

SECTION 32 00 00 - Exterior Improvements

1. Division of State Architect (DSA) reviews design conformance with CBSC Chapter 11 for accessibility requirements. There are differences between this code and the Americans with Disabilities Act (ADA).

The design professional is required to provide compliance to both the CBSC and the ADA. The University is accountable for compliance to both the ADA and the CBSC accessibility requirements. Drawings describing accessibility requirements provide the DSA reviewer with information that shows compliance to the provisions of CBSC Chapter 11B, as well as other related requirements applied to the project from federal and local agencies.

When required, at least one accessible route shall be provided from public transportation stops, accessible parking and accessible passenger loading zones, and public streets or sidewalks to the accessible building entrance they serve. When applicable, at least one accessible route shall connect accessible buildings, facilities, elements, and spaces that are on the same site. The accessible route shall coincide, to the maximum extent feasible, with the approved main campus circulation routes.

2. Contractor Quality Assurance: Refer to Milestones for Trade Shop Observation Walk-Downs in section 01 45 00, 1.6 Quality of Work, F., 1
3. Contractor Responsibilities: It shall be the sole responsibility of the contractor to provide protection of roadways, construction entrances, and adjacent surfaces and other items as required by the AHJ. Any damage to surfaces to be replaced per campus standards".

END OF SECTION 32 00 00

SECTION 32 01 90 - Operation and Maintenance of Planting

Planting Guarantee:

During the Guarantee to Repair Period specified in the General Conditions the Contractor shall be liable for damages to all trees covered by the provisions of this Section. Compensation to the University shall be as outlined below.

Contractor will not be held responsible for damages due to vandalism or freak acts of nature during the guarantee period. Immediately report such conditions to the University's Representative.

Tree Protection:

See 01 56 39 for Tree Protection

Plant Material Protection:

Provide protection for all plant materials designated to be retained. Contractor is responsible for replacing damaged plant life with approved equivalent.

New and existing plant materials shall not be allowed to deteriorate and shall be maintained in a healthy and vigorous condition during the course of construction and maintenance period.

During the course of construction, the Contractor shall take all necessary precautions, as outlined herein, to protect existing plant materials to be preserved from injury and death. Protection shall be given to the roots, trunk, and foliage.

The Contractor shall conduct operations continually to completion, unless weather conditions are prohibitive.

Provide ample water supply of potable quality and sufficient quantity for all operations required under this Section.

Trees subject to the provisions of this Section, which have been injured shall be repaired immediately by a certified Arborist. Repairs shall include removal of rough edges, sprung bark and severely injured branches as directed by the Arborist.

Necessary measures shall be taken to maintain healthy living conditions for existing plant materials to be preserved. Such measures shall include monthly washing of leaves for the removal of dust, regular irrigation, root feeding, etc.

Tree protection fencing shall be installed for the protection of existing trees to be preserved. No construction, demolition, or work of any nature will be allowed within the fenced area without prior written approval by the University's Representative.

- Approval by the University's Representative for work within the fenced area shall not release the Contractor from any of the provisions specified herein for the protection of existing trees to be preserved.
- During the course of construction of approved work within the fence area, no roots shall be cut without prior written approval by the University's Representative.

During construction, the existing site surface drainage patterns shall not be altered within the area of the drip line of existing plant materials.

Contractor shall not alter the existing water table within the area of the drip line of existing plant materials.

Do not permit the following within the drip line of any existing tree or shrub to be preserved:

- Storage or parking of automobiles or other vehicles.
- Stockpiling of building materials, refuse or excavated materials.
- Skinning or bruising of bark.
- Use of trees as support posts, power poles, or signposts; anchorage for ropes, guy wires, or power lines; or other similar functions.
- Dumping of poisonous materials on or around plant materials and roots. Such materials include but are not limited to paint, petroleum products, dirty water, or other deleterious materials.
- Cutting roots by utility trenching, foundation digging; placement of curbs and trenches, and other miscellaneous excavation without prior written approval by the University's Representative.
- Damage to the trunk, limbs, or foliage caused by maneuvering vehicles or stacking material or equipment to close to the plant.
- Compaction of the root area by movement of trucks or grading machines; storage of equipment, gravel, earth fill, or construction supplies; etc.

- Excessive water or heat from equipment, utility line construction, or burning of trash under or near shrubs or trees.
- Damage to root system from flooding, erosion, and excessive wetting and drying resulting from watering and other operations.

Tree Trimming

A Certified Arborist, shall be engaged to direct removal of branches from trees if necessary to protect the health of the tree or if required to clear for construction.

In company with the University's Representative, University and a certified Arborist, ascertain the limbs and roots which are to be trimmed. Clearly mark them to designate the approved point of cutting.

Dead and damaged trees that are determined by the Certified Arborist to be incapable of restoration to normal growth pattern shall be removed.

Cut evenly, using proper tools and skilled workmen, to achieve neat severance with the least possible damage to the tree.

In the case of root cuts, apply wet burlap or other protection, approved as noted herein, to prevent drying out, and maintain in a wet condition as long as necessary for temporary protection.

Landscape Maintenance

Plant material will be maintained throughout the duration of the construction period in a healthful manner. Plant material identified which requires special pruning, insect control, fertilization or other remedial health action will be treated during this period. Methods and rates of pesticide and fertilizer application will be reviewed by the University's Representative prior to approval.

Watering

Plant materials will be watered on a regular basis, at a rate consistent with their particular requirements. Verification of the proposed watering schedule shall be reviewed by the University's Representative prior to commencement of the maintenance.

