CONSTRUCTION STANDARD SPECIFICATION

SECTION 02932

EXTERIOR PLANTS

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EXTERIOR PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plants.
2. Planting soils.
3. Tree stabilization.
4. Landscape edgings.

B. Related Sections:

1. Section 02200, "Earthwork," for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
2. Section 02922, "Lawns and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.
3. Section 12930, “Site Furnishings” for Tree grates
4. SNL’s “CAMPUS DESIGN DEVELOPMENT GUIDELINES” Plant List

1.3 REFERENCES

A. The current version of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic design only.

1. AMERICAN NURSERY AND LANDSCAPE ASSOCIATION (ANLA)
   - ANLA ANSI/ANLA Z60.1 (Latest version) American Standard for Nursery Stock
2. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
   - ANSI A300 (Latest Version) Tree Care Operations – Trees, Shrubs and other Woody Plant Maintenance
3. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
   - Minimum ASTM D1117 Mullen Burst Strength – 425 psi

- Minimum ASTM D1682 Grab Tensile Strength – 200 lbs & 300 lbs.
- ASTM D1682 Grab Elongation – between 15, 35, 50, & 140 percent
- ASTM D3786 Trapezoidal Tear Strength – 50 lbs. & 100 lbs.
- Minimum ASTM D3786 Mullen Burst – 320 psi
- Minimum ASTM D 3787 Puncture – 120 lbs.
- ASTM D4833 Puncture – 100 lbs.
- ASTM D 4355 Apparent Opening Size [AOS] – $\geq$ U.S. Std. Sieve
- ASTM D4972 (Latest Version) pH of Soils
- ASTM D5268 (Latest Version) Topsoil Used for Landscaping Purposes

4. ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS (AOAC)
5. COE CW-02215 Equivalent opening size greater $\geq$ to U.S. Standard Sieve No.50
6. NATIONAL ARBORIST ASSOCIATION (NAA)
   - STANDARDIZED PLANT NAMES–SPN The American Joint Committee on Horticultural Nomenclature.
7. New Mexico Department of Agriculture (NMDOA)

1.4 SUBMITTALS

A. General: Submit the following items in accordance with Conditions of the Contract and Section 01330 – Submittal Procedures.

B. Product Data: Submit product data for the following materials and items. Include laboratory test reports and other data to show compliance with specifications (including specified standards). Product Data: For each type of product indicated, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Pesticides: Include product label, MSDS, and manufacturers' application instructions specific to the Project.
3. Anti-desiccant
4. Bark Mulch: Samples - Submit one cubic foot of bark mulch prior to placing order.
5. Fertilizer
6. Filter Fabric
7. Planting Schedule: Scheduled planting dates for each type of work to be performed.
8. Steel Edging
9. Tree Wrap
10. Root Barrier

C. Maintenance Instruction: Submit instructions and recommendations for properly maintaining all plant material for the first growing season of landscape work. Include fertilization (types), schedules, and pruning.

D. Certification: Submit certificates of inspection or manufacturer's certified analysis testing compliance with specifications for the following.

E. Record drawings noting any variations from the Contract Documents. Submit two copies of record "Red-Line" prints prior to expiration of the required maintenance period.

F. Submit Contractor's Certification per 1.05A.

G. Samples for Verification: For each of the following:

1. Trees and Shrubs: Provide for Nursery review and selection of material. Samples of each variety and size delivered to the site for review. Maintain approved samples on-site as a standard for comparison.
2. Organic Mulch: 1-quart of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
3. Inorganic Mulch: 5 lb of each inorganic mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on the site; provide an accurate indication of color, texture, and makeup of the material.

H. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed.

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

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

J. Material Test Reports: For standardized ASTM D 5268 topsoil Structural soil mixture.

K. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods. Include fertilization (types), schedule and pruning

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

B. A single firm specializing in all aspects of landscape and irrigation work and experienced with the type and scale of work required and having equipment and personnel adequate to perform the work according to this Specification and the Contract Drawings. If an irrigation system is required. The Contractor shall possess a State of New Mexico MS06 license for installing landscape irrigation systems. One on-site person must posses a journeyman irrigation license (JS6).

