

328 Irrigation

1 General

328400.011 Scope of Landscape Irrigation Work

Furnish all labor, equipment, appliances, materials and perform all operations required to complete irrigation system installation and other work as shown on the applicable drawings and as specified herein, guarantee and meet conditions of this Contract.

328400.451 Job Supervision - Irrigation

All work specified herein shall be performed under the direct supervision of a superintendent thoroughly familiar with the work of this Section and who shall be at the Project site for the duration of the work of this Section.

328400.461 Irrigation Installation Training

Drip irrigation installation will be preceded by instruction by Netafim to train the installer on the installation of the CV Techline. This training is to be arranged by the installer prior to any installation of this product. contact Kelly Keicher at 303-513-3738

328400.521 Job Conditions - Non-Interruption of existing irrigated areas

Adjacent landscape served by existing mainlines that are slated to be relocated shall have continuous use. Construction of new and relocated mainlines shall be coordinated to not interfere watering schedules. Adjacent landscape irrigation will continue in operation during construction.

328400.551 Substitute Products

Requests for substitution of products named in this section must be approved by the Owner's Representative one week prior to bid opening.

328401.021 Layout of Lines & Levels

Before any installation operations are started, the site shall be completely staked out for the work of this Section by the Contractor. Pipes are not to be installed through tree root ball locations. All mains and valve locations shall be staked out for approval before installation by the Owners Representative.

328401.031 Tolerances

Depth of main shall be 30" bury; laterals shall be eighteen (18") bury, depth at road crossings shall be 24". All road crossings shall be sleeved.

2 Products

328424.222 Automatic Control Scrubber Valve

Automatic Control Valves are to be Rainbird PES-B Electric Remote Control Scrubber Irrigation Valves with PRS Dial Series Pressure Regulating of size indicated on drawings, or equal.

328424.362 Isolation Gate Valve

Isolation valves (4") are to be 4" Mueller A-2360 Resilient Wedge Gate Valve, and shall be listed by NSF for use in potable water service.

328424.382 Quick Coupler Valves

Quick coupler valves are to be Rainbird #33-D two piece assembly with 3/4" schedule. 80 PVC nipple of length to bring head 1" above finish grade. Marlex Street Ells are to be used for a swing joint assembly to main line.

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- 328424.682 Pressure Regulating Module
Pressure regulating valve to be Rainbird PRS-Dial or equal.
- 328424.702 Valve Boxes
Super Jumbo box (2 valves max), or equal.
- 328425.102 Irrigation Pipe - Main Pressure Line
Main Pressure Line pipe between HDPE and control valves shall be Class 200, solvent weld PVC, with PVC schedule 40 fittings, sized as shown on plans.
- 328425.142 Irrigation Pipe - Main Pressure Line, HDPE
Main Pressure Line pipe shall be HDPE pipe, sized as shown on plans. See section 3311-00-13 for Specifications.
- 328425.202 Irrigation Pipe - Lateral Lines
Pipe shall be PVC Class 160 with PVC Schedule 40 fittings, solvent weld, as detailed, sized as shown on the plan.
- 328428.412 Schedule 80 PVC sleeving
Pipe for sleeve shall be schedule 80 PVC, sized as shown on drawings, of length to protrude from under concrete and/or asphalt a minimum 6".
- 328429.452 Pipe Thread Material
All threaded pipe connections shall be made with Weld-on 87685 thread sealant shall be used, or equal.
- 328429.462 Solvent Weld Primer & Cement
Solvent Weld Primer & Cement shall be only that which is recommended for use on pipe installed.
- 328449.882 Irrigation 2 wire Field Decoder
Field decoder shall be Rainbird FD-101TURF. Contractor may use FD-102 for two valves in one location, or FD-104 for 4 valves in one location.
- 328452.132 Wire Connectors
Wire connectors at electric control valves and all splices of irrigation controller wire in the field shall be made using "3M DBR-6" only.
- 328454.132 P7072 Decoder Cable
Communication cable for irrigation system shall be P7072 Shielded Communication Cable. Connections are to be made with waterproof connectors.
- 328454.32 Conduit-Decoder Cable
Furnish and install gray heavy wall Schedule 40 PVC conduit, rated and labeled for use with 90 C rated conductors (EPC), rigid, U.L. listed, meeting NEMA standard TC-2, Federal Specifications WC-1094A, U.L.-651, as manufactured by Baldwin, Carlon, Ethyl, Triangle, or equal. Pipe shall be 1"
- 328454.512 Surge Protection for 2 wire system
Surge protection for 2 wire system shall be Rainbird LSP-1, or equal.
- 328460.522 In Line Drip Emitter Tubing - Netafim Techline CV
to be Netafim Techline CV, Emitter flow rate and spacing are to be as of shown on drawings.

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328460.522 Blank (No Emitter) Tubing - Netafim
Drip Tubing with no emitters to be Netafim Techline with no emitters

328460.882 Flush Cap Assembly
Rainbird CF-22 Compression flush cap to be installed at the end of all polyethylene laterals in Ametek 6 or 10" circular box with tan/brown C.V. lid Part #181108. Contractor is to include one 1804 Rainbird pop-up SAM spray head w/ closed nozzle spray head connected with swing pipe to one 1/2" irrigation lateral.

