

SECTION 1000
LANDSCAPING

1000.1 GENERAL

This section pertains to the various horticultural and associated installations that are related to streetscapes, parks, and other landscapes.

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1001.1 GENERAL

1001.1.1 SCOPE

Work under this section consists of the installation and/or renovation of an underground irrigation system as shown on the drawings and as specified hereafter. The CONTRACTOR performing this work shall furnish all labor, equipment, materials, and permits necessary for the completion of the system, except those specified to be furnished by others. Unless otherwise specified or indicated on the drawings, or authorized by the LANDSCAPE ARCHITECT. The construction of the irrigation system shall include the furnishing, installing, and testing of all pipe, fittings, valves, heads, controllers, wires, air release and vacuum valves, backflow preventers inlet and discharge piping, automatic drain valves, manual drain valves, valve boxes, and all other components pertinent to the drawings and specifications of this system. The CONTRACTOR shall perform all trenching, excavating, boring, backfilling, compacting, concrete pouring, electrical work, welding, and any other work necessary for the completion of the project.

1001.1.2 APPLICABLE STANDARDS & REFERENCES

1001.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1001.1.2.2 American Society for Testing and Materials (ASTM) Standard Specifications, Latest Edition:

- A-53/M Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- D-1784 Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds.
- D-1785 Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120.
- D-1875 Test Method for Density of Adhesives in Fluid Form.

- D-2241 Specification for Polyvinyl Chloride (PVC) Pressure-Rated Pipe.
 - D-2466 Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.
 - D-2467 Specification for Socket-Type Polyvinyl Chloride (PVC) Plastic Pipe Fittings, schedule 80.
 - D-2564 Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings.
 - D-2672 Specification for Joints for IPS PVC Pipe Using Solvent Cement
 - D-2774 Recommended Practices Underground Installation Thermoplastic Pressure Piping.
 - D-2855 Recommended Practice for Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.
 - D-3139 Specification for Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals.
 - F-402 Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
 - F-656 Specification for Primers for Use in Solvent Cement Joints of Polyvinyl Chloride (PVC) Plastic Pipe and Fittings
- 1001.1.2.3 American Society of Mechanical Engineers (ASME) Standards, Latest Edition:
- B1 Screws and Pipe Threads
 - B16 Pipes and Fittings
 - B18 Fasteners

1001.1.3 SUBMITTALS

1001.1.3.1 THIS PUBLICATION - Section 1502 - Submittals

1001.1.3.2 PRODUCT DATA

1001.1.3.2.1 For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Clearly identify on each submitted sheet by highlighting the specific product being submitted for approval. Failure to clearly identify the specific

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product being submitted will result in a rejection for the entire submittal. Submit physical sample of valve box label. No substitutions of material or procedures shall be made concerning these documents without the written consent of the LANDSCAPE ARCHITECT.

1001.1.3.3 EXISTING STATIC PRESSURE VERIFICATION

1001.1.3.3.1 The CONTRACTOR shall verify actual static pressure at the designated point of connection prior to construction. In the event that the actual static pressure varies from the pressure noted on the plans, the CONTRACTOR shall notify the LANDSCAPE ARCHITECT for any necessary design modifications.

1001.1.3.4 CLOSEOUT SUBMITTALS

1001.1.3.4.1 Operation and Maintenance Data: For irrigation controllers and automatic control valves. Include in operation and maintenance manuals.

1001.1.4 AS-BUILT AND RECORD DRAWINGS

1001.1.4.1 The CONTRACTOR shall provide and keep up to date a complete set of "as-built" drawings which shall be corrected daily to show all changes in the location of heads, controllers, backflow preventers, valves, drains, meters, points of connection, wire splice points, pipe, drip equipment and wire routing and other changes that may have been made from the original drawings and specifications as provided to him. All gate valves, manual drains, wire splices, automatic and manual valve locations, controllers, power supply, and mainline piping shall be shown with actual measurements to reference points so they may be easily located in the field.

1001.1.4.2 At the time of final acceptance the CONTRACTOR shall furnish to the OWNER a reproducible paper copy (bond) of the record drawing(s) prepared by a qualified draftsman showing the entire completed irrigation system. The CONTRACTOR shall also provide and install in each of the controller pedestals on the project a legible reduction, laminated in plastic, layout drawing of the irrigation system that the controller operates with each valve zone color-coded. In addition to the charts for the controller vaults, the CONTRACTOR shall provide two additional laminated, color coded reductions of the layout drawing of the irrigation system for the OWNER'S records.

At the time of final acceptance, the CONTRACTOR shall also provide the "as-built" drawings to the LANDSCAPE ARCHITECT to prepare record

drawings. These record drawings shall be provided in an electronic format as acceptable by the OWNER. The electronic files shall be formatted as follows:

A single PDF file containing one of each sheet of the project drawings (no multiple PDF files). PDF file shall be named: COA Project Number.pdf (example 100100.pdf). Each sheet shall be oriented as if reading the drawings on a desk, rotated images are not acceptable. Each sheet shall be sequentially numbered in accordance with the construction plan set. All AutoCad files necessary to recreate the irrigation record drawing sheets.

1001.2 MATERIALS

1001.2.1 GENERAL

1001.2.1.1 All materials shall be new and without flaws or defects of any type and shall be the best of their class and kind. All materials shall be of the brands and types noted on the plans or as specified herein or approved as equal by the LANDSCAPE ARCHITECT in accordance with Section 6.

1001.2.1.2 The irrigation system was designed around equipment manufactured by specific companies as a standard. Approved as equal equipment by other manufacturers may be used only with the approval of the LANDSCAPE ARCHITECT and the OWNER prior to the opening of bids as stipulated in the Contract Documents.

1001.2.2 RECLAIMED WATER DESIGNATION

1001.2.2.1 Where irrigation systems use reclaimed water, all products including valve boxes, lateral and main line pipe, etc. where applicable and/or required by local code shall have the reclaimed water purple color designation or use indicator tape as acceptable by local code.

1001.2.3 PIPES, AND FITTINGS

1001.2.3.1 Comply with requirements in the plans for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

1001.2.3.2 Galvanized-Steel Pipe: Galvanized pipe shall be used for above ground connections to backflow prevention device assemblies and booster pumps as shown on the plans and details. Pipe shall be hot dip galvanized continuous welded, seamless, Schedule 40 conforming to applicable current ASTM standards.

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1001.2.3.3 PVC Pipe: All mainline plastic pipe which is 2 1/2 inches or smaller, shall be Schedule 40 PVC and shall conform to ASTM D 1785. All mainline pipe which is 3 inches or larger shall be bell gasket Class 200 PVC, Type 1, Grade 2 conforming to ASTM D 1785 with a 200 psi pressure rating with flexible joints conforming to ASTM D 3139. All lateral lines plastic pipe shall be solvent weld schedule 40 PVC and shall conform to ASTM D 1785.

1001.2.3.4 PVC pipe shall be continuously marked with identification of the manufacturer, type, class, size and material and shall conform to ASTM D 1784. Solvent joints shall meet ASTM D 2774 and D 2855 requirements. All plastic pipe shall be continuously and permanently marked with the following information: manufacturer's name, nominal pipe size, schedule, kind of material, kind of pipe, and the pressure rating in psi in accordance with the standards of the National Sanitation Foundation. Pipe shall be free of holes, foreign material, blisters, wrinkles, UV degradation, dents, or sun scald.

1001.2.3.5 PVC Fittings: Fittings on PVC mainlines larger than 3 inches shall be ring and gasket fittings. Ring and gasket joints at all changes in direction shall utilize mechanical joint restraints. In-line ring and gasket joints shall utilize mechanical joint restraints as recommended by the manufacturer. Fittings on PVC mainlines 2 1/2 inches in diameter and smaller shall be solvent weld PVC, Type 1, Cell Classification 12454-B, and shall comply with ASTM D 2466, D 2467, and D 1784.

1001.2.3.6 Risers and Threaded Nipples: All threaded PVC nipples and risers shall be Schedule 80 PVC pipe, or as specified in the plans.

1001.2.3.7 HDPE Pipe: Mainline and lateral HDPE piping shall be as specified on the plans. PE pipe shall be DR 11, IPS diameters, of a 4710 Bimodal Resin with a Slow Crack Growth Resistance, PENT, of >2000 hours per ASTM F1473 and a Cell Classification of 445574C per STM D3350. PE pipe shall be free of holes, foreign material, blisters, wrinkles, UV degradation or dents. Sections of pipe shall be joined using butt fusion, unless otherwise noted on the plans. PE pipe shall be made according to the following standards.

a. Pipe diameters 3" and larger shall be per ASTM F714 or ASTM D3035 and pressure rated 200 psi when using a Design Factor of .63.

b. Pipe diameters 2" and smaller shall be per ASTM D3035 and pressure rated 200 psi when using a Design Factor of .63. Pipe may be supplied in coils which must be straightened and re-rounded by the Contractor prior to use.

1001.2.4 PIPING JOINING MATERIALS

1001.2.4.1 Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick unless otherwise indicated; full-face or ring type unless otherwise indicated.

1001.2.4.2 Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

1001.2.4.3 Solvent Cements, cleaners / primers, and compounds for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

a. Primer shall conform to ASTM F 656 and meet NSF. Cement shall be low VOC, NSF approved, and meet ASTM D 2564. Primer and cement shall be rated for the type of pipe shown on the plans.

b. All threaded connections between metal to metal, PVC to metal, and PVC to PVC shall be made using Spears Blue 75 thread sealant or Polytetrafluoroethylene (PTFE) thread seal tape. PTFE thread seal tape shall comply with MIL-T-27730A Specifications shall have a minimum thickness of 3.5 mils and shall be 99% pure PTFE. Thread sealing compound shall not be used on threaded connections between sprinkler and nipple or bubbler and nipple. Thread sealant or PTFE tape shall be used in accordance with manufacturer's installation instructions.

c. "0"-ring gasket and pipe spigot ends shall be lubricated using the lubricant recommended or supplied by the pipe manufacturer.

1001.2.4.4 Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

1001.2.4.5 Joint Restraints: For use in changes in pipe size, changes in pipe direction, and in-line as recommended by the joint restraint manufacturer. Manufacturer and models shall be as specified on the plans.

1001.2.4.6 HDPE fittings shall be made from PE 4710 resin with a cell classification of 445574C per ASTM D3350.

a. Fittings shall be for IPS diameter pipe.

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- b. The “ends” of butt fusion fittings shall have thicknesses that match the thickness of pipe or fittings to which they are fused.
- c. Fittings shall be joined using appropriate heat fusion methods. Heat Fusion shall be in accordance with ASTM F2620.
- d. Reductions on tees: Reducing on run and/or branch tees shall be such that the size of the “main body” is that of the largest leg of the tee.
- e. Butt fusion fittings shall be DR 11 per ASTM D3261. Fabricated butt fusion fittings shall be per AWWA C906 and the following additional requirements.
 - i. Tees and elbows shall be made from DR 9 pipe with ends machined to DR 11.
 - ii. Tees and 90 degree bends shall be 3 Segment.
 - iii. 45 degree bends and bends of lesser angle shall be 2 Segment.
 - iv. Reducers shall be of the “swage reducer” style made from DR 11 pipe with ends DR 11 thickness.
 - v. Branch saddle reducing tees are not permitted. Reducing tees whether fabricated or molded shall be accomplished with size x size tees and reducers.
- f. Electrofusion fittings including electrofusion couplings, electrofusion branch saddles with branches no larger than 2”, electrofusion x FNPT saddles, and electrofusion swivel saddles shall be DR 11 per ASTM F1055. Electrofusion branch saddles with branches greater than 2” are not permitted. Electrofusion swivel saddles shall be as manufactured by The Harrington Corporation or approved equal.
- g. Flange Adapter Systems shall be molded or machined from stock and be SDR 11 complying with ASTM F2880. Back up rings shall be ductile iron per ASTM A536 and DR 11. Accessories shall be 1/8” neoprene gaskets and Grade 5 or stronger, zinc plated cap screws or threaded rod and nuts.
- h. Threaded Transitions: HDPE x MNPT brass or stainless steel transitions shall be DR 11.
- i. Mechanical Joint Adapters: Mechanical joint adapters shall be DR 11, with stiffeners and comply with AWWA C906.

1001.2.5 VALVES, VALVE BOXES, AND VALVE IDENTIFICATION TAGS

1001.2.5.1 Valves: Valves for use in electrically controlled automatic control systems shall be diaphragm activated and hydraulically operated solenoid valves as specified on the plans.

1001.2.5.2 Valve Boxes: Valve boxes shall be constructed of ABS (acrylonitrile butadiene styrene) plastic, color as shown on the plans, with rigid base and sides and shall be supplied with bolt lock cover secured with stainless steel bolts with box extensions as required. Valve box manufacturer and size shall be as specified on the plans. After installation, hot brand or conical bit router station number labels into valve box and valve box lid (one each). Label in valve box shall be 3/4 inch high by 3/16” deep. Label in valve box lid shall be 3 inch high, 3/16” deep. Label quick coupler boxes with “QC” and master valve boxes with “MV”.

1001.2.5.3 Valve Identification Tags: Valve Identification Tags shall be metal or polyurethane permanently marked with the valve number. Color: potable water; yellow / Non-potable water; purple. Tags shall be permanently attached to each remote control valve with tamper proof seals.

1001.2.6 SPRINKLER HEADS AND BUBBLERS

1001.2.6.1 Sprinkler heads shall be as specified on the plans and shall be installed on swing joints assembly as per the standard drawings as specified on the plans, or as otherwise approved by the LANDSCAPE ARCHITECT in writing.

1001.2.6.2 Bubblers shall be as specified on the plans and shall be installed on flexible nipple assembly as per the standard drawings as specified on the plans, or as otherwise approved by the LANDSCAPE ARCHITECT in writing.

1001.2.7 BACKFLOW PREVENTION

1001.2.7.1 Backflow preventers shall be as specified on plans and shall comply with all state and local cross connection regulations.