C. Plant Materials Quality Control

1. Ship landscape materials with certificates of inspection required by industry and the governing authorities [DOA and NMDA].
2. Label each tree, shrub and ground cover with securely attached waterproof tags, bearing legible designation of botanical and common name. Comply with regulation applicable to landscape materials.

3. Provide products in manufacture's standard packaging. For other materials, provide analysis by a recognized testing laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.
4. Do not make substitutions. If specified material is not available, submit proposal for use of substitute material.
5. Plant Material shall conform to varieties and sizes specified in the Contract Document Plant List and true to botanical name as listed in the SPN, and in accordance with the ASNS. Plant material shall be graded in accordance with the Code of Standards of the NAA.
6. Furnish healthy, vigorous, planting stock free from disease, insects and insects eggs, defects or disfigurement, bark abrasion, and sunscald damage. Plants shall be typical of their species or variety.
7. Provide plants grown under climatic conditions similar to this (project) locale. Unless otherwise stated, all plants including native pines shall be nursery grown and shall be appropriately tagged.
8. Container grown plant materials shall have been grown in its delivery container for not less than six [6] months, but not more than two [2] years. Root-bound plant material will not be accepted. Top of first major tree root must be within the first 1"-inch of the top of the root ball, otherwise the tree will be rejected.
9. Balled and burlapped plant materials shall have a solid ball of earth held in place securely by burlap and a stout twine or rope. Broken or loose balls will not be accepted. Protect root ball from desiccation with plastic wrap. Avoid trees with girdled roots.
10. Trees shall be symmetrically developed on all sides and shall have a single trunk or stem that is straight (unless otherwise specified) and free of doglegs, crooks, y-crotches or any other disfiguring shapes. All trees shall have a healthy root system and a single central leader that shall **not** have been pruned. Trees with 'included bark' within major branch unions will be rejected.
11. All trees shall have a branching pattern that is uniform in shape around their entire circumference. Plant material with irregular branching patterns or with branching patterns more highly developed on one side shall **not** be accepted.
12. All shade trees shall be 2 ½"inch caliper or larger. All ornamental trees (flowering pears, plums, etc.) shall be 2"inch caliper or larger.
13. The Sandia Construction Observer (SCO) and the Grounds and Road Services (G&RS) Representative shall be the judge of the quality and acceptability of all plant materials. All rejected plant material shall be immediately removed from the site and replaced with acceptable plant material at no additional cost to Sandia.

D. Preinstallation Conference: Conduct conference at Project site

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

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

2. 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.
3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

C. Notify the SCO of plant material arrival on site to accommodate immediate examination.

D. Properly protect plant material from wind damage and desiccation during transportation.

E. Plants "tree spaded" from nursery are acceptable providing plant balls conform to specifications.

F. Do not prune trees and shrubs prior to delivery. Do not bend or bind-tie trees or shrubs in such a manner as to damage bark, break branches or destroy natural shape. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving. Do not drop stock during delivery. Do not remove boxed or container-grown stock from containers until planting time.

G. Handle planting stock by root ball.

H. Storage

1. Place mulch in dry storage area away from contaminants.
2. Deliver packaged materials in original unopened containers showing weight, analysis, and name of manufacturer, in conformance with the NMDA.
3. Protect materials from deterioration and desiccation while stored at job site.
4. Plants not installed on the day of arrival at the project site shall be stored and protected as follows.

    a. All plants stored on the project site shall be protected from drying at all times by covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss, or other similar materials. All plants shall be watered as necessary until planting.
    b. Plants shall be stored in areas designated or approved by the SCO.

5. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.
6. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
7. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
8. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
9. Do not remove container-grown stock from containers before time of planting.
10. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Pre-Construction Walk-Through
   1. A Landscape Walk-Through of the construction site shall be scheduled by the Contractor five [5] days in advance of mobilization. This Walk-Through shall consist of the PM, Contractor, the SCO and the G&RS representative.
   2. The landscape irrigation system shall be activated to determine the system's operating conditions. The existing landscape and irrigation system conditions shall be recorded at this time.

B. 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.

C. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

   1. Notify SCO no fewer than two days in advance of proposed interruption of each service or utility. Do not proceed with interruption of services or utilities without SCO written permission.

D. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

   1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.8 CARE OF EXISTING PLANT MATERIAL & IRRIGATION SYSTEM

A. During construction rehabilitation plant material shall be regularly irrigated.

B. Where irrigation outages' will occur and will last longer than five days, the Contractor shall be responsible for watering landscape and plant material once per five days or as often as conditions dictate, until automatic irrigation service is restored. Apply water using the following formula:

   1. Ten (10) gallons of water for each inch of trunk caliper [width]
   2. Five (5) gallons of water for shrubs and ground cover.

C. Repairs: Where piping in lengths of 20'-feet or more is to be replaced, the repaired portion to the system shall be pressure tested. This shall be accomplished by capping the end section of the newly installed repair pipe and applying 100 psi water pressure for 1-hour. All joints shall remain exposed during testing and backfilling shall be completed as specified in Section 02812-S. The SCO and a G&RS Representative shall be present during testing.

D. All irrigation system repairs shall be inspected by a G&RS (Dept.10843-3) Representative prior to backfilling.

E. Replace material in-kind. Refer to the Installation Section of Section 02821-S.

1.9 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period at no charge to SNL.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of tree stabilization.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of Substantial Completion
3. Warranty periods in first three subparagraphs below are examples only for some categories of plants; revise to suit Project.

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
c. Annuals: Three months.
d. Turf (cool season and buffalo grass): 3 months.

4. Include the following remedial actions as a minimum:

a. Immediately remove dead plants within 10 business days and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 % percent dead or in an unhealthy condition at end of warranty period. Replacement materials shall be of equal quality, size and species as original and shall be approved by the SCO or G&RS Representative prior to planting.
c. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.10 PERFORMANCE

A. Perform work in a manner that will avoid damage if possible to existing utilities. Hand excavate as require.

B. Proceed with and complete landscape installation as the site becomes available.

C. Provide a Plant Protection and Preservation Plan for plant material in and adjacent to the Project Site that are scheduled to remain. The Plan shall show trunk lotions and drip line areas of all trees and significant shrubs to be preserved in and adjacent to the Project Site

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and 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.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than ¾" inch (19 mm) in diameter; or with stem girdling roots will be rejected.
2. 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 indicated.

B. 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 Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. 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 as shown on Drawings. Nomenclature to conform to (SPN) Standard Plant Names.

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

F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

G. Ensure container stocks have been grown in its delivery container for not less than six months. Any root bound plant material will **not** be accepted.

H. Trees and shrubs shall be pruned and repairable injuries made as follows:

1. Flush cuts are unacceptable. A proper cut shall begin just outside the branch bark ridge and angles down away from the stem of the tree, avoiding injury to the branch collar.
2. Comply with ANSI A300, "Trees, Shrubs, and Other Woody Plant Maintenance – Standard Practices."
3. Flush cuts are unacceptable. A proper cut shall begin just outside the branch bark ridge and angles down away from the stem of the tree, avoiding injury to the branch collar.

2.2 INORGANIC SOIL AMENDMENTS

A. Sulfur: Granular, biodegradable, and containing a minimum of 90 % percent sulfur, with a minimum of 99 % percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.

B. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 % percent iron and 10 % percent sulfur.

C. Perlite: Horticultural Perlite, soil amendment grade.

D. Agricultural Gypsum: Minimum 90 % percent calcium sulfate, finely ground with 90 % percent passing through No. 50 (0.30-mm) sieve.

E. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

F. Diatomaceous Earth: Calcined, 90 % percent silica, with approximately 140 % percent water absorption capacity by weight.

G. Zeolites: Mineral clinoptilolite with at least 60 % percent water absorption by weight.

H. Moisture-lite shall be screened to pass a #40 mesh

I. Cornell Structural soil Plant Mix shall be CU-Structural soil manufactured by an AMEREQ licensed company. More information regarding CU –Structural soil may be obtained by calling 1-800-832-878

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: shall be City Of Albuquerque soil amendment facility compost or equal follows:

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or granular texture, with a pH range of 3.4 to 4.8.

2.4 FERTILIZERS

A. Commercial Fertilizer: Commercial fertilizer shall be delivered to the site in unopened original containers, each bearing the manufacturer’s guaranteed analysis.

1. Fertilizer shall be a granular starter fertilizer with a guaranteed analysis of 16-24- 10 or similar ratio.
2. Fertilizer shall be a polymer-coated and sulfur-coated controlled release fertilizer containing ammonic and urea nitrogen. The minimum sulfur content shall be 4% and the minimum iron content shall be 1%.

B. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

2.5 PLANTING SOILS

A. Planting Soil Organic Compost, with pH range of 5.5 to 7, a minimum of 70% by volume, organic compost, screened to ½" inch free of stones 1" inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth. Mix Organic Compost with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Weight of Sulfur per 1000 Sq. Ft. (92.9 Sq. m): 5 lbs.
2. Weight of Agricultural Gypsum per 1000 Sq. Ft. (92.9 Sq. m): 10 lbs.
3. Weight of Superphosphate per 1000 Sq. Ft. (92.9 Sq. m): <1/2 lbs.
4. Also 20% by volume 'Moisture-lite' , screened to pass a #40 mesh.
5. Also 10% by volume, 'Ecolite' screened to pass # 40 mesh.

B. Topsoil -Topsoil shall be as defined by ASTM D 5268.

1. Suitable topsoil includes selectively excavated material that is representative of soils in local vicinity and is reasonably free form underlying sub-soils, clay lumps, objectionable weeds, litter, brush, matted roots, toxic substances or any material that might be harmful to plant growth or be a hindrance to grading, planting or maintenance operations.
2. Topsoil shall not contain more than 5% (five) percent by volume, stones or other objects larger than 1" inch in any diameter.
3. Imported topsoil shall comply with the following:

    a. Composition (by volume)

        i. Organic material – minimum of 2%.
        ii. Silt – minimum of 15%.
        iii. Sand – 15 to 50%.
        iv. Clay – 15 to 35%.
        v. Foreign Materials – maximum of 1.0%.
        vi. Top soil shall be approved by the SCO prior to installation.

    b. Soil pH shall be suitable for specified plants and be tested in accordance with ASTM D 4972. Typical pH range shall be pH 5.5 - 8.0.

4. Transport imported topsoil directly form the source to final location unless approved the SCO to be placed in stockpiles. If amendments are required, mix in an approved manner prior to placing on site. If stockpiling is approved, the locations and amount of the stockpiles will be designated by the SCO.

    a. Natural Fertilizer/Soil Conditioner: Provide as supplied by the following manufacturers: Soil Foods Inc., [505.983.8078] or Technology International [505.291.1100].

C. Soil Testing:

1. Collect samples of soil in planting/seeding areas; mix and submit a SINGLE SAMPLE to a recognized testing laboratory for evaluation of fertility.
2. Collect [5] to [10] samples from each unit or zone.
3. Testing shall include evaluation for PH, % Base Saturation, Free Lime, and EC.

2.6 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Bark Mulch - Bark mulch shall be fresh, shredded mixture of ½" – 5"inch pieces of wood, cambium and bark nuggets from coniferous trees, as available from Western Organics Inc.
2. Size Range: 5" inches **(76 mm)** maximum**, ½"** inch **(13 mm)** minimum.
3. Color: Natural

B. Inorganic Mulch:

1. As supplied by

   a. Rocky Mountain Stone Co.
   b. San Pedro Rock
   c. or approved equal

2. Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color.. Provide one or more of the following, as noted on the Contract Drawings:

   a. Crusher Fine Gravel Mulch – Color as noted on Contract Drawings.

      i. Crusher fines – Santa Fe Brown or Sunset Rose, 3/8" inch max.

   b. Large Gravel Mulch – ¾" inch, color as noted on Contract Drawings.

      i. Large Gravel,- ¾"-1" inch Tinaja Gravel

   c. Cobble Mulch – Stones not less than 4 – inches in any direction and not more than 12" – inches in ay direction with less than 15% broken fragments.

      i. Cobble – ½"-1 ½" inch Santa Fe Brown or ¾"-2" inches Rounded Gray Gravel

2.7 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. (101g/sq. m) minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

1. Non-Woven:

   a. Minimum ASTM D1682 Grab Tensile Strength – 200 lb
   b. ASTM D 1682 Grab Elongation – between 50 & 140 percent.
   c. ASTM D 3786 Trapezoidal Tear – 50 lbs.
   d. Minimum ASTM D 3786 Mullen Burst – 320 psi
   e. ASTM D 4833 Puncture – 100 lbs.

f. ASTM D 4355 Apparent Opening Size [AOS] - ≥ U.S. Std. Sieve.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd. (162 g/sq. m).

