ARTICLE 10

LANDSCAPING

10.1 DESCRIPTION

This work shall consist of furnishing and spreading fertilizers; soil preparation; furnishing and drilling or sowing seed; mulching the seeded areas; and placing blue grass sod in accordance with these specifications, accepted horticultural practice, and in reasonably close conformity with the locations and details shown on the plans or as designated.

For seeding in areas that don't have sprinklers or aren't irrigated , spring seeding is allowed from the **spring thaw to June 15th** and fall seeding is allowed from **September 1st until consistent ground freeze**. Seeding will be allowed between June 15th and September 1st only with irrigation or sprinkler systems being utilized.

Seeding accomplished outside the time periods listed above will be allowed only when ordered by the Landscape Architect or City Engineer or when the Contractor's request is approved in writing. When requested by the Contractor, the Contractor must agree to perform the following work at no cost to the City: (1) apply the specified seed and mulch at a rate of not less than 25 percent greater per unit area than the rates specified for use within the time periods listed above, (2) re-seed, re-mulch, and repair areas which fail to produce vegetation.

When seeding is ordered by the Landscape Architect or City Engineer outside the time periods listed above, the cost of additional material will be paid for by the City. The Contractor will not be responsible for failure of the seeded area to produce vegetation due to reasons beyond the control of the Contractor.

Sod shall be placed between **September 15 to October 15 and March 1 to April 15** of the calendar year or as otherwise approved by the Engineer.

Mulching may be accomplished by the crimping method using straw or hay, by the hydraulic method using wood cellulose fiber mulch or by other acceptable mulching methods approved by the Landscape Architect or City Engineer.

10.2 MATERIALS

10.2.1 SEED

(1) All seed shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the seed name, the lot number, net weight, origin, the percent of weed seed content, the guaranteed percentage of purity and germination, pounds of pure live seed (PLS) of each seed species and the total pounds of pure live seed in the container. All brands furnished shall be free from such noxious seeds as Russian or Canadian Thistle, European Bindweed, Johnson Grass and Leafy Spurge. The Contractor shall furnish to the Engineer a signed statement certifying that the seed furnished is from a lot that has been tested by a recognized laboratory for seed testing within six months prior to the date of delivery. Seed which has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable.

(2) The mixture shall consist of the following species and rates. Planting rates are expressed in terms of pure live seed (PLS).

(3) Turf Mix:

Species	Variety	LBS. PLS per 1,000 SF Drilled	LBS. PLS per 1,000 SF Broadcast
Turf Type Tall Fescue (*Festuca spp*.)		9.0	18.0
Kentucky Bluegrass (*P. pratensis*)		1.0	2.0
		10# PLS	20# PLS

*NOTE: This is a sample seed mix, refer to project specifications.

(4) Native Mix:

Species	Variety	LBS. PLS per Acre Drilled	LBS. PLS per Acre Broadcast
Blue grama (B. gracilis)	Lovington	0.4	0.8
Little bluestem (*S. scoparium*)	Pastura	1.2	2.4
Sideoats grama (B. *curtipendula*)	Butte or Vaughn		
Prairie sandreed (*C. longifolia*)	Goshen	1.1	2.2
Sand dropseed (*S. cryptandrus*)		0.1	0.1
Green needlegrass (N. *viridula*)		1.7	3.4
Streambank wheatgrass (*E. lanceolatus)*	Sodar	2.0	4.0
		8.1# PLS	16.1# PLS

*NOTE: This is a sample seed mix, refer to project specifications.

(5) Seed and seed labels shall conform to all current State and Federal regulations and will be subject to the testing provisions of the Association of Official Seed Analysis. Computations for quantity of seed required are based on the percentage of purity and percent of germination.

(6) If seed available on the market does not meet the minimum purity and germination percentages specified, the Contractor must compensate for a lesser percentage of purity of germination by furnishing sufficient additional seed to equal the specified product. Product comparison shall be made on the basis of pure live seed in pounds based on the information received from each seed bag. The formula used for determining the quantity of pure live seed (PLS) shall be: Pounds of Seed x (Purity x Germination) = Pounds of Pure Live Seed (PLS).

(7) Areas that are not irrigated or not provided with sprinkling or watering systems shall be seeded prior to May 15th in the Spring **or** following September 30th in the Fall.

(8) Seeding shall follow closely behind tilling the fertilizer or as directed by the Landscape Architect or City Engineer, to make special seed bed preparation unnecessary. The Landscape Architect or City Engineer may establish test sections for adjusting the seeding equipment to assure the specified rate. The Engineer may order equipment readjustment at any time.

(9) All slopes 2:1 and flatter shall be seeded by mechanical power drawn drills followed by packer wheels or drag chains. Mechanical power drawn drills shall have depth bands set to maintain a planting depth of at least one-quarter inch and shall be set to space the rows not more than seven inches (7”) apart. Seed that is extremely small shall be sown from a separate hopper adjusted to the proper rate of application.

(10) Seed shall not be drilled or sown during windy weather or when the ground is frozen or otherwise untillable.

(11) If inspections indicate that strips wider than the specified space between the rows planted have been left or other areas skipped, the Landscape Architect of City Engineer may require immediate resowing of the seed in such areas at the Contractor's expense.

(12) Unless otherwise noted on the plans, the Contractor shall be responsible for maintaining and watering areas seeded for a period of seven weeks after the time of seeding.

(13) Areas in which there is not a satisfactory stand (no bare areas larger than six (6) square inches) at the expiration of this seven-week period shall be reseeded. Watering of the seeded areas shall be carefully done in such a manner to avoid standing water, surface wash, or scour. Areas seeded and so maintained shall be protected against damage by vehicle and pedestrian traffic by the use of barriers and appropriate warning signs.

10.2.2 SOD

(1) Superior sod grown from certified, high quality seed of known origin or from plantings of certified grass seeds or stolons. Contractor shall submit to the Landscape Architect or City Engineer the name of the turf farm(s).

(2) Sod shall be true to type, quality cultured turf grass grown from seed approved by the US Department of Agriculture, free of diseases, clover, stones, pests and debris, and containing maximum of 2% of other grass species than variety specified; no more than two (2) broadleaf weeds or ten (10) annual weeds of weedy grasses per 50 square yards. Thickness of sod soil portion 1" maximum.

(3) Inspect sod to –

a. Assure satisfactory genetic identity and purity.
b. Assure over-all high quality and freedom from noxious weeds or an excessive amount of other crop and weedy plants at time of harvest.

(4) Sod shall be composed of the following approved seed mixtures:

Sod Blend		Supplier
KBG/Texas Mix		Southwest Farms
VorTEX		Korby Sod LLC
Graff's Texas Blue Grass Blend		Graff's Turf Farms
G & S Select		Bigfoot Turf

*NOTE: Sample seed mixture, refer to project specifications.

10.2.3 FERTILIZERS

(1) Fertilizer shall be delivered to the site, mixed as specified, in the original unopened standard size bags showing weight, analysis and name of manufacturer. Containers shall bear the manufacturer's guaranteed statement of analysis and shall be furnished to the Landscape Architect or City Engineer. Store fertilizer in a weatherproof place and in such a manner that it shall be kept dry and its effectiveness shall not be impaired.

(2) Superphosphate: Soluble mixture of treated minerals, 16% to 20% available phosphoric acid.

(3) Commercial Fertilizer: Complete fertilizer containing the following percentages of available plant nutrients:

a. Tablets: For trees and shrubs, provide tightly compressed long lasting, slow release tablets weighing 21 grams with an analysis of 20-10-5, and a potential acidity of not more than 5% by weight.
b. Granular: For lawns, vines, flowers and groundcovers, provide a granular, slow release, commercial fertilizer with NPK proportion of 3:1:2 with 120 days controlled release such as 24-4-10 50% duration and 3% iron.
c. Trees over 2" in caliber shall also receive: Install one 3 oz. packet of Mycor Tree Saver per one-inch diameter of tree trunk (i.e. 3 (3 oz.) packets per 3" B&B tree). Provide City Representative with 20 extra packets.

10.2.4 MULCH

(1) Hay mulch shall consist of clean field hay and shall not contain seeds of noxious weeds. Hay in such an advanced state of decomposition as to smother or retard the growth of grass will not be accepted. Hay which breaks in the crimping process rather than bending will not be accepted. The hay mulch shall have a minimum of 60% of the hay stubble 10" or longer upon completion of the crimping operation.

(2) After seeding has been completed, hay shall be uniformly applied at the rate of two tons per acre or as directed. It shall then be crimped in with a crimper or other approved equipment. After application, 60% of the crimped hay shall be 10" or longer. The Landscape Architect or City Engineer may order the employment of hand-crimping operations on such areas where excessive ground slopes or confined areas would

cause unsatisfactory crimping to result by mechanical methods. Crimping shall be performed on the contour. Crimping against the contour shall not be accepted.

(3) The seeded area shall be mulched and crimped within 24 hours after seeding. Areas not mulched and crimped within 24 hours after seeding must be reseeded with the specified seed mix at the Contractor's expense.

(4) Wood Cellulose Fiber for hydraulic mulching shall not contain any substance or factor which might inhibit germination or growth of grass seed. It shall be dyed an appropriate color to allow visual metering of its application. The wood cellulose fibers shall have the property of becoming evenly dispersed and suspended when agitated in water. When sprayed uniformly on the surface of the soil, the fiber shall form a blotter-like ground cover which readily absorbs water and allows infiltration to the underlying soil. Weight specifications from suppliers, and for all applications, shall refer only to air dry weight of the fiber, a standard equivalent to 10 percent moisture. The mulch material shall be supplied in packages having a gross weight not in excess of 100 pounds and shall be marked by the manufacturer to show the air-dry weight content. Suppliers shall certify that laboratory and field testing of their product has been accomplished, and that it meets all the foregoing requirements pertaining to wood cellulose fiber mulch.

(5) Cellulose wood fiber mulch shall be added after the proportionate quantities of water and other approved materials have been placed in the slurry tank. All ingredients shall be mixed to form a homogeneous slurry. Using the color of the mulch as a metering agent, the operator shall spray apply the slurry mixture uniformly over the designated seeded areas. Areas not properly mulched or areas damaged due to the Contractor's negligence, shall be repaired and remulched in an acceptable manner at the Contractor's expense. Mulch removed by circumstances beyond the Contractor's control shall be repaired and remulched as ordered. Payment for this corrective work, when ordered, shall be at the contract prices.

10.2.5 IMPORTED BACKFILL

(1) Fertile, loose, friable sandy loam or natural agriculture topsoil typical of locality and capable of sustaining vigorous plant growth; it shall be clean and free from toxic minerals, noxious weeds, rocks larger than two inch (2”) in any dimension, and other objectionable materials.

(2) Borrow Topsoil shall be tested by an approved laboratory for both a “Soil Sample Test” and a ” Paste Test” and provide the results to the Owner. If necessary, to bring the soil into a satisfactory condition for growing the plant material, the Contractor shall provide proposed recommendations on how the Contractor will amend the soil, at the Contractor’s expense.