1001.2.8 PLASTIC BALL VALVES

1001.2.8.1 Plastic ball valves shall be as specified on the plans.

1001.2.9 BRASS/BRONZE/IRON BODY GATE VALVES

1001.2.9.1 Brass/Bronze/Iron Body Gate Valves shall be as specified on the plans.

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1001.2.10 PRESSURE-REDUCING VALVES

1001.2.10.1 Pressure-Reducing Valves shall be as specified on the plans.

1001.2.11 QUICK COUPLERS

1001.2.11.1 Quick couplers shall be as specified on plans.

1001.2.12 FLOW SENSOR

1001.2.12.1 Flow sensor shall be as specified on the plans.

1001.2.13 DRIP IRRIGATION SPECIALTIES

1001.2.13.1 All drip irrigation equipment shall be as specified on the plans.

1001.2.14 CONTROLLERS AND WIRING

1001.2.14.1 Controllers shall be provided and installed as specified on the plans and/or standard drawings.

1001.2.14.2 Exterior Control Enclosures: Enclosure shall be as specified on plans and conform to NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding per plans and details.

1001.2.14.3 Wiring: UL 493, Type UF multi-conductor, with solid-copper conductors; insulated cable; suitable for direct burial.

a. WIRE (120 VOLTS): Wire for the 120 volt wiring shall be solid copper (or stranded copper in larger wire sizes) underground feeder for direct burial and PVC insulated. Size of wire shall be No. 12 AWG.

b. Low-Voltage, Wire (24 Volts) Branch-Circuit Cables: Wire for the 24 volt wiring shall be solid copper wire, PVC insulated; UL approved underground feeder wire for direct burial in ground. Common wires shall be No. 12, white, except as noted on drawings. The wire shall be supplied in either 500 feet or 2,500 feet rolls. Wiring between controllers and automatic control valves No. 12 AWG minimum color-coded different from feeder-circuit-cable jacket color.

c. Wire splicing materials: All wire splices shall be made watertight using wire connectors as specified on the plans. All wiring installed under sidewalks, roadways, parking lots, etc., shall be installed in a 1-1/4 inch or larger Class 200 PVC sleeve. All splices shall be located in valve boxes.

d. 2-Wire control wiring: For 2-wire controllers all irrigation wire for the controller, flow sensor, master valve and remote control valves shall be per the controller manufacturer's specifications and recommendations. Install decoders and grounding per manufacturer's specifications and recommendations or as shown on the plans.

1001.2.15 CONTROLLER DECODERS

1001.2.15.1 Controller decoders shall be as specified on the plans.

1001.2.16 BOOSTER PUMP

1001.2.16.1 Booster pump shall be as specified on the plans.

1001.2.17 OTHER MISCELLANEOUS FITTINGS AND MATERIALS

1001.2.17.1 All other miscellaneous fittings and materials shall be as specified on the plans.

1001.3 EXECUTION

1001.3.1 GENERAL

1001.3.1.1 All materials and equipment shall be installed in a neat and workmanlike manner according to manufacturer's published recommendations and specifications, local, and state codes, as shown on the detail drawings, plans and as specified herein.

1001.3.1.2 Plan locations of backflow preventers, valves, controllers, irrigation lines, sleeves, spray heads and other equipment are diagrammatic and indicate the spacing and relative locations of all installations. Final site conditions and existing and proposed plantings shall determine final locations and adjusted as necessary and as directed to meet existing and proposed conditions and obtain complete water coverage. Minor changes in locations of the above from locations shown shall be made as necessary to avoid existing and proposed trees, piping, utilities, structures, etc. at the CONTRACTOR'S expense or when directed by the LANDSCAPE ARCHITECT. CONTRACTOR shall be held responsible for relocation of any items without first obtaining the LANDSCAPE ARCHITECT'S approval. CONTRACTOR shall remove and relocate such items at their expense if so directed by the LANDSCAPE ARCHITECT.

1001.3.2 SITE CONDITIONS

1001.3.2.1 It is the responsibility of the CONTRACTOR to be aware of all surface and sub-

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surface conditions, and to notify the LANDSCAPE ARCHITECT, in writing, of any circumstances that would negatively impact the installation of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

1001.3.2.2 The Contractor shall contact the New Mexico One Call two working days in advance of any excavation.

1001.3.3 PRODUCT HANDLING

1001.3.3.1 The CONTRACTOR shall be responsible for correct procedures in loading, unloading, staking, transporting, and handling all materials to be used in the system. The CONTRACTOR shall avoid rough handling which could affect the useful life of equipment. Pipe shall be handled in accordance with the manufacturer's published recommendations on loading, unloading, and storage.

1001.3.4 EXCAVATION AND TRENCHING

1001.3.4.1 The CONTRACTOR shall stake out the location of each run of pipe and all sprinkler heads and valves prior to trenching. Each run of the system shall be approved by the LANDSCAPE ARCHITECT before actual installation is started.

1001.3.4.2 Excavation and trenching for pipe lines shall be true to line. The width of the trenches shall not be greater than necessary to permit proper jointing, tamping, backfilling, bedding or any other installation procedures that may be necessary. Trench widths shall also be wide enough so that there will be a minimum horizontal separation of 4 inches between pipes in the same trench.

1001.3.4.3 In areas where trees are present, trench lines will be adjusted on the site to install trenches beyond the drip line of the tree or at an alternate distance from the trunk as approved by the OWNER. If lines cannot be adjusted to be outside of the drip line or the alternate distance as approved by the OWNER, trenches shall be dug by hand to avoid cutting roots greater than 1" diameter. No additional compensation will be paid to the CONTRACTOR for hand trenching under the drip line of a tree.

1001.3.4.4 Trench depths shall be sufficient to provide the specified pipe cover as described in these specifications or as noted on the plans. In rocky areas the trenching depth shall be 6 inches below normal trench depth to allow for pipe bedding as described in these specifications.

1001.3.4.5 Depth of bury: There shall be a minimum of 28 inches and a maximum of 30 inches of cover for all constant pressure mainline. There shall be a minimum of 18 inches and a maximum of 20 inches of cover for all mainline located downstream of the master valve. There shall be a minimum of 18 inches and a maximum of 20 inches of cover for all lateral lines.

1001.3.4.6 Depth of bury at valve boxes: Provide sufficient valve box extension to provide the full required depth of bury per 1001.3.4.5. Additional extensions shall be utilized to achieve specified depths. Penetrations through the valve box or extensions shall be as shown in the standard drawings or as specified on the plans.

1001.3.4.7 Rock: It shall be the CONTRACTOR'S responsibility to remove and dispose of all unsuitable materials removed from the trench that cannot be used in the backfill operation. When material from the excavation or trenching is unsuitable for use as backfill, additional backfill material suitable for this purpose and approved by the LANDSCAPE ARCHITECT, shall be brought in at the expense of the CONTRACTOR. No additional compensation will be paid to the CONTRACTOR for encountering rock or unsuitable material unless specified otherwise in the Contract Documents.

1001.3.4.8 Directional Boring: CONTRACTOR may directional bore lines where it is practical or where required on the plans. Extend the bore a minimum 2 feet past the edge of pavement or until the bore is at the specified depth of bury, unless noted differently on the plans. Cap ends of each bore and locate ends at finished grade using metal stakes. All sleeving installed by directional boring shall have detectable locator placed at each end of the pipe. Locator shall be as specified on the plans.

1001.3.5 PIPING AND FITTINGS
INSTALLATION

1001.3.5.1 Installation of plastic pipe and fittings shall be in accordance with the manufacturer's published recommendations and procedures and as specified herein. Manufacturer's published recommended procedures for making solvent weld fittings shall be strictly adhered to.

1001.3.5.2 Caution shall be exercised by the CONTRACTOR in handling, loading, unloading and storing of pipe and fittings. All PVC pipe shall be stored and transported in a vehicle with a bed long enough to allow the pipe to lie flat without subjecting it

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to undue bending or concentrated external load at any point. Any section of pipe that has been dented or damaged or in any other way found to be defective, either before or after laying, shall be replaced with sound pipe without additional expense to the OWNER.

1001.3.5.3 Before installation, the inside of the pipe shall be cleaned of all direct and foreign matter and shall be kept in cleaned condition during and after laying of the pipe. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other foreign substances will enter the pipe or fittings. Where pipe ends are left for future expansion or connections, they shall be valved and capped, as directed on the plans and or by the LANDSCAPE ARCHITECT.

1001.3.5.4 All PVC pipe and fittings shall be assembled to permit the pipe or fittings to be joined at the true parallel position of the fitting. Placement of pipe in curving trenches which causes bending and stress on pipe and fittings will not be permitted. No excess piping or fittings shall be permitted in the installation of the system, which may increase pressure loss or potential blockage.

1001.3.5.5 Excavation and trenching shall be true to line and depth specified in these specifications or indicated on the plans. Before installing the pipe, all rubbish and rocks shall be removed from the trenches. If the soil is rocky, the trenches shall be padded with dirt or sand as outlined in these specifications. Material used for pipe padding shall be approved by the LANDSCAPE ARCHITECT. The full length of each section of the pipe shall rest solidly upon the bottom of the trench or bedding material.

1001.3.5.6 Pipe shall not be laid in water or when trench or weather conditions are unsuitable for the work. Any water or mud which may be encountered or may accumulate in the trenches or excavation shall be pumped out or otherwise removed as necessary to keep the bottom of the trench or excavation free and clear of water during the progress of the work.

1001.3.5.7 Unless otherwise specified on sleeving the plans, all piping passing under sidewalks, roadways, parking lots, etc., shall be sleeved in a Class 200 PVC pipe two sizes larger than the pipe to be sleeved.

1001.3.5.8 When more than one pipe is installed in the same trench, in no case shall one pipe be installed above or below another. Pipe can be installed in the same trench if pipes are laid side by side. In no case shall mainline and lateral pipe be installed in the same

trench. The minimum horizontal clearance between lines in the same trench shall be 4 inches.

1001.3.5.9 After all piping, risers, valves, thrust blocks, etc., have been installed and partial backfilled as specified herein, the control valve shall be opened and a full head of water used to flush out the system. After the system is thoroughly flushed, risers shall be capped off and the system pressure tested in accordance with the testing section. At the conclusion of the pressure test the heads shall be installed and the backfill operation completed.

1001.3.5.10 Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing. Use precautions on label when applying solvent weld in cold weather.

1001.3.6 JOINT CONSTRUCTION AND SOLVENT WELDING PROCEDURE

1001.3.6.1 Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

1001.3.6.2 PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

- a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
- b. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
- c. PVC Non-pressure Piping: Join according to ASTM D 2855.
- d. PVC plastic pipe shall be squarely cut.
- e. Burrs left from cutting shall be wiped off with a clean, dry cloth.
- f. Utilizing a cleaner / primer, thoroughly clean the mating pipe end and the fitting socket with a clean dry cloth.
- g. Apply a uniform coat of solvent cement to the outside of the pipe end with a non-synthetic brush or dauber.
- h. In like manner, apply a thin coating of solvent cement to the inside of the fitting socket.

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- i. Re-apply a light coat of solvent cement to the pipe and quickly insert it into the fitting to the full depth of the fitting socket.
- j. Rotate the pipe or fitting approximately 1/4 turn to insure even distribution of the solvent cement.
- k. Hold in position for approximately 30 seconds.
- l. Wipe off any excess solvent cement that forms as a bead around the outer shoulder.
- m. Care should be taken so as not to use an excess amount of solvent cement that could cause burrs or obstructions to form on the inside of the pipe joint.
- n. Solvent weld joints shall be allowed to cure for at least 24 hours before pressure is applied to the system.

1001.3.6.3 Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Join pipe fittings and valves as follows:

- a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
- b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

1001.3.6.4 Saddle Taps: No saddle taps shall be permitted unless specified on the plans.

1001.3.6.5 HDPE Fittings: Install HDPE fittings per manufacturer's written instructions and in conformance with ASTM D2657.

1001.3.6.6 Joint Restraints: Install joint restraints per manufacturer's written instructions.

1001.3.7 BACKFILLING

1001.3.7.1 Upon completion of a particular section of the irrigation system, and after sufficient time has elapsed for the curing of solvent weld joints, partial backfilling can begin, leaving all joints, risers and connections exposed for visual observation during the hydrostatic test. After completion and acceptance of the hydrostatic test by the LANDSCAPE ARCHITECT or OWNER'S representative for a particular section of the irrigation system, the backfill operation can be completed.

1001.3.7.2 All backfill material shall be subject to approval by the LANDSCAPE ARCHITECT. Backfill materials shall be free from rubbish, rock, large stones, brush, sod, frozen material or other unsuitable

substances that may damage pipe during the backfilling operations.

1001.3.7.3 In the event that the material from the excavation or trenching is found to be unsuitable for use in backfill, it shall be removed from the site and properly disposed of by the CONTRACTOR at his own expense. The CONTRACTOR shall then, at no additional cost to the OWNER, arrange for, purchase and/or furnish suitable backfill material consisting of earth, loam, sandy clay, sand, or other approved materials free of large clods of earth or sharp stones, approved by the LANDSCAPE ARCHITECT.

1001.3.7.4 In rocky areas, the trench depth shall be 6 inches below the normal trench depth to allow for 6 inches of suitable backfill as padding for the pipe. In like manner, there shall be at least 6 inches of suitable backfill on either side of the pipe as padding against the rock wall of the trench.

1001.3.7.5 Backfill shall be placed in horizontal layers not exceeding 6 inches in depth and shall be thoroughly tamped, rolled or otherwise compacted to original density or better so that no settling will result. Continuous warning tape shall be provided at 6 inches depth below sub-grade for all constant pressure mainline trenches. Backfill shall be placed to the original ground level or to the limits designated on the plans. If settlement of trenches occurs within one year from date of completion, it shall be the CONTRACTOR'S responsibility to refill trenches and re-seed or sod the repaired areas.

1001.3.8 SLEEVED CROSSING

1001.3.8.1 Unless otherwise noted on plans, all piping installed under sidewalks, roadways, parking lots, etc., shall be sleeved in a Class 200 PVC pipe a minimum double the diameter of the pipe to be sleeved. Wiring shall be placed in a separate sleeve from that of the pipe crossing and shall be 1-1/4 inch or larger Class 200 PVC and shall be large enough to allow free pulling of the specified number of wires.

1001.3.8.2 Every effort shall be made by the CONTRACTOR to install sleeving prior to the pouring or construction of the sidewalks, roadways, parking lots, etc. If prior sleeving is not possible, all crossings must be bored unless authorization for an open cut is obtained from the LANDSCAPE ARCHITECT.

1001.3.8.3 Sleeving ends, with the inner pipe or wire installed, shall be capped or taped closed using a good quality duct tape to prevent the entrance of dirt into the sleeve.

