.
2.02 PIPES, TUBES, AND FITTINGS:
A. Refer to Part 3 "Piping Applications" Article for installation of pipe, fitting, and joining materials.
B. PVC, Pressure-Rated Pipe:
1. ASTM D2241, CL 200 SDR-21.
C. Pipe Risers at Valves: 160 psi PVC pipe.
D. PVC Socket fittings, CL 200, ASTM D2467.
E. Sleeve Material: PVC - Schedule 80, Minimum size shall be 2 times the irrigation pipe diameter with a minimum size 2.5" diameter
2.03 JOINING MATERIALS:
A. Solvent Cement (PVC Piping):
1. Primer and solvent conforming to ASTM D2564-02.
2.04 OUTLETS:
A. Rotary Type Sprinkler Head: Pop-up type with screens; fully adjustable for flow and pressure; size as indicated; with letter or symbol designating degree of arc and arrow indicating center of spray pattern.
B. Spray Type Sprinkler head: Pop-up type with in-stem pressure regulator system.
C. Drip Specialties
1. Drip Zone Control Kit:
a. Factory assembled kit for controlling low-flow irrigation zones comprised of the following components:
1) Medium-flow remote control valve with 'double knife' diaphragm (1/2-inch diameter seat), double-filtered pilot flow, external bleed and internal bleed for manual operation.
1) Pressure regulator with plastic body capable of maintaining outlet pressure of 30 psi.
2) Filtration provided by either:
2)a. Inline Wye Filter of heavy-duty glass-filled nylon material with 150-mesh filter screen (factory-installed).
2)b. Inline Basket filter with threaded top section containing an indicator changing from green to red to indicate when the filter is full.
2. Manufacturers
a. Rainbird, Toro, Hunter, Netafim, Approved Equal
3. Landscape Dripline
a. Flexible PE tubing with pre-installed pressure-compensating emitters with dual outlet ports, 16 mm (0.630 inch) outside diameter.
b. Manufactures: As listed above
c. Warranty: 5 years free from original defects in materials and workmanship and 7 years for environmental stress cracking.
4. Compression Fittings:
a. UV-resistant ABS fittings with Buna rubber seal capable of accepting 1/2-inch poly tubing from 16 to 18 mm outside diameter.
b. Manufacturers: As listed above
5. Air Vacuum Relief Valve:
a. Plastic housing with rustproof materials designed for use with dripline tubing.
b. Manufacturers: As listed above
6. Flush Valve:
a. Plastic ball valve featuring PVC body and ball construction, EPDM Seat Seals and O ring, rated to 150 psi at 73°F.
b. Manufacturers: As listed Above
2.05 SHUTOFF & GENERAL-DUTY VALVES:
A. Cast Brass Gate Valves: Resilient-seated, nonrising-stem, cast brass body and bonnet (ASTM B584) gate valve; with brass stem and stem nut.
1. Maximum Working Pressure: 200 psig.
2. End Connections: Threaded ends.
3. Handle: Brass cross.
4. Manufacturers:
a. Matco-Norca 514.
b. Approved Equal.
5. Operating Wrenches: Furnish total of two (2) steel, tee-handle operating wrench(es) with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
B. Plastic Automatic Control Valves: The electric remote control valve shall be a normally closed 24 VAC 50/60 Hz (cycles/second) solenoid actuated globe/angle.
C. Valve Box and Cover: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
1. General Duty Valves
a. Shape: Round
b. Sidewall: PE, ABS, or FRP
c. Cover Material: PE, ABS, FRP, Green in color
2. Remote Control Valves
a. Shape: Rectangular
b. Sidewall: PE, ABS or FRP
c. Cover Material: PE, ABS or FRP, Green in color
3. Specialty Valve Boxes
a. Shape: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
b. Sidewall: PE, ABS or FRP
c. Cover Material: PE, ABS or FRP, Green in color
4. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4"-inch minimum to 1 inch maximum.
2.06 SPECIALTY VALVES:
A. Quick-Couplers: Factory-fabricated, brass, two-piece assembly.
1. Locking-Top Option: Vandal-resistant, single-lug locking feature.
2. Manufacturers:
a. 33DLRC by Rain Bird Sprinkler Mfg. Corp.
b. 075-SLVC by The Toro Company
c. Approved equal.