- The maintenance of the plant materials shall comply with standard horticultural practice for the correct watering, fertilizing, pruning and spraying of the specimen boxed trees.
- The maintenance and quality of the plant materials shall be subject to monthly checks. The dates of these checks shall be outlined in the University's Representative's field notification relating to the establishment of the plant maintenance period. Additional checks shall be scheduled as determined by the University's Representative.
- Contractor shall be responsible for performing periodic inspections of existing plant materials to be protected and relocated throughout the construction period, and submit written proposals to the University's Representative for additional maintenance work as may be required to ensure the health and general well-being of the plant material. Contractor shall retain, at the direction of the University's Representative additional specialists as may be required to perform this work.
- Contractor shall keep plant material free from weeds and debris at all times.

END OF SECTION 32 01 90

SECTION 32 12 00 - Flexible Paving

Consider option for use of permeable paving.

END OF SECTION 32 12 00

SECTION 32 13 00 - Rigid Paving

Concrete Finish: Stamp location of irrigation sleeves into concrete with a "L."

All hardscape shall be specified to meet (or exceed) SRI of .28 and comply with aging requirements to comply with current LEED standards. Permeable paving is preferred wherever possible.

Concrete is to include fly ash when feasible.

END OF SECTION 32 13 00

SECTION 32 15 00 - AGGREGATE SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes aggregate surfacing, complete, as shown, and as specified.
- B. Unit Pricing: Per square foot, including all components and accessories.

1.3 REFERENCES

- A. Standard Specifications - Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS.
- B. ASTM - American Society for Testing and Materials.
- C. ASTM C136-Sieve Analysis of Fine and Coarse Aggregates
- D. ASTM D2419- Sand Equivalent Value of Soils and Fine Aggregates

1.4 DEFINITIONS

- A. Percent Compaction: ASTM D1557, percentage of the maximum in-place dry density of the same material as determined by Soils Engineer.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's current catalog cuts and specifications for herbicide, aggregate, and stabilizer.
- B. Samples: Half [1/2] a pound for each size and color range of aggregate.
- C. Test Reports: Certified copies of field tests of compressive strengths of stabilized aggregate surfacing.

1.6 QUALITY ASSURANCE

- A. Qualifications: Submit certified documentation of successful experience of no less than three [3] years in the installation of similar aggregate surfacing.
 - 1. GraniteCrete Approved Installers can be found on our website here: [Professional Installation](#).
 - 2. GraniteCrete recommends that a GraniteCrete representative be on-site at the beginning of any installation to train the crew in the procedures for achieving an excellent GraniteCrete installation. GraniteCrete is not able to be present for the entire installation. However, GraniteCrete does offer paid consulting services if presence at the entire installation is desired, or required (minimum four hours, plus travel).
 - 3. GraniteCrete offers up to three hours of free consulting and training for all new installers.
 - 4. The installation instructions in this Specification Guide are meant as a guide for bidding purposes and will be superseded by the approved Submittal of installation instructions from GraniteCrete, Inc., and any field direction provided by the company representative.
 - 5. GraniteCrete, Inc. does not offer a warranty on any installation - even if completed by an Approved Installer - only on the product, bag-to-bag.
- B. Testing Agency: Selected by Owner and paid for by the Contractor.
- C. Standard Specifications: Shall mean the California Department of Transportation Standard Specifications, latest active edition.

1.7 MOCK-UP

- A. One [1] - 4 ft. x 4 ft. x thickness shown on Drawings, to remain at job site until Final Acceptance.
- B. Construct mockup of crushed aggregate blended with GraniteCrete admixture surfacing, including base course and edging, at location approved by Owner's Representative. Build mockup a min. of 4 weeks prior to date of scheduled final installation prior to installation. Intent of the mockup is to demonstrate surface finish, texture, color and standard of workmanship
- C. Notify Owner's Representative 10 days in advance of mockup construction.
- D. Allow Owner's Representative to view and obtain approval of mock-up before proceeding with rest of crushed aggregate blended with GraniteCrete admixture surfacing.
- E. Remove mock-up after acceptance of work specified in this Section.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect aggregate from contamination with foreign materials. Isolate stockpiles to prevent mixing of different aggregate grades. Prevent contamination with organic materials.
- B. Store headers on pallets. Bent, kinked or gouged steel header will be rejected.
- C. Deliver perishable materials in original, unopened packaging. Protect from dampness.
- D. Deliver all GraniteCrete Admixture bulk materials in original, unopened packaging. Protect materials and aggregate from contamination with foreign matter. Store under a waterproof cover and protect from dampness.

1.9 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Do not install Crushed aggregate during rain or while subbase is wet from rain. Do not apply soil sterilant when winds exceed 10 mph or during or after rain. Do not install during rainy condition or below 40 degrees Fahrenheit.
- B. Existing Conditions: For protection of existing plants to remain, see Division 01, Section "Temporary Tree and Plant Protection".

1.10 SEQUENCING AND SCHEDULING

- A. Acceptance: Do not install work under this section prior to acceptance of subgrade preparation under another section.
- B. Coordination: Coordinate with other trades to insure the following:
 - 1. Irrigation Sleeving: To be placed prior to placement of aggregate base.
 - 2. Trees in Paving: To be installed prior to headers and paving.
 - 3. Concrete headers and edges: To be placed prior to placement of aggregate surfacing.

1.11 MAINTENANCE

- A. Service: Immediately repair all damage to the work as the result of weather or traffic conditions. Report all damage resulting from work of other trades after acceptance of aggregate surfacing work. Repair to match adjacent undisturbed work.

PART 2 - PRODUCTS

2.1 AGGREGATE

A. Crushed Aggregate Screenings:

1. Physical Properties:

a. Fine Aggregate:

<u>Sieve Size</u>	<u>Percent Passing</u>
#4	95-100
#30	30- 50
#200	5- 15
Sand Equivalent	38 Minimum

b. Coarse Aggregate:

<u>Sieve Size</u>	<u>Percent Passing</u>
#4	95-100
#30	30-50
#200	0-2

B. Decomposed Granite (DG):

- DG shall have a 3/8" maximum gradation, produced from naturally friable rock/granite with enough fines to produce a smooth walking surface. Materials should be free from clay lumps, organic matter, and deleterious material. Blends of coarse sand and rock dust are not acceptable.
- Use a single supply source for the entire quantity required.
- Gradation, in accordance with ASTM C136:
- Color: California Gold
- Supplier: Vineyard Rock Products, Hollister, CA. - (831) 637-6443 [Or equal].