2.8 PESTICIDES

A. General: Pesticide registered and approved by 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.

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

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

2.9 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Proprietary Staking-and-Guying Devices: Proprietary stake and adjustable tie systems to secure each new planting by plant stem; sized as indicated and per manufacturer's written recommendations.

a. Arborbrace; ArborBrace Tree Guying System.
b. or approved equal.

B. Root-Ball Stabilization Materials:

1. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball; sized per manufacturer's written recommendations unless otherwise indicated.

a. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

i. Border Concepts, Inc.; Tomahawk Tree Stabilizers.
ii. Foresight Products, LLC; Duckbill Root ball Fixing System.
iii. Tree Staple, Inc.; Tree Staples.

2.10 LANDSCAPE EDGINGS

A. Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

1. Provide commercial 14 gauge steel edging x 1/8-inch thick x 6-inches high.
2. Provide commercial 14 gauge steel edging x 1/8-inch thick x 6-inches high.
3. Color shall be Green or Brown as specified on the Contract Drawings.
4. Steel edging sections shall have anchor stake loops stamped in face of section 32”-inches o.c. Use 12” inch tapered steel anchoring stakes 3/16” inch thick with a powder coat finish.

2.11 MISCELLANEOUS PRODUCTS

A. Anti-desiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions. Wilt-pruf or approved equal

B. Burlap: Non-synthetic, biodegradable.

C. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

D. Planter Filter Fabric: Nonwoven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

E. Tree trunk protection: Arborgard

F. Tree grates are specified in SNL Standard Specification 12930 Site Furnishings

G. Root Barrier

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants and mulches for compliance with requirements and conditions affecting installation and performance.

1. 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.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
5. Verify soil grades are complete and correct.

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

C. 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 SCO and replace with new planting soil.

D. Planting may be done whenever the weather and soil conditions are favorable (preferably Spring thru late Fall) or as otherwise authorized by the SCO.

3.2 PREPARATION

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

B. 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.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain SCO acceptance of layout before excavating or planting. Make minor adjustments as required, except where field conditions dictate adjustments.

D. Lay out plants at locations directed by SCO. Stake locations of individual trees and shrubs and outline areas for multiple plantings. Layout edges of planting beds stake trees and mark shrub locations with actual containerized plant material for review by the G+RS Representative – Dept 04843-3 and the project SCO.

E. Apply anti-desiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again two weeks after planting.

3.3 EXCAVATION FOR TREES AND SHRUBS

A. Prior to excavation of planting beds, swales and pits, all areas shall conform to the grades and slopes as shown on the drawings, and the location of any underground utilities and irrigation system shall be verified by the Contractor. Any damage to existing utilities or irrigation systems shall be immediately repaired at Contractor's expense.

B. Rock and other debris shall be removed to a depth necessary to permit proper planting.

C. Plant pits shall be excavated with sides sloping in at a 45 degree angle and shall meet the minimum dimensions shown on Standard Drawing LP5003STD - Planting Details & Schedule. Avoid glazing sides of planting pits. Glazed pits shall be scarified.

D. Excess soil and other excavated materials shall be removed from the project site, or as directed by the SCO.

E. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

F. Hardpan Layer: Drill 6”-inch (150-mm-) diameter holes, 24” inches (600 mm) apart, into free-draining strata or to a depth of 10’ feet (3 m), whichever is less, and backfill with free-draining material.

G. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

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

3.4 GROUND COVER BED PREPARATION

A. Bed areas shall be cultivated to a depth of 6-8” inches, removing all grass, weeds, roots, rocks, and other debris.

B. Prior to planting, water all areas thoroughly to produce weed growth. Apply "Glyphosate" herbicide to kill all growth and proceed with installation after period recommended by herbicide manufacturer.

C. Incorporate granular starter fertilizer at recommended rate along with planting soil mixture at the rate of 1 part planting soil mixture to 3 parts native soil.