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1001.3.9 THRUST BLOCKS

1001.3.9.1 Thrust blocks: Concrete thrust blocks shall be provided at mainline end caps. Thrust blocks shall be poured against undisturbed earth.

1001.3.10 SPRINKLER INSTALLATION

1001.3.10.1 Sprinkler and bubbler installation:

a. Install sprinklers and swing joint assemblies after hydrostatic test is completed.

b. Install bubblers and flexible nipple assembly after hydrostatic test is completed.

1001.3.10.2 Sprinkler heads shall be the type and make specified and shall be installed to grade unless otherwise specified. Sprinkler heads shall be installed 8 inches from curbs, walls, driveways, building walls, etc. Heads shall be installed in the vertical positions, hand backfilled and compacted to original density or better.

1001.3.10.3 Sprinkler head spacing shall not exceed the spacing shown on the plans and shall be in the locations and configuration as shown on the plans. CONTRACTOR shall verify area dimensions while staking sprinkler head location.

1001.3.10.4 After all piping is in place and connected and before installation of the swing joint and sprinkler heads, or flexible nipple assembly and bubblers, all control valves for a given section shall be fully opened and a full head of water shall be used to flush out the system.

1001.3.10.5 If water pressure without the heads installed is not sufficient to provide adequate water flow from end risers, the CONTRACTOR shall cap off enough heads closest to the water source to provide adequate flushing of the end riser assemblies.

1001.3.11 DRIP IRRIGATION SPECIALTY INSTALLATION

1001.3.11.1 Install drip irrigation system components as shown in the plans.

1001.3.12 AUTOMATIC IRRIGATION CONTROL SYSTEM INSTALLATION:

1001.3.12.1 The Controller location is indicated on the plans. The CONTRACTOR shall familiarize himself with the requirements of connections at the locations noted (120 volt supply to the controller) and shall include the cost to complete this portion of the contract.

1001.3.12.2 Controller shall be installed in a locking controller enclosure as specified on the plans. The controller shall be mounted and wired according to the manufacturer's recommended procedures and as specified in these specifications and on the plans.

1001.3.12.3 Electric control valves shall be connected to controller in the numerical sequences as shown on the plans. Install permanent labels on wires within the controller cabinet.

1001.3.13 ELECTRIC AUTOMATIC CONTROL VALVES

1001.3.13.1 All electric control valves shall be of the type and size as indicated on the plans and shall be installed where shown on the plans, following the published recommendations of the manufacturer and in accordance with these specifications and plans.

1001.3.13.2 The valve boxes shall be bolt down and of the size, type and color as shown on the plans. Valve boxes shall be installed as shown on the plans.

1001.3.13.3 Valve wire splices shall be waterproofed using connectors as specified on the plans and the CONTRACTOR shall leave 36 inches of coiled slack to facilitate raising splices to ground level without cutting wires.

1001.3.14 24-VOLT CONTROL VALVE WIRING

1001.3.14.1 All wire installation procedures as described herein shall be checked to conform to local electrical codes.

1001.3.14.2 Whenever possible, the CONTRACTOR shall install the 24 volt control valve wiring in the same trench as the mainline piping. All wires shall be laid on the bottom on one side of the pipe only and 2 inches below the pipe. The wires shall be laid loose in the trench to allow for contraction of the wire. Control wires shall be taped together in 10 foot-0 inch increments. When trenches used for piping are not appropriate for routing of wire, a trench, 18 inches deep, shall be provided by the CONTRACTOR for 24 volt wires and shall be identified with location dimensions on the "as-built" record drawings.

1001.3.14.3 Wire splices, other than at valve box locations, shall be kept to a minimum and if needed shall be made only at common splice points and placed in a wire splice box as shown on the plans or as approved by the LANDSCAPE ARCHITECT. The location of these wire splice boxes shall be shown on the "as-built" record drawings. There shall be a 36-inch

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coil in the wires placed in the wire splice boxes so that the splices can be pulled out above ground level to facilitate testing and trouble shooting. No buried wire splices shall be permitted. All wire splices shall be made waterproof using connectors as specified on the plans.

1001.3.14.4 In no case shall wires of different colors be spliced together.

1001.3.14.5 Control wires shall be identified with wire marking tape at each valve and at the Controller and at all splices. Valves shall be numbered on the record drawings.

1001.3.14.6 Spare wire: Install one spare #12 wire from controller along entire mainline to last electric remote control valve on each and every leg of mainline. Label spare wires at controller and wire stub to be located in a valve box. Spare wire is not required on decoder systems.

1001.3.15 120-VOLT CONTROLLER POWER WIRING:

1001.3.15.1 The CONTRACTOR shall familiarize himself with the work required to complete this portion of the installation. All 120 volt wiring shall be installed in accordance with state and local electrical codes. The 120 volt service shall consist of one black and one white wire. The neutral wire must be bonded.

1001.3.15.2 120 volt power shall be supplied to the controller location by a licensed electrician.

1001.3.16 MANUAL DRAIN VALVE-MAINLINE:

1001.3.16.1 Manual drain valves of the size and type indicated on the plans shall be installed at all low points of mainline piping, or at any other points that may be indicated on the irrigation system plans or as specified herein.

1001.3.17 FIELD QUALITY CONTROL AND TESTING:

1001.3.17.1 Upon completion of the irrigation system's mainline; the entire mainline shall be tested for a 4 hour period at 150 psi. Prior to testing the mainline shall be partially backfilled leaving all joints and connections exposed for visual observation. All dirt shall be flushed from the system and the line filled with water to remove air. The mainline shall be brought to static pressure. A pressure gauge and temporary valve shall be installed at the end of the mainline to permit hydrostatic pressure to be applied to the main. A

pressure of 150 psi must be retained for a 4 hour period. Any leaks resulting in the 4 hour pressure test shall be repaired and the system retested until the system passes the test.

1001.3.17.2 Upon completion of the irrigation system's lateral sections and after sufficient time has been allowed for solvent weld joints to cure, the entire system shall be hydrostatically tested by capping off all irrigation head risers. On systems using flex nipples or swing joints, the lateral line shall be tested prior to installation of the flex nipples or swing joints. Prior to capping, all air and dirt shall be flushed from the system and the pipe partially backfilled by center loading, leaving all joints, risers, swing joints and connections exposed for visual observation. All lateral irrigation piping must be pressure tested for 1 hour at 100 psi. The procedure shall be the same as used for the mainline. If after one hour no visible leakage has occurred and the 100 psi pressure has been retained, the heads shall be installed, and the backfill operation completed. Any leaks resulting from the hydrostatic test shall be repaired and the system retested until the system passes the test.

1001.3.17.3 Audit sprinkler system as required by the City of Albuquerque Water Waste and Water Conservation Landscape Ordinance and adjust as necessary prior to turf installation. The audit shall be performed by an independent auditor who did not have responsibility for the irrigation design.

1001.3.17.4 Backflow Preventer Test: The backflow preventer shall be tested according to procedures and meet performance results per the requirements of all local and national codes.

1001.3.18 ADJUSTING OF SYSTEM AND STARTUP SERVICE

1001.3.18.1 Upon completion of the installation, the CONTRACTOR shall adjust all heads and valves and program controller to provide optimum system performance. It will be the OWNER'S responsibility to make any minor adjustment to the system during the guarantee period.

1001.3.18.2 Perform booster pump startup service.

a. Complete installation and startup checks according to manufacturer's written instructions.

b. Verify that controllers are installed and connected according to the Contract Documents.

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c. Verify that electrical wiring installation complies with manufacturer's submittal.

1001.3.18.3 Adjust settings of controllers, to meet watering window requirements as specified on plans.

1001.3.18.4 Adjust sprinklers bubblers and boxes, except those intended to be mounted aboveground, so they will be flush with, or not more than indicated on drawings above finish grade.

1001.3.19 CLEAN-UP

1001.3.19.1 The CONTRACTOR shall continuously keep a neat and orderly area in which he is installing the system. Disposal of rubbish and waste material resulting from the installation shall be continual. Upon completion of the system, the CONTRACTOR shall remove from the OWNER'S property at his own expense, all temporary structures, rubbish, waste material, tools, and equipment resulting from or used in the installation of the system.

1001.3.20 PROTECTION OF EXISTING UTILITIES

1001.3.20.1 The CONTRACTOR shall be responsible for locating all cables, conduits, piping, and any other utilities or structures that may be encountered either above or below ground. All necessary precautions must be taken by the CONTRACTOR to prevent any damage to these existing improvements. In the event that such damage should occur from his operations, the CONTRACTOR shall repair or replace or bring to original condition the damaged utilities or improvements at his own expense.

1001.3.21 FINAL ACCEPTANCE

1001.3.21.1 When the CONTRACTOR is satisfied that the system is operating properly, that it is balanced and adjusted, that all work and cleanup is completed, he shall request a review of the irrigation system by the LANDSCAPE ARCHITECT and OWNER. At that time, the CONTRACTOR shall demonstrate each system in its entirety. In reviewing the work, no allowance for deviation from the original plans and specifications will be made unless prior approval has been obtained. This system review must be completed prior to beginning planting operations.

1001.3.21.2 Any inconsistencies to the specifications shall be noted by the LANDSCAPE ARCHITECT and the OWNER and a written copy of corrections needed shall be given to the CONTRACTOR. Any work deemed not acceptable shall be reworked to the

complete satisfaction of the OWNER and the LANDSCAPE ARCHITECT at no additional cost to the OWNER.

1001.3.21.3 When all work is completed to the satisfaction of the OWNER, a written acceptance of the total project will be given to the CONTRACTOR upon furnishing, by the CONTRACTOR of a complete "as-built" record drawing of the irrigation system that is acceptable to the OWNER.

1001.3.21.4 Operational Instruction: After the system has been tested and accepted the CONTRACTOR, along with the LANDSCAPE ARCHITECT shall instruct the OWNER in the operation and maintenance of the system.

1001.3.22 SYSTEM MAINTENANCE AND WARRANTY

1001.3.22.1 All materials shall have a minimum guarantee of one year against material defects or defective workmanship.

1001.3.22.2 For a period of one year from final acceptance of the system, the CONTRACTOR will promptly furnish and install, without cost to the OWNER, any and all parts or materials which prove defective in material or workmanship. All damage due to irrigation system line breaks caused by defective material or workmanship shall be repaired and brought to original condition by the CONTRACTOR at no expense to the OWNER. The CONTRACTOR shall complete all repairs within 24 hours of receipt of notification from the OWNER of system failure.

1001.3.22.3 Minor maintenance of the system shall be the responsibility of the OWNER.

1001.3.22.4 For a period of one year from final acceptance of the system, the CONTRACTOR shall repair any settlement of the trenches by one of the following methods as directed by the LANDSCAPE ARCHITECT and the OWNER.

- a. Bring to grade by top dressing (raking topsoil into the grass).
- b. Bring to grade with topsoil and seed.
- c. Remove existing sod, fill depression with topsoil, and replace with new sod to match existing sod.

1001.3.22.5 Repair by any of the above methods must result in a smooth, level area. Maintenance of repaired areas shall be the responsibility of the OWNER. Repair shall be completed by the CONTRACTOR within 48

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hours after notification from the OWNER of trench settlement problems.

1001.3.23 REVIEWS AND OBSERVATIONS

1001.3.23.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations shall be made at any time at the discretion of the LANDSCAPE ARCHITECT or OWNER. It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT in writing 48 hours in advance of each required review or observation. The sequence of required review shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work in the next sequence without written approval of the previous sequence. Payment will not be approved for items which have not been reviewed and approved in writing.

- a. Review staked locations of mainline, valves, laterals, and sprinkler heads.
- b. Review 24 volt control wire installation.
- c. Review and observe mainline installation and pressure test, and electric control valve installation.
- d. Review and observe lateral line pressure test and installation.
- e. Review automatic controller installation and operation.
- f. Review and observe sprinkler and bubbler head placement, coverage and operating pressure prior to planting.
- g. Final project review and acceptance.
- h. Review at end of the warranty period.

1001.3.24 MEASUREMENT & PAYMENT

1001.3.24.1 Measurement of the landscape irrigation system shall be lump sum or by units of the major components of the system as specified in the Supplemental Technical Specifications and/or the Bid Proposal and shall include the entire irrigation system from the water meter.

1001.3.24.2 Payment shall be at the contract price per lump sum or per unit as specified in the Supplemental Technical Specifications and in the Bid Proposal, which shall include all material, equipment and labor required to install and make operational the irrigation system.

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1005.1 GENERAL

1005.1.1 SCOPE

Work under this section consists of the planting of trees, shrubs, and groundcovers, including the furnishing of all labor, equipment, and materials and performing all work in connection therewith in accordance with the plans and specifications, or as authorized by the LANDSCAPE ARCHITECT.

1005.1.2 APPLICABLE STANDARDS & REFERENCES

1005.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1005.1.2.2 This Publication, Latest Edition:

Section 1001 Landscape Irrigation

Section 1010 Turf Sodding

Section 1011 Turf Seeding

1005.1.2.3 The scientific and common names used for the plants called for on the drawings are generally in conformity with the approved names given in the Latest Edition of the American Standard for Nursery Stock (ANSI Z60.1), published by the American Hort, Latest Edition and Standardized Plant Names, published by the American Joint Committee on Horticultural Nomenclature, Latest Edition. The names of varieties not included therein are generally in conformity with the names accepted in the nursery trade.

1005.1.3 SUBMITTALS

1005.1.3.1 THIS PUBLICATION - Section 1502 - Submittals

1005.1.3.2 PRODUCT DATA: For each type of product.

- a. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
- b. Other materials: Submit manufacturer product data and literature describing all products required by this section to the LANDSCAPE ARCHITECT for approval. Submit samples of each product and material where required by this section to the LANDSCAPE ARCHITECT for approval.
- c. Plant Photographs: When plant material is located

outside the Albuquerque Metropolitan Area, CONTRACTOR may submit color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three plants in photograph or three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

1005.1.3.3 Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

- a. Manufacturer's certified analysis of standard products.
- b. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

1005.1.3.4 Pesticides and Herbicides: Product label, Product Safety Data, and manufacturer's application instructions specific to Project.