C. Aggregate binder: Provide GraniteCrete Admixture. Color: Natural Gold

D. Crushed Aggregate Blended with GraniteCrete Admixture Surfacing:

- Manufacture: GraniteCrete, Inc.
 - 419 Webster Street, Suite 202 Monterey, CA 93940
 - Phone: (800) 670-0849; Fax: (800) 670-0849
 - www.granitecrete.com
- Product Description: GraniteCrete admixture is an all-natural product and does not contain oils, polymers, resins, or enzymes.

3. Substitutions: Products by other manufacturers that comply with specifications will be considered in accordance with University substitution procedures.

2.2 EQUIPMENT

- A. Mixing Equipment: Batch-type, using revolving blades or rotary drum.
- B. Compaction Equipment: [Vibratory - type] [Power roller weighing not less than 5 tons].

2.3 ACCESSORIES

- A. Steel Header:
 1. Size: [As shown on Drawings.] [3/16 in. x 4 in. primed and painted steel].
 2. Color: [Black] [Brown] [Natural]
 3. Stakes: 16" Steel rebar.
 4. Product: Joseph T. Ryerson & Son, Inc. [510] 653-2933, Brighton By-Products Co. [510] 846-1220.
- B. Soil Sterilant: Material shall be approved for use in the state of California and shall be a product suitable for use under paving and roadways.
- C. Aggregate Base: Class II per "Standard Specifications".
- D. Permeable Aggregate Base: Class II permeable per "Standard Specifications"
- E. Water: Fresh, clean, potable water as available from Owner. Transport as required.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Subgrades shall have been rough graded to within 0.10 ft. of finish grades less depth of aggregate surfacing.
- B. Verify that concrete bands [or adjacent paving] [and irrigation sleeving] have been installed and accepted under another Section prior to commencement of work.

3.2 PREPARATION

- A. Soil Sterilant:

1. Mixing: Mix soil sterilant in sprayer tank with clean water according to manufacturer's current printed specifications. Use sprayer which will apply the solution uniformly, without disturbing the soil.
 2. Solution Rate: 5 gallons per 1000 square feet for small areas and 150 gallons per acre for large areas.
 3. Spray Solution: Shake or stir prior to each application. Apply to dry soil surface only.
 4. Over spraying: Avoid spraying on walls and areas to receive planting.
 5. Depth: Immediately after application of spray solution, thoroughly incorporate the solution into the soil to a depth of 2 to 4 in. per manufacturer's current printed specifications.
- B. Compaction:
1. After completion of soil sterilization, compact subgrade. Refer to the project's Geotechnical Report for compaction recommendations, and testing requirements.
 2. Comply with Caltrans Standard Specifications Section 301-1 – "Sub-grade Preparation."
- C. Aggregate Base Course:
1. Verification: Do not place aggregate prior to acceptance of subgrade preparation.
 2. Placement: Spread aggregate to thicknesses shown on the Drawings and compact to a minimum of 95 percent, or as indicated per the project's Geotechnical Report.
- D. Steel Header:
1. Headers: Install header true to line and grade as shown on the Drawings. Align header edges and set flush with adjacent paving. Field weld all butt joints.
 2. Stakes: Stakes shall be a minimum of 14 inches long, and longer as required for solid anchorage. Header to be Field welded to stakes - see drawings for spacing.

3.3 GRANITECRETE INSTALLATION – GENERAL

- A. Installation: There are two installation methods for GraniteCrete: "Dry" and "Wet."
1. The dry method is for installations up to 6,000 square feet. The wet method is for installations over 6,000 square feet and may require the use of a volumetric truck. Discretion for the means and methods to use is ultimately the responsibility of the installer.
- B. Mixing Method:
1. Installations less than 500 square feet may be mixed on-site.
 2. Installations 500 square feet and over up to 6,000 square feet, must be delivered pre-mixed to the site from a GraniteCrete Inc. approved pre-mix facility. Approved retailers and pre-mix facilities can be found on the company website www.granitecrete.com.

3. For installations over 6,000 square feet, it is highly recommended to use a volumetric truck.
 4. The volumetric truck must be calibrated for the GraniteCrete mixture. Contact GraniteCrete, Inc. at info@granitecrete.com for a list of approved volumetric truck operators.
- C. Installation Depths/Lifts: Refer to Manufacture Current Specifications
- D. Measurements:
1. As needed use the manufacture online calculator to assist with estimating the amount of material needed.
 2. Please note only an estimator and the Contractor is responsible for the quantity of materials at the job-site.
- E. Refer to current manufacture specification for mixture / measurements requirements.

3.4 INSTALLATION

- A. Organic-Stabilized Aggregate Surfacing:
1. Placement: Install pre-mixed stabilized crushed aggregate onto the prepared subbase in a single 4" lift. Level and water so that moisture permeates the full 4" depth.
 2. Compacting: Thoroughly compact to a minimum 90 percent. Compact each area with at least 4 passes of the compacting equipment. After compacting, screed smooth. Compaction shall only be completed with
 3. Contaminated Areas: Do not permit mixture to contaminate planting areas. Clean up immediately all mixtures spilled into adjacent areas.
 4. Grading: When surface areas have been rolled and it becomes necessary to add a thin layer of material to bring the surface to grade, the previously rolled or compacted area shall be raked to provide a bond with the added material.
 5. Damaged or Defective Installation: Repair and replace in accordance with these Specifications at no additional cost to Owner.
 6. Replacement:
 - a. If compression tests of samples fail to meet specified compressive strength, immediately remove and replace aggregate surfacing with material conforming to Specifications.
 - b. All work required for removing and replacing the aggregate surfacing at no additional cost to Owner.
- B. Installation Instructions - "Dry" Method
1. Class II Base Rock: Moisten and compact base rock on the entire installation area to an even depth of 4-inch or 6-inch, depending on residential or commercial application. A vibratory plate can be used to compact the base rock; it should not be used to compact the GraniteCrete for residential installations.

