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PART II - CONSTRUCTION MATERIALS AND METHODS

SECTION 45.

PLANT LANDSCAPING

45.1. GENERAL

Fertilizing, seeding, mulching, sodding, planting, or transplanting of trees, shrubs, or other plants required to provide landscaped areas for the City shall be supplied and installed using current approved horticultural practices, these Specifications and the contract documents. These Specifications shall apply to all new construction within the City of Arvada.

45.2. MATERIALS

Materials to be incorporated into the landscaped areas shall conform to the minimum standards hereinafter referred to in the following (or approved equals.)

45.2.1. Shrubs, Trees and Other Plants

All plants shall be nursery grown, for a minimum of one year, in U.S. Department of Agriculture recognized hardiness zones two, three, four, and five only; conform to the requirements of the USDA standards, AAN Standardized Specifications, and the Colorado State Nursery Act of 1965. Plants imported shall comply with all nursery inspection and quarantine regulations of the state of origin and destination, as well as all federal regulations governing interstate shipment of nursery stock.

Plants shall be healthy representatives of the specified species or variety with well-developed branch and root systems that are free of all objectionable features, diseases, and insect pests. The minimum sizes and/or heights of all plants will be specified in the bid documents.

Plant materials shall be measured as indicated in the plans by container size, height, and/or caliper. Caliper is the measured diameter of the tree at a six inch height above the root ball. In trees above three inches in diameter the caliper measurement is made at a height of twelve inches above the root ball of the tree.

The Contractor shall be responsible for and furnish the City a certificate of inspection for all materials, as required by federal, state, or other authorities. A certificate of inspection will be supplied for each package, box, bale shipped or otherwise delivered. Contractor will provide a Grower's Certificate showing the origin of each plant. Each plant shall have a grower's label affixed to the plant which identifies the plant with the necessary dates to conform to these Specifications.

The Contractor's successful procurement arrangements for all plant material shall be evidenced by his/her act of submitting a Bid Proposal.

- A. Planting Pit Backfill - Backfill for each planting pit will be an improved soil consisting of three parts on-site topsoil and one part sphagnum peat or approved alternative, thoroughly blended and free of inorganic foreign substances.
- B. Tree Wrap - The Contractor will wrap each tree in crepe nursery wrap, spirally applied with one (1) inch overlap and double wrapped at top and bottom, as manufactured by Kraft or 3M. Waterproof tape will be used to hold the wrap in place.

- C. Plant Anchorage - Trees will be anchored by the use of double strands of twelve gauge galvanized steel wire anchored to the plant through new tree straps. This wire will be attached to metal tee-posts. The number of stakes or posts and the specific methods of anchorage will be indicated in the plans and specifications.
- D. Soil Conditioners For Trees and Shrubs - The desired soil conditioner and fertilizer will vary per project. Consult plans and project specifications for specific application of mulches and soil mixes desired.
 - 1. Agriform planting tablets (twenty-one grams/tablet) containing a 20-10-5 NPK ratio, as manufactured by the Sierra Chemical Company.
 - 2. Liquid commercial fertilizer containing a 20-30-10 NPK ratio and chelated iron applied in accordance with the Colorado Nurseryman's Association's recommendation on trees three (3) inches and larger in caliper.
 - 3. Sphagnum peat certified to have a ph less than five and containing ninety-five percent organic matter when supplied in six to seven and one half cubic feet compressed bales.
 - 4. Supreme Organic or A-1 compost by Jensen Sales, Littleton, Colorado
 - 5. Aspen Mulch or related products by Jensen Sales, Littleton, Colorado

45.2.2. Planting Pit Mulch and Cover

- A. Tree pits shall be covered with an approved two (2) inch thick chipper chip, or designated mulch material, in seeded areas and sodded areas. Edging, if included, will be shown on the drawings.
- B. Shrub beds shall be covered with a two (2) inch compressed thickness of two to three inch long cedar mulch or designated mulch material placed directly on the dirt around the plants. Edging, if included will be shown on the drawings.
- C. Weed Barrier, a layer of approved filter fabric (Mirafi 140N or equal) will be used in shrub beds or tree pits if designated on the drawings.