1005.1.4 PLANT MATERIAL OBSERVATION

1005.1.4.1 Plant Material Observation: LANDSCAPE ARCHITECT may observe plant material either at place of growth, wholesale nursery, or at CONTRACTORS yard before delivery for compliance with requirements, for genus, species, variety, cultivar, size, and quality. However at no additional expense to the OWNER, the CONTRACTOR shall be responsible for all travel expenses incurred by the LANDSCAPE ARCHITECT for any travel outside the Albuquerque Metropolitan Area. LANDSCAPE ARCHITECT may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. The LANDSCAPE ARCHITECT shall be the judge of the quality and acceptability of all plant materials. Remove rejected trees or shrubs immediately from project site.

1005.1.5 DELIVERY, STORAGE & HANDLING

1005.1.5.1 Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of

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manufacturer, and indication of compliance with state and Federal laws if applicable.

1005.1.5.2 Bulk Materials:

- a. Do not dump or store bulk materials near fuel containers / storage, structures, utilities, walkways and pavements, or on existing turf areas or plants.
- b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
- c. Accompany each delivery of bulk materials with appropriate certificates.

1005.1.5.3 Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

1005.1.5.4 Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

1005.1.5.5 Deliver plants after preparations for planting have been completed and install immediately. CONTRACTOR shall make all efforts to plant material the same day as it is delivered to the site. In the event that the plant material is not installed the same day, CONTRACTOR shall be responsible for maintaining plants in a healthy condition until installed.

- a. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
- b. Do not remove container-grown stock from containers before time of planting.
- c. Water root systems of plants stored on-site deeply and thoroughly. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1005.1.6 PROJECT CONDITIONS

1005.1.6.1 Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

1005.1.6.2 Weather Limitations: Proceed with planting

only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1005.1.6.3 Soil testing: CONTRACTOR shall conduct soil testing of imported or prepared soil, and existing site soil after grading operations by an approved soil-testing laboratory. CONTRACTOR shall provide soils test result and testing lab recommendations to LANDSCAPE ARCHITECT for review. If test reporting recommends amendments, fertilizers or conditioners that differ from those noted in the Contract Documents, the CONTRACTOR shall furnish and install alternate materials as directed by LANDSCAPE ARCHITECT. All soil testing will be at the expense of the CONTRACTOR. The soils test report shall include at a minimum the following information:

- a. pH
- b. Percent organic content by oven dried weight
- c. Nutrient levels by parts per million including: nitrate nitrogen, potash, sulfur, boron, phosphorus, potassium, magnesium, manganese, iron, sodium, copper, zinc and calcium. Testing shall also include salinity, computed percentage of sodium and free lime level. Soil test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified

1005.2 MATERIALS

1005.2.1 PLANT MATERIAL

1005.2.1.1 General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on plans. A complete list of plants, including a schedule of quantities, sizes and other requirements is shown on the plans. In the event that discrepancies occur between plant quantities listed in the Plant Legend and the planting plan, the plant quantities illustrated on the planting plan shall govern. All plants shall comply with ANSI Z60.1; with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

- a. Do not use trees with pruned, damaged, crooked, or multiple leaders; tight vertical branches where bark is

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squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable, unless otherwise specified on plans.

b. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise specified on plans or approved in writing by the LANDSCAPE ARCHITECT

c. Plant material with branching patterns that are not typical to the species, or with branching patterns more highly developed on one side than on other sides, shall not be acceptable.

1005.2.1.2 Root Quality: Plant roots shall be normal to the plant type specified. Root observations shall take place without impacting tree health. Root quality at or below the soil line shall comply with the following:

a. The roots shall be reasonably free of scrapes, broken or split wood.

b. The root system shall be reasonably free of injury, damage or decay. Wounds resulting from root pruning used to produce a high quality root system are not considered injuries.

c. A minimum of three structural roots reasonably distributed around the trunk (not clustered on one side) shall be found in each plant. Root distribution shall be uniform throughout the root ball, and growth shall be appropriate for the species. Plants with structural roots on only one side of the trunk (J roots) shall be rejected.

d. The root collar shall be within the upper 2 inches of the substrate/soil. Two structural roots shall reach the side of the root ball near the top surface of the root ball. The grower may request a modification to this requirement for species with roots that rapidly descend, provided that the grower removes all stem girdling roots above the structural roots across the top of the root ball

e. The root system shall be free of stem girdling roots over the root collar or kinked roots from nursery production practices.

1005.2.1.3 Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

a. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure

main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.

b. Other Plants: Measure with stems, petioles, and foliage in their normal position.

1005.2.1.4 Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to the LANDSCAPE ARCHITECT and at no additional cost to the OWNER, with a proportionate increase in size of roots or balls.

1005.2.1.5 Container grown plant material shall have been established in its delivery container for not less than six months, but for not more than two years. Any plant material found to be root bound at planting will not be accepted.

1005.2.1.6 Balled and burlapped plant material shall have a solid ball of earth of minimum specified size and held in place securely by burlap and a stout twine or rope. Broken or loose balls will be rejected. Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. d. The root collar shall be within the upper 2 inches of the substrate/soil.

1005.2.1.7 Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

1005.2.1.8 If formal arrangements or consecutive order of plants is indicated on the plans, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

1005.2.1.9 Plant material substitutions shall not be made without the written approval of the LANDSCAPE ARCHITECT. The use of materials differing in kind, quality, or size from that specified will be allowed only after the LANDSCAPE ARCHITECT is convinced that all means of obtaining the specified materials have been exhausted. At the time bids are submitted, the CONTRACTOR is assumed to have located the materials necessary to complete the job as specified. All requests for substitutions must be submitted prior to the opening of bids as stipulated in the Contract Documents.

1005.2.2 FERTILIZERS

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1005.2.2.1 CONTRACTOR shall apply fertilizers with nutrient composition and application rate as specified on the plans or determined by the soils test.

1005.2.3 ORGANIC AND AGGREGATE MULCH

1005.2.3.1 Organic and aggregate mulches shall be as specified on the plans.

1005.2.4 PLANTING SOIL MIXTURES:

1005.2.4.1 Specification for complete planting backfill. Planting soil mixture shall be a premixed, homogeneous soil. It will consist of sand and organic matter and meet performance characteristics outlined below.

a. Sand, 60% by volume of clean masonry sand with a sieve analysis of:

<u>sieve size</u>	<u>% passing</u>
3/8"	100%
#4	93-99%
#8	82-88%
#16	73-79%
#30	55-61%
#50	24-30%
#100	6-12%
#200	7-2%

b. Organic Matter, 40% by volume of compost material specified as follows: Organic matter shall be a combination organic carbon sources such as straw, hay, bark, sawdust or wood shavings and nitrogen sources such as manure, blood meal, or chemical fertilizers. Nitrogen sources must be added prior to composting. This mixture shall be aerobically composted at temperatures between 120 F and 160 F for a period of not less than 15 days, with further curing of not less than 3 months. Weed seeds are to be destroyed during composting and urea and ammonia form nitrogen ratio shall be as listed below. Finished compost is to be screened to provide less than 2% remaining on a 1/2 inch screen. Carbon to Nitrogen Ratio of organic matter shall be less than 50 parts carbon to one part nitrogen.

1005.2.4.2 The complete PLANTING SOIL MIXTURE shall have the following characteristics:

a. Calcium to magnesium ratios shall not exceed 20 parts calcium to one part magnesium. Potash (Potassium) (K) shall be present at a rate of at least 200 parts per million of exchangeable potassium. Salinity (EGXK) not to exceed 2 AMHOS/CM Nitrate nitrogen (NO3-N) shall be present at a rate of at least 30 parts per million. Phosphorus as measured by the Olson sodium bicarbonate measurement method shall be at greater than 25 parts per million. PH of the planting soil mixture shall be between 6.5 and 7.5. Organic matter by weight (by simple combustion) shall be more than 5%. Available moisture capacity in the one third to 15 bar tension shall be greater than 15%. TKN2 or Total Kjeldahl Nitrogen shall be 250 ppm or greater. NH4 shall be 25 ppm or less

b. The LANDSCAPE ARCHITECT reserves the right to adjust the above characteristics and waive all irregularities.

c. CONTRACTOR shall provide reports of test results of the planting soil mixture characteristics to the LANDSCAPE ARCHITECT. Reports shall be prepared by the supplier within the previous calendar year. Reports shall be submitted to and approved by the LANDSCAPE ARCHITECT prior to delivery of the planting soil mixture. Reports shall list the as tested qualities of the above characteristics and any recommendations the testing lab has.

1005.2.4.3 The OWNER may also test the final product as delivered or installed to verify the mixture matches the listed characteristics and the submitted soils report.

1005.2.4.4 Each Delivery shall have a load ticket. The load ticket shall list:

- a. Source of Mixture.
- b. Approximate volume of load.
- c. Date of delivery or loading.
- d. Typed name of individual representing the source.
- e. Inked original signature of individual representing the source.
- f. Area of site product delivered to.

Tickets shall be collected and provided to the LANDSCAPE ARCHITECT.

1005.2.5 PESTICIDES

1005.2.5.1 General: Pesticide registered and approved by the EPA, acceptable to authorities having

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jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

1005.2.5.2 Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

1005.2.5.3 Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

1005.2.6 TREE-STABILIZATION MATERIALS

1005.2.6.1 Tree-stabilization materials shall be as specified on the plans. Tree-stabilization shall only be installed if noted on the plans.

1005.2.7 WEED BARRIER FABRIC

1005.2.7.1 Weed barrier fabric shall be as specified on the plans.

1005.2.8 MISCELLANEOUS PRODUCTS

1005.2.8.1 All other miscellaneous materials shall be as specified on the plans.

1005.3 EXECUTION

1005.3.1 EXAMINATION

1005.3.1.1 Planting operations as specified herein shall begin only when other work including placing of topsoil to finished grade has progressed sufficiently to permit planting.

1005.3.1.2 Examine areas to receive plants, with LANDSCAPE ARCHITECT present, for compliance with requirements and conditions affecting installation and performance of the Work.

1005.3.1.3 If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by LANDSCAPE ARCHITECT and replace with new planting soil.

1005.3.1.4 Proceed with installation only after unsatisfactory conditions have been corrected and approved by LANDSCAPE ARCHITECT.

1005.3.2 PREPARATION

1005.3.2.1 Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting

operations.

1005.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

1005.3.2.3 Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain LANDSCAPE ARCHITECT'S acceptance of layout before excavating or planting. Make minor adjustments as required.

1005.3.3 PLANTING AREA ESTABLISHMENT

1005.3.3.1 General: Prepare planting area for soil placement and mix planting soil according to the specifications or plans.

1005.3.3.2 Before planting, obtain LANDSCAPE ARCHITECT'S acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

1005.3.3.3 Application of Fertilizer: At time of planting if specified on plans or directed by LANDSCAPE ARCHITECT, apply fertilizer to planting locations.

1005.3.4 EXCAVATION FOR TREES AND SHRUBS:

1005.3.4.1 Planting Pits: Excavate circular planting pits.

a. Excavate planting pit approximately two times the root ball diameter. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify and loosed sides of excavated planting pit.

b. Loosen soil outside the excavated planting pit to a diameter of three times as wide as the root ball diameter. Depth of loosened soil shall be approximately 12"- 16".

c. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

d. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly compact the added soil to prevent settling.

e. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate sub-grades of adjacent paving, structures, hardscapes, or other new or existing improvements.

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f. Maintain supervision of excavations during working hours.

g. Keep excavations covered or otherwise protected when unattended by CONTRACTOR personnel.

1005.3.4.2 Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

1005.3.4.3 Obstructions: Notify LANDSCAPE ARCHITECT if unexpected rock, hardpan or obstructions detrimental to trees or shrubs are encountered in excavations.

1005.3.4.4 Drainage: Notify LANDSCAPE ARCHITECT if subsoil conditions show evidence of unexpected water seepage or retention in tree or shrub planting pits.

1005.3.4.5 Fill excavations with water and allow to percolate away before positioning trees and shrubs.

1005.3.5 TREE, SHRUB, AND VINE PLANTING:

1005.3.5.1 Delivery: In any one day, only those plant materials intended to be planted that day shall be delivered to the project site unless otherwise approved by the LANDSCAPE ARCHITECT.

1005.3.5.2 Root Flare and Roots: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

1005.3.5.3 Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with top of root flare flush with adjacent finish grade.

a. Backfill: Backfill with 10% (by volume) Planting Soil Mixture and 90% excavated soil.

b. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Do not fold burlap down into planting soil. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

c. Backfill around root ball in layers, tamping to

settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

d. Continue backfilling process. Water again after placing and tamping final layer of soil.

1005.3.5.4 Container Grown Stock: Set each plant plumb and in center of planting pit or trench with top of root flare flush with adjacent finish grade.

a. Backfill: Backfill with 10% (by volume) Planting Soil Mixture and 90% excavated soil.

b. Carefully remove root ball from container without damaging root ball or plant.

c. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

d. Continue backfilling process. Water again after placing and tamping final layer of soil.

1005.3.5.5 Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

1005.3.5.6 Container and Boxed Root Ball Shaving: The outer surfaces of all root balls in containers and boxes, including the top and sides of the root ball shall be shaved to remove all circling, descending and matted roots. Shaving shall be performed using saws, knives, sharp shovels or other suitable equipment that is capable of making clean cuts on the roots. Shaving shall remove a minimum of one inch of root mat or up to 2 inches as required to remove all root segments that are not growing reasonably radial to the trunk.

1005.3.6 MECHANIZED TREE-SPADE PLANTING

1005.3.6.1 Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

1005.3.6.2 Use the same tree spade to excavate the

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planting hole as will be used to extract and transport the tree.

1005.3.6.3 When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

1005.3.6.4 Cut exposed roots cleanly during transplanting operations.

1005.3.6.5 Where possible, orient the tree in the same direction as in its original location.

1005.3.7 TREE, SHRUB, AND VINE PRUNING

1005.3.7.1 Remove only dead, dying, or broken branches. Do not prune for shape. 1005.3.7.2 Prune, thin, and shape trees, shrubs, and vines only with approval of and as directed by LANDSCAPE ARCHITECT.