2. GraniteCrete: Wheelbarrow the prepared GraniteCrete/DG mixture to the installation site and place a layer of the mixture to one-half of the desired final lift. Be sure to spread the mixture out before proceeding to step 3; this will ensure the mixture is moistened and mixed thoroughly.
3. Moisten the material with a hose end trigger sprayer attachment, avoiding puddling - oversaturation is detrimental and will negatively affect the integrity of the finished product. Rake area lightly to evenly distribute water throughout the mix or "lift". Proper moisture content can be checked by clenching your fist around the GraniteCrete, when the mixture just stays together and the color just starts to transfer to your hand, GraniteCrete is ready to compact. Walking on the area is perfectly acceptable; initial compaction can be performed by walking on the edges and corners.
4. Once the first lift has reached proper moisture content, level the GraniteCrete and compact it using a 36" drum roller in static position.
5. Install a second lift as above, repeating steps 1 through 4. When doing this, make sure to pay particular attention to the edges to ensure even material height, and moisten to dampen mixture.
6. Compaction: After proper moisture is achieved for compaction, hand tamp (with a 10" hand tamp) around benches, sign posts, corners, boulders, et cetera. Pay particular attention to corners and edges to ensure tight compaction.
7. Make several passes with a 36" walk-behind or drum roller in static position. Hand tamp out any imperfections with a 6" wooden masonry float. Pay particular attention to ensure accuracy in grading.
8. Make sure to keep your 10" hand tamp, walk-behind/drum roller, and wooden floats clean at all times. Fill in any divots with fresh, loose material (removing any larger stone) and hand tamp with the wooden floats to match the existing finish.
9. When laying GraniteCrete in batches, be sure to use the cold joint method below to ensure a blemish-free installation.
10. Finishing: If desired, lightly sweep the finished surface in a perpendicular pattern with a medium-bristled push broom. Then make several passes with a lawn roller until the desired surface texture is achieved. Remove spoils off the surface.
11. Do not allow GraniteCrete to dry during installation. Mist lightly with a hose end spray head or garden sprayer as necessary or cover with a plastic tarp.
12. The final step for a GraniteCrete installation is a dampening with water of all newly-installed and compacted GraniteCrete materials. Using a shower head/spray hose attachment, moisten the entire newly-installed GraniteCrete area - avoid puddling. For best results, moisten all newly-installed GraniteCrete paving a second time the following 1 to 5 days, as practical. Slow curing of GraniteCrete is important to avoid cracking.
13. Make sure there is no direct application of uncontrolled water (e.g. irrigation or sprinkler water) prior to final curing.

C. Installation Instructions - "Wet" Method - Using a Volumetric Truck

1. The use of an approved volumetric truck is required - see GraniteCrete website for approved volumetric truck companies.
 2. Class II Base Rock: Moisten and compact base rock on entire installation area to an even depth of 4-inch or 6-inch, depending on residential or commercial application. A vibratory plate can be used to compact the base rock; it should **not** be used to compact the GraniteCrete.
 3. Compaction: Walking on the area is perfectly acceptable; initial compaction can be performed by walking on the edges and corners. Rake or grade area with the flat side of a landscape or asphalt rake (do not use tang side,) until the GraniteCrete is one inch above finish grade.
 4. Once initial compaction has been completed, hand tamp (with a 10" hand tamp) around benches, sign posts, corners, boulders, et cetera. Pay particular attention to corners and edges to ensure tight compaction.
 5. Make several passes with a 36" walk-behind or drum roller in static position. Hand tamp out any imperfections with a 6" wooden masonry float. Pay particular attention to ensure accuracy in grading.
 6. Make sure to keep your 10" hand tamp, walk-behind/drum roller, and wooden floats clean at all times. Fill in any divots with fresh, loose material (removing any larger stone) and hand tamp with the wooden floats to match the existing finish.
 7. When laying GraniteCrete in batches, be sure to use the cold joint method below to ensure a blemish-free installation.
 8. Finishing: If desired, lightly sweep the finished surface in a perpendicular pattern with a medium-bristled push broom. Then make several passes with a lawn roller until the desired surface texture is achieved. Remove spoils off the surface.
 9. Do not allow GraniteCrete to dry during installation. Mist lightly with a hose end spray head or garden sprayer as necessary or cover with a plastic tarp.
 10. The final step for a GraniteCrete installation is a dampening with water of all newly-installed and compacted GraniteCrete materials. Using a shower head/spray hose attachment, moisten the entire newly-installed GraniteCrete area - avoid puddling. For best results, moisten all newly-installed GraniteCrete paving a second time the following 1 to 5 days, as practical. Slow curing of GraniteCrete is important to avoid cracking.
 11. Make sure there is no direct application of uncontrolled water (e.g. irrigation or sprinkler water) prior to final curing.
- D. Stay off the newly-installed GraniteCrete areas for at least one day; after that, foot traffic is allowed. Vehicular traffic should avoid newly installed areas for 5 – 7 days.
- E. Newly installed GraniteCrete paving surfaces are fully cured in 28 days. At that time, the entire surface should be blown or swept off to eliminate loose surface materials. Minor cracking may take place. However, over time, the aggregate fines will fill in the minor cracks and they should disappear. Occasional blowing off of the surface will help to minimize loose surface materials.

