PROJECT MANUAL

RANDOLPH PLAZA REDEVELOPMENT PROJECT

Prepared for:

Greektown Neighborhood Partnership

100% CONSTRUCTION DOCUMENTS

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SMITHGROUP

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SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Removing above- and below-grade site improvements.
   2. Temporary erosion and sedimentation control.

1.2 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify Call Before You Dig for area where Project is located before site clearing.

C. Do not commence site clearing operations until temporary erosion- and sedimentation-control[and plant-protection] measures are in place.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
   1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 EXISTING UTILITIES

A. Locate, identify, and disconnect utilities indicated to be abandoned in place.

3.4 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
   2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.5 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade walks plants.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete walks pavements.

B. Related Requirements:
1. Section 329300 "Exterior Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.2 DEFINITIONS

A. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

B. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

C. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

D. Fill: Soil materials used to raise existing grades.

E. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.

F. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D 1586.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

I. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

1.3 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
1. Do not proceed with work on adjoining property until directed by Architect.

C. Utility Locator Service: Notify "Call Before You Dig" for area where Project is located before beginning earth-moving operations.

D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 311000 "Site Clearing" are in place.

E. The following practices are prohibited within protection zones:
1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294**/**D 2940M 0; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

F. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

G. Drainage Course: Narrowly graded mixture of [**washed**]crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

H. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.

I. Sand: ASTM C 33/C 33M; fine aggregate.

J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.4 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.5 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
   1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.6 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.7 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill.

4. Under building slabs, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.8 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.9 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

3.10 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.

3.11 SUBSURFACE DRAINAGE

A. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698.
2. Place and compact impervious fill over drainage backfill in 6-inch- thick compacted layers to final subgrade.

3.12 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course under pavements and walks as follows:
1. Shape subbase course to required crown elevations and cross-slope grades.
2. Place subbase course 6 inches or less in compacted thickness in a single layer.
3. Place subbase course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

C. Pavement Shoulders: Place shoulders along edges of subbase course[and base course] to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.13 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
   1. Place drainage course 6 inches or less in compacted thickness in a single layer.
   2. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   3. Compact each layer of drainage course to required cross sections and thicknesses to not less than [95] <Insert number> percent of maximum dry unit weight according to ASTM D 698.

3.14 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

END OF SECTION

SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Brick pavers set in aggregate sand setting beds (on concrete).

B. Related Requirements:
   1. Section 321313 "Concrete Paving" [for concrete base under unit pavers] [and] [for cast-in-place concrete curbs and gutters serving as edge restraints for unit pavers].

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. Product Data: For the following:
   1. Pavers.
   2. Mortar and grout materials.

C. Samples for Verification: For full-size units of each type of unit paver indicated.[Assemble no fewer than five Samples of each type of unit on suitable backing and grout joints.][Include Samples of the following:]
   1. Joint materials.
   2. Brick pavers.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.
   1. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C 67.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquids in tightly closed containers protected from freezing.

1.7 FIELD CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

B. Weather Limitations for Mortar and Grout:
   1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.
   a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set pavers within 1 minute of spreading setting-bed mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 BRICK PAVERS

A. Brick Pavers: Light-traffic paving brick; ASTM C 902, Class SX , Type I, Application PS. Provide brick without frogs or cores in surfaces exposed to view in the completed Work.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Brick Tech Architectural
   2. Thickness: 2-1/4 inches .
   3. Face Size: 3-5/8 by 7-5/8 inches.
   4. Style: Wire cut.
   5. Color: Match Architect's sample.
      a. Dark Ironspot
      b. Manganese Ironspot
      c. Medium Ironspot 46
      d. Medium Ironspot 77

2.3 AGGREGATE SETTING-BED MATERIALS

A. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate.

B. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.

C. Drainage Geotextile: Nonwoven needle-punched geotextile fabric, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
   1. Survivability: Class 2, AASHTO M 288.
   2. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
   3. Permittivity: 0.5 per second, minimum; ASTM D 4491.
   4. UV Stability: 50 percent after 500 hours' exposure, ASTM D 4355.

2.4 MORTAR SETTING-BED MATERIALS

A. Regional Materials: Aggregate for mortar and grout shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

B. Portland Cement: ASTM C 150/C 150M, Type I or Type II.

C. Sand: ASTM C 144.

D. Latex Additive: [Manufacturer's standard] [acrylic resin] [or] [styrene-butadiene-rubber] water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed, and not containing a retarder.

2.5 MORTAR AND GROUT MIXES

A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimal performance characteristics. Discard mortars and grout if they have reached their initial set before being used.

B. Mortar-Bed Bond Coat: Mix neat cement and to a creamy consistency.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Where unit paving is to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.

C. Proceed with installation only after unsatisfactory conditions have been corrected[and waterproofing protection is in place].

3.2 PREPARATION

A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

B. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

3.3 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

D. Handle protective-coated brick pavers to prevent coated surfaces from contacting backs or edges of other units. If, despite these precautions, coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.

E. Joint Pattern: [**Running bond**] [**Herringbone**] [**Basket weave**] [**Grid**] [**As indicated**] [**Match and continue existing unit paver joint pattern**].

F. Pavers over Waterproofing: Exercise care in placing pavers and setting materials over waterproofing so protection materials are not displaced and waterproofing is not punctured or otherwise damaged. Carefully replace protection materials that become displaced and arrange for repair of damaged waterproofing before covering with paving.

G. Tolerances: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.

H. Tolerances: Do not exceed[1/16-inch **unit-to-unit offset from flush (lippage) nor** 1/8 inch in 24 inches **and**] 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.

I. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.
   1. Where pavers set in mortar bed are indicated as edge restraints for pavers set in aggregate setting bed, install pavers set in mortar and allow mortar to cure before placing aggregate setting bed and remainder of pavers. Cut off mortar bed at a steep angle so it will not interfere with aggregate setting bed.
   2. Where pavers embedded in concrete are indicated as edge restraints for pavers set in aggregate setting bed, install pavers embedded in concrete and allow concrete to cure before placing aggregate setting bed and remainder of pavers. Hold top of concrete below aggregate setting bed.

J. Provide steps made of pavers as indicated. Install paver steps before installing adjacent pavers.
   1. Where pavers set in mortar bed are indicated for steps constructed adjacent to pavers set in aggregate setting bed, install steps and allow mortar to cure before placing aggregate setting bed and remainder of pavers. Cut off mortar bed at a steep angle so it will not interfere with aggregate setting bed.

3.4 AGGREGATE SETTING-BED APPLICATIONS

A. Compact soil subgrade uniformly to at least [95] <Insert number> percent of [ASTM D 698] [ASTM D 1557] laboratory density.

B. Place aggregate[subbase and] base, compact by tamping with plate vibrator, and screed to depth indicated.

C. Place drainage geotextile over compacted base course, overlapping ends and edges at least 12 inches.

D. Place leveling course and screed to a thickness of 1 to 1-1/2 inches, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.

E. Treat leveling course with herbicide to inhibit growth of grass and weeds.

F. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed [3/8 inch] <Insert dimension> with pieces cut to fit from full-size unit pavers.
   1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

G. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.
   1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
   2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
   3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
   4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.

H. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

I. Do not allow traffic on installed pavers until sand has been vibrated into joints.

J. Repeat joint-filling process 30 days later.

3.5 MORTAR SETTING-BED APPLICATIONS

A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply mortar bed over bond coat; spread and screed mortar bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.

C. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.

D. Wet brick pavers before laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

E. Place pavers before initial set of cement occurs. Immediately before placing pavers on mortar bed, apply uniform 1/16-inch- thick bond coat to mortar bed or to back of each paver with a flat trowel.

F. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

G. Spaced Joint Widths: Provide [3/8-inch] [1/2-inch] [3/4-inch] nominal joint width with variations not exceeding plus or minus [1/16 inch] [1/8 inch] [3/16 inch].

H. Grouted Joints: Grout paver joints complying with ANSI A108.10.

I. Grout joints as soon as possible after initial set of setting bed.
   1. Force grout into joints, taking care not to smear grout on adjoining surfaces.
   2. Clean pavers as grouting progresses by dry brushing or rubbing with dry burlap to remove smears before tooling joints.
   3. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
   4. If tooling squeezes grout from joints, remove excess grout and smears by dry brushing or rubbing with dry burlap and tool joints again to produce a uniform appearance.

J. Cure grout by maintaining in a damp condition for seven days unless otherwise recommended by grout or liquid-latex manufacturer.

3.6 REPAIRING, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
   1. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.
   2. Do not allow protective coating to enter floor drains. Trap, collect, and remove coating material.

END OF SECTION

SECTION 323300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Seating.
2. Bicycle racks.
3. Formed metal planter.
4. Movable planters.
5. Bollards.

1.2 ACTION SUBMITTALS

A. Submittal Compliance Form: If Basis-of-Design products are provided, Submittal Compliance Form may be submitted in lieu of required . Ensure compliance with requirements included in Product Data: For each type of product.

B. Product Schedule: For site furnishings..

1.3 QUALITY ASSURANCE

A. Provide the following upon request:
1. Material Certificates: For site furnishings manufactured with preservative-treated wood.
a. Indicate type of preservative used and net amount of preservative retained.[For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.]

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 SEATING

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Landscape Forms.

B. Bench, Backed.
1. Product: Generation 50 Bench.
a. Style: Top of Wall, Embedded.
b. Back: Backed.
c. Arms: No arms.
d. Faceboard: Curved cut.
e. Color: FSC Ipe with No Finish.

C. Bench, Backless.
1. Product: Generation 50 Bench.
a. Style: Top of Wall, Embedded.
b. Back: Backless.
c. Arms: No arms.
d. Faceboard: Curved cut.
e. Color: FCS Ipe with No Finish.

2.2 BICYCLE RACKS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Landscape Forms.

B. Product: Ride Bike Rack.
1. Material: Powdercoated Metal.

2.3 FORMED METAL PLANTER

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Planterworx.

B. Product: XP Edging System.

1. Overall Height: 12 inches.
2. Overall Length: 426 feet.
3. Material: Powdercoated Aluminum.
4. Color: As selected by Architect from manufacturer's full range.

2.4 MOVABLE PLANTERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Kornegay Design.

B. Style 1.
1. Product: Cirque Series, #CS-44.
   a. Overall Height: 44 inches.
   b. Overall Diameter: 22 inches.
   c. Color: As selected by Architect from manufacturer's full range.
   d. Quantity: Five.

C. Style 2.
1. Product: Cirque Series, #CS-34.5.
   a. Overall Height: 34.5 inches.
   b. Overall Diameter: 36 inches.
   c. Color:As selected by Architect from manufacturer's full range.
   d. Quantity: Five.

D. Style 3.
1. Product: Cirque Series, #CS-30.
   a. Overall Height: 30 inches.
   b. Overall Diameter: 25.5 inches.
   c. Color: As selected by Architect from manufacturer's full range.
   d. Quantity: Five.

E. Color: .

2.5 BOLLARDS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Urban Accessories, Inc.

B. Product: DG-2.
1. Product: Cirque Series, #CS-44.
2. Overall Height: 44 inches.
3. Overall Diameter: 22 inches.
4. Color: As selected by Architect from manufacturer's full range.

2.6 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:
1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B211.
2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B221.
3. Structural Pipe and Tube: ASTM B429/B429M.
4. Sheet and Plate: ASTM B209.
5. Castings: ASTM B26/B26M.

B. Steel and Iron: Free of surface blemishes and complying with the following:
1. Plates, Shapes, and Bars: ASTM A36/A36M.
2. Steel Pipe: Standard-weight steel pipe complying with ASTM A53/A53M, or electric-resistance-welded pipe complying with ASTM A135/A135M.
3. Tubing: Cold-formed steel tubing complying with ASTM A500/A500M.
4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A513/A513M, or steel tubing fabricated from steel complying with ASTM A1011/A1011M and complying with dimensional tolerances in ASTM A500/A500M; zinc coated internally and externally.
5. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F1267.
6. Malleable-Iron Castings: ASTM A47/A47M, grade as recommended by fabricator for type of use intended.
7. Gray-Iron Castings: ASTM A48/A48M, Class 200.

C. Stainless Steel: Free of surface blemishes and complying with the following:
   1. Sheet, Strip, Plate, and Flat Bars: ASTM A240/A240M or ASTM A666.
   2. Pipe: Schedule 40 steel pipe complying with ASTM A312/A312M.
   3. Tubing: ASTM A554.

D. Fiberglass: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and with manufacturer's standard finish.

E. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.
   1. Polyethylene: Fabricated from virgin plastic HDPE resin.
   2. Polyethylene with Recycled Content: Fabricated from HDPE and other resins with postconsumer recycled content plus one-half of preconsumer recycled content not less than <**Insert number**> percent.

F. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard, corrosion-resistant-coated or noncorrodible materials; commercial quality, tamperproof, vandal and theft resistant.

G. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
   1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
   2. Hot-Dip Galvanizing: According to ASTM A123/A123M, ASTM A153/A153M, or ASTM A924/A924M.

2.7 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment: Pressure-treat wood according to AWPA U1, Use Category UC3b, and the following:
   1. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
   2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

2.8 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.

E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

F. Factory Assembly: Factory assemble components to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.9 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.11 STEEL AND GALVANIZED-STEEL FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

2.12 IRON FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.13 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
1. Run directional finishes with long dimension of each piece.
2. Directional Satin Finish: ASTM A480/A480M, No 4.
3. Dull Satin Finish: ASTM A480/A480M, No. 6.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and [**securely anchored**] [**positioned**] at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with , mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION

SECTION 329100 - SOIL PREPARATION (TOPSOIL)

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies all soil materials designated as "Topsoil" on the drawings or in the specifications. Supply topsoil for landscape work (seeding and planting) from **,** off-site sources .

B. Related Requirements:
1. Section 329300 "Exterior Planting" for soil mixtures that include topsoil.

1.2 REFERENCES

A. ASTM International, as referenced herein as ASTM.

B. US Department of Agriculture (USDA) Handbook No. 60 – Diagnosis and Improvement of Saline and Alkali Soils.

1.3 ACTION SUBMITTALS

A. Source Quality Control:
1. Material Test Reports: Conduct Topsoil testing for imported topsoil from off-site sources.
2. Sample: Provide 1 quart samples for each topsoil test unit (including source).
3. Conduct all topsoil sampling and testing prior to delivery from off-site sources, .

1.4 INFORMATIONAL SUBMITTALS

A. Field Quality Control:
1. Obtain samples, test materials and submit field test reports as described under Articles 2.1 and 3.1 below.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Soil-Testing Laboratory Qualifications: The contractor shall engage an independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil:
1. Topsoil for landscape work shall be a fertile, friable, sandy loam or loam surface soil without admixture of subsoil screened to be free of stones, stumps, root, trash, debris, and other materials deleterious to plant growth.