328460.932 Flush Cap
Netafim TSOV valve is to be installed at the end of all xeri-tube laterals.

328460.952 Flush Cap Box - 6"
Flush cap box to be Ametek 6" circular box with brown C.V. lid Part #181108.

4 Execution

324010.44 Water Service Connection - irrigation, non-potable
The Contractor shall tie into existing mainline where shown on drawing.

328424.354 Isolation Gate Valve
Isolation valves are to be installed in mainline at locations shown on drawings. Contractor is to provide extension sleeving from valve box to valve location.

328424.384 Quick Coupler Valves
Quick coupler valves are to be installed on swing pipe swing joint at location and grade as indicated on drawings and as per details. Installation in soft soils may require staking and tying quick coupler to stake. Drive stake to 12" below grade and tie with nylon tie.

328428.414 PVC sleeving
Sleeving shall be installed in locations noted on drawings and at a depth of 30" at roadway crossings, 24" at other pavements (mainline) and 18" for lateral lines at other pavements. Sleeve ends are to protrude beyond pavements or concrete improvements a minimum of 6". Where changes in direction are necessary, the sleeve shall be bent to smoothly transition the change of direction. No fittings are to be used for direction changes. Ends are to be taped to prevent filling by backfill. Mark locations with lath and notation indicating "sleeve".

328440.44 Automatic Control Valves
All control valves shall be installed as close as possible to the locations shown on the plan; any variances must be approved by the Owners Representative. Install valves, unions, reducers, pipes, wiring, etc. per detail. Control valves shall be installed in accordance with the manufacturer's recommendations. All valves shall have sufficient clearance from adjacent obstructions to provide accessibility for maintenance, including complete removal without removal of valve box. Valves are not to be located in flow line of swales or drainages.

328449.884 Irrigation 2 wire Field Decoder
Field decoder shall be installed in line at valve locations as per manufacturer's directions

328452.024 Wire Connectors
Wire connectors are to be installed as per manufacturers recommendation.

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328454.134 P7072 Decoder Cable

Communication cable for irrigation system is to be installed in 1" schedule 80 conduit above the irrigation mainline with loops at valve locations allowing connections to be made in valve boxes. Splices are to be made in valve boxes only.

328454.44 Conduit-Decoder cable

Conduit shall be placed in same trench as irrigation pipe, above the pipe where possible. Make bends symmetrical using a standard hickey, conduit bender, or bending machine. Cut all conduits square and ream ends to remove burrs. Clean and dry all conduits and raceways thoroughly before conductors are pulled. Provide expansion couplings to prevent damage due to expansion. Do not install PVC conduits where exposed. Reference NEC (National Electrical Code) Table 300-5 for burial.

328454.514 Surge Protection for 2 wire system

Surge protection for 2 wire system shall be installed as per manufacturer's instructions at locations shown. Surge protection is provided if FD-401 Field Decoder is used.

328455.064 Grounding

All grounding of controllers and field decoders to comply with ASIC Guideline 100-2002 for Earth Grounding Electronic Equipment in Irrigation Systems and per Rainbird Irrigation requirements for grounding

328455.144 Trenching & Backfilling

Comply with Section 312000 as required.

328455.154 Trench Excavation

Trenches shall be cut to true line and grade. Over-excavation of trenches for piping shall require compacted backfill to bring bottom of trench up to grade. Provide for surface drainage during construction. De-water all excavations immediately.

328455.174 Pipe Trench Backfilling

Trenches for piping shall be carefully backfilled with non-swelling on-site soils exclusive of any organic materials, construction debris or other deleterious materials, free from clods of earth or stones larger than two inches (2") in maximum dimension, by depositing the backfill materials equally on both sides of the pipe in loose 8" layers and thoroughly compacting the backfill to a minimum 90% of the maximum dry density determined in accordance with ASHTO T180, Modified Proctor.

328456.044 Piping- general

Manufacturer's specifications covering installation of their material shall be followed. Underground lines up to 2" shall have minimum horizontal clearance of 2" of each other. No sprinkler lines shall be stacked vertically in a common trench. Lines shall have minimum horizontal clearance of 12" from the lines of other trades, and minimum 2" vertical clearance between lines crossing at 45° - 90°. Trenches for irrigation mainline shall be excavated so that the pipe shall drain uniformly toward drain valves deemed necessary to properly drain the system. Minimum grade of piping to drains shall be 3"/100'. When pipe laying is not in progress, or at end of each day, pipe ends shall be closed with tight plug or cap.

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328460.524 In Line Drip Emitter Tubing - Netafim Techline CV Rings

Techline CV tubing to be installed in concentric rings as shown in detail and according to manufacturer, connected directly to poly lateral and spaced according to drawings. Tubing is to then be buried with 2" amended topsoil, then compacted with manual sod roller. Tubing is to be staked with 6" landscape fabric pins at all fittings and at minimum 4' on center. See Planting for topsoil specs.