3.5 COLD JOINT METHODS

- A. Cold joints can be used at the end of the work day.
- B. Method One:
 - 1. "Between pours," stop at an area that makes the joint location look intentional.
 - 2. Take a chalk snap line just back from loose GraniteCrete into the compacted area and create a chalk line. Use either a masonry blade - or a square-nose shovel - and cut a straight line across the installation.
 - 3. Continue with installation: Dampen the prior installation area. Place newly mixed GraniteCrete into the area, being careful not to overlap existing compacted material. Place a three-foot length of 2"x4" carefully along the edge of the new pour and compact by hitting/tapping the board with a single jack. Then, take a medium-bristled push broom and very lightly "feather" the two pours together.
- C. Method Two:
 - 1. Place a 2"x4" or 2"x6" piece of wood across the installation, loosely stake it, and finish compacting the material. Leave the board in place overnight.
 - 2. The next day, carefully lift the wood up and away from the installed GraniteCrete. Continue the installation process as per step 2 under Method One, making sure to dampen the prior installation area.
- D. Method Three: (Suggested for large open edges at the end of the work day)
 - 1. Install steel edging at a location that looks intentional and aesthetically makes sense. Permanently install using the stakes provided. Completely finish the first day's work.
 - 2. The next day, simply continue with the installation. Make sure to dampen the prior installation area first. Leave the edging in place. Again, be careful not to leave any new material on the previously installed GraniteCrete.

3.6 FIELD QUALITY CONTROL

- A. Tests: For each lift, have the testing laboratory verify the degree of compaction. Recompact failed areas until specified compaction is achieved. Testing to be paid for by Contractor.
- B. Follow All manufacture specifications and recommendations.

3.7 PROTECTION AND CURING PERIOD

- A. Protect the paving against traffic, injury or defacement, or damage by rain during curing period for cement-stabilized aggregate surfacing and subsequent construction operations until Final Acceptance.

- B. Do not allow traffic on crushed aggregate blended with GraniteCrete admixture surfacing for 5 days after placement or until compacted crushed aggregate blended with GraniteCrete admixture surfacing has fully cured. [Cover for extended curing period].
- C. Protect crushed aggregate blended with GraniteCrete admixture surfacing from damage until project completion. Repair damaged areas to match specified requirements.

3.8 MAINTENANCE AND REPAIRS

- A. Follow manufacturer's recommendations.
- B. Maintenance: Depending on the end user's desired finish surface, maintenance may require occasional blowing off or brooming of paved surface
- C. DO NOT use a pressure washer to clean GraniteCrete. Depending on quality of compaction at time of installation, a thin veneer of loose aggregate material is typical after the full 28 days cure period. If cracking appears in a GraniteCrete surface, broom loose aggregate "fines" into cracks and compact with a rubber mallet.
- D. Repair: When repairing GraniteCrete it is important to use the original aggregate/decomposed granite and the original GraniteCrete Admixture color to match previously installed materials. If the paved surface has large areas of raveled material (loose aggregate/decomposed granite) the initial installation may not have been properly compacted, or blended materials did not have optimum moisture content during installation. GraniteCrete must not be allowed to dry prior to final compaction.
- E. The following are suggestions for repair of raveled materials:
 - 1. For large loose/raveled areas, a minimum of 2 inches of GraniteCrete can be saw-cut at agreed length, removed, and re-installed. Repeat the installation steps.
 - 2. In areas that collapse/fail due to equipment weight, re-form and re-install with original materials as per specifications.
 - 3. Minor Crack Repair - With Sand Mixture:
 - a. Use a fine mesh sand - typically sold as "playground sand" or "play sand." Mix the sand and GraniteCrete together as though the sand is decomposed granite (use the same ratio as was used for the GraniteCrete installation). This will create a dry mix, similar to polymeric sand. Apply the sand mixture down into the crack using the appropriate tool (trowel, shovel, broom, et cetera). Fill the crack $\frac{3}{4}$ of the way to the top grade. Usually at the point post-installation that cracks begin to be seen, you will also see loose material on top. Sweep that loose material into the remaining $\frac{1}{4}$ top of the void. Try to not leave any sand mixture/patch material on the top of the installation - you want it as clean as possible; you can use a blower to help remove the sand mixture. Once the surface is clear of patch material, carefully wet the material. The cracks should virtually disappear.

3.9 MISCELLANEOUS MANUFACTURER NOTES

- A. Do not allow GraniteCrete to dry during installation. Mist lightly with a hose end spray head as necessary - avoid puddling - or cover with plastic tarp.
- B. Non-compacted - or poorly-compacted - GraniteCrete top layer will result in loose and pebbled materials. Edge and corner compaction may require special attention with a hand tamp during installation.
- C. Non-compacted - or poorly-compacted - base rock may result in failure of the top layer of GraniteCrete.
- D. Squeeze the mixture in your fist and open your hand. When the color has just started to transfer onto your hand and the mixture just begins to stay together in a clump, it's ready for installation. Excessive moisture level may result in "sticky" materials complicating the quality of the finish surface or proper compaction - if you squeeze the mixture and water oozes out, it is too damp. If the material is too wet, it may be placed on the bottom of the installation, with material that has a better moisture content on top.
- E. Aggregate/decomposed granite materials should meet the sieve specifications in this Specification Guide and be free of contaminants.
- F. Surface shall follow the overall contours of the landscape. Flat areas shall be sloped for drainage. Slope 1.5% percent minimum to drain away from structures, or as indicated on the drawings.
- G. Please Note: 3/8" minus aggregate comes in different colors. GraniteCrete™ samples reflect the use of a Golden Granite decomposed aggregates. Mock-ups using your local aggregate source is strongly suggested.
- H. Cover finished surface, when practical, to achieve maximum curing period. See Section 3.5.
- I. Minimum Compacted Thickness (See Section Details):
- J. Heavy Pedestrian, Light Vehicular, and Emergency Vehicle Access uses shall be installed in a 4-inch depth.
- K. Completed, finished surface shall be of consistent quality and free of damage or cracking.
- L. Materials such as organic materials, nails, stones, and loose material. Surface shall not have depressions or humps greater than [1/4] inch in ten feet. Cold joints, if any, should be inconspicuous.