Sieve Designation	Percent Passing
1 inch screen	100
1/4 inch screen	97 - 100
No. 10 U.S.S. mesh sieve	95 - 100
No. 140 U.S.S.	15 – 35

2. The pH range shall be 6.5 to 8.4. Topsoil that does not meet this pH range shall not be approved by the Architect.
3. Organic content shall not be less than 4 percent and not greater than 20 percent.
4. Clay content determined by Bouyoucous Hydrometer Test: between 5 percent and 15 percent.
5. Base percentages on dry weight of the sample

2.2 SOURCE QUALITY CONTROL:

A. Laboratory Test Reports:
1. Conduct topsoil testing for each soil test unit as follows:
a. Plant mixture: Plant mixture shall be tested twice. First - test topsoil as indicated above. Second - test plant mixture after integrating mixture ingredients as identified under Part 2 of Exterior Planting specification.

2. Submit all test reports for approval. Topsoil units that do not meet the soil requirements specified under this section will not be permitted for use as Topsoil.
3. Fertility: For each unamended soil type, test topsoil for organic materials, pH, phosphate, potash content, calcium, magnesium, zinc, iron, and manganese.
4. Physical Properties: Determine percent sand, silt and clay and textural classification (USDA) by hydrometer method. Identify all foreign materials such as rock, roots, and vegetation.
5. Supplemental Testing: Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action. If any heavy metal exceeds state listed background levels for human contact, soils will not be approved for use on site.
6. Recommendations: Based on the test results, the independent testing laboratory shall state recommendations for soil treatments and soil amendments to be incorporated prior to seeding and planting. List recommendations in weight per 1000 square feet for lawn area and cubic yard of plant mixture. Recommendations shall include; nitrogen, phosphorus, and potash nutrients and all soil amendments required for the long-term growth of the specified plants and turf.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Sampling: Each soil test unit shall be a composite of five to seven subsamples taken the full depth of proposed source for each acre of surface area. For on-site stockpiles, discard upper 6 inches of soil before sampling. For large stockpiles, partial excavation will be required for collection of representative samples. Include site plan verifying the locations of all topsoil sampling. Topsoil test reports shall be accompanied with each sample unit for review and approval by the Architect.

B. Testing methods and written recommendations when not references elsewhere, shall comply with USDA's Handbook No. 60. Nutrient data to be given in parts per million (ppm) dry soil.

C. Topsoil shall be as defined in ASTM D5268.

D. Soil pH shall be tested in accordance with ASTM D4972.

E. Test for organic material by using ASTM D2974.

END OF SECTION

SECTION 329300 – EXTERIOR PLANTINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Tree and shrub plantings.
2. Herbaceous perennials, ornamental grasses, groundcover and vine plantings.
3. Annual plantings.
4. Plant procurement.
5. Planting mixtures.
6. Plant mulch.
7. Aggregate maintenance edge.
8. Metal edging.
9. Staking and guying.
10. Maintenance.
11. Warranty replacements.

B. Related Requirements:
1. Section 311000 “Site Clearing” for stripping on-site topsoil.
2. Section 312000 “Earth Moving” for mass grading of the site.
3. Section 328400 “Planting Irrigation” for turf and planting irrigation systems.
4. Section 329100 “Soil Preparation (Topsoil)” for lawns and plant mixture amendment.

1.2 REFERENCES AND REGULATORY REQUIREMENTS

A. Hortus Third, The Staff of the L.H. Bailey Hortorium. 1976. MacMillan Publishing Co., New York.

B. ASTM International, as referenced herein as ASTM.

C. American Standard for Nursery Stock, as referenced herein as ANSI Z60.1-2004.

D. United State Department of Agriculture (USDA), Plant disease and insect control Phytosanitary and Export Certifications.

E. United States Composting Council, Seal of Testing Assurance (STA), Procedures for sampling and testing as outlined in the Test Methods for the Examination of Composting and Compost (TMECC) protocols.

1.3 DEFINITIONS

A. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

B. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.

C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

D. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

E. Finish Grade: Elevation of finished surface of planting soil.

F. Mycorrhizal Inoculum: Fungi either introduced or naturally occurring in the soil that greatly increased plant roots growth and ability to absorb nutrients and water.

G. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

H. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

I. Planting Area: Areas to be planted.

J. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

K. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, annuals, perennials, bulbs, corms, tubers, or herbaceous vegetation.

L. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

M. Root Production Method (RPM): A trademark technology referred to as root production method for a variety of tree and shrub species resulting is a dense fibrous root system for small sized plants.

N. Single Central Leader: A single central dominant leader branch, free of secondary co-dominant stems that would compete with the central leader, either naturally occurring or professionally trained in the nursery with no stem deformities or residual woody stubs from original leader.

O. Specimen Plant: Exceptionally heavy, symmetrical, and tightly knit, growth, superior in form, with properly spaced branching.

P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Q. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

R. Sheared Evergreen: Any evergreen tree or shrub that has been heavily trimmed or pruned to remove the natural shape of the plant. An evergreen tree grown at a “Christmas “tree farm is typically sheared.

S. Young Plants: Lining out stock, seedlings generally sold within the wholesale trade for continued cultivation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data:
1. Plant procurement verification:
   a. Within 4 weeks following the execution of the Agreement between the Owner and Contractor, submit vendor purchase order, invoice or bill of lading for each plant species showing sizes, quantities and root treatment.
   b. Provide digital photos of all plants materials. Photos must depict the entire size and condition of the plant and include a scale rod or other measuring device to show scale. For species where more than 20 plants are required, include a minimum of three photos that show the average plant, the best quality plant, and the worst quality plant to be provided. Label each photograph with the plant name, plant size, and name of the growing nursery.
   c. The Contractor may request the Landscape Architect to provide nursery visits for the purpose of reviewing and tagging plant materials. The Contractor shall compensate the Landscape Architect for said services.
   d. Substitutions shall not be permitted without written approval from the Landscape Architect.
2. Metal edging and accessories.
3. Jute mesh.
4. Tree wrap.
5. Soil amendments: Provide information on composition and source of all soil amendments. Include test results for compost and peat.
6. Mycorrhizal inoculum.
7. Fertilizer.
8. Pesticides and Herbicides: Include product label and manufacturer™™s application instructions specific to the project site.
9. Antidesiccants: Include product label and manufacturer™™s application instructions.

10. Maintenance edge aggregate gradation analysis.
11. Maintenance edge aggregate separation fabric.
12. Predator barrier fencing, tree guard, staking material and ties.

B. Source Quality Control:
   1. Samples:
      a. Organic and Mineral Mulch: 1 quart by volume in sealed plastic bag 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.
      b. Staking and/or guying materials.
      c. Maintenance edge aggregate: 1 quart by volume in sealed plastic bag. Provide an accurate representation of color, texture and size.
   2. Test Report:
      a. Topsoil: Test reports including fertilization recommendations for lawns and plant materials. Refer to Section [329100]-Soil Preparation (Topsoil).
   3. Certifications/Licenses:
      a. Phytosanitary Certification: Plant material Inspection Certificates required by Federal, State or other governing authority at the time of plant material verification identified above.
      b. License certificate(s) for pesticide applicator.
   4. Nursery Requirements:
      a. Plants shipped to the site as B&B must originate from a licensed plant nursery with a current Phytosanitary certification. Field collected plants will not be permitted.
      b. Wrap tree trunks with protective material in advance of digging.