328460.534 In Line Drip Emitter Tubing - Netafim Techline CV

Techline CV tubing to be installed in a 'grid' layout according to manufacturer following planting operations and fine grading. Surface is to be compacted with manual sod roller. Grid is to be spaced as shown in detail, and adjusted to insure watering of plan root ball. Grid is to be connected directly to poly lateral header, header connected to buried lateral line with swing pipe assembly. Test drip pattern in the presence of owner's representative prior to installation completion. Grid is to then be buried with 2" amended topsoil, then compacted with manual sod roller. Tubing is to be staked with 6" landscape fabric pins at all fittings and at minimum 4' on center. See Planting for topsoil specs.

328460.904 Flush Cap Assembly

Rainbird CF-22 Compression flush cap to be installed at the end of all polyethylene laterals in Ametek 10" circular box with black C.V. lid Part #181108. Flush Cap Assemblies are to be located adjacent to walks or lawn areas where possible for maintenance access.

328470.044 Irrigation Valve Control Wires

All control wires shall be placed carefully alongside and slightly below the water main where it will receive the greatest possible protection. Control wires not protected by the water main shall be laid in a suitable sized PVC conduit unless otherwise noted on the plans. Control wire shall have an eighteen (18") inch expansion loop at each valve and every 200' of wire. Where more than one control wire is located in the trench, the wires shall be taped together at 20' intervals to maintain orderly and efficient installation. Contractor shall provide an extra control wire at all manifolded valves. Contractor to avoid mid-line splices, but where necessary will adequately note location on the "as-builts".

328470.054 Irrigation Valve Control Wires

Control wires shall be placed carefully alongside and slightly below the water main where it will receive the greatest possible protection. Control wire not protected by the water main shall be laid in a suitable sized PVC conduit unless otherwise noted on the plans. Control wire shall have an eighteen (18") inch expansion loop at each valve and every 200' of wire. Contractor to avoid mid-line splices, but where necessary will adequately note location on the "as-builts".

5 Warranty

328400.815 As-Built Submittals

Contractor shall submit an as-built or record plan upon completion of work showing precise location of control valves, mains, drain valves, etc., and any changes in location of heads, piping, etc. to the Owner and their representative before final application for payment. Provide pdf of drawing(s).

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329380.55 Vandalism

Minor vandalism or other damage to the plantings or related work shall be the responsibility of the Contractor until all work receives Final Acceptance. Major vandalism or damage caused by others through no fault of the Contractor or his subcontractors shall be immediately brought to the attention of the Owners Representative who will be the sole judge as to the extent of such damage. Major damage is typically any damage over \$500.00 worth of materials and/or labor required to repair the damage. For the Contractor to be awarded additional monies under the provisions of "extra work" stated in the General Conditions, he shall have fully protected his work as specified herein. Any failure, however slight, of the Contractor to have protected his work shall be grounds to nullify any request for additional remuneration.

329 Planting

1 General

329000.121 Scope of Landscape Work

Include labor, equipment, material, incidentals, for the completion of planting, boulder placement, lawn, edging, and mulch work shown on the Drawings, stated in the Specifications or otherwise required.

329080.501 Stake Out Location of Landscape Work

The Contractor shall completely stake out the location of all trees, shrubs, and lawn area limits on the site for the approval of the Landscape Architect, making modifications as required.

329301.081 Applicable Standards

U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act, American Association of Nurserymen, current edition of "American Standard for Nursery Stock". Published by the American Association of Nurserymen, Inc., Washington D.C. and/or Colorado State Law, whichever is greater.

329301.101 Shipment and Delivery

No plant materials shall be delivered to the site more than 3 days before planting. Plants left unplanted for more than 3 days shall be subject to rejection by the Owners Representative. A suitable method of handling shall be employed to insure the careful, workmanlike delivery of all plants, especially heavy balled trees. The Contractor shall protect the stock in a temporary nursery at the project, protected from sun, drying winds and shaded, kept moist and protected with damp soil, moss or other acceptable material.

329301.151 Notification of Delivery

The Landscape Contractor shall notify the General Contractor and Owners Representative a minimum of 2 days in advance of the delivery of the plant materials. Notification shall include the time and method of delivery.

329301.181 Quality Control Submittals

Certificates of Inspection for Plants: All necessary State, Federal and other inspection certificates shall accompany the invoice for each shipment of plant materials as may be required by law, and showing source of origin. Certificates shall be filed with the Owners Representative prior to his acceptance of the material.

329301.201 Plant Material Labeling

Durable, legible labels stating in weather-resistant ink indicating the correct plant name and size as specified on the plant list shall be securely attached to all plants, bundles or packages of plants of a single species and size, or plant container delivered to the planting site. Plants not properly labeled shall be subject to rejection by the Owners Representative.

329301.211 Plant List

A list of purchased plants to be provided is shown on the Drawings.

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329301.221 Plant Material Inspection

The Owners Representative reserves the right to reject at any time or place prior to acceptance, any and all materials which in their opinion fail to meet specifications. Inspection of materials is primarily for quality, size and variety, but other requirements are not waived even though visual inspection results in approval. Plants may be inspected where available, but inspected at the places of supply shall not preclude the right of rejection at the site. Rejected materials shall be promptly removed from the site. No installation shall occur prior to inspection and acceptance of all plant material.