(3) Acidity/alkalinity range - pH 6.0 to 8.0.

10.2.6 TOP SOIL

(1) Contractor is to provide topsoil mix that conforms to the following tolerances.

(2) Topsoil for all tree, shrub, and ground cover planting beds shall consist of the following:

a. 60% to 70% sand
b. 10% max. silt.
c. 10% max. clay.
d. minimum 12% organic matter
e. pH value of 5.0 to 6.0.
f. Drainage minimum of 3/4 inch/hr.

(3) Acceptable amendments include:

a. Composted organic wood and manure-based product with a carbon to nitrogen ratio between 15:1 and 30:1, with a pH of 5 to 6, salt content below 6 mmhos/cm. Other materials such as mushroom compost, etc. may be considered for approval.
b. Amendments shall be free of objectionable odor, and free from all viable weed seeds, finely shredded to pass 70% through a 1/4 inch mesh screen.

(4) Topsoil for all lawn and meadow areas shall consist of the following:

a. 60% to 80% round sand.
b. 10% max. silt.
c. 10% max. clay.
d. minimum 5% organic matter
e. pH value of 5.0 to 6.0.
f. Drainage minimum of 3/4 inch/hr.

(5) Sand:

a. River pump or screened quarry sand with a particle size breakdown as follows. Provide sieve analysis for approval.

Coarse Sand	15%
Medium Sand	65%
Fine Sand	20%

(6) Compost:

a. Well-decomposed, 2-year-old, organic wood and manure based product with a carbon to nitrogen ratio between 15:1 and 30:1, with a pH of 5 to 6, and a salt content below 6 mmhos/cm. Other materials such as a decomposed mushroom or vegetable matter of natural occurrence may be considered for approval. Sheep and peat is acceptable.
b. Shredded particle minimum size: 1/4 – 1/2 inch.

(7) Fertilizer:

a. Analysis and application rates in accordance with soil analysis results - Slow release type sulphur coated urea complete with micronutrients.

(8) Peat Moss: (Mountain peat moss is not acceptable for use on the project)

a. Derived from partially decomposed fibrous or cellular stems and leaves of species of Sphagnum Mosses.
b. Elastic and homogenous, brown in color.
c. Free of wood and deleterious material that could prohibit growth.
d. Shredded particle minimum size: 1/4".

(9) Drain gravel: 3/4" diameter clean round drain rock, free of fines.

10.2.7 ORGANIC SOIL AMENDMENT

(1) Organic soil amendment shall be a composted organic wood and manure-based product with a carbon to nitrogen ratio between 15:1 and 30:1, with a pH of 5.0 to 6.0, and a salt content below 6 mmhos/cm. Other materials such as a decomposed mushroom or vegetable matter of natural occurrence may be considered for approval.

(2) The organic soil amendment shall be free of objectionable odor, and free from all viable weed seeds, finely shredded to pass 70% through a 1/8-inch mesh.

(3) Compost steer manure or peat moss, “Nutril Mulch”, “Soil Pep”, nitrogen stablilized organic amendment (not sawdust), or other material approved by Owner.

10.2.8 NATURAL ROCK MATERIALS

(1) Boulders shall be selected and approved by the Landscape Architect or City Engineer. Type, size, and color shall be as directed by the City. Boulders shall be approved prior to delivery to the site.

(2) Boulders shall be clean, uniform in type, and free of abrasions, marks, drill holes, and all other deleterious marks.

10.2.9 BRICK PAVERS

(1) Brick pavers shall conform to ASTM C-902, SW grade, Class SX, Type 1. Water absorption shall not exceed 4%.

(2) Size: Wire-cut pavers to the dimensions shown on the drawings.

(3) Color shall be as specified on the drawings or by the Landscape Architect or City Engineer.

(4) Friction Factor: Permanent wet leather/wet paver factor of 0.5 minimum.

10.2.10 IRRIGATION

(1) General Piping

a. Pressure Supply Lines (downstream of backflow prevention units) – Sch. 40 PVC.
b. Non-pressure Lines - Class 200 PVC
c. PVC Sleeving – Sch. 40 PVC.
d. Drip Tubing – Toro Dura-Pol EHD 1645 3/4" with .050 inch wall thickness.
e. Emitter Tubing - As recommended by emitter manufacturer.

(2) Plastic Pipe and Fittings:

a. Identification Markings. Identify all pipe with following indelible markings.

i. Manufacturer's name. ii. Nominal pipe size. iii. Schedule of class. iv. Pressure rating.
v. NSF (National Sanitation Foundation) seal of approval.
vi. Date of extrusion.

(3) Solvent Weld Pipe. Manufactured from virgin polyvinyl chloride (PVC) compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B, Type 1, Grade 1.

a. Fittings - Standard Schedule 40, injection molded PVC; complying with ASTM D1784 and D2466, cell classification 12454-B.

i. Threads. Injection molded type (where required).
ii. Tees and ells
1. Threaded Nipples - ASTM D2464, Schedule 80 with molded threads.
2. Joint Cement and Primer - Type as recommended by the manufacturer of the pipe and fittings.

(4) Drip Irrigation Systems

a. Drip Tubing - Manufactured of flexible vinyl chloride compound conforming to ASTM D1248, Type 1, Class C, Category 4, P14 and ASTM D3350 for PE 122111C.
b. Fittings - Type and make recommended by the tubing manufacturer.
c. Drip Valve Assembly – type and size to be shown on the design submittal.

i. PR Filter - Plastic construction with 200 mesh (75 micron) nylon screen and 1/2 inch blow-out assembly. Pressure reduction is included in the filter.
ii. Control Valve - 2 way, solenoid pilot operated type made of synthetic, non-corrosive material; diaphragm activated and slow closing. Include freely pivoted seat seal; retained (mounted) without attachment to diaphragm.
d. Emitters –Single port, pressure compensating, press on type by Rainbird.

i. Use 2 emitters per shrub, 4 per tree, and 1 per flower or groundcover. See plant list for specific emitter size.
ii. Gallons per hour (GPH) as indicated on plans.

e. Landscape Dripline Tubing – Dual outlet ports, pressure compensating in-line emitter tubing, Rainbird LD-09-12.

(5) Gate Valves - Gate Valves for 3/4 inch through 2-1/2 Inch Pipe - Brass construction; solid wedge, IPS threads, and non-rising stem with wheel operating handle.

(6) Quick Coupling Valves - Brass two-piece body designed for working pressure of 150 PSI; operable with quick coupler. Equip the quick coupler with a locking rubber cover. Key size and type will be as shown on Drawing.

(7) Valve Boxes:

a. Gate Valves, Quick Coupling Valves, Drain Valves, Drip Line Blow-out Stubs, and Wire Stub Box - Carson Brooks #910-10, box as detailed.
b. 3/4 inch through 2 inch Control Valves - Carson Brooks #1419-12 box.
c. Drip Valve Assemblies - Carson Brooks #1220-12 box.

(8) Electrical Control Wiring:

a. Two Wire System
b. Low Voltage
c. Electrical Control Wire - American Wire Gauge (AWG) No. 14 solid copper, Type UF cable, which is UL approved for direct underground burial, if required to operate system as designed.

d. If multiple controllers are utilized, and wire paths of different controllers cross each other, both common and control wires from each controller shall be different colors approved by Landscape Architect or City Engineer.
e. Control Wire connections and splices shall be made with 3M direct bury splice, Rain Bird Pentite connectors, or a similar dry splice method.
f. Low Voltage – (2-Wire Decoder Cable)
    i. Electrical Control Wire - UFUL approved, Paige Wire P7072D 12/2 (or as per manufactures requirements, direct burial copper wire to operate the system as designed.
    ii. If multiple controllers are utilized, refer to the wire routing plan for individual wire runs. Each controller shall have a wire path of a different color.
    Refer to plan for any additional cable color requirements.
    iii. If multiple controllers are utilized, each controller shall have its own 2-wire decoder cable run, controllers cannot be connected with the same 2-wire run.
    iv. Loop five (5) feet minimum of 2-wire cable into all valve boxes.
    v. Control Wire connections and splices shall be made with 3M DBY or King 600 DBY/R, or similar, direct bury splice, or as required by the controller manufacturer.

g. High Voltage – Type required by local codes and ordinances, of proper size to accommodate the needs of the equipment serviced.

(9) Automatic Controller – Size and type as shown on drawings and details. Unless otherwise specified use Weathertrak brand.

(10) Hydrometer Master Control Valve/Flowmeter - Size and type shown on drawings per each system design.

(11) Electric Control Valves - Size and type shown on drawings, having manual flow adjustment (except drip valves) and manual bleed nut.

(12) Sprinkler Heads - As indicated on drawings; Fabricated riser units in accordance with details on drawings – with riser nipples of the same size as riser openings in the sprinkler body.

(13) Backflow Preventer - Size and type indicated on drawings; Brass construction with 150 psi working pressure.

10.2.11 EROSION MATTING

(1) The erosion matting shall be installed as shown on the drawings and as directed by the Landscape Architect or City Engineer. An additional row of blanket (approximately four feet wide) may also be required in areas of steep slopes, drainage paths or south exposures. The area to be covered shall be properly prepared, fertilized, and seeded before the blanket is applied.

(2) The product data for the erosion matting must be submitted to and approved by the Landscape Architect or City Engineer prior to installation.

(3) When the blanket is unrolled, the netting shall be on top and the fibers in contact with the soil over the entire area. In ditches, the blankets shall be applied in the direction of the flow of the water, butted snugly at ends and sides and stapled. On slopes, the blankets shall be applied either horizontally or vertically to the slope. Ends and sides shall be butted snugly and stapled.

(4) When two or more lengths of fabric are required to be installed side-by-side or end to end to cover an area, a common row of staples will be used on adjoining blankets.

Minimum Blanket Dimensions	
Width	4 feet min.
Length	180 feet min.
Roll Sizes	80 square yards
Approx. Weight	78 pounds per roll
Staples	11 gauge wire, “U” shaped with 2-inch crown and legs 8-inches in length, min.

(5) The erosion matting will be applied uniformly and completely over the designated area. Use four staples across at the start of each roll. When blankets are placed along side of each other, outer staples shall be placed so as to catch the edge of each roll. Staple in row, in two-foot intervals along the entire length of the roll, and place two staples centered on the blanket, halfway between each row.

(6) As a waterway liner, staple at two-foot intervals throughout the length of the roll. When using two or more blankets side-by-side in a water course, do not put the seam (edges of adjoining blanket) at the center of the water flow. Offset approximately six (6) inches to one (1) foot.

(7) The Contractor shall also be responsible for maintaining and caring for the blankets for a seven-week period. All blankets that are disturbed during this period will be replaced and/or restapled by the Contractor.

10.2.12 GEOTEXTILE FABRIC

Geotextile Fabric (Filter Fabric): Shall be Warren's Terrabond, Mirascape, DuPont Typar 3301 or an approved substitution.