3.5 SETTING PLANTS

A. Trees

1. Excavate tree pits to a diameter three [3] times greater than the size of the root ball, and at the same depth of the root ball. Do not disturb soil at the bottom of the pits.
2. B&B Plants: Cut and remove wire basket. Remove any plastics or gro-bags, from root ball. Center and set tree plumb with the full side of the plant facing the front of the bed with top of ball at or slightly higher (no more than 1”-inch) than the surrounding finished grade. Fold down the top half of the burlap and remove any nylon strings or twine. Entirely remove synthetic burlap type materials.
3. Container-Grown Plants: Handle plants by the container and **not** by the tops or trunks. Set and plant trees same as for B&B.
4. Backfill and carefully tamp layers to two-thirds the depth of the root ball and flood with water. The backfill shall be watered to settle the soil and eliminate air pockets. No packing materials shall protrude above soil level after planting is completed.
5. After water is absorbed, install 6 fertilizer tablets evenly around perimeter of each tree root ball 6”-inches below grade. Continue backfilling and tamping to grade, leaving no voids or air pockets. Water again after placing final layer of backfill.
6. Form a 6’-foot diameter build-up earth ring or a 6-foot diameter depression [rare occasion] 4”-inches below surrounding finished grade with sides neatly sloped inward to top of root ball. On slopes, maintain 4-inches below surrounding grade on the downhill side. Fill saucer or depression with 2 – 3” inches of bark mulch.
7. Broadcast over the root ball and backfill soil, at the recommended rate, a broad-spectrum, pre-emergent herbicide prior to mulching.
8. Trees shall be staked, guyed, wrapped (as needed), protected, and mulched as indicated on Standard Drawing LP5003STD - Planting Details & Schedule.

9. Irrigation: Each tree shall receive two [2] bubblers. Refer to Section 02812 – Landscape Irrigation System.
10. Tree Protection: Trees shall be wrapped and protected in a suitable material that will prevent rabbits and other varmints from chewing on tree bark causing irreparable damage to trees. Refer to Standard Drawing LP5003STD – Planting Details & Schedule.

B. Shrubs.

1. Final grades of shrub areas and final shrub layout shall be approved by the SNL G&RS representative and the project SCO.
2. Clear shrub areas of rocks, stones larger than 1-inch in any dimension and other debris.
3. Container grown stock shall be removed from containers in such a way as to prevent damage to plant or roots.
4. Excavate shrub pits to a diameter 3X greater than the size of the root ball and at the same depth of the root ball. Place plants on compacted backfill layer. Shrubs shall be uniformly spaced as indicated, plumb and at finished grade, with the full side facing the front of the bed.
5. Place three fertilizer tablets per shrub when shrub pit is two-thirds backfilled. Place planting soil and native soil mixture at 1:3 ratio to finish grade level and thoroughly soak.
6. All bed areas shall have rock mulch spread as indicated on Contract Drawings to a uniform thickness of 2”-inches. Set top of backfill in shrub areas to allow for mulching.
7. Install “filter fabric” (weed barrier) and mulch as indicated on Contract Drawings.
8. Irrigation: Each shrub shall receive a minimum of two [2] micro water distribution lines placed on opposite sides of the root ball or as specified on Irrigation or Landscape Construction Documents. Refer to Section 02812 – Landscape Irrigation System and Standard Drawing LP5001STD, & LP5002STD – Irrigation Details.
9. Form a watering bowl/dish three times the size of the root ball width and four inches high to hold irrigation water.

C. Ground Cover :

1. Loosen sub-grade of planting bed areas to a minimum depth of 6”-inches. Clear area of stones larger than 1-inch in any dimension, sticks, rubbish and other extraneous matter.
2. Place one-halve of total amount of planting soil required over planting bed. Work into top of loosened sub-grade to create a transition layer, then place remainder of the planting soil.
3. Layout ground cover material and align plants uniformly. Excavate pits large enough to set each plant. Scarify root mass of each plant as deemed necessary. Backfill with excavated planting soil mix. Water thoroughly. Fill depressions and level high spots.
4. Prune ground cover plant material as deemed necessary. Refer to Section 3.010 [Pruning & Repair] of the Specification.

D. Apply anti-desiccant using power spray to provide an adequate film over trunks, branches, stems, twigs and foliage according to manufacturer’s recommendations. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again two weeks after planting.

1. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
2. Maintain supervision of excavations during working hours.

3. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
4. If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.

E. Subsoil and topsoil removed from excavations maybe used as part of planting soil mixture.

3.6 TREE, SHRUB, AND VINE PLANTING

A. Before 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.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare adjacent finish grades.