45.2.3. Grass Materials

All bluegrass seed shall be sports turf blend consisting of at least 4 varieties proportioned as follows unless otherwise indicated in the plans, drawings, Specifications or Special Conditions of a City project. Bluegrass with limosine SR2100 or A-34 or equal (2 types @ 33% each by volume) and Manhatten 3, SR4200 or equal (2 types @17% each by volume).

- A. Seed - Seed shall be furnished in containers that are labeled in conformance with applicable state and federal regulations and showing at least the name and address of supplier, seed name, lot number, net weight, percent of seed content, guaranteed percent of purity, and percent of germination. All seed furnished shall be free from noxious weed seeds. Containers whose contents become wet, moldy, or otherwise damaged will not be acceptable. All seed labels will be received by the project manager prior to acceptance of the seeding. Final or finish grade will be accepted by the project manager prior to seeding.
- B. Sod - Sod produced from the type of seed previously described shall be live nursery-grown grass actively growing or capable of renewing growth after dormancy. Sod

shall be free of all undesirable perennial or annual grasses, plants, stones, or any other material detrimental to growth or future maintenance. Grass shall be mowed to a height of two inches in the field. The sod will be machine cut in rectangular sections having a minimum soil thickness of five-eighths of an inch and sized to allow lifting and rolling without breaking. No netting or other material can be used to lift new sod.

C. Soil Conditioner For Grass or Sod A commercial fertilizer certified as to containing an NPK ratio of 20-10-5 unless otherwise specified in the Special Conditions.

D. Mulch For Seeded Grasses - Dyed wood cellulose fiber that is free of any substance which will inhibit germination or grass growth, will evenly dispense and suspend when agitated in water, will absorb water while allowing infiltration and when air dry will contain less than ten percent moisture especially at the time of delivery.

Cellulose fiber shall be supplied in packages, having a gross weight of 100 pounds or less and marked to show the air dry weight content with tackifier additives at industry standard minimum application rates.

E. Topsoil - Loose, friable loam that is free from admixtures of subsoil, refuse, stumps, rocks, roots, brush, weeds, or other material which would be detrimental to the proper development of vegetative growth.

45.3. TREE, SHRUB AND PLANT LANDSCAPING

Final or finish grade must be approved by the project manager prior to planting.

45.3.1. Transplanting of Plants

Handling plants shall be done according to recognized standard practices at all times. Plants shall be properly dug, pruned, inspected and tagged. The root system will be kept moist and the plant protected from all adverse conditions until planting is complete.

Plants may be furnished in non-biodegradable containers, which must be removed prior to planting, or with the root system balled and burlapped. Balling and burlapping must conform to the "American Standard for Nursery Stock" specifications. The plant ball shall be natural, not man-made, and used for handling the plant at all times. Plants having a trunk loosened from the root ball or a broken ball will be rejected.

All plants will be inspected and approved by the project manager on site before they are planted. The project manager or a designated representative will select and reject plants at the nursery, if possible. Leaders on central trunks will be healthy. All plants that are found to be stressed, damaged, drying out, insect infested, diseased, or otherwise failing to meet the specifications or which appear incapable of normal growth will be rejected. All trees and shrubs will be tagged for genus and species. Plants not tagged will be rejected.

Deciduous tree trunks shall be wrapped from the top of the ball to the first branch, after pruning, then taped with waterproof tape securely at top and bottom.

Locally grown trees not to exceed a six caliper inch trunk diameter may be machine transplanted. However, the lapsed time between digging and placing in the tree pit shall not exceed twelve hours.