2.07 CONTROLLER:
A. Existing controller may be used if space and functions allow.
B. If required, Controller shall be provided meeting the following requirements:
1. Shall include a base unit with expansions slots to accommodate zones required for working system.
2. Shall be capable of operating two 24 VAC solenoid valves per zone plus a mater valve.
3. Shall operate on 120VAC +/- 10% at 60Hz
4. Shall be capable of providing watering cycles by day of week, odd, even and cyclic.
5. Shall have a display capable of displaying each zones schedule start days and watering windows in the same screen with active watering schedule notification
6. Shall have 12-hour AM/PM or 24 hour clock with a midnight day change over
7. Shall have 365 day calendar backed up against power interruptions by an internal lithium battery that will maintain date and time for 10 years.
8. Shall be capable of communicating with the existing on-site weather sensor that measure site temperature and rainfall.
9. Controller shall have programmable rain shut off threshold
10. Shall be capable in running off time based program or ET based programming
11. The controller shall be EPA WaterSense labeled
12. Shall offer manual watering of all zones
13. Controllor shall be capable of being located in the same location as the existing location.
14. Manufacturer's
a. Rainbird
b. Approved Equal
2.08 CONTROL WIRE (REMOTE VALVE TO CONTROLLER)
A. General: UL 493, Type UF, single conductor, with solid-copper conductor and PE insulation; suitable for direct burial
1. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color coded per the following
a. Common Wire - White
b. Control Wire - Red
c. Spare Common Wire - Green
d. Spare Control Wire - Blue
2. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial
3. Each wire path shall be grounded using a Rain Bird MSP-1 surge protector, or approved equal
4. All connectors shall be 3M DBR connectors only
2.09 RAIN/TEMPERATURE SENSOR
A. Automatic rain shutoff sensor shall be capable of sensing precipitation/temperature and interrupting irrigation during rain and low temperature events.
B. All sensors shall be capable of interfacing with approved controller.
C. Contractor shall field locate for optimum performance.
2.10 MISCELLANEOUS SPRINKLER EQUIPMENT:
A. Valve Identification Tags: Pre-printed plastic tags with minimum text height of 1 inch, capable of being attached to valve stem or valve wire within valve box.
B. Gravel: Clean washed gravel 3/4" nominal diameter.
2.11 POINT OF CONNECTION
A. Irrigation Contractor shall be responsible for providing all point of connection taps, back flow devices, valves, vaults & covers.
B. Irrigation Contractor shall show in the provided shop drawings the point of connection for approval.
C. Irrigation Contractor shall provide a Master Valve for the proposed irrigation system.
PART 3 - EXECUTION
3.01 GENERAL:
A. Install piping and wiring in sleeves under sidewalks, roadways, and parking lots.
1. Install piping sleeves by boring or jacking under existing paving if possible.
2. Irrigation Contractor shall coordinate sleeve locations under new construction during early construction stages to avoid boring where possible; Refer to Sheet LS200 for sleeve locations.
B. Provide minimum cover over top of underground piping according to the following:
1. Irrigation Main Piping: Minimum depth of 18 inches below finished grade to top of pipe.
2. Circuit (Lateral) Piping: Minimum depth of 12 inches below finished grade to top of pipe.
3. Sleeves: 18 inches Minimum.
3.02 PREPARATION:
A. Set stakes to identify locations proposed irrigation system.
B. Route piping to avoid conflicts with other work
C. Unless otherwise installed, bore for sleeves under existing pavement as indicated on plans.
1. Sleeves shall be installed prior to pavement installation.
3.03 TRENCHING
A. Trench and backfill with subsoil excavated on-site.
B. Trench shall accommodate grade changes
C. Maintain trenches free of debris, material or obstructions that may damage pipe.
3.04 PIPING APPLICATIONS:
A. Install components having pressure rating equal to or greater than system operating pressure.
3.05 PIPING INSTALLATION:
A. Location and Arrangement: To be determined by shop drawing approval.
B. Install piping free of sags and bends.
C. Install groups of pipes parallel to each other spaced to permit valve servicing.
D. Install fittings for changes in direction and branch connections.
E. Install dielectric fittings to connect piping of dissimilar metals.
F. Install underground thermoplastic piping according to ASTM D2774.
G. Lay piping on solid subbase, uniformly sloped without humps or depressions.
H. Install PVC piping in dry weather when temperature is above 40°F (5°C).
3.06 JOINT CONSTRUCTION:
A. Construct solvent-weld joints per ASTM D2855 and Butt Heat Fusion (HDPE Piping) per ASTM D3261 & ASTM D2657
B. Construct mechanical joints per manufacturer's recommendations:
1. Provide adequate joint restraint at all mechanical joints through thrust blocking or mechanical restraints.
3.07 VALVE INSTALLATION:
A. Underground Gate Valves: Install in round valve box with top flush with grade.
B. Control Valves/Master Valves: Install in rectangular control-valve box.
C. Quick Couple Valves: Install in round valve box.
3.08 OUTLET INSTALLATION:
A. Drip line Installation: Install drip lines per manufacturer's recommendations in areas shown on the plans and the approved shop drawings.