1005.3.7.3 Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by LANDSCAPE ARCHITECT, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

1005.3.7.4 Do not apply pruning paint to wounds.

1005.3.8 TREE STABILIZATION

1005.3.8.1 Tree Stabilization by Upright Staking and Tying: Install tree stabilization as shown on the plans.

1005.3.9 MULCHING

1005.3.9.1 Mulch backfilled surfaces of planting areas and other areas indicated.

a. Trees in Turf Areas: Apply organic mulch ring of 4-inch average thickness, with sufficient radius to cover planting pit backfill radius around trunks or stems. Do not place mulch within 4 inches of trunks or stems.

b. Mulch in Planting Areas: Apply 4 inch average thickness of organic or aggregate mulch over surface of planting area as specified on the plans. Top of mulch shall be below the top of adjacent surface at the dimension shown in the plans. Do not place mulch within 4 inches of trunks or stems.

1005.3.10 PESTICIDE APPLICATION

1005.3.10.1 Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with

OWNER and others in proximity to the Work. Notify OWNER before each application is performed.

1005.3.10.2 Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Apply pre-emergent herbicides only in areas shown on the plans. Do not apply to seeded areas.

1005.3.10.3 Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

1005.3.11 REPAIR AND REPLACEMENT

1005.3.11.1 General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by the LANDSCAPE ARCHITECT.

- a. Submit details of proposed pruning and repairs.
- b. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
- c. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by LANDSCAPE ARCHITECT.

1005.3.11.2 Remove and replace trees and other plants that are more than 25 twenty five percent dead or in an unhealthy condition or are damaged during construction operations that the LANDSCAPE ARCHITECT determines are incapable of restoring to normal growth pattern.

1005.3.12 CLEANING AND PROTECTION

1005.3.12.1 During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

1005.3.12.2 Remove and legally dispose of surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris.

1005.3.12.3 Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

1005.3.12.4 After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant

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material, planting areas, and Project site.

1005.3.13 PLANT MAINTENANCE

1005.3.13.1 Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of the CONTRACTOR. Begin maintenance immediately after plants are installed and continue until final acceptance of the project.

1005.3.13.2 Maintenance shall include watering, weeding, cultivating, removal of dead material and debris, resetting of trees to upright positions, restoration of earth basins, and such other operations as may be necessary for the health of the planted stock and the general appearance of the landscaped areas. Protection shall include care of the planted stock from damages resulting from trespass, erosion (including watering), weather, vandalism, disease and the like.

1005.3.14 REVIEWS AND OBSERVATIONS

1005.3.14.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations shall be made at any time at the discretion of the LANDSCAPE ARCHITECT.

1005.3.14.2 It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT, in writing, 48 hours in advance of each required review and observation.

1005.3.14.3 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next sequence without written approval of the work of the previous sequence. Payment will not be approved for items which have not been reviewed and approved in writing.

- a. Review plant material at CONTRACTOR'S yard or designated nursery prior to delivery to job site.
- b. Review staked locations of material prior to planting.
- c. Review material at the job site prior to and during planting.
- d. Review at end of maintenance period.
- e. Final review of the project and acceptance.
- f. Review at end of growing season or 12 months, whichever comes first.

1005.3.15 WARRANTY

1005.3.15.1 All plant materials shall be warranted to be in a live, healthy, and normal growing condition following the date of final acceptance by the LANDSCAPE ARCHITECT. through 12 months or one growing season whichever comes first. A growing season shall be defined as May 15 through September 15. Such plant materials that are dead or in an unhealthy, impaired growth condition, shall be replaced by the CONTRACTOR within 10 days after the end of the warranty period.

1005.3.16 MEASUREMENT & PAYMENT

1005.3.16.1 The measurement shall be made per each size of a particular species of tree shrub and/or ground cover plant.

1005.3.16.2 PAYMENT:

a. Payment shall be made at the contract unit price for each size of a particular species of plant, square footage of mulch, and any other non-living materials as specified in the bid proposal or approved by the LANDSCAPE ARCHITECT, which shall include all materials, equipment and labor required in furnishing and planting the landscape plants and installation of other non-living materials.

b. All other items specified within this section, including but not limited to: pruning, fertilizing, pesticide application, planting soil mixture, watering and tree stabilization, unless noted otherwise in the plans, shall be considered incidental to the payment for planting / plants.

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1010.1 GENERAL

1010.1.1 SCOPE

Furnish all labor, materials and equipment necessary for preparation of sodbed, furnishing and installation of sod, fertilizer, soil amendments, and related work specified herein and as indicated on plans or as authorized by the LANDSCAPE ARCHITECT.

1010.1.2 APPLICABLE STANDARDS & REFERENCES

1010.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1010.1.2.2 This Publication, Latest Edition:

Section 1001 Landscape Irrigation

Section 1005 Planting for trees, shrubs, ground covers, and soil amendments.

1010.1.2.3 Turfgrass Producers International (TPI) Guideline Specifications for Turfgrass Sodding, Latest Edition.

1010.1.3 SUBMITTALS

1010.1.3.1 THIS PUBLICATION - Section 1502 - Submittals

1010.1.3.2 Certification of Turfgrass Sod: From sod vendor for each turfgrass monostand or mixture, stating the botanical and common name, percentage of each species and variety, and location of production. Include the year of production and date of cutting.

a. Certification of each mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

1010.1.3.3 Product Certificates: For fertilizers and organic amendments, from manufacturer.

1010.1.3.4 Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1010.1.4 DELIVERY, STORAGE & HANDLING:

1010.1.4.1 Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass

Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from tearing, breakage and drying, or any other damage.

1010.1.4.2 Bulk Materials:

a. Do not dump or store bulk materials near fuel containers or storage, structures, utilities, walkways and pavements, or on existing turf areas or plants.

b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

c. Accompany each delivery of bulk materials with appropriate certificates.

1010.1.5 PROJECT CONDITIONS

1010.1.5.1 Soil testing: CONTRACTOR shall conduct soil testing of imported or prepared soil, and existing site soil after grading operations by an approved soil-testing laboratory. CONTRACTOR shall provide soils test result and testing lab recommendations to LANDSCAPE ARCHITECT for review. If test reporting recommends amendments, fertilizers or conditioners that differ from those noted in the Contract Documents, the CONTRACTOR shall furnish and install alternate materials as directed by LANDSCAPE ARCHITECT. All soil testing will be at the expense of the CONTRACTOR. The soils test report shall include at a minimum the following information:

a. pH

b. Percent organic content by oven dried weight

c. Nutrient levels by parts per million including: nitrate nitrogen, potash, sulfur, boron, phosphorus, potassium, magnesium, manganese, iron, sodium, copper, zinc and calcium. Testing shall also include salinity, computed percentage of sodium and free lime level. Soil test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified

1010.2 MATERIALS

1010.2.1 TURFGRASS SOD

1010.2.1.1 Turfgrass Sod: Certified Number 1 Quality / Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, and complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and

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TURF SODDING

texture that is strongly rooted and capable of vigorous growth and development when planted.

1010.2.1.2 Turfgrass Species: Sod shall be a mixture of 75% perennial bluegrass (*Poa*), and 25% perennial Ryegrass (*Lolium*) species unless otherwise specified on the plans. Other species or sod blends / mixes may be substituted for above if indicated on the drawings or with prior written approval of the LANDSCAPE ARCHITECT. A written description of the seed mix shall be submitted a minimum of 30 days prior to laying of sod. It shall be free of other grasses, stones, and other harmful or deleterious matter.

1010.2.1.3 Sod shall be cut by an approved mechanical sod cutter to a thickness of not more than 2 inches, or less than 1 inch. Sod shall be installed in place on the site not more than 24 hours after cutting.

1010.2.2 FERTILIZER

1010.2.2.1 Starter Fertilizer: Granular complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

a. Composition: 4 lb./1000 sq. ft., 18 percent of actual nitrogen, 24 percent available phosphorous, and 16 percent available potassium, by weight (18-24-16), or as specified on the plans.

1010.2.3 ORGANIC AMENDMENT

1010.2.3.1 Compost Mulch: Well-composted (minimum 1 year), stable, and weed-free organic matter, pH range of 5.5 to 7.5; moisture content 35 to 55 percent by weight; 90% percent passing through a 1/4 inch sieve; soluble salt content not exceeding 1.5 mnhos/cm, not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

a. Organic Matter Content: 80 percent of dry weight minimum.

b. Feedstock: Agricultural, food, or industrial residuals; bio-solids; yard trimmings; or source-separated or compostable mixed solid waste.

1010.2.3.2 Humates or composted bio-waste materials may be utilized with prior written approval of the LANDSCAPE ARCHITECT or as specified on the plans.

1010.2.4 PESTICIDES AND HERBICIDES

1010.2.4.1 General: Pesticide, registered and approved

by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

1010.2.4.2 Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the organic amendment layer.

1010.2.4.3 Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

1010.3 EXECUTION

1010.3.1 EXAMINATION

1010.3.1.1 Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

c. Uniformly moisten excessively dry soil that is not workable or which is dusty.

1010.3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.

If contamination by foreign or deleterious material or liquid is present in soil within a sodding area, remove the soil and contamination as directed by the LANDSCAPE ARCHITECT and replace with new planting soil at no additional cost to the OWNER.

1010.3.2 PREPARATION OF SODBED

1010.3.2.1 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by sodding operations.

a. Protect grade stakes set by others until directed to remove them.

1010.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-

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TURF SODDING

bearing water runoff or airborne dust to adjacent properties and walkways.

a. Reference project NEPA and/or SWPPP requirements if applicable.

1010.3.2.3 Prior to start of soil preparation all finish grades shall be established and approved as meeting the requirements of the grading plan. Apply a uniform two inch layer (6 C.Y./1000 square feet) of organic amendment to the entire area to be sodded. After application of organic amendment and starter fertilizer all areas to be sodded shall be thoroughly ripped in cross directions to a depth of 6 inches and rototilled to a minimum depth of 4 inches. If existing tree roots exist that prevent rototilling to a 4 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction. After rototilling is complete at cross directions, drag to an even grade, then roll for firmness. After finish grade is established, CONTRACTOR shall apply 4 lbs. of starter fertilizer per each 1000 square feet and watered in once. If humates or composted bio-waste materials are specified in the plans, CONTRACTOR shall follow sodbed preparation notes as shown on the plans.

1010.3.2.4 Installation: Before laying sod, the finish grade shall be brought to a firm, even surface, free from stones or lumps, in excess of one inch diameter, and shaped to provide drainage. The finish grade shall be reviewed and approved by the LANDSCAPE ARCHITECT prior to laying any sod.

1010.3.3 SODDING

1010.3.3.1 Do not lay sod if dormant, or if ground is frozen or muddy.

1010.3.3.2 Lay sod over moistened soil lightly raking the soil ahead of each sod strip. Sod shall be laid perpendicular to or across the slope with staggered joints. Remove and dispose any netting from sod as laid. Pieces shall be fitted together tightly so that no joint is visible, and sod tamped firmly and evenly by hand to insure contact with soil, eliminate air pockets, and form a smooth surface. After all the sodding has been laid it shall be rolled with a hand roller.

1010.3.3.3 Watering: Water all sodded areas immediately after final rolling with a fine spray moistening soil to a depth of 4 inches. Irrigate by means of the automatic underground irrigation system all sodded areas as often as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod and promote healthy grass growth until a thick, even stand of grass has been obtained.

1010.3.3.4 Sodding Restrictions: Sodding shall occur during the following period. Coordinate sodding period with maintenance period to provide required maintenance from date of sodding completion. Sodding may occur outside this period with prior written approval of the LANDSCAPE ARCHITECT.

a. Sodding: April 1st – September 30th.

1010.3.4 TURF RENOVATION

1010.3.4.1 Renovate existing turf where indicated on the plans.

1010.3.4.2 Renovate turf damaged by CONTRACTOR'S operations, such as storage of materials or equipment and movement of vehicles.

a. Reestablish turf where settlement or washouts occur or where minor regrading is required.

b. Install new planting soil as required.

1010.3.4.3 Remove dead or diseased sod and/or vegetation from unsatisfactory turf areas; do not bury in soil.

1010.3.4.4 Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from CONTRACTOR'S operations, and replace with new planting soil.

1010.3.4.5 Mow, dethatch, core aerate, and rake existing turf.

1010.3.4.6 Remove weeds before sodding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

1010.3.4.7 Remove and legally dispose of waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf.

1010.3.4.8 Remove existing turf with an approved sod cutter leaving a clean, uniform edge. Remove existing turf to the minimum dimension of the width of a roll of sod to be installed during renovation.

1010.3.4.9 Till stripped, bare, and compacted areas thoroughly to a soil depth of 4 inches. If existing tree roots or other site conditions exist that prevent tilling to a 4 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

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TURF SODDING

a. Organic Amendment(s): Reference 1010.2.3

b. Starter Fertilizer: Reference 1010.2.2

1010.3.4.10 CONTRACTOR is not required to till soil in applications of sodded turf renovation over trenching of irrigation lines or in other areas as shown on the plans.

1010.3.4.11 Install sod as required for new turf.

1010.3.4.12 Water newly planted areas and keep moist until new turf is established.

1010.3.5 TURF PROTECTION AND MAINTENANCE

1010.3.5.1 General: Protection and Maintenance shall continue until final acceptance. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

a. Fill in as necessary soil subsidence that may occur because of settling, gaps between sod rolls, or other processes. Fill material shall be a mix of equal parts sand and compost. Replace materials and turf damaged or lost in areas of subsidence.

b. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

1010.3.5.2 Watering: Keep soil uniformly moist to a depth of 1-1/2 inches below sod.

a. Schedule watering to prevent wilting, puddling, and erosion. Avoid walking over muddy or newly planted areas.

1010.3.5.3 Mowing: Sod shall be maintained at a height of 2 inches. The maximum height between cuttings shall not exceed 3 inches. Do not mow when turf is wet.

1010.3.5.4 Turf Post-fertilization: Apply fertilizer after initial mowing and when grass is dry at an application rate recommended by the manufacturer or as specified in the plans, or as submitted in writing and approved by LANDSCAPE ARCHITECT and OWNER.

1010.3.6 SATISFACTORY TURF

1010.3.6.1 Turf installations shall meet the following criteria:

a. Satisfactory Sodded Turf: Final acceptance shall only occur after healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

1010.3.6.2 Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

1010.3.7 PESTICIDE AND HERBICIDE APPLICATION

1010.3.7.1 Apply pesticides, herbicides, and other chemical products and biological control agents only with prior written approval of the LANDSCAPE ARCHITECT and OWNER and according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with LANDSCAPE ARCHITECT and others in proximity to the Work. Notify LANDSCAPE ARCHITECT before any application is performed.