10.2.13 PLANT INSTALLATION ACCESSORIES AND MATERIALS

(1) Ground Anchors at Tree Pits: Duckbill-type galvanized steel ground anchor/rootball system and cable assembly 68 RBK kit (for trees up to 3'' caliper) or 88 RBK kit (for trees up to 6'' caliper), by Foresight Products, Inc., (800) 325-5360, or accepted equal. Install per manufacturer's recommendations. Do not install on dry, cracked, crumbling or broken rootballs.

(2) Guying and Staking Material:

a. Guying Wire: 12-gauge galvanized steel wire. Cotton/Nylon Webbing Straps with Grommets as provided by Jeffco Enterprises, Inc., 6340 W. 56th Avenue, Arvada, CO 80002, (303)422-2722, or accepted substitute.

i. Size for Trees Up to 3-1/2" Caliper: 16" x 3".
ii. Straps: Tensile strength of 1,000 lbs. and heat sealed on ends. iii. Strap Color: Brown or Tan. iv. Grommets: Securely attached and minimum 1/4 inch from end of strap.

b. Tree Wrapping: Tree wrapping material shall be of first quality, 4-inch wide, bituminous impregnated tape, corrugated or crepe paper; brown in color, specifically manufactured for tree wrapping. The Contractor shall submit a sample for the City's approval a minimum of 3 weeks prior to delivery on site.

10.2.14 PRE-EMERGENT HERBICIDE

At Contractor's option, pre-emergent herbicide: Shall be "Pendulam Aqua Cap" as manufactured by BASF or approved substitution. Apply per the manufacturer's recommendations for weed control.

10.2.15 EMERGENT HERBICIDE

For all turf planting beds, provide Roundup (Glyphosate) as manufactured by Monsanto Company or an approved equal.

10.2.16 INSECTICIDE AND FUNGICIDE

(1) For all tree plantings, provide systemic insecticide, Merit 75 WP or an approved equal.

a. Systemic insecticide such as Merit 75 WP Brand or an approved equal shall be applied per the manufacturer's recommendation at the time of planting of trees and approved by the Landscape Architect. .
b. Trees: Install 1.0 to 1.4 level teaspoons per one-inch of trunk diameter (D.B.H., At Breast Height) Minimum (1) teaspoon per 2" caliper tree.
c. Shrubs: Install .7 to 1.4 level teaspoons per one-foot of height of shrub.
d. Method of application shall be soil injection or soil drench as per manufacturer's recommendation. Apply treatment with water and keep moist for 7 to 10 days. Insecticide and fungicide shall be approved by the Landscape Architect.

10.2.17 LANDSCAPE EDGER

Landscape edger shall be "Permaloc Cleanline" or equal, 3/16" x 5 ½" aluminum edger with aluminum stakes or pins for supports, factory painted dark green

10.2.18 INTEGRAL COLORED CONCRETE

(1) Refer to *Article 4 - Non-Structural Concrete* for the concrete mix requirements.

(2) Integrally colored concrete used on the project shall be Davis Color, as noted on plans, and installed per the manufacturer's specifications.

(3) Coloring pigment added must be determined by weight. Visual bag splitting will not be permitted.

(4) All aggregate materials must be supplied from the same source and must be nonreactive.

(5) Cement for the entire project must be supplied from the same source and must be the same type and brand.

(6) For each specified color, maintain the same weight ratio pigment to cement for all colored concrete that is placed.

(7) The curing and sealing compound for colored concrete shall be of the same manufacturer as the colored admixture, for use with integrally colored concrete, and shall conform to
ASTMC309.

10.2.19 PLANT MATERIALS

(1) Plant Quality:

a. Plants: First class representatives of specified species or variety or cultivar, in healthy condition with normal well developed branch and root systems, free of

all objectionable features, and in conformance with the requirements of AJCH, American Standard for Nursery Stock and Colorado State Nursery Act. Where standards may conflict, use the standard that requires the highest quality of performance.

i. Trees: Fully branched in proportion to width and height. Minimum acceptable sizes of plants measured before pruning with branches in normal position, shall conform to the measurements as specified in the plant list furnished. ii. Larger plants than specified may be used, if accepted, at no additional cost to the Landscape Architect.
iii. All plants must be a minimum of 2 years old.

b. Source: Plants grown in Hardiness Zones 2, 3, 4 and 5 only will be accepted. Plants shall be nursery grown. The term "nursery grown" includes native plants and imported plants that have been growing in a nursery for a minimum of one growing season. Trees and shrubs shall have been root-pruned during their growing period in the nursery in accordance with standard nursery practice.

i. Hardiness Zones: Defined in U.S. Department of Agriculture publications. ii. Grower's Certificates: Required when doubt exists as to origin of plant material.

c. Insects, Pests and Plant Diseases:

i. Trees and Shrubs: Healthy, free of diseases, insects, eggs, larvae, or parasites of objectionable or damaging nature. ii. Coniferous Trees: Spray at time of installation and periodically as required to exclude infestation until final acceptance.

d. Inspection: Subject to inspection and acceptance. Landscape Architect reserves right to reject at any time or place prior to final project acceptance, any and all materials and plants which in the Landscape Architect's opinion fail to meet these specification requirements. Inspection is primarily for quality; however, other requirements are not waived when visual inspection results in acceptance. Plants may be inspected where growing, but inspection at the growth site shall not preclude the right of rejection at the site.
e. Promptly remove rejected plants and other materials from the site.

(2) Plants Required: Species (botanical name), size, manner in which to be furnished and quantity required to complete the planting, are listed and indicated by symbol on the drawings.

a. In the event discrepancies occur between the quantities of plants indicated in the schedule and indicated by symbol on the drawings, plant quantities indicated by symbol on the drawing shall govern.

(3) Procurement: The entering of a proposal and execution of a contract will be construed as evidence that the Contractor has made successful procurement arrangements for the plant materials as specified.

(4) Substitutions: Substitutions will not be accepted, except with written permission of the Landscape Architect.

10.2.20 ROOT BARRIER

Root Barrier shall be Century Root Barrier, CR2420, as supplied by:

Century Products USA 1144
North Grove St.
Anaheim, CA 92806
Ph. 714-632-7083
Fax: 714-632-5470 www.centuryrootbarrier.com

10.3 EXECUTION

10.3.1 FINISH GRADING AND SITE PREPARATION

Preparation:

(1) Protection

a. Trees, shrubs, and other plants

i. Protect the trunks and roots of existing trees on site, which are intended to remain. Do not use heavy equipment within branch spread or within the dripline of the tree. Interfering branches may be removed only at the direction of the Landscape Architect or City Engineer. Protect other plants and features which are to remain. Do not expose or damage existing shrub or tree roots.

(2) During preliminary grading, dig out weeds from planting areas by their roots and remove from the site.

(3) Remove from the site rocks larger than 2 inches in size and foreign matter such as building rubble, wire, cans, sticks, concrete, etc., before placing topsoil.

Performance:

(1) Add necessary amendments and redistribute existing topsoil stored on site and provide additional borrow backfill material to bring the surface to within 1” below the finish walk or curb grades.

(2) Direct surface drainage in the manner indicated on drawings by molding the surface to facilitate the natural run-off of water. Fill low spots and pockets with topsoil and grade to drain properly.

10.3.2 ROCKWORK

General:

(1) Construct rockwork with natural rock, at locations shown on the drawings or as directed by the Landscape Architect or City Engineer.

(2) During installation, rockwork that does not meet the quality of the submittals or samples as determined by the Landscape Architect or City Engineer shall be removed by the Contractor and replaced at no additional cost to the City. Field modifications recommended by the Contractor and approved by the Landscape Architect or City Engineer shall be made without additional cost to the City.

Preparation, Layout, and Installation:

(1) Field verify the location for boulder placement prior to installation of boulders.

(2) Handle, hoist, anchor and otherwise place boulders in the location approved by the Landscape Architect.

(3) Boulders shall be installed with no more than 2/3 of the boulder height above grade.

(4) Boulders shall be placed so that the top of the boulder is no higher than 24” above the adjacent street elevation.

(5) Contractor shall assume responsibility for the proper alignment of completed work.

Defective Materials and Rockwork:

(1) Rockwork shall be considered defective if not constructed or placed in accordance with the requirements of the drawings and specifications as determined by the Architect. Natural boulders must be held securely in a permanent position.

(2) Defective rockwork shall be removed and replaced with new rockwork acceptable to the Landscape Architect or City Engineer, unless suitable correction of defects may be otherwise accomplished as authorized by the Landscape Architect or City Engineer, and without additional cost to the City.

10.3.3 BRICK PAVING

Examination:

(1) Verification of Conditions:

a. Notify Landscape Architect or City Engineer of any discovered conflicts and discrepancies on the drawings with the conditions on the site which would prevent the proper installation of brick work.
b. Review the site and verify that other trades have completed their work and that the site is acceptable to receive the brick work.

Preparation:

(1) Controls: Lay brick work plumb and true to line and grade as indicated on the drawings and in accordance with approved standards for brick paving construction. Plan for proper drainage on brick paving surfaces.

(2) Brick on Sand Base: For subgrade preparation, see *Section 02310 - Finish Grading and Section 02315 - Excavating, Backfilling and Compacting.*

(3) Cleaning: Clean brick before setting by thoroughly scrubbing with fiber brushes and follow with a thorough drenching with clean water. Use only mild cleaning compounds containing no caustic or harsh fillers or abrasives.

(4) Setting Bed/Surface: Thoroughly clean up, sweep, brush down and scrub as required to generate an optimum substrate for accepting the brick work.

Installation of Brick on Sand Base:

(1) Soil Sterilant: Apply solution over the entire area to be paved in accordance with the manufacturer's latest printed instructions.

(2) Sand Base: Place the sand base to the thickness indicated on the drawings and thoroughly compact.

(3) Setting: Set pavers in the patterns indicated on the drawings.

(4) Joints: Set pavers snugly together with tight joints; tamp in place maintaining true line and grade.

(5) Sand Topping: Sweep the joints full of sand. Sweep excess sand from the bricks and remove.

Tolerances:

(1) Do not permit finished paving surfaces to vary more than 1/4 in. measured with a 10 ft. metal straightedge, except at grade changes.

(2) No "birdbaths" or other surface irregularities will be permitted. Correct irregularities to the satisfaction of the Landscape Architect.

10.3.4 IRRIGATION

(1) Coordination with City Parks Department - The contractor shall meet and coordinate with the appropriate City Parks Department supervisor for the new, replaced or repaired irrigation system as associated with this project and the plans and specifications.

(2) Landscape Plan Review and Coordination - Contractor will be held responsible for coordination between landscape and the irrigation system installation. Landscape

material locations shown on the Landscape Plan shall take precedence over the irrigation system equipment locations. If the irrigation equipment is installed in conflict with the landscape material locations shown on the Landscape Plan, the Contractor will be required to relocate the irrigation equipment, as necessary, at Contractor's expense.