END OF SECTION 321500

SECTION 32 16 00 - Curbs and Gutters

Regulatory Requirements

Access for Persons with Disabilities: Comply with California Building Code and Americans with Disabilities Act Accessibility Guidelines (ADAAG) for site development, walks, and sidewalks to ensure access for persons with disabilities. Form, shape, and finish curb cuts in accordance with requirements of most restrictive code.

END OF SECTION 32 16 00

SECTION 32 33 13 – Bicycle Racks

Bicycle Storage: Covered, lockable, high density parking storage is to be provided. Racks and base assembly shall be Hot rolled ASTM A36 solid steel bars welded with GMAW (MIG). industrial high gloss powder coated.

Racks should be secured to concrete with two tamper-resistant stainless-steel anchors.

END OF SECTION 32 33 13

SECTION 32 33 23 – Trash and Litter Receptacles

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Interior Trash and Recycling Receptacles.
2. Exterior Trash and Recycling Receptacles.
3. Solar Compacting Recycling Receptacles.
4. State-required Signage

B. Related Sections:

1. See Cal Poly Trash Enclosures Standards and Guidelines.

1.3 SUBMITTALS

1. Product data - Submit product data sheets for each product.

2. Samples:

- a. Submit samples of Signage Materials.

1.4 QUALITY ASSURANCE

A. Reference Standards:

- 1. Title 19 CCR, Public Safety, State Fire Marshal Regulations
- 2. Title 24 CCR, Part 1 - Building Standards Administrative Code
- 3. Title 24 CCR, Part 2 - California Building Code, VOL. 1&2 (CBC) (IBC, as Amended by CA), Currently adopted version
- 4. Title 24 CCR, Part 11 - California Green Building Standards Code (Calgreen Code), Currently adopted version
- 5. Americans with Disabilities Act (ADA), Title II or Title III.
- 6. California State Law AB 1383

1.5 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to site in sealed and labeled packaging.

1.6 WARRANTY

- A. Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fails in materials or workmanship within specified warranty period.

- 1. Warranty Period: 1 year.

- B. Installer Warranty: 1 year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Interior Receptacles:

- 1. Rubbermaid.
- 2. No Substitutions, Campus Standard.

- B. Exterior Receptacles.

1. Big Belly, 150 A Street, Suite 103, Needham, MA 02494; <https://bigbelly.com>
2. No Substitutions, Campus Standard
- C. Signage
 1. Recycle Across America (RAA); <https://www.recycleacrossamerica.org/>
 2. No Substitutions, Campus Standard

2.2 CAMPUS STANDARD MODELS

- A. Interior Receptacles:
 1. Rubbermaid 2007918 3-Stream Recycling Station
- B. Standard Exterior Receptacles:
 1. Big Belly standard capacity non-compacting; 50 gallon (190 liters)
 2. Available optional CLEAN software system and wireless connectivity is not required or desired.
 3. All exterior receptacles need to be set on a concrete pad and anchored.
- C. Special Exterior Receptacles:
 1. Big Belly standard capacity Solar-compacting; 50 gallon (190 liters)
 2. For use in high volume areas, such as adjacent to take-out dining locations. Confirm needs and desired model for each location with the University.
 3. Available optional CLEAN software system and wireless connectivity is not required or desired.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine site for compliance to accessibility requirements for slopes and cross slopes. Desired cross slope is 1.5% or less, required to be less than 2%.

3.2 SIGNAGE

- A. The State of California Regulation AB 1383 includes regulations for State agencies regarding the provision of "adequate signage" on all bins.

- B. The University has adopted a version of the standardized signate provided by Recycling Across America (RAA).
- C. For interior bins, the Contractor may coordinate with RAA to pre-kit the stickers on the bins prior to delivery to save time and labor costs.

3.3 ACCESS TO BINS

- A. Verify that bin placement allows for access to bins of all waste streams by the local hauling contractor without moving bins around.
- B. Trash Enclosures, where provided to house bins at exterior locations, shall be per the Cal Poly Trash Enclosure Standards and Guidelines.

END OF SECTION 32 33 23

SECTION 32 80 00 – Irrigation

Design Guidelines:

The Irrigation system shall utilize the latest technology in water conservation. Smart controllers with rain sensors, matched precipitation rate spray heads in turf and drip irrigation in planting areas will minimize overspray and run-off. Two Toro drip bubblers (DB-04-PC) will be placed at each tree location for tree irrigation supplied by a surface dripline. The irrigation system will be zoned according to site condition, species watering needs, and sun exposure. Quick couplers shall be provided every 75 feet throughout the irrigation system for maintenance. Zones shall not exceed 15 gallons per minute. Swivel Lock or Power Lock fittings shall be used in lieu of compression fittings. Basis of Design: Power-Loc™ Fittings, JAIN by Rivulis, or Campus Approved Equal.

CSU Requirements:

Conserve water resources, including installing controls to optimize irrigation water, and promoting the use of reclaimed water. Prepare a year-round watering program according to seasonal evapotranspiration data for the region. Decorative fountains should be minimized.

Campus Standard Irrigation System:

Calsense Resource Management Systems (Website: www.calsense.com). Provide a programmable, automatically controlled underground sprinkler irrigation system for landscape planting. Provide components from manufacturers matching standard irrigation equipment used by University, including heads, valves, piping circuits, controls, and accessories, or approved equal. Provide looped layout with mainline isolation gate valves and isolation gate valves at valve manifolds.