C. Field Quality Control:
   1. Project Work Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a project work schedule to the Landscape Architect indicating dates for delivery, installation, and Substantial Completion for all landscape work. The Schedule shall be comprehensive and address procurement, delivery, and installations of irrigation, planting and seeding areas of the site. For large site, the schedule shall reflect a phased installation and shall include support graphics required to identify this phased approach. Refer to below for a complete list of schedule requirements.
   2. Maintenance Schedule: Prior to the issuance of Substantial Completion, submit a detailed typewritten approach and schedule for the warranty maintenance of all landscape activities outlined under this section. Coordinate landscape maintenance with other applicable Sections () and combine all maintenance activities into one plan of action. The schedule shall be comprehensive .
   3. Irrigation Plan: Within 4 weeks following the issuance of the Notice to Proceed, submit a detailed typewritten approach and schedule that outlines watering requirements for maintaining the landscape as described herein. The Irrigation Plans shall be submitted in conjunction with the Maintenance Schedule. The plan shall address how the irrigation system will be operated during the warranty period, frequencies and durations that will be established to provide the correct watering rates for plants and lawns, inspection protocols and frequencies and winterization procedures. In locations where no automatic irrigation system has been installed, describe means, methods and frequencies for hand watering. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Landscape Architect. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e. system can be set to water one area for the required maintenance period), and may be automated with a timer. Supply all water and equipment at the Contractor™™s expense from a source approved by the Landscape Architect. Reliance on natural precipitation will only be allowed with provision of recorded data from a rain gauge located within a 2-mile radius of the project site. The schedule shall be comprehensive [and shall be the basis for monthly payment during the maintenance period].
   4. Maintenance Report Forms: Using the approved Maintenance Schedule and Irrigation Plan as the framework for all maintenance activities (plant maintenance, and irrigation operations). The Contractor shall provide detailed maintenance report forms for each site visit. The reports shall be completed by the on-site maintenance superintendent performing the work prior to leaving the site and shall be submitted monthly as back-up to each invoice. Office prepared reports will not be permitted and payment for this work will only be made by the Owner when proof of completed specified maintenance has been provided. Each report shall include the following:
      a. Date of activity.
      b. Length of time on site (start time and finish time).
      c. Name and signature of the maintenance superintendent.

d. Number of personnel performing the work.
e. Site climatic conditions (rain, wind, temperature, etc.)
f. Detailed description of maintenance activities performed by area.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data:
1. Include list of at least three similar projects completed in the last 5 years by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
2. Provide resumes of field technician (foreman) responsible for managing the purchase and installation of all materials. Separate resumes shall be provided for the planting, seeding, irrigation and maintenance technicians.
3. License certificates for arborist.

1.7 QUALITY ASSURANCE

A. Substitutions:
1. It is the Contractor™™s responsibility to locate and secure all plant materials and to verify their availability through the timely Action Submittal process identified above. Failure to comply with this requirement shall not be a reason for making substitutions. Furthermore, it may be necessary to purchase specified plants from multiple nurseries and from out-of-state sources providing said sources are within the same hardiness zone as the site.
2. Substitutions of plant materials will not be permitted unless authorized in writing by the Landscape Architect. If proof is submitted in writing that a plant specified is not obtainable, the Landscape Architect may assist in identifying alternate sources or substitutions.
3. Plants of larger size may be used if approved and if root balls meet ANSI Z60.1 standards for the increased size. Adjustments will be made at no additional cost to the Owner. Approval of smaller size plant materials shall require a corresponding of the contract price subject to owner approval.
4. Container plants may be substituted for those designated "B&B• • if approved by the Landscape Architect.

B. Measurements: Measure plants according to ANSI Z60.1. Do not prune to obtain required sizes.
1. 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.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
3. Plants pruned to compensate for transplanting shock will not be accepted if overall height and spread does not meet the specified dimensions after pruning.

1.8 DELIVERY, STORAGE, AND HANDLING

A. General:
1. Packaged Materials: Deliver packaged materials in original unopened containers showing weight, analysis and name of manufacturer. During shipment and storage on site, protect materials from breakage, moisture, heat or other damage.
2. Store materials only in locations approved by the Owner.

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 materials with appropriate certificates.

C. Plant Materials:
1. During shipment, do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Do not bend, stack or bind plants in a manner that damages bark, breaks branches or root systems, deforms root balls or destroys natural shape.
2. Transport plants in closed vehicles or with the entire load properly covered to protect from drying winds, heat, freezing or other exposure that may be harmful. Schedule shipping to minimize on-site storage of plants. Closed vehicles shall be adequately ventilated/refrigerated.

3. Stock shall not be shipped until the planting preparations have been completed. If planting is delayed more than 24 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.
    a. Heel-in bare-root stock. Pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Soak roots that are in less than moist condition in water for two hours. Plants with dry roots will be rejected. Any bare-root plants requiring sweating to break dormancy must have this procedure carried out before plants arrive onsite.
    b. Set balled stock on ground and cover ball with soil, or bark mulch.
    c. Do not remove container-grown stock from containers before time of planting.
    d. 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.
4. Schedule shipping aquatic tubers and plugs to result in on-site storage time of less than one day prior to installation. If delays beyond the contractor's control occur after delivery, store plants to ensure viability. All aquatic plants that are in a state of decay at the time of planting shall be rejected regardless of its condition at the time of delivery to the site.
5. Labels: Prior to shipping, each plant or bundle of like variety and size shall be labeled with legible weatherproof tags indicating the correct name and size of plant. Label aquatic plants (tubers, plugs, and/or bare-root) individually or in bundles of like variety.
6. Aquatic plant container bags shall be opened upon arrival to allow air flow, but stored in a cool shaded location with ample moisture to maintain the plants in their natural wet habitat condition.
7. Store bulbs, corms, and tubers in a dry place at 60 – 65 degrees F until planting.
8. Handle plants at all times in accordance with the best horticultural practices. Lift B&B materials from the bottom of the ball only; do not roll the plants. Plants handled otherwise will be subject to rejection. Balled and burlapped plants which have cracked or broken balls are not acceptable and shall not be planted. Plants with mechanical damage, deformation or breakage will not be accepted and are to be replaced at the Contractor's expense.

1.9 SCHEDULING

A. Work Schedule:
1. Upon authorization to proceed with the work, submit a project work schedule indicating the dates of each of the following items:
    a. Submittal schedule.
    b. Tagging of plants in nurseries.
    c. Delivery of other materials to the site.
    d. Staking of plant locations on the site.
    e. Delivery of plant material to the site.
    f. Planting.
    g. Substantial Completion of the work.
    h. Maintenance period.
2. Update schedule monthly to reflect progress of the work.

B. Planting Season:
1. Materials shall be installed during planting seasons normally recognized in the job locality.
2. USDA Hardiness Zone 4:
    a. B&B and container grown plants, planting season shall be from April 15 through June 15 and from October 1 until the prepared soil becomes frozen.
    b. Evergreen plants from April 15 through June 15 and from September 1 through September 15.
    c. Bare root woody plants and aquatic tuber and root stock only in spring from April 15 through approximately June 15 but no later than full leaf-out of existing woody and aquatic plants.
    d. Bulbs, corms and tubers from September 15 through October 15 and from April 15 through June 15. Spring vs. fall planting is species dependent and Contractor shall comply with seasonal limitations identified on the plant list included on the drawings.
3. USDA Hardiness Zone 5:
    a. B&B and container grown plants, planting season shall be from April 1 through June 1 and from October 1 until the prepared soil becomes frozen.
    b. Evergreen plants from April 1 through June 1 and from September 15 through October 15.
    c. Bare root woody plants and aquatic tuber and root stock only in spring from April 1 through approximately June 1 but no later than full leaf-out of existing woody and aquatic plants.

d. Bulbs, corms and tubers from September 15 through November 1 and from April 1 through June 1. Spring vs. fall planting is species dependent and Contractor shall comply with seasonal limitations identified on the plant list included on the drawings.