1. Use planting soil mixed with native (excavated) soil at 1:3 ratio for backfill.
2. 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. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

D. 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.

3.7 MECHANIZED TREE SPADE PLANTING

A. Trees shall 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 the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

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

C. Cut exposed roots cleanly during transplanting operations.

D. Use the same tree spade to excavate the planting hole as was used to extract and transport the tree.

E. Plant trees as shown on Drawings, following procedures in "Tree, Shrub, and Vine Planting" Article.

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

3.8 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by SNL Architect.

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

D. Do not apply pruning paint to wounds.

3.9 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

1. Use Arborbrace proprietary stake and tie system to secure trees 2” inches and greater.

B. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball as indicated in the drawings

1. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.10 ROOT-BARRIER INSTALLATION

A. Install root barrier where trees are planted within 120” inches **(1500 mm)**] of paving or other hardscape elements, such as walls, curbs, and walkways unless otherwise shown on Drawings.

B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for a distance of 60” inches (1500 mm) in each direction from the tree trunk, for a total distance of 10’ feet (3 m) per tree. If trees are spaced closer, use a single continuous piece of root barrier.

1. Position top of root barrier flush with finish grade.
2. Overlap root barrier a minimum of 12” inches (300 mm) at joints.
3. Do not distort or bend root barrier during construction activities.
4. Do not install root barrier surrounding the root ball of tree.
5. Install root barrier a minimum of 3’ feet deep from finished grade.

3.11 PLANTING IN PLANTERS

A. Place a layer of drainage gravel at least 4” inches (100 mm) thick in bottom of planter. Cover bottom with filter fabric and wrap filter fabric 4” inches (100 mm) up on all sides. Duct tape along the entire top edge of the filter fabric, to secure the filter fabric against the sides during the soil-filling process.

B. Fill planter with mix of planting soil and topsoil at a 1:3 ratio. Place soil mix in lightly compacted layers to an elevation of 1-1/2” inches (38 mm) below top of planter, allowing natural settlement.

3.12 PLANTING AREA MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 12 inches **(300mm)** and secure seams with galvanized pins.

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

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 3”-inch (75-mm) average thickness, with 36”-inch (900-mm) radius around trunks or stems. Do not place mulch within 3” inches (75 mm) of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3”-inch (75-mm) average thickness of organic mulch extending 12” inches (300 mm) beyond edge of individual planting pit or trench] and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3” inches (75 mm) of trunks or stems.
3. Inorganic Mulch in Planting Areas: Apply 3”-inches (75-mm) average thickness of mineral mulch extending 12” inches (300 mm) beyond edge of individual planting pit or trench] and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3”inches (75 mm) of trunks or stems.
4. Setting Stone

    a. Dry Stream (Water Harvesting System)

        i. ¾”inch Tinaja gravel 3” inch in depth lining the channel (as indicated on the Contract Drawings).
        ii. 2-4” inch Cobblestone placed along sides of channel (as indicated on the Contract Drawings).
        iii. 7-14”inches Rainbow round cobblestone placed along sides of channel (as indicated on the Contract Drawings).
        iv. Los Lunas Boulders 14”-20”inches in size placed along sides of channel (as indicated on the Contract Drawings).

    b. Paths and Other Areas [Shown On Contract Drawings].

        i. Compacted Crusher Fines or ½” inch Tinaja gravel 2”-inches minimum in depth.

    c. Mulch for Planting Beds.

        i. 3/8” inch Santa Fe Brown 2”-inches minimum depth.

ii. 3/8”inch Sunset Rose gravel, 2”-inches minimum depth.
iii. Crusher Fines or ½”inch Tinaja gravel – 2”-inches in depth.
iv. Crusher Fines shall be graded 75% percent crushed stone.

d. Gravel Mulch:

i. Install gravel mulch at a depth of 2 - 4-“inches max. unless otherwise indicated. All mulch shall be installed a minimum of 1”-inch below surrounding hardscape grade i.e. concrete or asphalt walk-ways and cart-pass, mow strips, etc…
ii. Large Boulders For Seating, etc.:.
iii. Los Lunas Boulders dimensions in range of: Length 3’-5’ feet, width 2’-3’feet, and height of 20” – 30”inches refer to drawing.

3.13 EDGING INSTALLATION

A. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30”inches (760 mm) apart, driven below top elevation of edging.