329320.021 Plant Sizes

Requirements for the measurement follow the code for standards currently recommended by the American Association of Nurserymen, Inc. in the American Standard for Nursery Stock

329350.011 Planting Commencement

No planting work shall commence until the adjacent site improvements, drainage improvements, pavements, irrigation installation and finish grading is completed. No heavy trucking or moving of plant materials or equipment shall be permitted on newly completed pavements, sod or seeded areas. Further, the irrigation system shall have been tested in the presence of the Operator's Representative and be in operating order prior to any planting, seeding or sodding, with the exception of drip emitters, which shall be placed following planting.

329350.051 Weather Restrictions

No lawn or planting work shall take place during inclement weather or when the ground conditions are, in the opinion of the Owners Representative, not in a condition to be properly worked.

329350.151 Irrigation & Establishment Restrictions

No seeding or planting operations shall occur prior to April 15 nor later than September 30.

329381.011 Substitute Products

Requests for substitution of products named in this section must be approved by the Owner's Representative one week prior to bid opening.

2 Products

329223.012 Sod

Shall be 100% bluegrass or a mixture approved by Landscape Architect. Sod shall have a healthy root system, shall have been regularly watered, mowed, fertilized and weeded; be free from objectionable weed of grasses; have been from 5/8" min. to 1" max. thickness of soil adhering to root system, cut into strips 18" by 24" min. size when installed. It shall not be allowed to dry out, or sod with adhering soil which breaks, crumbles will not be accepted, and will not be accepted if stored for longer than 36 hours from time of cutting.

329223.502 Fertilizer for Sod Areas

A commercial fertilizer providing 6 pounds per 1000 sq. ft. "treble super phosphate" (0-46-0), and 1 pounds per 1000 sq. ft. nitrogen, shall be supplied, in original manufacturer's containers, with label showing composition intact, free-flowing and dry, in quantities necessary to apply over all sod areas.

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329333.022 Fertilizer for Shrub Areas

A commercial fertilizer providing 2 pounds per 1000 sq. ft. Phosphate, and 1 pound per 1000 sq. ft. Potash, shall be supplied, in original manufacturer's containers, with label showing composition intact, free-flowing and dry, in quantities necessary to apply over all shrub bed areas.

329334.012 Biosol Soil Amendment

Biosol soil amendment shall be "Biosol Planters Kit" as manufactured by Rocky Mountain Bio Products, 10801 E 54th Avenue, Denver, CO 80239 (888)696-8960, (20 lb Biosol, 50 lb humate, and 1 lb all purpose mycorrhizae), or equal if approved by Owner's Representative prior to bidding.

329413.022 Concrete Edging

Concrete Edging for use as shrub bed borders shall be 6" x 4" fiber mesh reinforced extruded Mortar. Mortar shall consist of fine and course sands, 6 sacks Portland Cement per cubic yard, fiber mesh reinforcing as per manufacturers recommendations. Mix at least three minutes and not more than five minutes in mechanical batch mixer, with maximum amount of water to produce workable consistency.

329443.022 Fertilizer for Trees

Fertilizer shall be Agriform 20-10-5 tablets or equal.

329443.032 Insecticide Spray

Methoxychlor or similar insecticide.

329443.042 Tree Wrapping Material

Tree wrapping material shall be first quality 4" wide, bituminous impregnated tape, corrugated or crepe paper, brown in color, specifically manufactured for tree wrapping and having qualities to resist insect infestation.

329443.052 Tree Stakes

Standard "T" 6' high steel posts, dark green in color with safety caps or wood fence posts. Stakes for guying pines and spruce shall be 30" long (5' steel "T" posts cut in half)

329443.062 Protective Nylon Loops

1-1/2" wide (min.) for restraining tree in guying operations. Lengths as required.

329443.072 Guy Wire

14 gauge, double strand, pliable galvanized steel wire twisted to remove slack to each stake, and PVC Pipe section as shown in details for visibility. Leave 1" to 2" slack in wire to allow for trunk movement.

3 Materials

329113.013 Soil Amendment

50% Ground well-aged cow or chicken manure, or ground sheep manure, 50% finely ground and aged wood chip, with a proven analysis to verify organic content, PH, electro-conductivity, nitrogen, potassium, and phosphorus content. A sample of the material will be supplied to the Owner's Representative with an analysis.

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329113.043 Imported Topsoil

Imported friable sandy loam; reasonably free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter; electro-conductivity range 0 to 4 mmohs; containing a minimum of 4 percent and a maximum of 25 percent organic matter; Limit decaying matter to 2% percent of total content by volume. Clay loam or clay will not be accepted

329113.33 Backfill Material

Excavated material will be considered satisfactory for general backfill purposes. All backfill material shall be free from rubbish, vegetative matter, frozen materials or stones larger then six (6") inches in maximum dimension. Any material not suitable for backfill shall be stockpiled on site as designated on drawings or directed in the field.