1010.3.7.2 Post-Emergent Herbicides (Selective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

1010.3.8 CLEANUP AND PROTECTION

1010.3.8.1 Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

1010.3.8.2 Remove and legally dispose of surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris.

1010.3.8.3 Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic.

1010.3.9 REVIEWS AND OBSERVATIONS

1010.3.9.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations shall be made any time at the discretion of the LANDSCAPE ARCHITECT.

1010.3.9.2 It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT in writing, 48 hours in advance of each required review.

1010.3.9.3 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed

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with work of the next sequence without written approval of the work of the previous sequence. Payment will not be approved for items which have not been reviewed and approved in writing.

- a. Automatic irrigation system, if required, shall be installed, tested, and approved.
- b. Each phase of soil preparation shall be observed in process.
- c. Finish grade shall be reviewed.
- d. Sod shall be reviewed prior to installation.
- e. Sod shall be reviewed after installation.
- f. Substantial completion review.
- g. Final review of the project and acceptance.
- h. Sod shall be reviewed 12 months after completion.

1010.3.10 MEASUREMENT & PAYMENT

1010.3.10.1 The measurement of grass sodding shall be by the square foot or square yard as indicated in the bid proposal.

1010.3.10.2 Payment shall be made at the contract unit price per square foot or square yard for grass sodding complete in place, which shall include all material, equipment and labor required in preparation, final grading, fertilizing, sod placement, watering, and maintenance as specified herein.

SECTION 1011
TURF SEEDING

1011.1 GENERAL

1011.1.1 SCOPE

Furnish all labor, materials and equipment necessary for preparation of seedbed, furnishing and installation of seed, fertilizer, soil amendments, and related work specified herein and as indicated on plans or as authorized by the LANDSCAPE ARCHITECT.

1011.1.2 APPLICABLE STANDARDS & REFERENCES

1011.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1011.1.2.2 This Publication, Latest Edition:

Section 1001 Landscape Irrigation for irrigation of landscaped areas.

Section 1005 Planting for trees, shrubs, ground covers, and soil amendments.

Section 1012 Miscellaneous Seeding for hand seeding and hydro-seeding / mulching.

PERFORMANCE REQUIREMENTS

1011.1.3.1 The CONTRACTOR shall be responsible for protecting and caring for turf seeded areas until final acceptance of the work and shall repair at CONTRACTOR expense any damage to seeded areas caused by pedestrian, vehicular traffic, vandalism or other cause.

1011.1.4 SUBMITTALS

1011.1.4.1 THIS PUBLICATION - Section 1502 - Submittals

1011.1.4.2 Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

a. Include identification of source and name and telephone number of supplier.

1011.1.4.3 Product Certificates: For fertilizers and organic amendments, from manufacturer.

1011.1.4.4 Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1011.1.5 DELIVERY, STORAGE, & HANDLING

1011.1.5.1 Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

1011.1.5.2 Bulk Materials:

a. Do not dump or store bulk materials near fuel containers, herbicides, structures, utilities, walkways and pavements, or on existing turf areas or plants.

b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

c. Accompany each delivery of bulk materials with appropriate certificates.

1011.1.6 PROJECT CONDITIONS

1011.1.6.1 Soil testing: CONTRACTOR shall conduct soil testing of imported or prepared soil, and existing site soil after grading operations by an approved soil-testing laboratory. CONTRACTOR shall provide soils test result and testing lab recommendations to LANDSCAPE ARCHITECT for review. If test reporting recommends amendments, fertilizers or conditioners that differ from those noted in the Contract Documents, the CONTRACTOR shall furnish and install alternate materials as directed by LANDSCAPE ARCHITECT. All soil testing will be at the expense of the CONTRACTOR. The soils test report shall include at a minimum the following information:

a. pH

b. Percent organic content by oven dried weight

c. Nutrient levels by parts per million including: nitrate nitrogen, potash, sulfur, boron, phosphorus, potassium, magnesium, manganese, iron, sodium, copper, zinc and calcium. Testing shall also include salinity, computed percentage of sodium and free lime level. Soil test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified

1011.2 PRODUCTS

1011.2.1 SEED

1011.2.1.1 Turf grass seed shall consist of 75% perennial bluegrass (Poa), and 25% perennial Ryegrass (Lolium) species. The LANDSCAPE ARCHITECT

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shall receive all labels from seed bags for verification. Purity of seed shall not be less than 98% and germination shall not be less than 85%. Other seed species or blends / mixes may be substituted for above if indicated on the drawings or with prior approval of the LANDSCAPE ARCHITECT.

1011.2.1.2 Each bag of seed shall be sealed and labeled by the seed dealer in accordance with Federal Seed Laws and New Mexico Department of Agriculture Labeling Laws. This includes: variety, kind of seed, lot number, purity, germination, percent crop, percent inert, percent weed {including noxious weeds}, origin, test data and net weight. Federal Seed Laws require that analysis shall be no older than 5 months for seed shipped interstate and no older than 9 months for seed shipped intra-state.

1011.2.2 FERTILIZERS

1011.2.2.1 Starter Fertilizer: Granular complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

- a. Composition: 4 lb./1000 sq. ft., 18 percent of actual nitrogen, 24 percent available phosphorous, and 16 percent available potassium, by weight (18-24-16).
- b. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

1011.2.3 ORGANIC AMENDMENTS

1011.2.3.1 Compost Mulch: Well-composted (minimum 1 year), stable, and weed-free organic matter, pH range of 5.5 to 7.5; moisture content 35 to 55 percent by weight; 90% percent passing through a 1/4 inch sieve; soluble salt content not exceeding 1.5 mnhos/cm, not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

- a. Organic Matter Content: 80 percent of dry weight minimum.
- b. Feedstock: Agricultural, food, or industrial residuals; bio-solids; yard trimmings; or source-separated or compostable mixed solid waste.

1011.2.3.2 Humates, or composted bio-waste materials may be utilized with prior written approval of the LANDSCAPE ARCHITECT or as specified on the plans.

1011.2.4 PESTICIDES

1011.2.4.1 General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

1011.2.4.2 Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the organic amendment layer.

1011.2.4.3 Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

1011.3 EXECUTION

1011.3.1 EXAMINATION

1011.3.1.1 Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

- a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
- b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
- c. Uniformly moisten excessively dry soil that is not workable or which is dusty.

1011.3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.

1011.3.1.3 If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the LANDSCAPE ARCHITECT and replace with new planting soil at no additional cost to the OWNER.

1011.3.2 PREPARATION

1011.3.2.1 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by seeding operations.

- a. Protect grade stakes set by others until directed to remove them.

1011.3.2.2 Install erosion-control measures to prevent

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erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Reference project NEPA and/or SWPPP requirements if applicable.

1011.3.3 SEED BED PREPARATION

1011.3.3.1 Prior to start of soil preparation all finish grades shall be established and approved as meeting the requirements of the grading plan.

1011.3.3.2 Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

1011.3.3.3 Apply a uniform 2-inch layer of organic amendment to the entire area to be seeded. After application of organic amendment all areas to be seeded shall be thoroughly rototilled to a minimum depth of 4 inches. If existing tree roots exist that prevent rototilling to a 4 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction. After rototilling is complete at cross directions, drag to an even grade, then roll for firmness. Before seeding, the finish grade shall be brought to a firm, even surface, free from stones or lumps in excess of one inch diameter, and shaped to provide drainage. The finish grade shall be reviewed and approved by the LANDSCAPE ARCHITECT prior to seeding. After finish grade is established, CONTRACTOR shall apply 4 lbs. of starter fertilizer per each 1000 square feet and watered in once. If humates or composted bio-waste materials are specified in the plans, CONTRACTOR shall follow seed bed preparation notes as shown on the plans.

1011.3.4 SEEDING

1011.3.4.1 The seeding rate shall be 250 lbs. pure live seed (PLS) per acre or as shown on the plans. The specific mix shall be uniformly applied over the area to be seeded.

1011.3.4.2 CONTRACTOR'S vehicles and other equipment shall not travel over the seeded areas. If, as determined by the LANDSCAPE ARCHITECT, rain or some other factor occurs over prepared surfaces prior to seeding which prevents seeding to the proper depth, the CONTRACTOR shall again prepare the seed bed without additional compensation.

1011.3.4.3 Time of seeding: (Seeding Season) Turf grass seeding shall only be accomplished in the Spring from April 1 through May 30 or in the Fall from August 15 through September 30. If seeding is not accomplished during the "time of seeding" the CONTRACTOR shall accomplish the seeding at the

"time of seeding" during the next calendar year. Extension of the CONTRACT to meet the "time of seeding" shall be accomplished at no additional expense to the OWNER.

a. All soil slopes which have been completed prior to the seeding season shall be seeded immediately after the opening of the current seeding season.

b. All soil slopes which are completed during the seeding season shall be seeded that same season.

c. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to this specification.

1011.3.4.4 Drill Seeding: All seed shall be drilled in cross directions, where practical, with 50% of the seed applied in each direction. The second pass of the seeder when seeding in cross directions shall be across the slope. In areas where seeding in cross directions is impractical, seeding shall be accomplished by drilling and shall be across the slope. Seed shall be planted approximately 1/4 inch deep, with a maximum depth of 1/2 inch unless otherwise specified on the plans. The distance between the drilled furrows shall not be more than 2 inches. Seeding shall be done with grass seeding equipment in good working order with double disc openers, depth bands, drop tubes, packer wheels or drag chains, rate control attachments, seed boxes with agitators for trashy seed.

1011.3.4.5 Broadcasting: The seed will be broadcast by a mechanical spreader at a rate as specified or as indicated on the plans. Seeds shall be planted to a minimum depth of 1/4 inch and no deeper than 1/2 inch. Broadcasting shall only be used when specified on the plans and/or approved by the LANDSCAPE ARCHITECT.

1011.3.5 WATERING

1011.3.5.1 Permanent Irrigation Systems for Turf Grasses: Seeded areas having a permanent irrigation system as specified on the plans will be watered by said system. Watering of the seed will be the responsibility of the CONTRACTOR until final acceptance or as otherwise noted in the Contract Documents. All seeded areas shall be watered immediately after completion of seeding, keeping the top two inches of soil evenly moist until seed has uniformly germinated and grown to a height of two inches.

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1011.3.6 TURF RENOVATION

1011.3.6.1 Renovate existing turf where indicated.

1011.3.6.2 Renovate turf damaged by CONTRACTOR's operations, such as storage of materials or equipment and movement of vehicles.

a. Reestablish finished grade and turf where settlement or washouts occur or where minor re-grading is required.

b. Install new planting soil as required.

1011.3.6.3 Remove dead or diseased turf and/or vegetation from unsatisfactory turf areas; do not bury in soil.

1011.3.6.4 Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from CONTRACTOR'S operations, and replace with new planting soil.

1011.3.6.5 Mow, dethatch, core aerate, and rake existing turf.

1011.3.6.6 Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required and approved by the LANDSCAPE ARCHITECT. Do not use pre-emergent herbicides.

1011.3.6.7 Remove and legally dispose of waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf.

1011.3.6.8 Till stripped, bare, and compacted areas thoroughly to a soil depth of 4 inches. If existing tree roots exist that prevent tilling to a 4 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction.

1011.3.6.9 Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

1011.3.6.10 Apply seed as required for new turf.

1011.3.6.11 Water newly planted areas and keep moist until new turf is established.

1011.3.7 SEEDED TURF PROTECTION AND MAINTENANCE

1011.3.7.1 General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, re-grade, and

replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

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

b. Apply treatments as required and approved by the LANDSCAPE ARCHITECT to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

1011.3.7.2 Protection and Maintenance for Seeded Turf: Protect and maintain all turf seeded areas until a dense uniform stand of grass has been established and has been final accepted. The grass shall have been cut a minimum of three times at a height of 2 inches prior to substantial completion. After completion of second mowing, apply an additional 4 pounds per 1000 square feet of starter fertilizer, or fertilize as shown on the plans, or as recommended in the soils report and approved by the LANDSCAPE ARCHITECT.

1011.3.7.3 Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain the specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowing to maintain the specified grass heights.

1011.3.8 SATISFACTORY TURF

1011.3.8.1 Turf installations shall meet the following criteria as determined by the LANDSCAPE ARCHITECT:

a. Satisfactory Seeded Turf: Prior to substantial completion, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 3 inches in diameter.

1011.3.8.2 Use specified materials to re-establish turf that does not comply with requirements and continue maintenance until turf is satisfactory at no additional cost to OWNER.

1011.3.9 CLEANUP AND PROTECTION

1011.3.9.1 Promptly remove soil and debris created by

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seeding work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

1011.3.9.2 Remove and legally dispose of surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris.

1011.3.9.3 Erect temporary fencing or barricades and warning signs as required to protect newly seeded areas from traffic. Maintain fencing and barricades until satisfactory turf is established or as otherwise approved by the LANDSCAPE ARCHITECT.

1011.3.9.4 Remove non-degradable erosion-control measures after grass establishment period.

1011.3.10 WARRANTY

1011.3.10.1 If at the end of one complete growing season, it has been determined by the LANDSCAPE ARCHITECT that insufficient germination has occurred in turf areas the CONTRACTOR shall reseed such areas with no additional cost to the OWNER.

1011.3.11 REVIEWS AND OBSERVATIONS

1011.3.11.1 The following shall be the minimum required reviews and observations to seeded turf grass during the course of construction. Additional reviews and observations shall be made at any time at the discretion of the LANDSCAPE ARCHITECT.

1011.3.11.2 It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT, in writing, 48 hours in advance of each required review or observation.

1011.3.11.3 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next sequence without written approval of the work of the previous sequence. Payments will not be approved for items which have not been reviewed and approved in writing.

- a. Automatic irrigation system where required shall be installed, tested, and approved in accordance with Section 1001, if required.
- b. Each phase of soil preparation shall be observed in process.
- c. Finish grade shall be reviewed.
- d. Seed shall be reviewed prior to seeding.
- e. Seeded area shall be reviewed after completion.

f. Substantial completion review.

g. Final review of the project and acceptance.

1011.3.12 MEASUREMENT & PAYMENT

1011.3.12.1 The measurement of turf grass seeding shall be by the acre.

1011.3.12.2 PAYMENT: Payment shall be made at the contract unit price per acre of turf grass seeding complete in place, which shall include the seed, soil preparation, fertilizing, seeding, watering, and maintenance.