(3) Static Pressure Verification - Contractor shall field verify the static pressure at the project site, prior to commencing work or ordering irrigation materials, and submit findings, in writing, to the Landscape Architect. If Contractor fails to verify static water pressure prior to commencing work or ordering irrigation materials, Contractor shall assume responsibility for all costs required to make the system operational and the costs required to replace any damaged landscape material. Damage shall include all required material costs, design costs and plant replacement costs.

(4) Inspection – Examine areas and conditions under which the Work of this Section is to be performed. Do not proceed with Work until unsatisfactory conditions have been corrected. Grading operations, with the exception of final grading, shall be completed and approved by the Landscape Architect or City Engineer before staking or installation of any irrigation system begins.

(5) Preparation

a. Staking shall Occur as Follows:

Mark, with powdered lime, the routing of the pressure supply line and flag heads for first few zones. Contact the Landscape Architect 48 hours in advance and request a review of the staking. Landscape Architect will advise installer as to the amount of staking to be prepared. Landscape Architect will review staking and direct changes if required. Review does not relieve the installer from coverage problems due to the improper placement of heads after staking.
ii. If the Project has significant topography, freeform planting beds, or other amenities that could require alteration of irrigation equipment layout as deemed necessary by the Landscape Architect, do not install irrigation equipment in these areas until the Landscape Architect has approved equipment staking.

b. Install sleeving under asphalt paving and concrete walks, prior to concreting and paving operations, to accommodate piping and wiring. Compact backfill around the sleeves to 95% Modified Proctor Density within 2% of optimum moisture content in accordance with ASTM D1557.

c. Trenching – Trench excavation shall follow, as much as possible, the layout shown on the drawing. Dig trenches straight and support the pipe continuously on the bottom of trench. The trench bottom shall be clean and smooth with all rock and organic debris removed.

d. Clearances

i. Piping 3 Inches and Larger - Make trenches of sufficient width (14 inches minimum) to properly assemble and position pipe in the

trench. The minimum clearance of piping 3 inches or larger shall be 5 inches horizontally on both sides of the trench. ii. Piping Smaller than 3 Inches - Trenches shall have a minimum width of 7 inches.
ii. Line Clearance - Provide not less than 6 inches of clearance between each line, and not less than 12 inches of clearance between the lines of other trades.

e. Pipe and Wire Depth:

iii. Pressure Supply Piping – 24 inches from top of pipe.
iv. PVC Sleeving – 18 inches from top of pipe. iii. Non-pressure Piping (rotor) - 18 inches from top of pipe. iv. Non-pressure Piping (pop-up) - 18 inches from top of pipe.
v. Control Wiring – Located below pressure main.
vi. Drip Tubing - 2 inches from top of pipe.
vii. Emitter Tubing (Micro-tubing) – Surface installation under fabric.

f. Boring will be permitted only where the pipe must pass under obstruction(s) which cannot be removed. In backfilling bore, the final density of backfill shall match that of the surrounding soil. It is acceptable to use sleeves of suitable diameter installed first by jacking or boring, and pipe laid through the sleeves. Observe the same precautions as though pipe were installed in an open trench.

g. Vibratory Plow - Non-pressure piping may be installed through the use of the vibratory plow method if the Landscape Architect determines soil conditions are satisfactory for this method of installation. Vibratory plowing does not relieve the installer of observing minimum pipe depths.

(6) Installation - Locate other equipment as near as possible to the locations designated. Deviations shall be reviewed by the Landscape Architect prior to installation.

a. PVC Piping

i. Snake the pipe in the trench as much as possible to allow for expansion and contraction.
ii. Do not install pipe when the air temperature is below 40° F.
iii. Place manual drain valves at low points and dead ends of pressure supply piping to ensure complete drainage of the system.
iv. When pipe laying is not in progress, or at end of each day, close pipe ends with a tight plug or cap.
v. Perform Work in accordance with good practices prevailing in piping trades.
1. Solvent Weld PVC Pipe - Lay pipe and make all plastic-to-plastic joints in accordance with the manufacturer's recommendations.

b. Drip Tubing

i. Make all fitting connections as per manufacturers recommendations.
ii. Use only a manufacturer provided or recommended hole punch when making penetrations in drip tubing for insert fittings. Use of any other

hole punch shall be cause for immediate removal and replacement of all installed drip tubing.

iii. Install drip line blow-out stubs at all dead ends of drip tubing.

c. Control Wiring

i. Low Voltage Wiring– 2-Wire:

1. Bury control wiring between the controller and electric valves in pressure supply line trenches, strung as close as possible to the main pipe lines with such wires to be consistently located below and to one side of the pipe, or in separate trenches.
2. Provide an expansion loop at every pressure pipe angle fitting, every electric control valve location (in valve box), and every 500 feet. Include a minimum of 5 feet in every valve box, 2 feet at every angle fitting and 10 feet at every future phase line.
3. Make all splices and E.C.V. connections using 3M DBY-6, King 600 DBR/Y connectors, or a similar dry splice method.
4. Install all control wire splices not occurring at the control valve in a separate splice valve box.
5. Install one decoder for each control valve or as indicated on the plans.
6. The wire paths shall be sized per distance requirements or as shown on the plan. The two-wire decoder cable shall be of the type indicated on the plans or per manufacturer recommendation.
7. The two-wire paths may be spliced, or “teed”, permitting extensions of the path in multiple directions. In general, the distance from the controller to the end of any one end of a “tee” or wire run shall not exceed the maximum for the gauge of any wire, even if the total of all wires exceeds that number. All wire splices must be made in a valve box with DBR-6 or equal direct-burial waterproof connectors.
8. Grounding of decoders and decoder wire shall occur every 500' of wire or every 8^{TH} decoder and at all ends of 2-wire decoder cable run.
9. Grounding shall occur at right angles to the wire path and shall have an impedance of 10 Ohms or less, or shall meet the standards of the Earth Grounding Guidelines by ASIC.
10. Where the limits of work consist of narrow areas that make grounding rods installed at right angles a hardship, contractor shall utilize grounding plates installed at a minimum distance of 4’ offset and parallel to the wire path. Avoid installing grounding near other electrical equipment.

ii. High Voltage Wiring for Automatic Controller:

1. Provide 120 volt power connection to an automatic controller.
2. All electric work shall conform to local codes, ordinances, and authorities having jurisdiction. All high voltage electrical work shall be performed by a licensed electrician.

d. Automatic Controller

i. Install the controller in accordance with the manufacturer's instructions as detailed and where shown on the drawings. ii. Connect remote control valves to the controller in numerical sequence as shown on drawings.
ii. Final location of the controller shall be approved by the Landscape Architect prior to installation.
iii. Each controller shall have a dedicated, separate, ground wire and grounding rod as detailed.
iv. All above ground conduit shall be rigid galvanized with appropriate fittings. vi. All below ground conduit shall be schedule 40 PVC.

e. Hydrometer Master Control Valve/Flowmeter

i. Install the cross-handle 3 inches below finished grade as shown on drawings as detailed.
ii. When grouped together, allow at least 12 inches between valve box sides.
iii. Install each remote-control valve in a separate valve box.
iv. Install each individual valve box flush with the grade.

f. Isolation Control Valve

i. All control valves shall be a threaded union.
ii. A PVC ball valve shall be installed upstream of the control valve.

g. Electric Control Valves

i. All control valves shall be a threaded union.
ii. Install the cross-handle 3 inches below the finished grade where shown on the drawings as detailed.
iii. When grouped together, allow at least 12 inches between valve box sides.
iv. Install each remote-control valve in a separate valve box.
v. Install each individual valve box flush with grade.

h. Quick Coupling Valves

i. Install quick couplers on double swing-joint assemblies of Schedule 80 PVC pipe; plumb and flush to grade.
ii. Angled nipple relative to pressure supply line shall be no more than 45 degrees and no less than 10 degrees.
iii. Install quick coupling valves as detailed.

i. Drip Valve Assemblies

i. Install drip valve assembly as detailed.

j. Drip Emitters

i. Stake all surface emitters as detailed and with acceptable tubing stakes.

k. Drain Valves

i. Install manual drain valves at all low points in the pressure supply line as detailed.
ii. Provide a three cubic foot drainage sump for each drain valve installed.

l. Valve Boxes

i. Install one valve box for each type of valve installed as detailed.
ii. Valve box extensions are not acceptable except for master valves. Install gravel sump after compaction of all trenches.
iii. Place the final portion of gravel inside the valve box after the valve box is backfilled and compacted.
iv. Brand the controller letter and station number on the lid of each valve box. Letter and number size shall be no smaller than 1 inch and no greater in size than 1 1/2 inches. Depth of the branding shall be no more than 1/8 inch into the valve box lid.

m. Gate Valves

i. Install where shown on the drawings as detailed.

n. Sprinkler Heads

i. Install sprinkler heads where designated on the drawings or where staked. Set to finish grade as detailed.
ii. Spacing of heads shall not exceed the maximum length indicated on the drawing unless re-staked as directed by the Landscape Architect. In no case shall the spacing exceed the maximum recommended length by the manufacturer.
iii. Install heads on double swing-joint risers of schedule 40 PVC pipe. An angled nipple relative to a non-pressure line shall be no more than 45 degrees or less than 10 degrees.
iv. Adjust partial circle heads for proper coverage.
v. Adjust heads to the correct height after sod is installed.
vi. Plant placement shall not interfere with intended sprinkler head coverage, piping, or other equipment.
vii. The Landscape Architect may request nozzle changes or adjustments without additional cost to the Owner.

o. Backflow Preventer

i. Install where shown on the drawings as detailed.

p. Backfilling

i. Do not begin backfilling operations until the required system tests have been completed. Backfilling shall not be done in freezing weather except with the approval of the Landscape Architect. ii. Leave trenches slightly mounded to allow for settlement after backfilling is completed. Trenches shall be finish graded prior to walk-through of system by the Landscape Architect.

iii. Materials

1. Excavated material is generally considered satisfactory for backfill purposes.
2. Backfill material shall be free of rubbish, vegetable matter, frozen materials, and stones larger than 1 inch in any dimension.
3. Do not mix subsoil with topsoil.
4. Material not suitable for backfill shall be hauled away. Contractor shall be responsible for providing suitable backfill if the excavated material is unacceptable or not sufficient to meet the backfill, compaction, and final grade requirements.

iv. Do not leave trenches open for a period of more than 48 hours. Open excavations shall be protected in accordance with OSHA regulations.

v. Compact backfill to 90% maximum density, determined in accordance with ASTM D1557 utilizing the following methods:

1. Mechanical tamping.
2. Puddling or ponding. Puddling or ponding and/or jetting is prohibited within 20'-0" of building or foundation walls.

q. Piping Under Paving

i. Provide for a minimum cover of 18 inches between the top of the pipe and the bottom of the aggregate base for all pressure and non-pressure piping installed under asphaltic concrete or concrete paving. ii. Piping located under areas where asphalt or concrete paving will be installed shall be bedded with sand (a layer 6" below pipe and 6" above pipe).

iii. Compact backfill material in 6" lifts at 90% maximum density determined in accordance with ASTM D1557 using manual or mechanical tamping devices.

iv. Set in place, cap, and pressure test all piping under paving, in presence of the Landscape Architect prior to backfilling and paving operations.

v. Piping under existing walks or concrete pavement shall be done by jacking, boring, or hydraulic driving, but where cutting or breaking of walks and/or concrete is necessary, it shall be done and replaced at no cost to the City. Obtain permission to cut or break walks and/or concrete from the Landscape Architect.

r. Water Supply and Point of Connection

i. Water supply shall be extended as shown from the water main.