B. Rotary/Spray Head Installation: Install rotary/spray heads per manufacturer's recommendations in areas shown on the plans and approved shop drawings.
3.09 AUTOMATIC-CONTROL SYSTEM INSTALLATION:
A. Install control wire in same trench as irrigation piping as approved with shop drawings.
smaller than recommended by controller manufacturer.
B. Connect to Controller and accessories per manufacturers recommendations
3.10 CONNECTIONS:
A. Make all electrical connections in conformance with local code requirements.
B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.
3.11 LABELING AND IDENTIFYING:
A. Provide valve tags at each remote control valve as shown on the approved shop drawings.
B. Install Warning Stakes per detail
3.12 FIELD QUALITY CONTROL:
A. Perform the following field tests and inspections and prepare test reports:
1. Hydrostatic Test: After installation and prior to backfilling, utilize quick-couple valves to charge mainline with pressurized air to 100 psi.
2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties.
B. Remove and replace defective units and retest as specified above until all requirements are met.
3.13 STARTUP SERVICE:
A. Verify that controller is installed and connected according to the Owners direction.
B. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.
C. Complete startup checks according to manufacturer's written instructions.
3.14 ADJUSTING:
A. Adjust settings of controller and provide initial watering schedule per Owner's requirements.
B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
3.15 CLEANING:
A. Flush dirt and debris from piping before installing sprinklers and other devices.
3.16 DEMONSTRATION:
A. Schedule a complete demonstration and system walk-through with the Owner's representative.
B. Provide one complete spring start-up and a fall shutdown by installer, at no extra cost to Owner.
3.17 MAINTENANCE:
A. Irrigation Contractor shall maintain and coordinate system for plant establishment throughout 90 day maintenance period.
B. Provide one complete spring start-up and a fall shutdown by installer, at no extra cost to Owner.
3.18 WARRANTY:
A. Irrigation Contractor shall warranty irrigation system for a minimum of 12 months starting from the date of Substantial Completion.
B. Irrigation Contractor shall be responsible for all system leaks due to quality of installation.
3.19 DOCUMENTATION:
A. Provide a complete operations and maintenance manual to the Owner in a three-ring binder with the following items, separated by tabbed dividers for clear organization.
1. Provide a label on the spine of the binder clearly stating "IRRIGATION SYSTEM OPERATION AND MAINTENANCE".
2. Table of Contents.
3. Cut-sheets or manufacturer's data for all installed equipment including:
a. Remote Control Valves.
b. Quick Couple Valves.
c. Controller.
4. Operations Data from manufacturers documenting diagnostic, repair and replacement procedures for all items "a" through "c" identified above.
5. Complete description of spring start-up operations including:
a. Valve inspection.
b. Controller programming guidelines for spring, summer and fall watering schedules.
c. Controller battery replacement (As Required).
d. Rain Sensor Battery replacement (As Required)
B. Provide an as-built drawing at the same size and scale as the design drawings with the following information clearly shown:
1. Location of all sleeves with coordinates.
2. Location of mainline and lateral pipe runs with sizes clearly indicated with coordinates.
3. Location of all valves with coordinates.
4. Location of controller and rain sensor (As Required)
5. Utilize standard industry symbols and notations for all equipment.
C. Provide a copy of the Maintenance/Operations Manual and As-Built Drawing to the owner for review and approval.
1. Contractor shall make all revisions noted and required by the owner.
2. Contractor is required to demonstrate completion of all revisions, which may include providing a revised copy for additional review at the discretion of the owner.
D. Maintenance/Operations Manual and As-Built Drawing shall be completed and turned over to the owner before Final Payment will be made to the Irrigation Contractor.
END OF SECTION 328400

Table with 4 columns: No., Date, Name, Title. Includes rows for ORIGINAL SUBMITTAL and REVISION.

Logo for Renaissance Infrastructure Consulting, featuring a stylized globe and the company name in bold letters.

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