Coordinate with Project Manager to locate inside utility or electrical room with network access and accessible to landscape maintenance staff.

Installed Calsense equipment to be reviewed by manufacturer representative and letter of installation certification shall be provided to campus representative, by contractor, prior to completion.

END OF SECTION 32 80 00

SECTION 32 84 00 - Planting Irrigation

Irrigation Controller:

Campus Standard: Basis of Design: Hunter Industries Inc. - ACC Controller Type. Or Approved Equal.

For repairs or placement of existing Irrigation Controller, where approved by Cal Poly, use Calsense CS3000 Cellular or Ethernet and Radio Controlled for FLOWSense if applicable. Evapotranspiration (ET)-based controller. Controller shall have non-volatile memory to retain program in memory during temporary power failures. Provide colorized digital (.PDF format) **and** physical laminated colorized diagrams with labeled and numbered valve locations, controller and MV/FS location, mainline, laterals and respective irrigated areas (colorized zones) for inside panel of each controller.

Wall Mount Enclosure:

The wall-mounted gray box shall be a completely assembled unit, pre-mounted with the designated controller. The box shall be constructed of weather- and vandal-resistant stainless steel. The wall mount unit shall come complete with transient and lightning protection board and factory-labeled terminals. The transient protection board shall be pre-mounted in the wall mount unit and shall support field replaceable modules which include terminal strips for the connection of irrigation field wires, 2-Wire cable, and weather monitoring devices such as an ET gage, Tipping Rain Bucket, and Wind gage. The wall mount unit shall feature a security-tight locking mechanism, louvered vents, with splash guards, and bee/wasp screens.

All wall mount units shall come with a 10-year limited warranty and shall be fully UL-approved.
Double-Wide, Top Entry Enclosure Assemblies:

Calsense Controller Assembly: SSE-D-R, vandal and weather resistant, made entirely of 304 grade stainless steel with the top being 12 gauge and the body being 14 gauge. The pre-assembled vandal resistant enclosure factory pre-assembled and supplied by controller manufacturer shall come complete with 24 VAC lightning and surge protection and all terminals shall be factory labeled. The pre-assembled enclosure shall come provided with an On/Off switch to isolate the controller along with a GFI receptacle. Specific radio antenna(s) shall be pre-mounted and connected on enclosure. The enclosure shall include 2-7/8", 1-1/2" thick, 6-pin cylinder, die-cast steel padlock with unique shackles design. The assembly shall carry a full U/L listing. The 38-inch height enclosure with flip top should allow for side by side placement of two controllers. All necessary wiring between the two controllers in order to share central communications and/or flow and weather data shall be pre-wired by the manufacturer for easy installation. The main housing shall be louvered upper and lower body to allow cross flow ventilation. A stainless-steel backboard shall be provided for the purpose of mounting electronic and various other types of equipment. The stainless-steel backboard shall be mounted on four stainless steel bolts that will allow for easy removal of the backboard. The factory pre-assembled enclosures shall carry a ten-year limited warranty.

Top Entry Single Enclosure:

Calsense Controller Assembly: SSE-R, vandal and weather resistant, made entirely of 304 grade stainless steel with the top being 12 gauge and the body being 14 gauge. The pre-assembled vandal resistant enclosure factory pre-assembled and supplied by controller manufacturer shall come complete with 24 VAC lightning and surge protection and all terminals shall be factory labeled. The pre-assembled enclosure shall come provided with an On/Off switch to isolate the controller along with a GFI receptacle. Specific radio antenna(s) shall be pre-mounted and

connected on enclosure. The enclosure shall include 2-7/8", 1-1/2" thick, 6-pin cylinder, die-cast steel padlock with unique shackles design. The assembly shall carry a full U/L listing. The 38-inch height enclosure with flip top should allow for one controller. The main housing shall be louvered upper and lower body to allow cross flow ventilation. A stainless-steel backboard shall be provided for the purpose of mounting electronic and various other types of equipment. The stainless-steel backboard shall be mounted on four stainless steel bolts that will allow for easy removal of the backboard. The factory pre-assembled enclosures shall carry a ten-year limited warranty.

Controller Grounding:

Grounding shall consist of one 5/8-inch x 8-foot copper rod installed per irrigation controller and where multiple controllers *are not* connected to the same ground rod.

The top of each rod shall be installed inside a 10-inch round valve box, with the rod installed as close as practical to the controller. If a pedestal enclosure is used, the ground rod may be installed through the pedestal base. Under no circumstances shall the rods be shortened. A #6 AWG solid copper wire shall be used to connect from the ground lug of the transient protection board to the copper rod. Brass clamps specifically designed to secure the copper wire to the grounding rod shall be used. There shall be no kinks or sharp bends in the wire. Each wire may be wrapped around the rod and brazed in place as an alternative to clamping. Braze the wire to the rod for at least one circumference of the rod.

Low Voltage System: Expressly for control of automatic control valves for underground sprinkler systems.

Transformer: To convert building service voltage to control voltage of 24 volts.

Circuit Control: The controller shall automatically calculate cycle and soak scheduling to water each station for a fixed cycle time and allow the water to soak in between cycles, maximizing infiltration and minimizing runoff.

Timing Device: The controller shall have the ability to accommodate multiple types of irrigation schedules including irrigating even days, odd days, prescribed days of the week, and interval scheduling ranging from every other day up to every four weeks.

Wiring: Solid copper with UL approval for direct burial in ground. Provide one spare control wire along entire wire routing for each controller for each unused station at controller. Loop 36 inches excess wire into each single valve box and into one valve box in each group of valves.