(7) Field Quality Control

a. Flushing - After piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads, quick coupler assemblies, and hose valves,

thoroughly flush the piping system under a full head of water pressure from dead end fittings. Maintain flushing for 5 minutes through the furthermost valves. Cap all risers after flushing.

b. Testing - Conduct tests in the presence of the Landscape Architect. Arrange for presence of the Landscape Architect 48 hours in advance of testing. Supply a hydrostatic pump and all other test equipment.

i. Prior to backfilling, and after the installation of all control valves, fill the pressure supply line with water, and pressurize to 40 PSI over the designated static pressure or 120 PSI, whichever is greater, for a period of 24 hours (24 hour test). ii. Leakage, Pressure Loss - Test is acceptable if no loss of pressure is evident during the test period.
ii. Leaks - Detect and repair leaks.
iii. Retest system until test pressure can be maintained for the duration of the test.
iv. Before final acceptance, pressure supply line shall remain under pressure for a period of 48 hours.

(8) Adjusting - Upon completion of installation, "fine-tune" the entire system by regulating valves, adjusting patterns and break-up arms, and setting pressure reducing valves at pro-per and similar pressure to provide optimum and efficient coverage. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, and buildings as much as possible. Heads of same type shall be operating at the same pressure +/- 7%.

a. If it is determined that irrigation adjustments will provide proper coverage, and improved water distribution as determined by the Landscape Architect, contractor shall make such adjustments prior to Final Acceptance, as directed, at no additional cost to the City. Adjustments may also include changes in nozzle sizes, degrees of arc, and control valve throttling.
b. All sprinkler heads shall be set perpendicular to the finish grade unless otherwise designated.
c. Areas which do not conform to designated operation requirements due to unauthorized changes or poor installation practices shall be immediately corrected at no additional cost to the City.

(9) Cleaning – Maintain a continuous cleaning operation throughout the duration of work. Dispose of, off-site at no additional cost to the City, all trash or debris generated by the installation of the irrigation system.

(10) Maintenance

a. Furnish the following maintenance items to the City prior to final Acceptance:

i. 2 Sets of special tools required for removing, disassembling, and adjusting each type of sprinkler head and valve supplied on this Project.
ii. 2 six foot valve keys for the operation of gate valves or stop and waste valves (if applicable).

iii. 2 keys for each automatic controller, if applicable. iv. 2 quick coupler keys and 2 matching hose swivels for each type of quick coupling valve installed, if applicable.

v. Aluminum drain valve keys of sufficient length for the operation of drain valves, if applicable.

10.3.5 PLANTING AND LANDSCAPING

(1) Layout and Identification

a. The Contractor shall locate and stake all tree and shrub locations and sod limits according to the locations shown on the plans. All planting locations shall be observed and approved by the Landscape Architect, prior to planting operations. The Contractor shall make minor modifications in planting locations as directed by the Landscape Architect.

(2) Plant Protection and Delivery

a. All plant material shall be protected from the time of digging, to the time of final acceptance from injury, excessive drying winds, improper ventilation, overwatering, freezing, high temperatures, or any other condition damaging to the plant. Any plants showing evidence of poor care, or which are molded, mildewed, wilted or dried out shall be rejected.

b. Plant material shall be planted on the day of delivery or shall be placed in a temporary nursery, kept moist, shaded and protected from sun and wind. If balled and burlapped plants are not planted on the day of delivery, they shall be heeled in immediately in the temporary nursery, kept moist and protected with damp soil, moss, or other acceptable material to the full height of the root ball.

c. Plants shall not be bound with wire or rope that may damage the bark or break branches. Plants shall be lifted and handled from bottom of ball or container. Plants with balls loose, cracked or broken, man-made, or completely dry or plants with trunks loose in the ball before or during planting operations shall not be accepted and shall be removed from the site at the Contractor’s expense within 24 hours.

(3) Excavation of Planting Pit

a. All plant pits shall be centered on the location stake, and shall be excavated in a saucer shape with sloped/tapered sides and a flat bottom. The depth of the plant pit shall be measured from the finish grade of the soil, not mulch, and as detailed in the contract drawings. The base of all soil balls shall be placed on compacted backfill fill.

b. Trees: The diameter of all tree pits shall be a minimum of 3X larger than the diameter of the ball or spread of the roots or as specified in the details drawings. Remove wire baskets, bundling cords, and the top 2/3 of burlap from the trees. Except for trees planted on slopes, the top surface of all root balls shall be slightly above the adjacent finished grade. It is important not to place tree balls too low.

c. Shrubs: The diameter of all shrub pits shall be a minimum of twice the diameter of the ball or spread of roots. The base of all soil balls shall be placed on compacted backfill fill.
d. Vines and Ground Covers and Perennials: The diameter of all vine and ground cover pits shall be 6 inches greater than the spread of roots.

(4) Plant Installation Procedures

a. Planting and Staking

i. Plants shall be set in the center of the pit on compacted backfill mix. Immediately after setting the plant in the pit, all non-biodegradable materials shall be completely removed from the ball and trunk, including but not limited to plastic, metal, wire, wood, cardboard, paper, fiber, treated burlap and twine. The only exception shall be the bottoms (not sides) of fiber pots. Plant handling shall be done in such a manner as not to injure the plant root system, disturb the soil ball or in any way cause harm or stress to the plant. If the root system of a container-grown plant has become container-bound, the roots shall be gently vertically cut on four sides of the root ball prior to planting.

ii. All plants shall be placed and kept plumb and straight as the pit is filled with backfill mix. Contractor shall adjust any plant which is not perfectly upright to a plumb position prior to acceptance. . Trees and shrubs in non-irrigated areas are to have saucers built around them at the drip lines.

iii. Plant trees and shrubs with the root flare of the plant at grade level. After placing the tree in the pit, the hole around the plant root system shall be halfway backfilled with specified mix and any large air pockets removed by hand with the blunt, handle end of a shovel or other such hand tool. If the Landscape Archirect determines that the ball is excessively dry, the Contractor shall then inset a deep watering device into the ball at a 45degree angle every 8 inches for one minute. The pit shall then be completely filled with backfill mix and tamped again with the shovel. No mechanical compaction shall be allowed. The pit shall then be watered by thoroughly saturating the backfill with water to a minimum of 3 feet surface dimension. No watering shall be done prior to this time. Watering shall be repeated once when all free water has disappeared. The second watering shall not be completed if the sub grade around the pit is already moist. After the second watering, the Contractor shall add the specified mulch. All surplus soil and debris shall be removed by the Contractor. The Contractor shall stake and guy trees immediately after planting according to standard detail.

iv. For trees in grass and planting beds, the Contractor shall drive stakes 3 feet vertically into firm soil outside the plant pit. The Contractor shall run wire up to the tree trunk and through the nylon webbing wrapped around the tree at approximately ½ the height of the tree. Webbing and wire attachment between stake and tree shall be

adjusted so the straps are under just enough tension to avoid visible sag in the lines. Rigid guying shall be accepted.

v. Contractor shall place stakes according to the construction detail. The Contractor shall return to the site and remove stakes one year from planting.

b. Wrapping, Pruning, and Mulching

i. Wrapping - Trees shall be wrapped with two layers of crinkled paper cemented together with bituminous material, four-inches (4") wide minimum, with a stretch factor of thirty-three percent (33%).
ii. Pruning – Prune only damaged or dead branches as directed by the Project Manager.
iii. Mulch –
1. Trees: Create a forty-eight-inch (48") diameter by four inch (4") high formed soil berm around the tree and fill with four-inch (4") deep specified wood mulch. Mulch shall be kept four to six inches (4"-6") away from tree trunk.
2. Shrubs: Mulch backfilled surfaces of pits, planting beds areas, and other areas indicated or as directed by the Project Manager. Apply four-inch (4") thick layer of mulch and finish level with adjacent finish grades. Do not place mulch against the stems of plants.

c. Backfill for Trees and Shrubs

i. Organic Soil Amendment: 33% volume of backfill.
ii. Planting Pit excavated material: 67% volume of backfill.
iii. Fertilizer Tablets: One 21 gram fertilizer tablet for each ½" of tree trunk caliper and one tablet per 12 inches height, or spread (whichever is greater) for each shrub.
iv. Insecticide: Trees: Install 1.0 to 1.4 level teaspoons per one-inch of trunk diameter (D.B.H., At Breast Height); Minimum (1) teaspoon per 2" caliper tree. Shrubs: Install 0.7 to 1.4 level teaspoons per one-foot of height of shrub.

(5) Soil Preparation

a. Soil preparation and mulching for all landscape areas, including seed and sod:

i. Finish grading shall be performed to fill in erosion gullies on slopes identified on the drawings. Where the use of large machinery is difficult, finished grade shall be worked with smaller equipment or by hand.
ii. Remove all rubble, stone and extraneous material over two (2) inches in diameter from the site.
iii. For planting areas, apply "Roundup" or equal short-term herbicide to inhibit unwanted plant growth prior to seeding. Apply in accordance with the manufacturer's recommendation for this purpose and sufficiently in advance of planting to avoid damage to new plants and grass.

iv. Spread approved topsoil and the following amendments to the areas specified on the drawings. Do not rototill or disk topsoil dressing. Seeding to follow within 7 days of topsoil application.
    1. Organic Soil Amendment: Apply 3 cubic yards per 1,000 square feet.
    2. Commercial Fertilizer (18-46-0): Apply 15 lbs of available Nitrogen per 1,000 square feet.
    3. Substantiate quantities with delivery tickets and empty manufacturer bags on a daily basis to the City.
v. Refine grade to restore smooth even finish grades and to ensure positive surface drainage. No planting shall take place until the Landscape Architect accepts the final grade.
vi. Moisten prepared sod/seed areas before planting if the soil is dry. Water thoroughly and allow the surface moisture to dry before planting lawns. Do not create a muddy soil condition.
vii. Apply mulch a minimum of 4-inches thick to completely cover the root ball.

(6) Installation of Landscape Edger

a. Contractor shall install edging per the manufacturer's recommendation. Edging shall be installed between all plant beds and sod/seeded area, or as shown on the plans.