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1012.1 GENERAL

1012.1.1 SCOPE

Furnish all labor, materials and equipment necessary for preparation of seedbed, furnishing and installation of seed, fertilizer, erosion control measures, soil amendments, and related work specified herein and as indicated on plans or as authorized by the LANDSCAPE ARCHITECT or ENGINEER.

1012.1.2 APPLICABLE STANDARDS & REFERENCES:

1012.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1012.1.2.2 All seed shall be certified by state of origin. The certification authority for the state of New Mexico is the New Mexico Crop Improvement Association.

1012.1.2.3 Reclamation efforts are controlled by the requirements stipulated in the National Pollution Discharge Elimination System General Permit for Region VI of the Environmental Protection Agency.

1012.1.3 PERFORMANCE REQUIREMENTS

1012.1.3.1 The CONTRACTOR shall be responsible for protecting and caring for seeded areas until final acceptance of the work and shall repair at CONTRACTOR expense any damage to seeded areas caused by pedestrian, vehicular traffic, vandalism or other cause.

1012.1.4 SUBMITTALS

1012.1.4.1 THIS PUBLICATION - Section 1502 - Submittals

1012.1.4.2 Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging. Include state, origin and name and telephone number of supplier.

1012.1.4.3 Product Certificates: For fertilizers and organic amendments, from manufacturer.

1012.1.4.4 Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1012.1.4.5 Sources of supply for native grass hay,

straw, hydro-mulch, erosion control blankets, and/or gravel mulch.

1012.1.5 DELIVERY, STORAGE & HANDLING

1012.1.5.1 Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

1012.1.5.2 Bulk Materials:

a. Do not dump or store bulk materials near fuel containers, herbicides, structures, utilities, walkways and pavements, or on existing turf areas or plants.

b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

c. Accompany each delivery of bulk materials with appropriate certificates.

1012.2 PRODUCTS

1012.2.1 SEED

1012.2.1.1 Native Seed: The native seed species and rate of application shall be as shown below and shall be used based on the type of soil or as specified on the plans or in the Supplemental Technical Specifications.

1012.2.1.2 Grass seed shall be fresh, re-cleaned seed of the latest crop, mixed in the proportions by weight, and be pure live seed as denoted within these specifications or as per the plans.

1012.2.1.3 Seed shall be delivered to the site in the original unopened containers which shall bear the vendor's guarantee of analysis. Labeling of seed shall be in accordance with Federal Seed Laws and the New Mexico Department of Agriculture labeling laws. Federal seed laws require that analysis shall be no older than five months for seed shipped interstate and no older than nine months for seed shipped intra-state. Seeds may be pre-mixed by a seed dealer.

Documentation must be provided, the same as if the seeds were sold or bagged separately. The LANDSCAPE ARCHITECT or ENGINEER shall receive all labels from all bags of seed used for verification. For each species included in the mix the following information will be found on each bag tag:

a. Variety - specify if certified.

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- b. Kind of seed
- c. Lot number
- d. Purity
- e. Germination
- f. % of Crop seed, % inert, % noxious weed
- g. Origin
- h. Test date
- i. Pounds of this species or percentage of total lot.

1012.2.1.4 Seed Mixture and Rate: Seed species mixtures and application rates shall be as follows and shall be used based on the soil type unless otherwise specified in the plans or Supplemental Technical Specifications.

a. Gravelly Uplands and Slopes (Mainly East Foothills): Seed rate is given in pounds of pure live seed (PLS) per acre. Shrub species noted shall only be included in the seed mix if required in the plans or approved by the LANDSCAPE ARCHITECT or ENGINEER prior to seeding. Contractor shall use at least two of the shrub species listed below at a total application rate of 0.5# PLS/AC. If the area to be seeded is along a recreational trail or roadway the shrub species shall not be included in the mix. Perennial wildflower species shall be included if required in the plans. Contractor shall use at least four of the perennial wildflower species listed below at a total application rate of 1.0# PLS/AC.

<i>Paradoxa Apache Plume</i>	-	
<i>Krascheninnikovia lanata</i> - Winterfat	.25	Shrub
<i>Yucca glauca</i> – Soapweed Yucca	.25	Shrub
<i>Ericameria nauseosa</i> – Chamisa	.25	Shrub
<i>Dalea purpurea var purpurea</i> – Purple Prairie Clover	.25	Perennial Wildflower
<i>Ratibida colum-nifera forma pul-cherrima</i> – Mexi-can Hat	.25	Perennial Wildflower
<i>Gaillardia aris-tata</i> - Blanket Flower	.25	Perennial Wildflower
<i>Sphaeralcea par-vifolia</i> - Nelson Globemallow	.25	Perennial Wildflower
<i>Oenothera pallida</i> - White Evening Primrose	.25	Perennial Wildflower
<i>Baileya multiradi-ata</i> - Desert Mari-gold	.25	Perennial Wildflower
<i>Abronia fragrans or Abronia villosa</i> - Sand Verbena	.25	Perennial Wildflower

a. Gravelly Up-lands & Slopes	#PLS/AC	Notes
<i>Bouteloua gracilis</i> ‘Hachita’ – Blue Grama	7.0	
<i>Bouteloua curti-pendula</i> ‘Niner’ - Sideoats Grama	5.0	
<i>Stipa neomexi-cana</i> – Needle & Thread Grass	2.0	
<i>Oryzopsis hy-menoides</i> - Indian Rice Grass	2.0	
<i>Koeleria macran-tha</i> – June Grass	1.0	
<i>Pleuraphis jamesii</i> ‘Viva’ – Galleta	1.0	
<i>Fallugia</i>	.25	Shrub

b. Sandy Soils: (Mainly Westside Areas) Seed rate is given in pounds of pure live seed (PLS) per acre. Shrub species noted shall only be included in the seed mix if required in the plans or approved by the LANDSCAPE ARCHITECT or ENGINEER prior to seeding. Contractor shall use at least two of the shrub species listed below at a total application rate of 0.5# PLS/AC. If the area to be seeded is along a recreational trail or roadway the shrub species shall not be included in the mix. Perennial wildflower species shall be included if required in the plans. Contractor shall use at least four of the perennial wildflower species listed below at a total application rate of 1.0# PLS/AC.

b. Sandy Soils	#PLS/AC	Notes
<i>Hilaria jamesii</i> ‘Viva’ - Galleta	7.0	
<i>Oryzopsis hymenoides</i> ‘Paloma’ - Indian Rice	5.0	

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b. Sandy Soils	#PLS/ AC	Notes
Grass		
<i>Bouteloua gracilis</i> 'Hachita' – Blue Grama	2.0	
<i>Bouteloua curtipendula</i> 'Vaughn' – Sideoats Grama	1.0	
<i>Agropyron smithii</i> 'Arriba' – Western Wheat	1.0	
<i>Sporobolus cryptandrus</i> – Sand Dropseed	1.0	
<i>Sporobolus airoides</i> 'Salado' – Alkali Sacaton	1.0	
<i>Rhus trilobata</i> – Three Leaf Sumac	.25	Shrub
<i>Artemisia frigida</i> – Fringed sagebush	.25	Shrub
<i>Atriplex canescens</i> – Fourwing Saltbush (NM Origin)	.25	Shrub
<i>Artemisia filifolia</i> – Sand Sage	.5	Shrub
<i>Yucca glauca</i> – Soapweed Yucca	.5	Shrub
<i>Sphaeralcea ambigua</i> – Desert Globemallow	.25	Perennial wildflower
<i>Sphaeralcea parvifolia</i> – Nelson Globemallow	.25	Perennial wildflower
<i>Oenothera pallida</i> – White Evening Primrose	.25	Perennial wildflower
<i>Baileya multiradiata</i> – Desert Marigold	.25	Perennial wildflower
<i>Abronia fragrans</i> or <i>Abronia villosa</i> – Sand Verbena	.25	Perennial wildflower
<i>Dalea purpurea</i> var <i>purpurea</i> – Purple Prairie Clover	.25	Perennial Wildflower
<i>Ratibida columnifera</i> <i>forma pulcherrima</i> – Mexican Hat	.25	Perennial Wildflower

c. Clay, Clay Loam Soils: Mainly Valley & Bosque areas). Seed rate is given in pounds of pure live seed (PLS) per acre. Shrub species noted shall only be included in the seed mix if required in the plans or approved by the LANDSCAPE ARCHITECT or ENGINEER prior to seeding. Contractor shall use at least two of the shrub species listed below at a total application rate of 0.5# PLS/AC. If the area to be

seeded is along a recreational trail or roadway the shrub species shall not be included in the mix. Perennial wildflower species shall be included if required in the plans. Contractor shall use at least three of the perennial wildflower species listed below at a total application rate of 0.5# PLS/AC.

c. Clay, Clay Loam Soils	#PLS/AC	Notes
<i>Hilaria jamesii</i> 'Viva' - Galleta	4.0	
<i>Bouteloua curtipendula</i> 'Vaughn' – Sideoats Grama	3.0	
<i>Oryzopsis hymenoides</i> 'Paloma' - Indian Rice Grass	2.0	
<i>Sporobolus airoides</i> 'Salado' – Alkali Sacaton	2.0	
<i>Agropyron smithii</i> 'Arriba' – Western Wheat	1.0	
<i>Bouteloua gracilis</i> 'Hachita' – Blue Grama	1.0	
<i>Sporobolus cryptandrus</i> – Sand Dropseed	1.0	
<i>Sorghastrum nutans</i> – Indian Grass	.5	
<i>Krascheninnikovia lanata</i> - Winterfat	.25	Shrub
<i>Artemisia ludoviciana</i> – Prairie Sage	.25	Shrub
<i>Ericameria nauseosa</i> – Rubber Rabbitbrush	.25	Shrub
<i>Atriplex confertifolia</i> - Shadscale	.25	Shrub
<i>Oenothera hookeri</i> – Evening Primrose	.25	Perennial wildflower
<i>Oenothera pallida</i> – White Evening Primrose	.25	Perennial wildflower
<i>Baileya multiradiata</i> - Desert Marigold	.25	Perennial wildflower
<i>Linum lewisii</i> – Blue Flax	.25	Perennial wildflower
<i>Dalea purpurea</i> var <i>purpurea</i> – Purple Prairie Clover	.25	Perennial Wildflower
<i>Ratibida columnifera</i>	.25	Perennial

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<i>forma pulcherrima</i> – Mexican Hat		Wildflower
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d. Specific seed mixture application areas shall be determined in the field with the LANDSCAPE ARCHITECT or ENGINEER prior to seed installation. Alternate seed mixes, variations of species, and variations of application rates are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. Variations in application rates due to the presence of irrigation are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1012.2.2 NATIVE GRASS AND WILDFLOWER MEADOWS

1012.2.2.1 Native grass and wildflower meadow seeding shall be installed to the extents shown on the plans. Seed mix for meadow plantings shall differ from those identified in 1012.2.1.4 as follows:

1012.2.2.2 Wildflower Seed: Fresh, clean, and dry new seed, of mixed species as follows:

a. Wildflower seed mix shall be developed based on soil type from seed mixes listed in Section 1012.2.1.4 and applied at a rate of 50# PLS/AC or as specified on the plans

1012.2.2.3 Native-Grass Seed: Fresh, clean, and dry new seed, of mixed species as follows:

a. Native-grass seed mix shall be 50% / 50% (by weight) combination of *Bouteloua gracilis* 'Hachita' – Blue Grama, and *Buchloe dactyloides* – Buffalo grass, applied at a rate of 100# PLS/AC, or as specified on the plans

1012.2.2.4 Wildflower and Native-Grass Seed: Fresh, clean, and dry new seed, of mixed species as follows:

a. Wildflower and native grass seed mix shall be an equal combination of 1012.2.2.2 and 1012.2.2.3 above applied at rates noted.

1012.2.2.5 Seed Carrier: Inert material, sharp clean sand, or perlite.

1012.2.3 MULCHES

1012.2.3.1 Hydro-mulch/Tackifier:

a. Hydro-mulch shall consist of a mulch/tackifier combination independently laboratory tested for erosion control performance using a rainfall simulator raining at 4 inches per hour and mulch/tackifier applied

at 1,600 lbs. per acre. No combination of mulch and tackifier shall be used unless laboratory test results based upon the above conditions show the mulch-tackifier combination to give a calculated apparent erosion rate of 5 tons per acre per hour or less.

b. The mulch shall include anionic Poly Acrylamide Tackifier (P.A.M) or approved equal tackifier. This tackifier shall be adhered to the fibers during manufacturing, or added during mixing in the hydraulic mulching equipment. The tackifier shall be homogenous within the unit package. It shall have no growth or germination inhibiting factors and be nontoxic.

c. The mulch material shall consist of fibers manufactured expressly from annually renewable organic fibers. The fibers shall be processed in such a manner as to contain no growth or germination inhibiting factors. Fiber shall not be produced from residue from wood pulp and paper plants.

d. The fibers of the mulch must maintain uniform suspension in water under agitation. The fiber mulch shall blend with the additives to form homogenous slurry. Upon application, the mulch material shall form a blotter-like mat covering the ground. This mat shall have the characteristics of moisture absorption and percolation and shall cover and hold grass seed in contact with the soil. The fiber mulch shall be dyed with biodegradable dye and not inhibit plant growth.

e. The rate of application of the mulch/tackifier shall be a minimum 2,000 lbs. per acre. This application rate may vary according to soil type and slope as noted in the plans.

f. Alternate hydro-mulch/tackifier products and applications are acceptable if specified on the plans or with prior written approval by the LANDSCAPE ARCHITECT or ENGINEER.

1012.2.3.2 Native Grass Hay and Straw Mulch

a. Hay Mulch: Perennial native or introduced grasses of fine-stemmed varieties shall be used unless otherwise specified on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. At least 50 percent of the herbage by weight of each bale of hay shall be 10 inches in length or longer. Hay with noxious seed or plants will not be acceptable. Rotted, brittle, or moldy hay will not be acceptable. Marsh grass or prairie hay composed of native grass species to be seeded will be acceptable. Marsh grass hay shall be composed of mid and tall native, usually tough and wiry grass and grass-like plants found in the lowland areas within the Rocky Mountain region. Tall wheat

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grass, Timothy grass, intermediate wheat grass, switch grass, or orchard hay will be acceptable only upon prior written approval of the LANDSCAPE ARCHITECT or ENGINEER and then only if cut prior to seed formation. Hay shall be properly cured prior to use. Hay which is brittle, short fibered or improperly cured is not acceptable.

b. Straw Mulch: Small grain straw such as wheat, barley, rye or oats will not be allowed except by prior written approval of the LANDSCAPE ARCHITECT or ENGINEER and with the concurrence of the Air Division of the Environmental Health Department. Other materials, such as alfalfa, are not acceptable. Material which is brittle, shorter than 10 inches or which breaks or fragments during the crimping operation will not be acceptable.