45.3.2. Pruning

All pruning will conform to currently approved horticultural practices. Pruning evergreens shall be limited to the removal of damaged or dead foliage. Other plants shall have all damaged or dead roots or branches pruned to slightly above the nearest healthy side bud, at an angle not to exceed 45 degrees from the remaining portion. Leaders shall not be pruned. Other pruning, as required by project manager, may be required.

Within ten days prior to transplanting, locally grown deciduous trees and shrubs shall be pruned to reduce their foliage spread by one-third unless otherwise directed.

45.3.3. Excavating for Planting Pits

Planting pits shall be flat bottomed, circular in outline and excavated with vertical sides. No glazed smooth holes will be accepted. The Contractor will, at the request of the project manager, roughen the surfaces of the plant pits. Pits shall have a diameter eighteen (18) inches greater than the earth ball diameter for trees and twelve (12) inches greater than the earth ball diameter of bare root or container shrubs. A minimum layer of select backfill will be placed below the bottom of the earth ball or root system. The backfill will be at least nine (9) inches deep under trees and six (6) inches deep under shrubs. Areas to be planted with ground cover shall be suitably furrowed using select backfill to a depth of six (6) inches. Pits shall be free of underground obstructions such as pipes, wires, rock formation, debris or contaminants.

The Contractor shall protect and maintain in service all existing underground utilities, sprinkler system equipment, piping and amenities or structures, whether or not shown on the drawings during the performance of the work. He/she shall adequately barricade any pit or hole which is to remain open in excess of four hours.

45.3.4. Planting Trees and Shrubs

Planting of trees, shrubs, and other Plants shall be done at a time of year that is favorable to plant growth and in accordance with good horticultural practice.

Excavation for planting shall not commence until the project manager has staked all planting pits or shrub beds. Under no circumstances shall plant material be installed which interferes with the operation or coverage of the sprinkler system equipment or which will be damaged by the irrigation spray.

Following excavation of the planting pit, the Contractor shall place the specified depth of improved planting mix into the hole before setting any tree or shrub. Upright plants shall be set plumb. Prostrate plants shall be set at the same depth to the ground surface as originally grown. The ball of each tree shall be set so that the top of the ball is parallel to the slope of the plant bed.

In irrigated areas all deciduous trees will be planted two (2) inches above finished grade, evergreen trees will be placed with the top of the ball three (3) inches above finished grade. In non-irrigated areas, the top of the ball shall be surrounded by a saucer, the diameter of the plant pit, that will hold water; and the top of the ball will be set one (1) inch above ground level. All wire baskets or any synthetic material must be totally removed from the root ball of all plants. Remove all cord and peel burlap back from the top one third of the root ball. The wire and cord removed from each tree will be set to the side of the newly planted tree for

inspection by the project manager.

During the setting of the plant, the Contractor shall partially backfill the pit to within six (6) inches of finish grade by carefully placing and compacting as specified planting pit backfill around the ball of the plant. The plant shall then be fertilized by meeting Agriform tablets, equally spaced, eight (8) inches below finish grade. Four tablets shall be placed in the pits for each tree with a caliper three (3) inches and larger; three (3) tablets shall be placed in the pits for each tree with a one and one-half (1/2) to two and one-half (2 1/2) inch caliper. Shrubs shall have two (2) tablets each placed 180 degrees apart in the pit.

Following fertilization, the placement and gentle compaction of planting pit backfill around the ball shall continue until the hole is completely backfilled. Water shall then be placed in the pit by means of a water lance so that the hole is irrigated from the bottom upward.

When water has disappeared, the pit shall be filled with more Planting pit backfill until stabilized to the desired finish grade.

Trees shall then be anchored by means of stakes and wire. Stakes shall be metal tee-posts placed in undisturbed soil outside the pits; and guy wires shall be anchored to above the first and second limb crotch of the tree. The guy wire will be threaded through rubber hose so that no wire contacts the tree. The wire shall then be tightened sufficiently by twisting the wire to anchor the tree in a true vertical plumb, allowing the plant one inch play in each direction. Two guy wires 180 degrees apart in an east-west orientation will be used for each tree two (2) inches in caliper or smaller.