4. USDA Hardiness Zone 6:
   a. B&B and container grown plants, planting season shall be from March 15 through May 15 and from October 1 until the prepared soil becomes frozen.
   b. Evergreen plants from March 15 through May 15 and from October 1 through November 1.
   c. Bare root woody plants and aquatic tuber and root stock only in spring from March 15 through approximately May 15 but no later than full leaf-out of existing woody and aquatic plants.
   d. Bulbs, corms and tubers from October 1 through November 15 and from March 15 through May 15. Spring vs. fall planting is species dependent and Contractor shall comply with seasonal limitations identified on the plant list included on the drawings.
5. If special circumstances warrant installation outside the normal planting season, submit a written request to the [**Landscape Architect**] describing conditions and stating the proposed variance. Planting outside the planting season could extend warranty obligations and will be dependent upon the extent of the variance.
6. 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.
7. Coordination with lawn installation: Plant trees, shrubs, and other plants after finish grades are established but before seeding/sodding unless otherwise indicated. When planting trees, shrubs, and other plants after seeding/sodding, protect completed areas, and promptly repair damage caused by planting operations.

1.10 WARRANTY, MAINTENANCE AND ACCEPTANCE

A. Substantial Completion:
1. The Substantial Completion inspection shall occur for the entire project and only one Notice of Substantial Completion will be issued. Phased approvals will not be permitted. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion or correction.
2. The Substantial Completion inspection for the landscape shall occur in phases based upon the phasing plan approved at the beginning of the work by the Landscape Architect. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
3. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs and plant replacements shall occur at no additional cost to the Owner.
4. Substantial Completion will be provided for all planting areas complying with the following:
5. Landscape Architect approval of all specified submittals.
6. The work shall be 100 percent complete (including all site preparation , earthwork , plant mixture installation , plantings, , irrigation, and clean-up), and ready for inspection.
7. After receiving a Notice of Substantial Completion warrant and maintain all plantings in accordance with 3.13 of this Section in a vigorous, well-kept condition until Final Acceptance.

B. Final Acceptance:
1. Prior to plant dormancy and the expiration of the warranty and maintenance period, the Landscape Architect will conduct an inspection of all plantings , irrigation system and review all previously submitted maintenance report forms to verify all completed maintenance activities. There shall be clear evidence through factual reporting by the contractor and field observations made by the Owner or Landscape Architect that the specified maintenance has occurred. Following the inspection, the Landscape Architect will issue a punch list identifying all work requiring completion, replacement or correction.
2. The contractor shall complete all punch list items within 2 week of its issuance. All repairs and plant replacements shall occur at no additional cost to the Owner.
3. Final Acceptance will be based upon Landscape Architect, approval and the work having:
   a. Been well maintained with all landscape plantings in a healthy growing condition free of disease and insect problems.
   b. All maintenance items completed and documented by Contractor through maintenance report forms.

4. Final Acceptance and the end of the warranty period for the landscape will occur only after all punch list items have been satisfactorily completed and the site is left in the condition specified under Cleanup and Protection.

C. Warranty and Maintenance Period:
1. The end of the warranty and maintenance period shall be:
   a. October 31 – one year following fall Substantial Completion.
   b. June 30 – one year following spring Substantial Completion.
2. Prior to and during the warranty and maintenance period, replace any plants that are damaged, dead, or, in the opinion of the Landscape Architect, are unhealthy, or have lost more than 25 percent of their natural shape due to dead branches, excessive pruning or improper maintenance. Rejected plant materials shall be removed from the site immediately after being rejected and legally disposed off-site. Replacement plants shall be installed within 2 weeks following the inspection unless otherwise agreed to in writing by the Owner.
3. Only one replacement of any plant is required after Substantial Completion, except for losses due to failure to comply with specified installation and/or maintenance requirements.
4. Make replacements in accordance with the original specifications, plant list, and notes. Fully restore areas damaged by replacement operations to their original and specified condition.
5. The Contractor will not be held responsible for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents beyond landscape installer's control which result from floods, hail storms, winds over 100 miles per hour, fires or vandalism, unless Contractor has not completed specified installation in a manner that could have protected the landscaping from these phenomena.
6. If, in the opinion of the Landscape Architect, it is advisable to extend the warranty and maintenance period for an additional growing season, the contractor will be notified of such requirement by the Owner. Improper planting and/or failure to perform and document the specified maintenance in accordance with contract requirement shall be the basis for extending the period of establishment for a second growing season. All specified maintenance and warranty requirements will be required during this extended period and all costs shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in the Plant Legend shown on Drawings and with the minimum quality conforming to American Standard for Nursery Stock, ANSI Z60.1. Branching on all plants shall be characteristic of the species, well-shaped, full, sound, healthy, vigorous stock of uniform growth and densely foliated when in leaf. All plants shall be free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
1. 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.
2. Plants shall originate from the same USDA Hardiness Zone as project site, or lower (colder).
3. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Where plant height or spread is indicated with a tolerance, the smaller dimension is the minimum acceptable; the larger dimension represents the maximum permissible. The average dimension of all plants must, at least, equal the average of the tolerance figures shown on the drawings. Spread shall meet the minimum dimension specified in all directions and must be considered as pivoting on center of plant.
4. Plants of a larger size may be used if acceptable to the Landscape Architect and at no extra cost to Owner, with a proportionate increase in size of roots or balls.
5. All plants shall have a waterproof legible label securely attached to each plant bearing designation of plant¢¢s common and scientific name, including genus, species, and cultivar or variety, when applicable.
6. Do not prune plants prior to delivery.
7. Stressed or damaged plants or those not conforming to the specifications shall be subject to rejection by the Landscape Architect at any time during the term of the contract.

B. Root treatments on all plants shall conform to the following requirements:
1. Balled and burlapped ("B&B") plants shall have a healthy root systems developed by transplanting or root pruning with a firm, natural ball of earth securely wrapped with burlap, bound with cord and wire basket. Root flare shall be visible before planting. Plants with damaged or broken root balls or multiple layers of burlap will not be accepted.

2. Containers shall be finished landscape grade material having their roots well established in the soil mass. Plants over-established in the container, as evidenced by pot-bound root ends, will not be accepted.
3. Except when designated as seedlings, bare root (BR) plants shall be finished landscape grade material having a well-branched fibrous root system characteristic of the species. Roots are to be kept continuously moist with wet straw, moss, or other materials. Remove broken and injured roots prior to planting.
4. Root Production Method (RPM) for plants shall have a well-developed fibrous system superior in mass to BR plants of comparable size and age.
5. Annuals , perennials and ornamental grasses shall have 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. [annuals and biennials shall be in bud but not yet in bloom].

C. Trees: Evergreen and deciduous trees shall have straight single leaders. 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 3/4 inch in diameter; or with stem girdling roots will not be accepted. Evergreens shall be unsheared.
1. Trees indicated as specimen shall be exceptionally heavy, symmetrical, and superior in form, branching, and symmetry.
2. Caliper is the trunk diameter taken at a specified distance above root collar as described in ANSI Z60.1.
3. Branching height is the distance above ground where balanced branching occurs.

2.2 MULCH

A. Organic Mulch: Well-composted, finely shredded processed hardwood bark, free from foreign material and fragments in excess of 2 inches in any dimension.
1. Dyed mulch or mulch that is predominantly wood chips will not be accepted.

B. Filter Fabric: Synthetic, non-woven, needle-punched geotextile fabric weighing 2 to 4 oz per square yard with a minimum grab tensile strength of 35 pounds and permeability of 0.03 cm/second.