329301.043 Container Grown Plants

Plants designated in various size and type containers in the plant list shall be of a reasonable age and state of development for the size container in which they are specified. They shall have been growing in their containers sufficiently long to develop a good sound root system capable of holding the soil intact after removal from the container, but not so long as to have become root bound.

329301.053 Balled Plants

Plants delivered as "B&B", balled and burlapped shall be adequately balled with firm, natural ball wrapped tightly with burlap. No plant shall be planted if the ball is cracked or broken either before or during the planting process. Any plant which is loose in the ball shall be removed from the site and another plant conforming to the specifications of the plant removed shall be planted in its place at the expense of the Contractor.

329301.103 Shrub Quality

All Plants shall conform to the Colorado Nursery Act. Shrubs shall have a well-developed branch structure with a vigorous root system typical of the size and species and be sound, healthy and vigorous plants free from visual defects, plant diseases and all forms of insect infestation until Final Acceptance. Unless noted, all plants shall be nursery-grown, meaning plants that have been growing in a nursery either lined out or containerized for a minimum of two growing seasons and have been root pruned according to acceptable nursery practice. All shall be freshly dug at the time of delivery, (Plants healed in or placed in cold storage for more than 9 months will not be accepted.) and shall have been grown under similar climatic conditions as that of the project's location prior to planting.

329301.223 Specifics for the Selection of Shade Trees, Part 1

1. Trees greater than one and one-half inches (1-1/2") caliper shall be able to stand erect without a supporting stake.
2. Trees shall have straight trunks with less than a five percent (5%) bow. 3. Branches shall be less than two-thirds (2/3) the trunk diameter.
4. Trees shall be healthy and have had adequate annual growth the previous two (2) growing seasons for that species. (See fact sheets on growth rates).
5. Trees shall be rooted into the root ball so that soil or media remains intact and trunk and root ball move as one when lifted, bur not root bound. The trunk should bend when gently pushed and should not be loose so it pivots at or below the soil line.
6. Trees shall have no roots larger than one-fifth (1/5) the diameter of the trunk protruding from the grow bag or container.

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329301.233 Specifics for the Selection of Shade Trees, Part 2

7. Trees shall have one dominant leader for the top of the tree with a viable terminal bud or shoot.
8. Trees shall have no vertical branches except for those cultivars reported to be fastigiated.
9. Trees shall have branches evenly distributed around the trunk and no branches shall be directly above another.
10. The largest branches shall be spaced at least six inches (6") apart except for those cultivars with characteristic multiple tops.
11. The tree canopy shall be mostly symmetrical and free of large voids. Clear trunk should be no more than 40% of tree height unless otherwise specified in the planting specifications.
12. If any of the above conditions are not met, trees may be rejected by the Owner.

329301.243 General Considerations for Plant Quality

Trees and shrubs will be inspected by the Owner prior to planting and rejected if damage or imperfections in development are noted to include: flush cuts or open injuries on the main trunk; trunk cankers; Loose or torn bark in excess of 10% of the circumference of the trunk or branch; Borer holes or boring dust in trunks or main branches; Branch attachments with the included bark; Co-dominate stems - trees only; Trees and Shrubs in violation of Rules and Regulations pertaining to Title 34, Article 26 of the Colorado Nursery Act; Damaged or incomplete graft unions; When in leaf, with more than five percent (5%) chlorotic leaves; When any root is greater than one-tenth (1/10th) the diameter of the trunk, circles more than one-third (1/3) the trunk and is in the top half of the root ball; Plants infested with colonies of other insect pests will be rejected or properly treated at the discretion of the Owner.

329401.013 Granite Rock Mulch -1/2"

Rock Mulch shall be 1/2" inch tan granite covering shrub beds. Rock mulch shall be free of trash, sticks or roots, Granite to be similar to buff-tan colored granite. Submit sample to Owner's Representative prior to construction.

329401.043 Granite Rock Mulch -1-1/2"

Rock Mulch shall be 1-1/2 inch granite covering shrub beds. Rock mulch shall be free of trash, sticks or roots. Granite to be buff-tan colored granite. Submit sample to Owner's Representative prior to construction.

329401.443 La Sal Purple Rock Mulch -2-3" for shrub bed berms

Rock Mulch shall be 2" to 3" inch "La Sal Purple" covering shrub beds. 1/2 Cubic Foot La Sal Purple to be selectively and randomly cast over the surface of berms where shown on plans, over the top of 1/2" Tan Granite to provide textural difference. Rock mulch shall be free of trash, sticks or roots, Submit sample to Owner's Representative prior to construction.

329460.083 Granite Boulders

Landscape boulders to of minimum dimensions as shown on drawings. Boulders shall be buried such that exposed rock surface depicts natural exposure of outcrop formation. Boulders are to be tan/gold granite. Exposed surface of installed landscape boulders shall not show machine caused scarring or breakage. Typical examples of this type of boulder can be seen at "The Rock Shop", 800 S 15th Street, Grand Junction. Contractor to submit sample to Owner's Representative prior to acquisition.