3.14 TREE GRATE INSTALLATION

A. Tree Grates: Set grate segments flush with adjoining surfaces as shown on Drawings. Shim from supporting substrate with soil-resistant plastic. Maintain a 3”-inch- (75-mm-) minimum growth radius around base of tree; break away units of casting, if necessary, according to manufacturer's written instructions.

3.15 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.16 MAINTENANCE DURING INSTALLATION

A. Maintenance of plant material shall follow ANSI A300 Standard Practices.

B. Maintenance operations shall begin immediately after each plant is installed and shall continue as specified herein following substantial completion. Plants shall be kept in a healthy, growing

condition by watering, pruning, spraying, weeding, and any other operations necessary to maintain such health. Planting beds shall be kept free of weeds, grass, and other undesired vegetation. Keep all walks and paved areas clean. The site is to be kept clear of debris resulting from landscape work or maintenance. Protect planted stock from damage resulting from trespass, erosion [to include watering], weather disease, and other hazards.

1. Program Controller to provide optimum irrigation. Maintain these conditions thru maintenance period.

C. Contractor shall be responsible for repair or replacement of any damaged structures, plants, etc. in which damage resulted from planting/landscaping operations.

3.17 SUBSTANTIAL COMPLETION

A. The SCO and G&RS Representative shall inspect all work for substantial completion upon written request by the Contractor three days in advance. The SCO and the 4843-3 Representative shall generate a punch list of items to repair or replace.

B. Upon completion of all repairs or replacements requested at the time of inspection, repairs and/or replacements shall be re-inspected and the SCO shall certify in writing the substantial completion.

3.18 GUARANTEE PERIOD

A. All plant materials shall be guaranteed for replacement for a period of 365 days, beginning on the date of substantial completion certification.

B. Replacements: Any plant required under this contract that is dead or not showing satisfactory growth, as determined by the SCO shall be promptly removed from the site and replaced by the Contractor within ten consecutive working days of being notified by the SDR (Sandia Designated Representative). All replacements shall be of the same size and variety as originally specified, unless otherwise directed.

C. Plant material damaged by rabbits or other varmints during Guarantee Period that were not protected as specified herein and on Contract Drawings, shall be replaced by the Contractor at no cost to Sandia National Labs.

D. The Contractor will not be responsible for damage to plants by vehicles or encroachers following substantial completion and acceptance.

3.19 MAINTENANCE

A. The Contractor will be responsible for maintaining the irrigation system and all plant material up to the date of substantial completion, and for a thirty [30] day maintenance period beginning on the date of substantial completion. During this thirty [30] day maintenance period, the Contractor is responsible for:

1. Watering plants as necessary to maintain adequate supply of moisture in root zone. Maintain optimum moisture conditions.
2. Coordinating CICS programming with the SNL G&RS Department.
3. Watering at a rate which allows soil to absorb water.
4. Pruning plants as required to remove dead, damaged, or conflicting branches.
5. Mulching plants to keep a depth of 2” to 4” – inches.
6. In planting beds, removing grass and weeds on a weekly basis.
7. Spraying plants with approved pesticides as required and directed by the SCO and the G&RS Representative.

B. CICS programming adjustments

1. Inspect irrigation and perform adjustments on a weekly basis.

3.20 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with SNL operations and others in proximity to the Work. Notify SCO before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.21 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. 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.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.22 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off of SNL's property.

3.23 FINAL INSPECTION AND ACCEPTANCE

A. At the end of the maintenance and guarantee period and after substantial completion an inspection of plants will be made by the SCO upon written request by Contractor five days in advance. The Contractor will be notified in writing of the Final Acceptance, or of work required. The Contractor will be responsible for all maintenance until all punch list items are completed and Final Acceptance is granted, at which time Sandia will assume responsibility.

B. Landscape work may be inspected for acceptance in phases agreeable to the SCO providing work offered for inspection is completed including maintenance. Final inspection shall be done by the Sandia G&RS Representative and the SCO. Existing Project-Site Conditions addressed under Sections 1.9 of this Specification shall also be inspected at this time for final acceptance.

C. Any plant material, as required under this contract that is dead, not true to name or size as specified, or not in satisfactory growth condition as determined by the SCO shall be removed from site and replaced as originally specified without cost to Sandia National Labs.

-END OF SECTION -