45.3.5. Mulching Plant Pits

All single trees, clusters of trees and/or shrubs, including row patterns, shall be mulched with chipper chip shredded wood or designated mulch material. Mulch shall cover the tree pit around each tree and shrub. Shrub and ground cover beds shall be mulched unless otherwise stated or shown on the drawings.

45.4. GRASS LANDSCAPING

Prior to seeding or sodding and in accordance with the requirements of the applicable section of the City Standard Specifications, the area to be landscaped shall be cleaned, grubbed, and graded to within one-half inch of finish grade.

All irregularities in the ground surface, except the saucers for trees and shrubs in rough grass seeding areas, shall be removed. Special measures shall be taken to eliminate all low spots and pockets that would trap water and to clear the area of one to one and one-half inch and larger rocks or other debris.

45.4.1. Season for Planting Grass Seed

Seeding seasons in any calendar year shall be limited to those periods of time favoring a healthy growth of grass by accepted horticultural practices. Unless otherwise approved by the project manager, seeding shall be accomplished within the following time periods:

<u>Grass Area</u>	<u>Early Season</u>	<u>Late Season</u>
Sprinkler Irrigated	March 1 to April 15	September 1 to October 1
Non-Irrigated	March 1 to April 15	-----

Seeding shall not be performed during windy weather or when the ground is frozen or otherwise untillable. Seeding portions of the designated areas may be permitted before construction is complete in order to take advantage of the growing season, with prior approval of the project manager.

45.4.2. Bed Preparation for Seeding or Sod Placement

Commercial fertilizer (18-46-0 NPK) at the rate of 300 pounds per acre shall be applied and then be spread and tilled into the top two inches of the soil. The ground surface shall be graded and worked by hand, if necessary to within one-half inch of finish grade to prepare for seeding or sod placement. Areas to be seeded or sodded which are contiguous with curbs, sidewalks, or other architectural structures shall be sloped and graded to a level one inch lower than the structural surface grade, on the uphill side of the paved surface. On the downhill side of the structured surface, the finish grade, after seeding or sodding, will be flush with the top of the paved surface.

All areas that have set for any period of time after fertilizing, which become firm or leaked over for whatever reason, shall be retilled to a depth of one inch prior to seeding.

45.4.3. Seed Planting Rate

Seed shall be sown to provide the coverage of "Pure Live Seed" (PLS) mixture, as determined in accordance with the following formula:

$$\text{lbs. (PLS)} = \text{lbs. seed} \times \% \text{ Purity} \times \% \text{ Germination}$$

45.4.4. Planting Seed

The Contractor will seed over fertilized ground using approved mechanical power-drawn drills followed by packer wheels.

Fertilizer type and method of application may vary with each project. Consult the project plans and specifications for any modifications in the fertilization or bed preparation process.

The power-drawn drill shall be set to maintain a seed planting depth of one-fourth (1/4) inch. Seed sown by broadcast type seeders or by hand shall be "raked in" or otherwise covered with soil to a depth of one-quarter (1/4) inch. The hand-broadcasting method of seeding shall be limited to those areas not accessible by machine methods.

45.4.5. Mulching Seeded Areas

Mulching seeded areas shall be accomplished by the hydraulic method using wood cellulose fiber mulch. Hydraulic mulching in slurry form shall be applied to all seeded areas. Proportionate quantities of water, tackifier and other approved materials shall first be placed in the slurry tank and mix. Cellulose fiber mulch shall be added and mixing continued until the slurry is homogeneous. The slurry mixture shall then be uniformly spray applied at the rate of 1,400 pounds/acre over the designated area, using the color of the mulch as a metering agent. Hydraulic mulching shall not be performed in the presence of free surface water. Seed shall not be included in the hydraulic mulch. Mulch shall be Weyerhaeuser Silva-Fiore or approved equal.