2.3 STAKING AND GUYING

A. Staking:
1. Tree support stakes shall be 2 inch x 2 inch hardwood posts free of bark or 3 inch diameter hardwood or cedar posts with bark intact. Posts shall be minimum 8 feet long. Metal fence posts are not permitted unless approved in advance by the Landscape Architect.
2. Tree support stakes for Root Production Method trees (RPM) shall be 1 inch x 1 inch hardwood posts free of bark.
3. Wire stays for tree stakes shall be No. 12 to 14 gauge galvanized wire. Polypropylene strapping will not be permitted.
4. Chafing guards shall be fiber-reinforced hose of not less than 1/2 inch inside diameter, color black. Multi-colored hose will not be permitted.

B. Guying:
1. Tree support stakes for guying shall be 2 x 4 hardwood posts 30 inches long or metal fence posts 48• • • • long. Guying stakes shall be driven below grade and not visible.
2. Cable for guying trees shall be 3/16 inch diameter, five strand, galvanized steel wire. Green polypropylene strapping will not be permitted.
3. Cable clamps and turnbuckles shall be galvanized, forged steel. Turnbuckles shall be 3/8-inch eye with 6-inch minimum opening.
4. Chafing guards shall be fiber-reinforced hose of not less than 1/2 inch inside diameter, color black. Multi-colored hose will not be permitted.

2.4 TREE WRAP

A. Tree wrap for deciduous trees shall be 4-inch wide, two-ply, waterproofed crepe Kraft paper with plies cemented together with asphalt. Twine used to secure wrap shall be natural fiber two-ply jute. Tape or plastic twine will not be permitted as a substitution for the jute twine.

B. Tree guards for Root Production Method trees (RPM) shall be vinyl, wraparound, 36 inch long, vented and UV stabilized.Delete tree guards if RPM trees are not used. Do not delete this if using RPM trees since this serves as a rodent guard.

2.5 WATER

A. Water shall be free of wastewater effluent or other hazardous chemicals. On-site sources of water may be available from the creek at no cost or from City hydrant with appropriate metering. Confirm prior to commencing work.

2.6 TOPSOIL

A. Refer to Section 329100.

2.7 PLANTING MIXTURES

A. General: All planting mixtures shall be well pulverized, blended materials, free of rocks, debris of any type, tree roots, and other extraneous materials that will impede plant growth. When blending off-site amendments (peat, compost, etc.) with topsoil, the topsoil shall be pulverized and screened to remove all non-soil materials greater than ½ inch diameter. On-site sub-soils will not be permitted for use in plant mixtures.

B. Standard planting backfill for individual tree and shrub pits shall be: 1 part existing, well pulverized soil excavated from planting pit or from site topsoil stockpile thoroughly blended with 1 part off-site topsoil and 1 part compost or peat.

C.

D.

E. Plant bed mixture for beds comprising a mix of shrubs, perennials, annuals, ornamental grasses and groundcover shall be 2 parts off-site topsoil thoroughly blended with 1 part compost or peat.

2.8 SOIL AMENDMENTS

A. Peat shall be a product having at least 95 percent organic content consisting of sphagnum peat moss with a pH range of 3.0 – 4.0 and Von Post decomposition value of H1 – H3, or low-lime reed-sedge peat with a pH range of 4.0 to 5.0 and Von Post decomposition value of H4 – H6. Product shall be free of sticks, wood or other debris.

B. Compost shall be a heavily decomposed mature/stabilized, humus-like material derived from the aerobic decomposition of yard clippings or other compostable materials. Manure is not suitable for use. The compost shall have a dark brown or black color, be capable of supporting plant growth without ongoing addition of fertilizers or other soil amendments and shall not have an objectionable odor. The compost shall be free of plastic, glass, metal and other physical contaminants, as well as viable weed seeds and other plant parts capable of reproducing (except airborne weed species).
   1. pH: 5.5 to 8.
   2. Moisture content: 35 to 55 percent by weight. No visible free water or dust is produced when handling it.
   3. Sieve analysis: 100 percent passing ¾ inch screen.
   4. Soluble salt content: Less than 5 percent.
   5. Organic matter content: Minimum 60 percent.

C. Sand shall be clean, coarse, ungraded, meeting the requirements of ASTM C33 for fine aggregates.

D. pH Adjusters:
   1. Lime shall be finely ground agricultural grade dolomitic limestone containing not less than 85 percent calcium and magnesium carbonates conforming to ASTM C602, Class T or O.
   2. Elemental sulfur shall be granular, biodegradable, horticultural grade material containing at least 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

E. Mycorrhizal Inoculum
   1. Mycorrhizal fungi in the inoculant shall be available as propagules, i.e., spores, root fragments and hyphae. The inoculant shall contain highly selected strains of low host specificity endo- and ectomycorrhizal fungi combined with other beneficial fungi (Trichoderma), humic acids, biostimulants, beneficial bacteria, soluble sea kelp, and yucca plant extracts, as manufactured by Horticultural Alliance or approved equal.

2.9 FERTILIZER

A. Fertilizers are required at the time of installation and during the warranty/maintenance period. The fertilization program shall be based on soil testing and formulations and rates of application shall be based on test reports provided by the independent testing laboratory.

B. The independent testing laboratory shall also prepare a custom formulation and rate for each category of plants to be installed and maintained; i.e. trees, shrubs, perennials/ornamental grasses, annuals and bulbs.

C. Fertilizers shall include organic and inorganic, slow release and water-soluble nitrogen and the percentages shall be based on soil types and the time of year being applied. Fertilizers shall not be applied during the hot summer months unless specific to blooming plants or in the late summer when plant growth will not harden off prior to the first killing frost.

D. The fertilizer to be used to amend the soil before planting shall be granular fertilizer that conforms to applicable state and federal regulations, and contains no less than 60 percent slow-release nitrogen.

E. Fertilizer to be used during the year warranty maintenance period shall be a complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, not less than 30 percent of the nitrogen from a slow release source. Fifty percent of the nitrogen shall be derived from natural organic sources. The formulations shall be as outlined in 3.13B.12 of this Section.

2.10 PESTICIDES AND HERBICIDES

A. Pesticides and herbicides shall be 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-use pesticides and herbicides unless authorized in writing by authorities having jurisdiction.
   1. 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.
   2. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.11 ANTIDESICCANTS

A. Water-soluble emulsion specifically manufactured for agricultural use that will provide a protective film over plant surfaces and be permeable enough to permit transpiration. Use according to manufacturer's written instructions.

2.12 METAL EDGING

A. Metal edging shall comply with ASTM A1011/A1011M, sized 3/16 inch thick x 4 inches wide x 16 feet length, made of steel, colored black, fabricated in sections with stake pockets stamped, punched, or welded to face of sections approximately 30 inches apart, with 3/16 inch x 16 inch stakes, as manufactured by J.D. Russell Co., or approved equal.
   1. Accessories shall be from same product line and manufacturer.

2.13 MAINTENANCE EDGE AGGREGATE

A. Aggregate for maintenance edges shall be: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color:
   1. Type: Slate chips.
   2. Size Range: 1-1/2 inches maximum, 3/4 inch minimum.
   3. Color: Readily available natural color range.

B. Filter Fabric: Synthetic, non-woven, needle-punched geotextile fabric weighing 2 to 4 oz per square yard with a minimum grab tensile strength of 35 pounds and permeability of 0.03 cm/second.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General:
   1. Prior to beginning work, examine and verify the acceptability of the project site and notify the Landscape Architect of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected or resolved.
   2. Verify that no foreign or deleterious material has been deposited in soil within a planting area.

3. Where planting occurs in close proximity to other site improvements, provide adequate protection to all features prior to commencing work. Promptly repair any items damaged during planting operations to their original condition.
4. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
5. Suspend spoil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
6. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
7. If plants die or are rejected due to non-conformity to contract requirements, they must be removed from the site immediately and replaced before Substantial Completion.