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4 Execution

329110.064 Installing Topsoil

Stockpile materials on site at locations indicated. Stockpile in sufficient quantities to meet project schedule and requirements. Separate differing materials with dividers or stockpile apart to prevent mixing. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

329111.044 Landscape area excavation Procedure

Excavate areas to be planted (as per drawings) to a sufficient depth to receive amended soil and to remove unsatisfactory material (including road base, asphalt, concrete and trash) and remove from site.

329113.124 Stockpiling Imported Topsoil

Stockpile materials on site at locations indicated by the Owner's Representative. Stockpile in sufficient quantities to meet project schedule and requirements. Separate differing materials with dividers or stockpile apart to prevent mixing. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

329113.134 Backfill - Shrub Beds

Scarify (where directed on plans) areas to receive topsoil or backfill as designated on plans to a depth of 12". Contractor shall backfill designated shrub beds with specified soil to meet proposed grades. Soil is to be compacted to 85% modified proctor (wheel rolled) to minimize settling. Beds are to be filled over drip irrigation tubing to a depth of 2", and above adjacent edge of shrub bed, shaped to form mounded planting areas. Shrub bed perimeter is to be finished with 4:1 slopes from 2" below adjacent concrete to finish grade to form shallow trench to hold mulch. See shrub bed detail.

329113.154 Soil Preparation

Contractor shall prepare the planting areas already backfilled with topsoil by applying soil amendment at a rate of 6 cu. yds. per 1000 sq. ft. over all planted areas., discing or rototilling, the soil to a depth of 8". After this has been done, all rocks bigger than 1" shall be picked up and removed from the site. Soil preparation is for top soiled planting areas only.

329113.184 Topsoil Backfill - Shrub Beds

Contractor shall backfill excavated shrub beds with specified topsoil. Soil is to be compacted to 85% modified proctor (wheel rolled) to minimize settling. Beds are to be filled to a depth of 6" above adjacent edge of shrub bed, or to a height not to exceed slopes of 3:1, shaped to form mounded planting areas. Shrub bed perimeter is to be finished with 4:1 slopes from 2" below adjacent concrete to finish grade. Scarify all areas to receive topsoil to a depth of 6".

329113.304 Fine Grading for Landscape areas

Remove any dikes used to facilitate watering. Smooth surface, contour to distribute irrigation to root ball. Form trench at all landscape edgers or pavements to accommodate mulch at depth specified. See details.

329114.234 Cleanup of Topsoil Stockpile

Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

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329219.814 Irrigation of Lawn Areas

Within 12 hours after planting lawn, the sprinkler system shall be activated to moisten planted areas to a depth of 2". All areas shall be kept moistened by frequent light watering for 3 weeks, or until the Final Acceptance of the Project, and such watering shall be the responsibility of the Contractor until seeded areas are accepted by the Owner.

329223.014 Sod

Perimeter of area to be sodded shall be graded to within 1/2" to 3/4" below adjacent pavements, edger, or foundations. Sod shall be laid on a firm, smoothly graded, and pre-moistened bed with tight joints so that no voids occur under or between strips. Joints shall be staggered perpendicular to the direction of flow (slope) in all drainage areas or steep slopes. Sod shall be watered immediately after each section of sod is laid. Operate sprinkler to soak all sod to a depth of 2", and maintain this moisture level for three (3) weeks. or until the Final Acceptance of the Project. Such watering shall be the responsibility of the Contractor until sodded areas are accepted by the Owner. In the event that sod dries or shrinks, a mixture of screened topsoil and bluegrass seed shall be brushed in the cracks and tamped flush. Excessively shrunk sod (over 3/4" shrinkage) shall be replaced.

329223.504 Fertilizer for Sod Areas

Fertilizer is to be incorporated into the soil to a depth of 6". Once sod has been laid, apply at rate specified in 2.0 Products.

329301.224 Tree Location conflicts with Underground Lines

The Contractor shall be responsible for damage to any underground utility, irrigation line or other improvements. In the event a pipe or line obstructs a plant location, the Contractor will notify the Owners Representative to receive a new plant location.

329310.024 Layout of Plant Locations

Contractor is to stake out the location of all trees, shrubs, perennials, and lawn area limits, or place containerized shrubs and perennials for approval by Landscape Architect prior to planting. All planting stake locations shall be observed and approved by the Landscape Architect, prior to planting operations.

329312.084 Planting Techniques - Part 1

1. Trees, shrubs and perennial flowers shall be in planting areas separate from turf areas.
 - a. In those instances where the Owner requires trees or shrubs planted in turf areas, the turf will be established prior to installation of trees or shrubs.
 - b. Trees and shrubs shall be planted a minimum of four inches (4") above the finished grade of the turf or mulched area based on their uppermost structural roots.
 - c. If the planting hole is inadvertently dug too deep, soil shall be added and compacted.
 - d. The width of the planting hole shall be a minimum of at least one and one-half times the diameter of the root ball, two times the diameter of the rootball where possible.
2. Trees and shrubs shall be planted with two (2) or more of the upper-most structural roots no more than two inches (2") below the surface of the root ball measured three to four inches (3-4") from the trunk (except as noted below).