1012.2.3.3 Germination/Erosion Control Mats

a. Erosion-Control Blankets: As specified in the plans. Maximum 1-inch thick biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long, or 11 ga. 6" pins with washers.

b. Other products as specified on the plans or within the Supplemental Technical Specifications, or as approved by the LANDSCAPE ARCHITECT or ENGINEER.

1012.2.3.4 Aggregate Mulch: Sloped areas steeper than 3:1

a. Aggregate mulch shall consist of 3/4 inch to 1.5 inch depth maximum size crushed or angular material and will only be allowed with prior written approval of the LANDSCAPE ARCHITECT or ENGINEER. Install aggregate mulch at a depth equal to material size. Aggregate mulch shall be installed at a density not greater than 75% of the surface area.

1012.2.4 SOIL AMENDMENT

1012.2.4.1 Fertilizer: Fertilizer and Soil Amendments: Unless otherwise specified on the plans or in the Supplemental Technical Specification, no fertilizer or other soil amendments are required on areas specified to receive native seeding. If fertilizer and/or other soil amendments are required they shall be in accordance with Section 1011.2.2 of these specifications. If fertilizer and soil amendments are required CONTRACTOR shall perform a soils test in accordance with Section 1011.1.6.1 of these specifications.

1012.3 EXECUTION

1012.3.1 EXAMINATION

1012.3.1.1 Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

c. Uniformly moisten excessively dry soil that is not workable or which is dusty.

1012.3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.

1012.3.1.3 If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the LANDSCAPE ARCHITECT or ENGINEER and replace with new planting soil at no additional cost to the OWNER.

1012.3.2 PREPARATION

1012.3.2.1 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by seeding operations.

a. Protect grade stakes set by others until directed to remove them.

1012.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Reference project NEPA and/or SWPPP requirements if applicable.

1012.3.3 SEED BED PREPARATION

1012.3.3.1 Prior to the starting of any seed bed preparation the final grades of all earthwork shall be inspected and approved by the LANDSCAPE ARCHITECT or ENGINEER.

1012.3.3.2 No preparation shall be performed when the surface is wet or muddy or when the soil moisture content is such that the soil is not fully loosened by the disking operation.

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1012.3.3.3 The extent of seed bed preparation shall not exceed the area on which seeding, mulching and crimping operations can be completed prior to crusting or wind or water erosion of the prepared surface. If erosion, crusting or re-compaction occurs, the affected area shall be re-worked beginning with seed bed preparation. Depth of preparation must be approved by the LANDSCAPE ARCHITECT or ENGINEER prior to the seeding and mulching operations.

1012.3.3.4 Mechanical Preparation: Seed bed shall be prepared to a minimum depth of 4 inches, tilling with a disc, harrow or chiseling tools. Seed bed preparation shall be confined to disturbed areas unless otherwise specifically directed by the LANDSCAPE ARCHITECT or ENGINEER. Area of heavy or compacted soil may require additional preparation such as chiseling or ripping if disking alone does not result in specified depth. All competitive vegetation shall be uprooted during seed bed preparation and the soil shall be uniformly worked to a smooth, firm surface free of clods, stones or other foreign materials, 4 inches or larger, that would interfere with seeding or crimping equipment operations and germination. Tilling shall not occur when the steady wind speed is over 15 mph and is causing a dust problem to adjoining areas. No work shall be done when the moisture content of the soil is unfavorable or the ground is otherwise in an un-tillable condition.

1012.3.3.5 Hand preparation: Areas which cannot be prepared with mechanized equipment because of small size or irregular shape, slope angle, or significant existing vegetation which is to remain, may be loosened to a minimum depth of 2 inches using hand tools or small mechanized equipment. Any such areas will be specified on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1012.3.4 PREPARATION FOR GERMINATION / EROSION-CONTROL MATERIALS

1012.3.4.1 For erosion-control mats, provide seed bed preparation and seeding prior to installation as specified within this section. Install erosion-control germination materials and fasten as recommended by material manufacturer.

1012.3.4.2 For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

1012.3.4.3 Moisten prepared area after planting if surface is dry. Water thoroughly without creating

erosion or run-off.

1012.3.5 SEEDING

1012.3.5.1 General: Seed types and rates shall be as shown on plans or as directed by the LANDSCAPE ARCHITECT or ENGINEER. Three specific seed mixes have been specified for distinct areas of the city. Seeded areas shall be drilled seeded and mulched where slopes are flatter than 3:1 unless otherwise directed by the LANDSCAPE ARCHITECT or ENGINEER. Slopes steeper than 3:1 shall be broadcast seeded and hydro-mulched, aggregate mulched or erosion control blankets applied as per plans or as directed by the LANDSCAPE ARCHITECT or ENGINEER.

a. Seeding shall not start until the seed bed preparation has been inspected and approved by the LANDSCAPE ARCHITECT or ENGINEER.

b. CONTRACTOR'S vehicles and other equipment shall not travel over the prepared areas. If, as determined by the LANDSCAPE ARCHITECT or ENGINEER, that rain or some other factor has impacted prepared surfaces so that it is not possible to seed to the proper depth, the CONTRACTOR shall again prepare the seed bed without additional compensation.

c. No more area may be seeded than can be stabilized (i.e. covered with mulch and crimped, covered with gravel mulch or erosion control mats, hydro-mulched) by the end of the work day. No seeding operations may be conducted when steady wind speeds exceed 15 mph. If steady winds exceed 15 mph, seeding operations will be halted and any areas seeded shall be mulched.

d. Weather Limitations: Proceed with seeding operations only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to this specification.

1012.3.5.2 Drill Seeding: Drill seeding is required for reclamation areas unless otherwise specified in the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. Seed shall be applied with a landscape seeder with double rollers, or "rangeland" type seed drill equipped with packer wheels. Seed shall be drilled to a maximum depth of 1/2 inch unless otherwise specified. Direction of seeding shall be in long sweeping and overlapping S-curves on flats and perpendicular to slopes and on the contour whenever possible.

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1012.3.5.3 Broadcast Seeding: Seed may be applied by hand or by utilizing a rotary spreader or a seeder box with a gear feed mechanism if mechanized seeding is not possible due to limited size, irregular shape, or slope angle exceeding 3:1. Rice hulls or other fillers shall be used to prevent uneven separation of lighter seed. Seed shall be evenly distributed and applied at a rate which is a minimum of twice that of drilled seed rate unless otherwise specified. Immediately following the seeding operation, the seed-bed shall be lightly raked to provide approximately 1/2 inch cover of soil over most of the seed.

1012.3.5.4 A hydro-mulch slurry blower may be used only with the prior written approval of the LANDSCAPE ARCHITECT or ENGINEER.

1012.3.6 MEADOW SEEDING

1012.3.6.1 Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 15 mph.

- a. Before sowing, mix seed with seed carrier at a ratio of not less than four parts seed carrier to one part seed.
- b. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
- c. Do not use wet seed or seed that is moldy or otherwise damaged.

1012.3.6.2 Broadcast, hand or hydro-seed as specified within this section. Brush or rake seed into top 1/16 inch of soil, roll lightly, and water with fine spray.

1012.3.6.3 On slopes steeper than 3:1, protect seeded areas from hot, dry weather or drying winds by applying erosion control/germination materials within same day after completing seeding operations.

1012.3.6.4 Water newly planted areas and keep moist until meadow is established.

1012.3.7 MULCHING FOR MISCELLANEOUS SEEDING

1012.3.7.1 General: All seeded areas shall be mulched unless otherwise specified on the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1012.3.7.2 On seeded areas that are level or have slopes 3:1 or flatter, fiber mulching or hydraulic mulching shall be utilized unless otherwise specified on the plans or in the Supplemental Technical

Specifications or with prior written approval of the LANDSCAPE ARCHITECT or ENGINEER. On seeded areas that have slopes steeper than 3:1, only hydro-mulch, gravel mulch, or erosion control mats may be used as specified on the plans and in the Supplemental Technical Specifications.

1012.3.7.3 Hay/Straw Mulching: Hay mulch shall be applied at a minimum rate of 2.5 tons per acre of air-dry hay. If approved, straw mulch shall be applied at a minimum rate of 2.5 tons per acre of air-dry straw.

a. Crimping: Hay and/or straw mulch shall be crimped into the soil. The mulch shall be spread uniformly over the area either by hand or with a mechanical mulch spreader. When spread by hand, the bales of mulch shall be torn apart and fluffed before spreading. Mulching will not be permitted when wind velocity exceeds 15 miles per hour. A heavy disc such as a mulch-tiller, with flat serrated discs at least 1/4 inch in thickness, having dull edges and the disc spaced up to 8 inches apart shall be used to crimp (or anchor) the mulch into the soil to a minimum depth of 2 inches or as specified on the plans or in the Supplemental Technical Specifications. The discs shall be of sufficient diameter to prevent the frame of the equipment from dragging the mulch.

b. The crimping operations shall be across the slope where practical but not be parallel to prevailing Westerly winds (270 degrees magnetic). Crimping shall be in a general north-south direction where practical, and with tight interlocking "S" curves to avoid straight crimp lines.

c. If small grain straw mulch is used it shall be crimped in two directions in a cross-hatch pattern.

1012.3.7.4 Hydro-mulching: Immediately following the drilling operation, all seeded areas shall receive hydro-mulch application with tackifier at the minimum rate of 2,000 lbs. per acre. The slurry shall be mixed in a tank with an agitation system and shall be sprayed, under pressure, uniformly to a depth of 1/8 inch over the soil surface. The hydraulic mulching equipment shall keep all materials in uniform suspension throughout the mixing and suspension cycle. The applicator shall use both horizontal and vertical movements to achieve an even application of the slurry material. All areas receiving insufficient coverage in the opinion of the LANDSCAPE ARCHITECT or ENGINEER shall receive additional slurry.

1012.3.7.5 Erosion Control, Germination Blankets, Mats, or Fabric

a. The erosion control blankets shall be applied over

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seeded slope areas on the same day that seeding occurs without exception. Installation and anchoring of blankets shall occur as per approved manufacturer's specifications.

1012.3.7.6 Aggregate Mulch

a. If slope is accessible by appropriate equipment, steep slopes can be mulched with aggregate mulch with written approval of the LANDSCAPE ARCHITECT or ENGINEER. Immediately following seeding operation, all seeded areas shall receive aggregate mulch as noted in the plans. The mulch shall be placed in a layer approximately one stone deep over seeded areas. Seeding and mulch shall be completed simultaneously in strips from the top of the slope to the bottom so that seeded areas are not damaged by equipment use over seeded areas.

1012.3.8 MAINTENANCE AND PROTECTION

1012.3.8.1 The CONTRACTOR shall maintain the seeded areas regularly following installation until final acceptance.

1012.3.8.2 The CONTRACTOR shall be responsible for protecting and caring for seeded and mulched areas until final acceptance of the work and shall repair at his/her expense any damage to seeded and mulched areas caused by pedestrian or vehicular traffic or vandalism.

1012.3.9 MEADOW MAINTENANCE

1012.3.9.1 Maintain and establish areas designated as meadows by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, re-grade, and replant bare or eroded areas and re-mulch. Provide materials and installation the same as those used in the original installation.

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

b. In areas where erosion control/germination materials have been disturbed by wind or maintenance operations, add new mats and anchor as required to prevent displacement.

1012.3.9.2 Watering:

a. Schedule watering to provide germination and establishment, prevent wilting, puddling, erosion, and displacement of seed or erosion control/germination materials.

1012.3.10 PEST AND WEED CONTROL

1012.3.10.1 Pest Control: Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with the LANDSCAPE ARCHITECT or ENGINEER and any others in proximity to the Work. Notify the LANDSCAPE ARCHITECT or ENGINEER before each application is performed. Pest control shall be implemented as necessary at no cost to the OWNER until final acceptance of the Project.

1012.3.10.2 CONTRACTOR shall control germination of weed species that are not included as part of the seed mix. Weed control may be mechanical or hand removal methods as determined by the CONTRACTOR with approval by the LANDSCAPE ARCHITECT or ENGINEER. Weed control shall be implemented as necessary at no cost to the OWNER until final acceptance of the Project.

1012.3.11 WARRANTY

1012.3.11.1 If at the end of one complete growing season, it has been determined by the LANDSCAPE ARCHITECT or ENGINEER that insufficient germination has occurred in meadow areas the CONTRACTOR shall reseed such areas with no additional cost to the OWNER.

1012.3.11.2 Where miscellaneous seeding is installed in areas without an irrigation system, no warranty shall be required after the date of final acceptance.

1012.3.11.3 CONTRACTOR shall provide a certificate to the OWNER prior to final acceptance that all requirements of this specification have been met.

1012.3.12 REVIEWS AND OBSERVATIONS

1012.3.12.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations can be made at any time at the discretion of the LANDSCAPE ARCHITECT or ENGINEER. It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT or ENGINEER, in writing, 48 hours in advance of each required review or observation.

1012.3.12.2 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next phase without written approval of the work of the previous phase by the LANDSCAPE

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ARCHITECT or ENGINEER. Payment will not be approved for items which have not been reviewed and approved in writing.

- a. Each phase of soil preparation shall be observed in process.
- b. Finish grade shall be reviewed.
- c. Implementation plan shall be approved prior to seeding.
- d. Seed shall be reviewed prior to seeding.
- e. Seeded area shall be reviewed after completion.
- f. Mulched areas shall be reviewed after completion.
- g. Final review and acceptance.
- h. Warranty review

1012.3.13 MEASUREMENT & PAYMENT

1012.3.13.1 Measurement: The measurement of native grass seeding shall be by the acre.

1012.3.13.2 Payment: Payment shall be made at the contract unit price per acre, of native grass seeding complete in place, which shall include the seed, fertilizer (if required), area preparation, seeding, soil amendments (if required), and mulching.