(7) Schedule

a. No planting work shall take place during freezing or excessively windy or wet weather or when the ground conditions are, in the opinion of the Landscape Architect, not in a condition to be properly worked. Contractor shall include time in their schedule for work stoppage due to inclement weather or ground conditions. Inclement weather or ground conditions shall not be a cause for an extension of the project completion date unless written approval has been obtained from the City for extension of the project completion date.
b. No planting work shall commence until the adjacent site improvements, pavements, utility installation and finish grading are completed. The Contractor shall limit their use of heavy equipment on pavement and planted areas. In all cases, the Contractor shall be responsible for all damage to existing conditions.

(8) Maintenance, Acceptance, and Guarantee

a. Maintenance period shall begin immediately after each area is planted based on the following requirements:
    i. All plants shall be protected and maintained until final acceptance of all work. Maintenance shall include mowing, watering, weeding, cultivating, mulching, tightening and repairing of guys, adjusting metal edging, the removal of dead branches, resetting plants to proper grade or upright position, barricading the site and any other necessary operations. The Contractor shall provide all water and equipment necessary for maintenance throughout the duration of the contract.

Water is available at the planting site. After final acceptance, maintenance becomes the responsibility of the City.

ii. If during the duration of the contract period, but prior to final acceptance, any of the plants die or if they are, in the opinion of the Landscape Architect , in an unhealthy or unsightly condition or if they have lost their natural shape due to dead branches or excessive pruning of branches, then the Contractor shall replace the material at the Contractor's expense. This replacement shall be completed prior to final acceptance of the project and shall not void the two-year guarantee.

b. Prior to final acceptance, the Contractor shall furnish four (4) copies of written maintenance instructions to the City for the maintenance and care of all new planted areas for the initial three (3) years after installation. These instructions shall include but not be limited to staking, pruning, insect and disease control and fertilizing.

c. Guarantee:

i. For a period of two (2) years after final acceptance of all work and at no additional cost to the City, the Contractor shall replace any plants that have died, or are partially dead, if they are in the opinion of the Landscape Architect, in an unhealthy or unsightly condition, or they have lost their natural shape due to dead branches or excessive pruning of dead branches. Inadequate or improper maintenance by the City shall not be cause for replacement by the Contractor provided the Contractor shall have submitted throughout the guarantee period a bi-weekly letter of report to the City on improper or inadequate maintenance practices and recommended remedial actions. The Contractor shall apply a "new" two-year guarantee period to each replacement plant that is installed.

ii. The Contractor shall guarantee all plants to be true to name and to meet all conditions of these specifications. Any plant which is not true to name as indicated by leaf, flower form, or fruiting characteristics revealed within the guaranteed period shall be replaced by the Contractor at the Contractor's expense.

iii. All replacement planting under the guarantee provision shall be executed within one month of notice to replace such plants. Upon the Landscape Architect's written approval, the Contractor shall replace rejected plants at a later date, mutually agreed upon, provided that the Contractor removes all rejected plants within seven (7) days of the notice to replace such plants. If the rejected plants are not removed in seven (7) days, the City may at their option remove these plants and the cost of the removal shall be charged to the Contractor.

iv. Replacement planting is to be in accordance with the original specifications and its cost considered to be included in the bid price. All areas damaged by tree or shrub planting or replacement operations are to be fully restored to their original conditions as specified.

10.3.6 TOPSOIL

(1) Preparation of Subgrade

a. Grade soil, eliminating uneven areas and low spots, ensuring positive drainage towards the storm drains. Remove soil that is contaminated with toxic materials or has materials detrimental to growth such as asphalt, concrete and debris which has contaminated the subgrade soil. Dispose of removed materials legally off site. If hazardous materials are discovered notify the City immediately.

b. Cultivate the area subsoil that is to receive topsoil to a depth of 12" in all areas, especially in those areas where equipment used for hauling and spreading has compacted the soil. A no-till drill will execute the seeding of the site; A minimum disturbance is required. Additional cultivation of disturbed or compacted areas shall be at the cost of the contractor.

c. Remove surface debris, roots, vegetation, branches and stones in excess of 3" diameter.

(2) Spreading of Soil Mixture

a. Coordinate efforts with other trades. Under no circumstances is the soil mixture to be spread if other trades have not completed their work; this could contaminate or compact the installed soil mixture.

b. Spread soil after the Landscape Architect has inspected and provided written approval of the subgrade preparation in terms of slope, scarification and depths. Do not spread soil in a frozen or saturated condition.

c. Spread soil mixture with adequate moisture in uniform layers over the approved subgrade, where planting is indicated.

d. For soil application around trees see the appropriate section of this Article.

e. Manually spread soil mixture around trees, shrubs and obstacles.

(3) Finish Grading of Soil Mixture

a. Grade soil, eliminating uneven areas and low spots, ensuring positive drainage away from buildings and towards storm drainage systems. Remove soil contaminated with toxic materials. Remove surface debris, roots, vegetation, branches, stones in excess of 3" diameter, and all extraneous material. Dispose of the removed materials. Prepare loose, friable beds by means of hand cultivation and subsequent raking. Following planting, mulch planted shrub beds with a depth of 5" gravel mulch and rake smooth.

10.3.7 SODDING

(1) Delivery, Storage, & Handling:

a. Cut and lift sod by approved methods. Cut sod in pieces approximately ¾ to one inch thick and a **minimum 30" width**. Roll or fold sod so it may be lifted and handled without breaking or tearing and without the loss of soil.

b. Schedule deliveries to coincide with soil preparation and finish grading. Keep storage at the job site to a minimum without causing delays.

    i. Deliver, unload and store sod on pallets within 24 hours of being lifted.
    ii. Do not deliver small, irregular or broken pieces of sod.

c. Storage

    i. During Wet Weather - Allow sod to dry sufficiently to prevent tearing during lifting and handling. ii. During Dry Weather - Protect sod from drying, water as necessary to ensure its vitality and prevent excess loss of soil in handling. Sod that dries out will be rejected.

(2) Timing of Installation:

a. Placement of Sod:

    i. Irrigated & Non-Irrigated Areas: Within seven (7) calendar days after the completion and acceptance of finish grading in any area.
    ii. There shall be no installation of sod between October 1 and April 1.

(3) Installation:

a. Lay sod during the growing season. Sodding during the dry summer period, at freezing temperatures, or over frozen soil is not acceptable.
b. Lay sod within 36 hours of it being lifted.
c. Lay sod in rows with the joints staggered. Butt sections closely without overlapping or leaving gaps between the sections. Cut out irregular or thin sections with a sharp knife.
d. Lay sod flush with the adjoining, existing sodded surfaces. Top of sod dirt shall be 2 inches below the top of concrete walks or curbs.
e. After sodding has been completed, roll horizontal surface areas in two directions perpendicular to each other.
f. Repair and re-roll areas with depressions, lumps, or other irregularities.
g. Heavy rolling to correct irregularities in the grade will not be permitted.
h. Water the sodded areas immediately after laying to obtain moisture penetration through the sod into the top 4 inches of topsoil.
i. Replace damaged areas at no additional cost to the City.

(4) Field Quality Control:

a. Final Acceptance -

    i. Sodded areas will be accepted at final inspection if –
        1. Sodded areas are properly rolled and turf is established (including that the roots have begun to develop).
        2. Sod is free of bare and dead spots and without weeds.
        3. No surface soil is visible when the grass has been cut to a height of 2 inches.
        4. Sodded areas have been mowed a minimum of two times.

(5) Protection:

a. Protecting sodded areas against traffic or other use immediately after sodding is completed by placing adequate warning signs and barricades.
b. Provide adequate protection of the sodded areas against trespassing, erosion, and damage of any kind. Remove this protection after the Landscape Architect has accepted the sodded areas.

(6) Maintenance:

a. Contractor shall maintain sodded area (including mowing, watering, removing weeds and resodding) until the Landscape Architect has accepted the sodded areas.
b. The Contractor shall maintain the sodded area until the Landscape Architect has accepted the project.
c. The maintenance includes:

i. Managing the irrigation schedule and repairs to the irrigation system as necessary.
ii. Maintaining acceptable coverage on all newly sodded areas to guarantee growth of the plant materials.

iii. Mowing, if applicable, to control weed growth and recommended growing height per supplier. If weed population is high, then clippings shall be collected. Frequency of mowing shall be done per the supplier's recommendations to guarantee a healthy and flourishing turf condition. If mowing is not possible, then the Contractor may use herbicides as necessary once the vegetation is at a mature stand and can handle the chemicals. If herbicide does damage the vegetation stand, then the Contractor will be responsible for reestablishing the vegetation stand at the Contractor's expense.

iv. Trimming shall be done where mowers are unable to reach.

v. Clippings shall be removed from all hard surfaces.

vi. Provide suitable signage notifying the public to keep off the seeded areas, providing barricades as needed.

vii. Apply fertilizer as necessary, typically four (4) times per year.

10.3.8 Root Barrier

(1) Installation:

a. Cut the desired length of molded roll material and install directly alongside hardscapes where shown on the plan.
b. Connecting: Connect the ends by overlapping two 6" sections with the leading rib cut directly down the middle. Glue the surface using Century sealant or equal.

c. When necessary, use an umbrella Cement nail to tack up the barrier. This must be used above the grade or water line.
d. Vertically integrated and flared, molded 90 degree root deflecting ribs are always facing the root ball.
e. Always install the root barriers 2” above the grade to prevent root penetration above the barrier.
f. Backfill with existing native soil. If necessary for drainage, use gravel or crushed rock. Avoid backfill less than ¾” or greater than 1-1/2” in diameter. Finish to grade. Do not distort the barrier during installation.

10.3.9 Seeding

(1) Timing of Installation:

a. No-Till Drill Seeding:
    i. Irrigated Areas: Within fourteen (14) calendar days after the completion and acceptance of finish grading in any area.
    ii. There shall be no seeding between September 20 and April 15.

(2) Preparation:

a. Excessive Soil Moisture: Do not commence with the work of this section when soil moisture content is so great that excessive compaction will occur.
b. Inadequate Soil Moisture: Apply water, as necessary, to bring the soil to optimum moisture content for planting. Do not work soil when it is so dry that dust will form in the air or that clods will not break readily.
c. After Site Preparation is completed, Contractor shall receive approval from the Landscape Architect prior to seeding.

(3) Mulching:

a. Application:

i. All areas to be seeded shall be mulched.

ii. Mulch should be applied immediately prior to seeding. The period between mulching and seeding shall not exceed 2 weeks.

iii. Rate of mulching shall be 1.5 tons per acre.

iv. Mulch shall be uniformly applied over the designated area.

v. Mulch shall be anchored in place immediately following application (the same day as applied).

vi. A mulch crimper, with flat serrated disk shall be used to anchor the mulch into the soil. The disk shall be not less than ¼ inch in thickness, shall have dull edges, and shall be spaced not more than nine inches apart. The disk shall be of sufficient diameter to prevent the frame of the equipment from dragging the mulch over the mulched area with anchoring equipment. The depth of cut shall be 3 to 4 inches.