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329312.094 Planting Techniques - Part 2

Soil shall be removed from the top of the root ball prior to planting to determine the actual depth of the structural roots. a. Hackberry (*Celtis occidentalis*), green ash (*Fraxinus americana*), red maple (*Acer rubrum*), little leaf linden (*Tilia cordata*), crabapples (*Malus spp.*) and poplars (*Populus spp.*) shall be planted with no more than one inch (1") of soil over the uppermost structural roots. b. Adventitious roots above the structural roots shall be removed. c. The presence of encircling roots shall be checked for and treated as in 9. below. d. The planting hole shall be dug two to four inches (2-4") shallower than the depth of the root ball (based on the location of the structural roots.) e. Soil shall be graded from the surrounding soil to near the top of the root ball to cover the exposed sides of the root ball. f. There shall be no landscape soil placed on top of the root ball.

329312.104 Planting Techniques - Part 3

3. The top 12 to 18 inches (two or three levels) of wire basket shall be removed from the root ball. The bottom half of baskets more than about 40 inches in diameter can be left intact.
4. All twine and wire at the base of the trunk shall be removed and disposed of offsite.
5. All synthetic and plastic burlap shall be cut as far down the root ball as possible so soil along the side of the root ball is in direct contact with backfill soil. All synthetic and plastic burlap shall be removed from the site.
6. Natural burlap shall be removed from the top of the ball and at least one-half (1/2) way down the side of the root ball. Burlap shall be removed from the site.
7. Fertilizer shall not be added to the back-fill soil.
8. Containers shall be removed from the root ball prior to planting. Containers shall be removed from the site and properly disposed of.

329312.114 Planting Techniques - Part 4

9. Pot bound (root bound) trees and shrubs shall be avoided.
a. There shall be no roots greater than 1/10 diameter of the trunk circling more than one-third the way around the top half of the root ball. There shall be no kinked roots greater than 1/5 the trunk diameter. Roots in violation can be cut and the tree accepted at the option of the Owner. b. If it is necessary to plant a pot bound tree or shrub, encircling roots shall be cut to prevent them from girdling the plant in the future. Three (3) or four (4) slices one inch (1") or two inches (2") deep shall be made from the bottom to the top of the root ball.
10. Mulch shall be placed on the root ball to within 6 to 8 inches of the trunk or main stem(s), and no closer.

329312.124 Planting Techniques - Part 5

11. The planting of clump aspen and other trees (i.e. two or more stems in one root ball) shall be avoided.
a. If a clump effect is desired, separate trees shall be planted with their root balls touching.
12. Trees and shrubs shall be moved by their root balls, not their trunks, in such a manner that trunk and branch damage shall be avoided.
13. Trees and shrubs planted on slopes shall be set so the to-most root in the ball on the uphill side is even with the soil. The side of the root ball on the downhill side shall be well above the surrounding soil and a basin formed to retain water. Sufficient soil shall be applied to cover the sides of the root ball.

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329312.134 Planting Techniques - Part 6

14. A three inch (3") layer of mulch shall be applied around trees and shrubs to within six to eight (6-8") inches of the trunk or stem (s). A mulched area two feet (2') in diameter for each one inch (1") of tree trunk DBH (with a minimum diameter of eight feet (8') for trees), shall be maintained during the establishment period.

15. If staking is necessary it shall be accomplished using one of the following methods:

- a. Two or three wood dowels shall be driven through the edge of the root ball into the underlying soil for three gallon and smaller trees.
- b. One horizontal 2X2 shall be screwed or nailed to two 2X2's driven 12 inches into undisturbed soil on each side of the root ball. Two sets shall be needed for each root ball.
- c. Two or three (2-3) t-posts driven into a minimum of 12 inches of undisturbed soil.

329312.144 Planting Techniques - Part 7

i. When two (2) posts are specified, these shall be placed on either side of the tree parallel to the prevalent wind direction.

ii. When three (3) posts are specified these shall be placed equidistant (120 degrees) around the tree.

iii. Stakes will be kept clear of branches to prevent rub damage.

iv. Guys shall be flagged with a conspicuous material and replaced as required by the Owner.

16. Feather growth on the lower portion of the trunk shall remain in place for one (1) year after planting.

329312.154 Planting Techniques - Part 8

17. Pruning other than to correct structural problems or remove broken branches shall be avoided.

18. The trunks and large branches and foliage of all pines shall be sprayed with a pyrethrum (organic product), pyrethroid or similar insecticide prior to or within a day of planting by a qualified applicator.

a. A wettable powder formulation shall be used if available.

b. Phytotoxicity resulting from this treatment shall be the responsibility of the applicator.

329312.204 Plant Pit Backfill

On-site soil shall be used for backfill (unless excavated soil is gravel) after being mixed with 1/3 part specified soil amendment. Gravel shall be replaced with topsoil.

329333.034 Fertilizer for Shrub Areas

Fertilizer shall be spread at the rates noted in 2.0 Products, this Section. The area shall again be disced or rototilled at right angles to the first tillage, the shrub and seed beds shall be totally free from rock or clay clods over 1" diameter.

329334.014 Biosol Soil Amendment

Biosol Planters Mix shall be incorporated at the following rates

- a. 1/2 cup per 1 gal Perennial
- b. 1 cup per 5 gal shrub
- c. 2 cups per 2" caliper of tree size of each tree.