B. Utilities: Have all underground utilities located by servicing agencies. In the vicinity of utilities, hand-excavate to minimize possibility of damage.

C. On-site sources of water will not be available for use by the landscape installer.

D. Pesticides and Other Chemicals:
1. General: All plants delivered to the site shall be free of disease, pests, eggs, and larvae. Promptly remove all plants that do not conform to this requirement.
   a. Insecticides should only be used to control pests when present in quantities that will be detrimental to plant vigor.
   b. Applying foliar herbicides to control weeds in plant beds after installation will not be permitted unless approved in advance by the Landscape Architect. Approval will only be granted if plants to be controlled cannot be effectively removed by hand pulling. Foliar herbiciding will only be permitted as part of the weed control program developed by the Contractor in advance of planting.
   c. All chemical shall be stored and mixed off-site. No chemicals of any type shall remain on site at the end of each work day.
   d. Do not apply over water or dispose of used container on-site.
   e. Post all pesticide and herbicide applications.
2. Pre-emergent application:
   a. Apply granular chemicals in accordance with Manufacturer's instruction.
   b. Apply in early spring just prior to targeted species breaking dormancy. Do not apply too early in the spring.
   c. Do not apply when weather conditions will prevent an effective application or will result in in-effective control of targeted species.
   d. Spread granular chemical only in areas intended to be treated. Promptly remove all granular material spread over pavement and in areas not intended to be treated.
3. Post-emergent application :
   a. Protect all landscape plantings outside of target areas.
   b. Mixing, cleaning or disposal of pesticides, herbicides, and other chemicals will not be permitted on site. Notify the Owner at least 24 hours prior to any application.
   c. Do not spray chemicals when wind exceeds 5 MPH.
   d. Repeat procedures until desired effect is achieved.
   e. Mixing, application and clean-up procedures shall be in accordance with manufacturer's instructions.

E. Coordination with Other Work:
1. The Contractor shall coordinate work with other contractors or trades to determine the appropriate sequence of landscape installation with respect to other work on the site.
2. Completed work installed out of construction sequence which is subsequently disturbed by the completion of work by other trades shall be repaired by the landscape installer at no cost to the Owner.
3. Maintain grade stakes and layout controls set by others until removal is mutually agreed upon by all parties concerned.

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, if necessary, to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties, natural resources and walkways.

C. Vegetation Removal: Strip and dispose of organic debris and root mat.

3.3 LAYOUT

A. Accurately lay out each plant location and planting bed edges according to the drawings, using clearly visible painted, labeled stakes or plastic flags. Spray paint continuous lines on bare soil delineating plant bed boundaries. When scaling locations on the drawings, use at least 2 known reference points as layout controls to determine plant locations. Do not proceed with planting operations until locations have been reviewed and approved in writing by the Landscape Architect.

B. Prior to installation, all plant locations and bed edges must be approved by the Landscape Architect, who may field adjust locations at no additional cost to Owner. Plants installed without layout approval are subject to relocation by the Contractor at their expense.

3.4 PLANT INSTALLATION

A. General: Complete all plantings, metal edging and mulching prior to fine grading adjacent seed beds.
   1. For plant beds, complete rough grading.

B. Planting Pit Excavation:
   1. For individual plant pits in seeded areas, spread seed bed topsoil to the uniform depth and rough grade prior to layout and planting pit excavation.
   2. Remove rocks and other unclassified underground obstructions to at least 6 inches below the finished planting depth of the root ball. Trim perimeter of planting pit leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Ensure that root ball will sit on undisturbed base soil to prevent settling. If plant pits are initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
   3. If underground utilities or other surface or subsurface obstructions are encountered that cannot be removed, do not proceed with planting operations until alternate planting locations have been selected and approved by the Landscape Architect.
   4. Size and configure planting pits in accordance with the planting details. If rotating augers or other mechanical diggers are used, scarify the side walls and bottom of the pit.
   5. Where poor soil percolation is probable, test drainage by filling planting pits with 12 inches of water. Record the drainage time for each pit and if, in the opinion of the Landscape Architect, the water does not adequately drain off within 24 hours, install drains or raise plant pits as directed.
   6. Keep excavations covered or otherwise protected after working hours and when unattended by Installer's personnel.

C. Planting Bed Excavation:
   1. Refer to Section 312000 – Earth Moving for earthwork requirements.
   2. In locations where plant beds are shown on the drawings and earth moving is not required other than achieving the specified plant bed subgrades, excavate plant beds to the depth shown on the planting details. Remove surplus excavated subsoil material that is not part of the specified planting soil to an area designated by the Owner and legally dispose off-site.
   3. Grade subgrade smooth and uniform. Slope to perimeter of plant bed when underdrains are required to collect accumulated water within the bed.
   4. Transition from plant bed subgrade to adjacent seed bed subgrade outside the limits of the plant bed to ensure full depth plant bed mixture is provided.
   5. Where plant beds terminate next to pavement surfaces, subgrade transitions shall be 12 inches wide within the plant bed to protect pavement base material from being undermined.
   6. Obtain approval from the Landscape Architect for all subgrades prior to placing plant mixtures. Notify the Landscape Architecture at least 48 hours in advance of placing plant mixture.
   7. Keep excavations covered or otherwise protected after working hours and when unattended by Installer's personnel.

D. Mixing and Placing Planting Mixtures:
   1. Install planting bed and planting pit mixtures to the specified proportions and depths. On-site mixing of existing topsoil with off-site materials shall result in a homogenous blend of all ingredients. Screen all mixture to remove foreign debris and rocks greater than ½ inch diameter prior to placement.
   2. Place planting bed mixture in 6 inch lifts and lightly compact to prevent settlement after planting. Settlement that occurs after planting will require plant removal and the addition of additional plant mixture at the Contractor’s expense. When placing mixture in raised planters, set finish grade elevations 2 inches low for mulch placement.
   3. Grade planting areas to a smooth, uniform surface plane. Roll and rake, remove ridges, and fill depressions to meet grade.

E. Fertilizing:
1. Prior to or during planting, amend all planting pit and bed mixes by incorporating fertilizer at rates specified by soil test reports as specified under Section 329100 – Soil Preparation (Topsoil). Do not broadcast fertilize over the surface of the soil or onto any plant root ball.
2. For individual plant pits, incorporate fertilizer into back fill during planting operations. For plant beds, pre-mix fertilizer prior to installation.

F. Planting and Backfill:
1. Do not plant when the ground is frozen or saturated.
2. Balled and burlapped plants: Do not use planting stock if root ball is cracked or broken before or during planting operation. Set the plant in the center of planting pit with the crown set between 1 inch above adjacent soil for shrubs and 2 inches above adjacent soil for trees. Plant root flares shall not be set below adjacent finish grade. Face plant to give the best appearance or relationship to primary views. Cut away burlap, rope, wire or other wrapping materials from the top one-third of the root ball, and remove from pit. If plastic wrap or other non-degradable materials are used in lieu of burlap, completely remove them from the root ball before backfilling. Backfill planting pit approximately two-thirds full, add fertilizer, water and allow planting mixture to settle. After the water has been absorbed, complete backfilling and tamp lightly to grade to prevent future settlement, and form a watering basin with plant mixture of the size indicated on Plans.
3. Container-grown plants: Remove containers and make at least five vertical cuts one-half to one inch deep around the root ball and thoroughly loosen the roots on the outside of the ball. Plant as specified above for balled and burlapped plants, and as modified herein. All container-grown stock shall be planted so that top of container soil is level with surrounding grade. Do not plant higher to account for mulch, as mulch should not cover plant crown.