Areas not properly mulched, or damaged due to Contractor's negligence, shall be repaired and remulched in an acceptable manner at the Contractor's expense. Mulch removed by wind or water erosion Prior to acceptance shall be reseeded and remulched by the Contractor at this expense.

45.4.6. Placing Sod

Sod placement may start after the sod bed or finished grade has been fertilized and prepared as previously specified. Special care shall be taken to prepare the surface to the specified elevations and to neatly rake the finished grade near fences, curbs, sidewalks, buildings, etc. Sod shall be transplanted within twenty-four hours after lifting, unless weather conditions prohibit normal operations. Sod shall be laid smoothly, edge to edge, perpendicular to slope, with staggered joints and pressed firmly into contact with the sod bed by rolling. All holes in the sod, frayed edges, and missing strip corners shall be trimmed to straight lines and patches to completely fill all voids in the surface. Sod layed on slopes of 3:1 or greater will be secured with six (6) inch long wood stakes, as needed, until growth is established.

Once in place, the sodded area shall be lightly watered and rolled to insure full contact with the soil. After rolling, water shall continue until the added moisture penetrates the subsoil to a depth of not less than two inches.

Sod that becomes withered, moldy, or yellow from heating, or has been allowed to dry out or freeze, will be rejected.

45.5. CARE AND MAINTENANCE

All trees, shrubs, other plant materials and seeded or sodded areas shall be cared for, watered, maintained, and if necessary, barricaded and protected from damage from whatever cause until their acceptance. By the time of final inspection for acceptance, plant grower tags shall be removed. The landscaping shall be finally accepted for warranty and guaranteed by the Contractor, after the following conditions have been met.

45.5.1. Trees, Shrubs and Other Plants

All plants shall be cared for, watered, and maintained by the Contractor until final project acceptance. The Contractor shall not request an acceptance inspection until all plants that are dead or damaged due to his operation or vandalism, or any other reason are replaced with like size and species.

45.5.2. Seeded Grass Areas

Seeded areas shall be mowed to a two inch height at least once by the Contractor. The Contractor will otherwise maintain seed until there is an acceptable uniform plant growth. Areas that are not producing a uniform plant growth within five weeks following seeding shall be reseeded.

Unacceptable uniform plant growth shall be defined as scattered bare spots, greater than one square foot, exceeding three percent of the seeded area. However, for seeded areas under irrigation it shall also include producing a uniform plant growth to a height of two inches. Irrigated areas that are seeded late in the fall planting season which are not producing an

acceptable uniform plant growth, as previously defined, shall be reseeded during the following spring planting season. If such a condition exists and the Contractor has diligently pursued the performance of his work, the City, at its option, may extend the contract completion date and reduce the contract retainage. Retainage may be reduced to less than five percent of the total contract amount but shall be at least double the estimated or contracted cost of obtaining the required growth in the indicated areas, plus those areas which are susceptible to damage by winter kill, washout, or other causes.

45.5.3. Sodded Areas

Sodded grass areas shall be watered as needed and mowed at least once, and otherwise maintained for a period of thirty days after transplanting the sod.

Any areas that fail to sustain a healthy growth of grass during this period or appear susceptible to negative drainage shall be reworked and resodded by the Contractor before acceptance.

45.6. GUARANTEE AND WARRANTY OF PLANTS

The Contractor will replace all plants which die during the two year warranty. Exception will be made for plants which die during this period due to vandalism or neglect. Replacement will be limited to one time only. Replacement materials will be identical in size and species to the original plants specified. Replacement materials will be high quality. The Engineer reserves the right to reject any replacement materials not meeting City of Arvada Standards.

Contractor agrees to replace dead plants within two weeks after notification by the Engineer. The Engineer will maintain an accurate copy of the planting plan indicating which specimens were removed and/or replaced.