Care must be exercised so that a minimum amount of soil will be disturbed.

(4) Field Quality Control:

a. Tests: Samples of materials may be taken and tested for conformity to the Specifications at any time.
b. Rejected Materials: Remove rejected materials immediately from the site at the Contractor's expense. Contractor shall pay the costs of testing materials that are not meeting specifications.

(5) Acceptance:

a. Contractor shall reseed areas that are thin or weak 14 days after the initial seeding. Contractor shall reseed (and keep reseeding) until there are no bare, thin or weak spots greater than a 12 square inch area.
b. Maintenance – Contractor shall maintain the turf area (i.e. mowing, watering and reseeding) until the Landscape Architect has accepted the lawn. The maintenance period includes the time period from initial seeding to final acceptance of the turf area, which may be a different date than the acceptance of the other facilities in the project. It will be the responsibility of the Contractor to establish a stand of grass that has no bare, weak or thin spots greater than a 12 square inch area and to maintain the lawn until the stand of grass has been achieved. From that date, a one – year warranty will begin on the lawn area.

10.3.10 TREES AND PLANTS

(1) Quality Assurance

a. Regulatory Requirements:

i. Plants: In conformance with the requirements of AJCH (plant names shall meet standards of AJCH), American Standard for Nursery Stock and Colorado State Nursery Act.
ii. Comply with federal, state and local laws requiring inspection for plant disease and infestations. Inspection certificates required by state law shall accompany each shipment of plants and the certificates will be delivered to the City. Inspections are to be performed in the state of origin.

b. Transport plant materials in enclosed or tarped vehicles to minimize damage from the wind and sun. Contractor is to carefully schedule and monitor shipments to minimize shipping time and to ensure the careful handling of plants.
c. Shipments of plants will be carefully inspected by the Engineer and/or Landscape Architect at the site at the time of off-loading from trucks to verify compliance with the above shipping requirements.
d. Substitutions of plant materials will not be permitted unless authorized in writing by the Landscape Architect. If proof is submitted that the plant specified is not

obtainable, a proposal will be considered for using the nearest equivalent size or variety with corresponding adjustments of Contract Price.

e. Landscape Contractors shall provide two previous project examples of similar size and scope with their bids.
f. Personnel: Employ only qualified personnel familiar with the required work.

(2) Delivery, Storage, and Handling

a. Preparation:

i. Plants: Containerized or balled and burlapped (B & B) with limbs bound, properly pruned and prepared for shipping in accordance with accepted industry standards and in a manner that will not damage roots, branches, shape, short and long term health, and future development. Size of root ball shall be as defined in the American Standard for Nursery Stock (American Association of Nurserymen; latest edition). Keep root systems moist and protect plants from adverse conditions due to climate and transportation between the time they are dug and actual planting. Spray broad-leafed trees planted in full leaf with Protec 400W Anti-transpirant or accepted substitute prior to delivery to the site. Apply according to the manufacturer's directions.
ii. Identification: Grower's label affixed to the plant which contains data necessary to indicate conformance to the Specifications. Use durable waterproof labels with water resistant ink that will remain legible for at least 60 days.
iii. Notify the Landscape Architect a minimum of two weeks prior to the delivery of plant materials to site so that a pre-delivery inspection may be made. Alternatively, indicate a delivery schedule in advance so that plant material may be inspected upon arrival at the job site, whichever is more appropriate.

b. Delivery:

i. Deliver packaged material in sealed containers showing weight, analysis and the name of the manufacturer. Protect materials from deterioration during delivery and while stored at the site.
ii. ii. Deliver only plant materials that can be planted in one day unless adequate storage and watering facilities are available on the project site.
iii. Protect B & B root balls during shipping with proper handling techniques; cracked or crumbling root balls will be rejected. Protect root balls at the site by maintaining a thorough moisture; heel in with sawdust (or comparable material) if not planted within 24 hours of delivery. Maintain the root ball in a moist condition and do not allow it to dry out.
iv. Tree trunks are to be wrapped in burlap during transportation and installation to avoid trunk damage. Trees with trunk damage will be rejected.
v. Notify the Landscape Architect or City Engineer of the delivery schedule a minimum of 48 hours in advance so that plant material can be inspected prior to unloading from trucks.
vi. Remove rejected material immediately from site.

vii. Do not lift, move, adjust to plumb, or otherwise manipulate plants by the trunk or stems.

c. Handling:

i. Do not drop plants. Do not lift plants by the trunk, stems or foliage.
1. Ball of Plant: Natural, not made. Handle plant by the root ball at all times. Plants will not be accepted if the root ball is broken or the trunk is loose in the ball.

ii. Protect plants from drying out or other injury.
1. Prune minor, broken and damaged roots before planting. Treat minor wounds immediately to prevent disease and insect infestation.
2. Major damage will be cause for rejection as determined by the Landscape Architect.

(3) Maintenance

a. General: Maintain trees, shrubs and ground cover in a healthy vigorous state until final acceptance of the entire project. Provide all supervision, labor, material, equipment and transportation required to maintain plants under the requirements of this section.
b. Materials: Conform to the Specifications or otherwise be acceptable to the Landscape Architect.
c. Replacement: Replace and replant plants damaged by the Contractor's operations and negligence, and according to *WARRANTY* of this section.
d. Watering: Water deeply (8-10") when soil moisture is below optimum level for the best plant growth. Water woody plants in any winter month that snow or rain does not provide at least 1" of precipitation.
e. Wrapping: After all trees have been inspected and accepted by the Landscape Architect, wrap deciduous tree trunks with standard nursery crepe wrap material from the ground level to the first limb after pruning. Tape securely at the top and bottom. Remove wrapping for spring and summer and replace it in the fall.
f. Staking and Guying: Inspect at least two (2) times per year (spring and fall) and assure conformance with the following:

i. Webbing strap in good condition.
ii. Trunks and branches are not girdled by the webbing strap.
iii. iii. Guy wires secure but not taut.
iv. iv. Stakes secure.
v. Trees plumb.

g. Pruning: Prune only damaged or dead branches in accordance with the Specifications in this section.
h. Mulching: Supplement mulch around trees in accordance with the Specifications in this section.
i. Weed Control: As required, use selective herbicides approved by the Landscape Architect.
j. Insect and Disease Control: As required, use insecticides and fungicides approved by the Landscape Architect.

(4) Plant Protection and Delivery

a. All plant material shall be protected, from the time of digging to the time of final acceptance, from injury, excessive drying or winds, improper ventilation, overwatering, freezing, high temperatures, or any other condition damaging to the plant. Any plants showing evidence of poor care, or which are molded, mildewed, wilted or dried out shall be rejected.
b. Plant materials shall be planted on the day of delivery or shall be placed in a temporary nursery, kept moist, shaded and protected from the sun and wind. If balled and burlapped plants are not planted on the day of delivery, they shall be heeled in immediately in the temporary nursery, kept moist and protected with damp soil, moss, or other acceptable material.
c. Plants shall not be bound with wire or rope that may damage the bark or break branches. Plants shall be lifted and handled from the bottom of the root ball or container. Plants with root balls that are loose, cracked, broken, man-made, or completely dry, or plants with trunks loose in the ball before or during planting operations shall not be accepted and shall be removed from the site at the Contractor's expense within 24 hours.

(5) Preparation

a. Plants: Do not begin planting until deficiencies are corrected or plants replaced.
b. Protection:
    i. Be responsible for the proper repair of underground pipe, electric wiring, or other subsurface improvements damaged by operations under this Section.
    ii. Be responsible for proper repair to walls, pavements and any other structural surfaces damaged by the operations under this Section.
    iii. Pay for repairs made by contractors designated by the City.
    iv. Be responsible for replacement of vandalized materials not yet installed. Report all cases of vandalism promptly to the City .

(6) Excavation of Planting Pit

a. All plant pits shall be centered on the location stake and shall be excavated in a saucer shape with vertical sides and a flat bottom. The depth of the plant pit shall be measured from the finished grade of the soil, not mulch. The base of all soil balls shall be placed on compacted backfill fill.
b. Trees: The diameter of all tree pits shall be a minimum of 3X larger than the diameter of the ball or spread of the roots. There shall be a minimum 3" clearance between the bottom of the root ball and the plant pit for balled and burlapped stock. Trees are to have wire baskets, bundling cords, and the top 2/3 of the burlap removed. Except for trees planted on slopes, the top surface of all root balls shall be flush with the adjacent planting beds or with the subgrade below the sod. It is important not to place tree balls too low.
c. Shrubs: The diameter of all shrub pits shall be twice the diameter of the ball or spread of the roots. There shall be a minimum 6” clearance between the bottom of the root ball and the plant pit. The base of all root balls shall be placed on compacted backfill fill.

d. Vines and Ground Covers and Perennials: The diameter of all vine and ground cover pits shall be 6 inches greater than the spread of the roots.

(7) Planting

a. General:

i. Center trees in the trench as dimensioned on drawings.
ii. Face for best effect.
iii. Set the plant plumb and hold rigidly in position until the soil has been lightly tamped around the ball or container roots.

b. Balled and Burlapped Plants (B & B):

i. Plants shall be set in the center of the pit on compacted backfill mix. Immediately after setting in the pit, all non-biodegradable materials shall be completely removed from the ball and trunk, including but not limited to plastic, metal, wire, wood, cardboard, paper, fiber, treated burlap and twine. The only exception shall be that the bottom (not sides) of fiber pots and plant handling shall be done in such a manner so as not to injure the plant root system, disturb the soil ball or in any way cause harm or stress to the plant. If the root system of a container-grown plant has become container-bound, the roots shall be gently, vertically cut on four sides of the root ball prior to planting.
ii. ii. Plant trees and shrubs with the root flare of the plant at grade level. All plants shall be placed and kept plumb and straight as the pit is filled with backfill mix. Any plant which is not perfectly upright and plumb prior to final acceptance shall be adjusted by the Contractor to a plumb position. Trees and shrubs in non-irrigated areas are to have saucers built around them at the drip line.
iii. After placing the plant in the pit, the hole around the plant root system shall be halfway backfilled with the specified mix and any large air pockets removed by hand with the blunt, handle end of a shovel or other such hand tool. If the Landscape Architect determines that the ball is excessively dry, the Contractor shall then inset a deep watering device into the ball at a 45 degree angle every 8 inches for one minute. The pit shall then be completely filled with backfill mix and tamped again with the shovel. No mechanical compaction shall be allowed. The pit shall then be watered by thoroughly saturating the backfill with water to a minimum of 3 feet. No watering shall be done prior to this time. Watering shall be repeated once, when all free water has disappeared. This second watering shall not be completed if the subgrade around the pit is already moist. After watering, the Contractor shall add the necessary soil to establish the finish grade level before adding specified mulch. All surplus soil and debris shall be removed by the Contractor. The Contractor shall stake and guy trees immediately after planting according to the standard detail.

c. Container-Grown Plants at Planter Pots:
i. Can Removal:

1. Knockout Cans: Do not cut the sides. Tap the can and gently remove the plant.
2. Straight-Side Cans: Cut the cans on 2 sides with an acceptable can cutter. Do not cut with a spade or axe.

ii. Carefully remove plants without injury or damage to the root ball. After removing the plant, vertically score the root ball using a sharp knife, about 1/4” deep and every 2” to 3” in circumference.
iii. Biodegradable container installations must be accepted prior to planting.
iv. Dig planting holes as specified.
v. Hand place plants on firmly compacted soil. Hand backfill and hand tamp leaving slight depression around outer circumference of planting area.