3.5 SPECIAL PLANTING CONSIDERATIONS:

A. Mycorrhizal Inoculum:
1. Rototill 2 granular pounds per 1000 square feet into the top 8 inches of soil for plant beds or as recommended by supplier. Incorporate 1 pound per cubic yard of plant pit backfill as backfill is being placed.

B. Sloped Plantings:
1. 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. Complete planting as specified under 3.4 F above.

C. Root Production Method (RPM) Trees:
1. Complete plantings as specified for container grown plants above. Install tree guard and staking in accordance with planting detail.

D. Bare-Root Plants:
1. Prior to planting, remove damaged roots and those running beyond the general root mass. Place bare-root stock in center of plant pit and plant so that the roots are arranged in a natural position, uniformly distributed around the crown of the plant. Carefully work soil mix in around the roots in several layers, watering until puddled and allowing the soil to settle between layers. Maintain plumb while working backfill around roots. Complete planting as specified for balled and burlapped plants above.

E. Mechanized Tree Spade Planting
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 the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
2. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
3. Cut exposed roots cleanly during transplanting operations.
4. Use the same tree spade to excavate the planting pit as was used to extract and transport the tree.
5. Fill all voids between the plating pit and root ball with off-site topsoil tamping or watering soil in place until all voids are filled.
6. Deep root water and fertilize immediately following installation.
7. Where possible, orient the tree in the same direction as in its original location.

3.6 MULCHING

A. Uniformly install mulch on all trees and shrub beds to depth shown on Plans within 48 hours of planting.

B. Keep mulch out of the crowns of shrubs and perennials, at least 3 inches from all tree trunks, and off sidewalks and roadways.

3.7 PRUNING

A. After planting, prune trees and shrubs to remove all dead, dying, broken, or crossed limbs flush with the ground or main stem leaving no stubs. Do not prune to shape or to compensate for transplanting shock without prior approval from the Landscape Architect. Retain natural form of the plant type. Prune using standard professional horticultural and arboricultural practices. Remove trimmings from the site.

B. Employ workers experienced in this type of work.

3.8 WRAPPING

A. The trunks of deciduous trees shall be wrapped immediately after planting, but not before the condition of the trunks has been inspected and approved by the Landscape Architect. Trim the margins of any abrasions or cuts with a sharp, sterile knife prior to applying wrap.

B. Wrap trees beginning at the base and extending to the first branches in a spiral pattern with an overlap of half the width of the paper.

C. Secure the wrapping at the top, bottom and at 18 inch maximum intervals with twine.

3.9 STAKING AND GUYING

A. Install guying and staking as shown on the details immediately after planting.

B. Remove and dispose of stakes and guys at the end of the warranty period.

3.10 EDGING

A. Metal Edge:
1. Install edging as detailed and at all locations shown on Plans, keeping the alignment smooth and continuous without visible deviation from the line or arc being set.

B. Trench Edge:
1. Install trench edge between all planting beds and lawn in the manner shown on the plans.

3.11 MAINTENANCE EDGE

A. Excavate areas receiving maintenance edge to the cross section shown on the details.

B. Level and compact subgrade and install filter fabric as detailed, overlapping ends by 6 inches.

C. Install aggregate, leveling material with the top of edging.

3.12 CLEANUP AND PROTECTION

A. Remove excess and waste material daily. When planting has been completed, clear the site of all debris, stockpiles and materials.

B. Repair any damage to existing landscape, paving or other such features as a result of work related to this contract to its original condition.

C. Protect landscape work and materials from damage due to landscape operations, operations by other Contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

3.13 MAINTENANCE

A. Provide all maintenance under the supervision of a skilled employee of the landscape installer. The skilled maintenance supervisor shall be: capable of operating the automatic irrigation system controller, conduct plant diagnostics to identify the presence of disease and insect problems, and be capable of directing a maintenance crew in the performance of horticultural maintenance practices identified below.
1. Failure to perform and submit factual Maintenance Report Forms could result in non-payment for said services and require the extension of the warranty and maintenance period an additional year at the Contractor’s expense.

B. Provide all equipment, materials, labor and services to maintain the landscape beginning immediately after each plant is installed and continuing until Final Acceptance and the end of the warranty period. Perform all work under the direct supervision of a technician trained to recognize and treat conditions affecting the establishment and growth of the plants and perform the following:
   1. Inspect the entire landscape at least once per week during the growing season and perform needed maintenance promptly.
   2. Irrigation:
      a. Irrigate all plants to maintain optimum moisture within the root zone. Reoccurring overly dry or wet conditions shall be grounds for rejection of plant material. When using an automatic sprinkler system, the landscape installer responsible for maintenance shall bear full responsibility to set each zone to the correct frequency and duration.
      b. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Landscape Architect. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e. system can be set to water one area for the required maintenance period), and may be automated with a timer. Supply all water and equipment at the Contractor's expense from a source approved by the Landscape Architect.
      c. The soil of the upland plug planting zones shall be kept moist to a depth of four-inches throughout the first growing season. The soils of the wetland plug/tuber and root stock planting zones shall be kept saturated throughout the first growing season. Irrigate the remainder of the plant material to maintain optimum moisture within the root zone (minimum once per week).
   3. All pruning shall be performed by or under the supervision of a licensed arborist. Prune dead wood and broken limbs as identified, in accordance with [**3.7**] - Pruning. Do not shear evergreens or any shrubs unless specifically required to be maintained as a sheared hedge. Maintain the natural shape of trees and shrubs.
   4. Maintain stakes and guys taut and in the specified condition. Repair trees wraps if loose, torn or untied.
   5. Maintain all plant beds and tree saucers weed free. Edge shrub and perennial beds and tree rings at least monthly during the growing season, keeping all tree rings to a uniform diameter. Hook mulch monthly and add mulch as needed.
   6. Deadhead perennials as necessary during maintenance visits to extend blooming periods.
   7. In spring – prior to the start of the growing season, cut all ornamental grasses and flush with the ground and remove cuttings from the site.
   8. Apply treatments as necessary to keep plants and planted areas free of insects, pests, and disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and herbicides. Treatments include utilizing physical and cultural controls.
   9. All pesticides shall be applied by a licensed pesticide applicator. Apply pesticides and all other chemical products and biological control agents in accordance with the authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner at least 24 hours before each application is performed. No mixing or disposal of chemicals is allowed onsite.
   10. Apply antidesiccant to upright conifers December through February, at least once per month. In locations subject to high wind or salt spray, install burlap windscreens around spreading conifers and broadleaf evergreens but do not allow burlap to touch evergreen plants.
   11. Collect all litter and debris from plant beds and dispose off-site.
   12. Fertilization:
      a. Trees, shrubs and ornamental grasses: Fertilize once in the fall after the first hard freeze (usually October) but before the ground freezes; 1 pound of 4-1-2 (N-P-K) per 1,000 square feet of ground below the tree canopy or shrub bed.
      b. Perennials: Fertilize twice, once in the early spring and again 8 weeks later with 1 pound of 5-10-5 (N-P-K) per 100 square feet.
      c. Annuals and bulbs: For bed plantings, use high phosphorous granular fertilizer 10-20-10 (N-P-K) monthly during the growing season applied at a rate identify on the package label. For potted annuals, use high phosphorous water-soluble fertilizer 10-20-10 (N-P-K) every 2 weeks applied at a rate identified on the package label.
   13. Remove dead and unacceptable plants as their condition becomes apparent.
   14. At the end of the warranty period, but prior to Final Inspection, remove all guying, trunk wrap, watering saucers and top dress tree rings and beds 1 inch deep with the specified mulch product.

END OF SECTION