329343.104 Watering

All trees and shrubs shall be watered-in using a deep-watering device, immediately after planting, staking and guying. All planting shall be watered the same day it is planted.

329 Planting

329401.014 Preparation for Mulch

Perimeter of Shrub Beds shall be graded 3" below top of curbs, walks, edger (see detail), or any other grade level improvements for receiving rock or wood chip mulch. Planted area of shrub bed shall remain at the same grade or higher than adjacent pavements or lawn areas to insure adequate drainage of shrub beds.

329401.014 Installation of Rock Mulch

Place rock in all areas shown to receive mulch on drawings. Spread carefully and evenly to a minimum depth of 3" on areas shown on drawing.

329413.024 Concrete Edging

Concrete Edging shall be extruded into a trench which allows the top of curbing to be 1/2"-1" above adjacent lawn grade. Lines are to be straight, and curbs to be single radius curves with adjoining lines tangent to curve. Curbing installed not in line, grade, or proper curve will be removed and replaced at Contractor expense.

329413.554 Drip Tube Topsoil Backfill - Shrub Beds

Scarify (where directed on plans) areas to receive topsoil to a depth of 12". Contractor shall backfill designated shrub beds with specified amended topsoil to meet proposed grades. Soil is to be compacted to 85% modified proctor (wheel rolled) to minimize settling. Beds are to be filled over drip irrigation tubing to a depth of 2", and above adjacent edge of shrub bed, shaped to form mounded planting areas. Shrub bed perimeter is to be finished with 4:1 slopes from 2" below adjacent concrete to finish grade to form shallow trench to hold mulch. See shrub bed detail.

329443.024 Fertilizer for Trees

Use 4 (four) 21 gram tablets per tree, 7 (seven) 10 gram tablets per tree. Distribute fertilizer tablets evenly at 6" depth in tree well around root ball. Complete backfilling procedure

329443.044 Tree Wrapping Material

All deciduous tree trunks shall be wrapped after October 1, with wrapping material overlapping one and one-half (1 1/2") inches wound from ground line to the second branch, and securely taped at five places, including the top, middle and bottom. Wrap is to be removed the following spring.

329443.054 Staking and Guying

Deciduous trees - place two 6' long steel fence posts at 180° driven vertically into firm soil inside of steel edger tree ring with blade on tree side, run double strand of wire securely through nylon strap around trunk at minimum 1/3 height of tree and back to post, twist to remove slack. Evergreen trees 6' high and larger - Place three 30" long steel post stakes at 120° around tree, drive into firm soil at angle toward tree, run double strand of wire securely through nylon strap around trunk and guy twist to remove slack.

329460.074 Boulders

Boulders are to be placed with the intent of depicting natural formations and to provide retainage of soil where indicated on drawings. The nature of the selected rock will allow the cut side to be placed down, exposing the natural surface. Backfill following placement, compact.

329 Planting

5 Warranty

329223.015 Maintenance Period for Lawn Areas (sod)

The maintenance period shall begin immediately after each area is sodded and continue for thirty days or until final acceptance, whichever is longer. During this time the Contractor shall be responsible for watering, mowing, spraying, weeding, repair of areas damaged by erosion, wind, fire or other causes. Such areas shall be repaired to reestablish the condition and grade of the soil prior to application of the netting or mulch and shall be refertilized and resodded, as directed. After 30 days or until final acceptance of the entire project (whichever is longer), maintenance shall become the responsibility of Owner. The Owner's Representative will direct the Contractor on what sod areas need to be replaced at the final walk-through.

329223.025 Final Acceptance for Lawn Areas

The sodded area shall be accepted on the basis of having uniform live growth over the entire sodded area. Acceptable uniform live growth shall be defined as when scattered dead or brown spots, not greater than one (1) sq. ft., do not exceed five (5%) percent of the sodded area. Gaps created by shrinkage of sod strips shall not be readily visible. Dead or brown spots greater than (1) sq. ft. shall be replaced by the contractor at no cost to the Owner.

329310.015 Protection and Maintenance of Plant Materials

All planting shall be protected and maintained until final acceptance of all work. Maintenance shall include watering, weeding, cultivating, mulching, insect control (through spraying, biological control, or whatever method is recommended by the Tri River Extension Service), tightening and repairs of guys, removal of dead branches, resetting plants to proper grade or upright position, and other necessary operations.

329380.025 Replacement

All replacement planting is to be executed within ten (10) days of notice to replace such plants. Replacement of 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.

329380.055 Final Inspection and Acceptance

Inspection of the work to determine completion of contract, exclusive of the possible replacement of plants, will be made by the Owners Representative at the conclusion of construction operations. The condition of all planting will be noted and a determination made by the Owners Representative whether maintenance shall continue in any part. Contractor will be notified of acceptance of the work or any deficiencies in the requirements for completion. Plants must be in excellent and vigorous conditions. Excessively pruned trees and shrubs which, in the opinion of the Owners Representative, are no longer excellent representatives of their species shall be replaced prior to Final Acceptance.