(8) Anchoring and Guying of Trees

a. Root ball Anchoring:

i. Anchor the root balls of trees as standard method per the details and notes on the plans.
ii. Trees shall remain plumb and straight from installation through the warranty period.
iii. Trees shall be supported immediately after planting. All trees shall be root ball anchored and wrapped (depending on date of installation) as detailed and anchored as detailed and/or per manufacturer’s recommendations. Wrap smooth barked trees as part of maintenance work in the fall. Refer to planting and tree grate details.
iv. Mock-Up: Install mock-up of manufactured project at the job site per the manufacturer's instructions for review and acceptance by the Landscape Architect.

Tree Caliper @ 12-in Above Grade	Root ball Anchor Kit
Up to 3 inch	Duckbill 68 RBK Kit
Up to 6 inch	Duckbill 88 RBK Kit

b. Guying and Wrapping:

i. Stake and guy all trees not receiving root anchoring.

Tree Caliper @ 12-in Above Grade	No. of Guys	Size	Turn-Buckle	Deadmen/Anchor
2-6 inch	3	1/8”x7x7	3/8”x10-5/8	4x4x24, 18” deep
6-8 inch	3	3/16”x7x7	3/8”x10-5/8	6x6x30, 30” deep

ii. Root ball anchor or stake all trees immediately after planting, as shown on the planting details. Do not plant trees that cannot be anchored, or staked and guyed properly before the workday ends.

iii. Wrap all deciduous tree trunks per planting details no later than November 15. Before wrapping, the Landscape Architect should inspect tree trunks for injury, improper pruning, and insect infestation. Contractor shall remove all wrappings by May 21.
iv. Trees shall remain plumb and straight from installation through the warranty period.
v. Tree support shall be done as outlined on the following tables.
vi. Trees shall be supported immediately after planting. All trees shall be guyed and wrapped as detailed, or anchored as detailed and/or per the manufacturer's recommendations. Wrap smooth barked trees as part of maintenance work in the fall. Refer to planting and tree grate details.
vii. Wire and Positioning: Wire shall be passed through grommets in nylon straps to prevent direct contact with the bark of the tree and placed around the trunk in a single loop above the lowest branch. Wire shall be tightened and kept taut by twisting the strands together. Guy trees above the first point of branching, with guys spaced equally around and outside the perimeter of the ball. Cover guys with a specified tree collar at points of contact with the bark. Position guys at crotches and fasten to a deadman. All exposed wire is to be covered by white PVC pipe per the planting details.
viii. Turnbuckle: Provide one (1) turnbuckle for each guy. Use 2 cable clamps at each cable connection. Place white plastic guy covers on all guys.
ix. Mock-Up: Install a mock-up of the manufactured project at the job site per the manufacturer's instructions for review and acceptance by the Landscape Architect.
x. Contractor shall return to the site after one year and remove stakes.

(9) Schedule

a. No planting work shall take place during freezing, excessively windy or wet weather or when the ground conditions are, in the opinion of the Landscape Architect, not in a condition to be properly worked. Contractor shall include time in his schedule for work stoppage due to inclement weather or ground conditions. Inclement weather or ground conditions shall not be cause for an extension of the project completion date unless written approval has been obtained from the Landscape Architect for an extension of the project completion date.
b. No planting work shall commence until the adjacent site improvements, pavements, utility installation and finish grading are completed. The Contractor shall limit his use of heavy equipment on pavements and planted areas. In all cases, he shall be responsible for all damage to existing conditions.

(10) Plant Installation in Winter

a. When minimum night temperatures drop below 40º F, the following operations will be adhered to:

i. Preparation for field installation of plant materials shall be such that newly-delivered plants can be installed immediately and not maintained in temporary storage.
ii. Broadleaf evergreens and coniferous plants installed after December 1st should be treated with an approved anti-desiccant according to the manufacturer's recommendations.
iii. Where specified, backfill should be placed around plants immediately following planting. Leaving the tops of root balls exposed for more than 24 hours is unacceptable.
iv. Installation contractors should closely monitor the soil moisture levels of plant root balls. Inspect moisture levels weekly and adjust irrigation controllers accordingly. Soils should be moist but not saturated. Do not irrigate soils that contain adequate moisture.

(11) Watering

a. Plants shall be watered immediately after planting. After the first watering, water shall be applied to plants as conditions require to keep the plants in a healthy and vigorous growing condition until completion of the Contract.

(12) Pruning

a. Trees: A licensed tree surgeon shall prune trees as necessary under direction of the Landscape Architect immediately following installation.
b. New Plant Material: Prune the minimum necessary to remove injured twigs and branches, deadwood, and suckers and as required to insure a healthy plant representative of the species and in keeping with accepted horticulture practices.

i. Prune any damaged or dead roots or branches back to and slightly above, the nearest healthy side bud, but at angle from the remaining portion not exceeding 45 degrees.
ii. Evergreen: Trim only damaged or dead foliage and/or branches.
iii. Do not prune leaders. On cuts over 1" diameter, trace the injury back to living tissue, smooth and treat with an accepted tree wound dressing.

(13) Mulching - Where used, mulch shall be placed within 2 days of planting and a minimum of 4-inches deep to a radius of 3-feet. Mulch shall not be placed within 6 inches of the trunk.

(14) Maintenance, Acceptance, and Guarantee

a. Maintenance period shall begin immediately after each area is planted based on the following requirements:

i. All planting shall be protected and maintained until final acceptance of all work. Maintenance shall include watering, weeding, cultivating, mulching, tightening and repairing of guys, removal of dead branches, resetting plants to proper grade or upright position, barricading the site and other necessary operations. The Contractor shall provide all water

and equipment necessary for maintenance during the duration of the contract. Water is available at the planting site. After final acceptance, maintenance becomes the responsibility of the City.

ii. If during the duration of the contract prior to final acceptance, any of the plants die, or if they are, in the opinion of the Landscape Architect, in unhealthy or unsightly condition or if they have lost their natural shape due to dead branches or excessive pruning of branches, then the Contractor shall replace the material at his expense. This replacement shall be completed prior to final acceptance of the project and shall not void the one-year guarantee.

iii. Minor vandalism, theft, or other damage to the plants or related work shall be the responsibility of the Contractor until all work receives final acceptance.

b. Prior to final acceptance, the Contractor shall furnish four (4) copies of written maintenance instructions to the City for maintenance and care of all new planted areas for the first 3 years after installation. These instructions shall include but not be limited to staking, pruning, insect and disease control and fertilizing.

c. Guarantee

i. For a period of two years after final acceptance of all work and at no additional cost to the City, the Contractor shall replace any plants that have died or are partially dead due to unhealthy or unsightly conditions, or have lost their natural shape due to dead branches or excessive pruning of dead branches. Adverse site conditions are natural causes for the purposes of this contract. Inadequate or improper maintenance by the City shall not be cause for replacement by the Contractor, provided the Contractor has submitted throughout the guarantee period a bi-monthly letter of report to the City on improper or inadequate maintenance practices and recommended remedial actions. The Contractor shall apply a “new” one year guaranty period to each replacement plant that is installed.

ii. The Contractor shall guaranty all plants to be true to name and to meet all conditions of these specifications. Any plant which is not true to name as indicated by leaf, flower form, or fruiting characteristics revealed within the guarantee period shall be replaced by the Contractor, at the Contractor's expense.

iii. All replacement planting under the guarantee provision shall be executed within one month of notice to replace such plants. Upon the Landscape Architect’s written approval, the Contractor shall replace rejected plants at a later date, mutually agreed upon, provided that the Contractor removes all rejected plants within seven days of the notice to replace such plants. If the rejected plants are not removed in 7 days, the Landscape Architect may at their option remove these plants and the cost of such removal shall be charged to the Contractor.

iv. Replacement planting is to be in accordance with the original specifications and its cost considered to be included in the bid price. All areas damaged by tree or shrub planting or replacement operations are to be fully restored to their original condition as specified.

10.3.11 INTEGRAL CONCRETE COLORING

(1) Placing Colored Flatwork Concrete

a. The concrete consistency as denoted by the slump test should remain at the same slump + ½" for all colored concrete placed. The concrete slump shall be 3" maximum + ½" at the point of delivery. Once a portion of the batch has been placed, no water should be added to the remaining batch.
b. Concrete should always be placed in forms as near the final location as possible. Avoid using a concrete vibrator to move the concrete laterally.

(2) Finishing Colored Flatwork Concrete

a. Finishing must be done uniformly. Over troweling often results in dark spots in the colored concrete and will not be permitted. Finishing must not begin until bleed water has left the surface. No sprinkling or fogging will be permitted.

(3) Curing Colored Flatwork Concrete

a. The finished slab should be sealed with Davis seal in a matching color. Plastic sheeting or membrane paper will not be permitted.

(4) Patching Colored Concrete

a. All repair work must be done within three days of form removal so the repair and surrounding concrete age together.
b. White cement must be added to the patching mix to overcome the fact that a patch area will normally dry darker. The color added to the patch mix should be the same ratio as the original color/cement ratio.

10.6 METHOD OF MEASUREMENT

The quantities of native seeding will not be measured but shall be the quantities shown on the plans, completed and accepted; except that measurements will be made for revisions requested by the Engineer, or for discrepancies of plus or minus five percent of the total quantity shown on the plans.

The quantity of native seeding shall include fertilizer and matting (if applicable), mulch and seed, completed and accepted. The quantity of sod to be measured will be the actual number of square feet including sod preparation, fertilizer, and sod, completed and accepted.

Measurement for acres will be by slope distances.

10.7 BASIS OF PAYMENT

The accepted quantities of native seeding and sod will be paid for at the contract unit price for each of the pay items listed below that appear in the bid schedule. Payment will be made under:

Pay Item	Pay Unit
Seeding (Native)	Acre
Sod	Square Foot

Soil preparation, seed, fertilizer, mulching and erosion matting will not be paid for separately but shall be included in the work.

Cost for adjusting or re-adjusting the seeding or fertilizing equipment will not be paid for separately but shall be included in the work.

Costs for adjusting or re-adjusting the mulching equipment will not be paid for separately but shall be included in the work.

Water for seeding, mulching, hydraulic mulching, and sodding will not be paid for separately but shall be included in the work.