CS 3000, pedestal mounted controller call out: CS3-2W-S/CS3-EN/CS-2W-2ST/CS-2W-POC/FM XX

Provide CAT-5 or 6 cable in conduit from the nearest router to the controller maximum run 328' including bends and twists.

Two wire plan notes:

Specify number # of decoders needed. Two station decoders. POC decoder included in call out above. Decoder part number: CS-2W-2ST

Two wire cable: Specify Paige cable P-7354-D in conduit. Maximum run 7,000 feet. 1.25 "Conduit recommended.

Grounding requirements:

- Every 300-400 feet with one 5/8-inch x 8-foot copper grounding rod per irrigation controller and decoder.
- #6 AWG solid copper wire from the copper rod to the field common (white wires in the black harness) of the controller / decoder.

Flow Sensor: QS Series 200 2" (FM 2U) ultrasonic flow meter by FLOMEC. The flow sensor used shall be supplied by the same manufacturer as the irrigation controller to insure warranty. The flow sensor shall be wired back to the irrigation controller using two #14 AWG wires, **one red & one blue** in 1" PVC conduit to connect to the irrigation controller. The **blue** and **red** wires ensure proper identification and installation with the required DC voltage to run from the controller to the FLOWMEC flow sensor. The flow meter needs to be installed with the proper distance before and after the meter. Installation shall be with cut sch 80 threaded nipples directly into the meter and glued into sch 80 couplers on the mainline. The maximum wire run between the flow meter and controller shall be 2000 ft. The flow meter shall send low voltage digital pulses back to the

controller and therefore all electrical connections must be waterproof and be resistant to any moisture entry. It is intended that all wire runs between the controller and flow meter shall be direct pulls and have no splices. If wire splices are unavoidable, they must be installed in a valve box with 3M Scotch lock No. 3570 connector sealing pack used. If lateral systems are very small, a smaller flowmeter could be installed for accuracy in lower demand zones, but field testing would be needed to verify a change in sizing.

Master Valve: Superior 3300-020 2" Normally Open. Installed on threaded 6" or longer sch 80 nipples cut in half and glued into sch 80 couplers on the mainline. No unions or threaded fittings are acceptable.

Piping and Fittings

Campus Preferences:

Mainline Pipe and Fittings - PVC Plastic Pipe (3 inches and larger): Rigid un-plasticized polyvinyl chloride (PVC) 1120, Type 1, Grade 1, NSF-approved pipe, complying with ASTM D 2241. For mainline to control valve connections, use Schedule 80 PVC threaded both ends.

Mainline Pipe and Fittings - PVC Plastic Pipe (smaller than 3 inches): Rigid un-plasticized polyvinyl chloride (PVC) 1120, Type 1, Grade 1, NSF-approved pipe, color – white, complying with ASTM D 1785. For mainline to control valve connections, use Schedule 80 PVC threaded both ends.

Lateral Pipe and Fittings (Downstream of Control Valves): Rigid un-plasticized polyvinyl chloride (PVC) 1120, Type 1, Grade 1, NSF-approved, color-white, complying with ASTM D 1785. For pipe and fittings, Schedule 40 solvent weld pipe, and Schedule 40, Type 1, PVC Solvent weld fitting conforming to ASTM D 2466 and ASTM D 1784.

Galvanized Steel Pipe and Fittings: Pipe standard weight, seamless or welded, galvanized conforming to ASTM A 53. Fittings galvanized malleable-iron, threaded fittings conforming to ANSI B 16.3.

Copper Pipe and Fittings: Pipe Type L seamless copper water tube, drawn temper, conforming to ASTM B 88. Fittings wrought copper or cast brass, recessed solder joint type fittings conforming to ANSI B 16.22.

Sleeving: Rigid un-plasticized polyvinyl chloride (PVC) 1120, Type 1, Grade 1, NSF-approved pipe, extruded from material conforming to ASTM D 1784, color-white. Schedule 40 solvent weld pipe. Sized 2"-4" diameter placed in a bed of sand before hardscape or concrete is placed down. Hardscape or concrete to be stamped with "L" at sleeve location for landscape use.

Swivel Lock or Power Lock fittings shall be used in lieu of compression fittings. Basis of Design: Power-Loc™ Fittings, JAIN by Rivulis, or Campus Approved Equal.

Campus Preference

- Sprinkler Remote Control Valves (RCV) - Angle Valves: Superior Controls Company, Inc.; Model 950A-DWPRS – Electric Diaphragm Angle Valve. Solid brass construction; 200 PSI rating;
Website: <http://www.bucknersuperior.com/Professionals/Products/AngleValves/950A.aspx>
- Sprinkler Remote Control Valves (RCV) -Globe Valves: Superior Controls Company, Inc.; Model 950-DWPRS – Pressure Regulating Valve. Solid brass construction; 200 PSI rating.
Website: <http://www.bucknersuperior.com/Home/NEWSuperior950.aspx>
- Sprinkler Manual Control Valves (MCV): Nibco Inc., 1516 Middlebury Street, Elkhart, IN 46516-4740, Phone: 574-295-3000, Fax: 574-295-3307. Model T-211-YK – Class 125 Bronze Globe Valves. Furnish two valve keys, 3-foot long with tee handles and key end to fit valves.
Website: <http://www.nibco.com>
- Isolation Valves (3-inches and smaller): Nibco Inc., 1516 Middlebury Street, Elkhart, IN 46516-4740, Phone: 574-295-3000, Fax: 574-295-3307. Model T-113-K – 250 PSI CSP Bronze Gate Valve. Screw-in bonnet, non-rising stem, solid wedge, push-on ends with joint restraints, 250 PSI / 17.2 Bar non-shock cold working pressure, conforming to MSS SP-80, size - 2-inches. Website: <http://www.nibco.com/assets/PR113KIR.pdf>
- Isolation Valves (Larger than 3-inches): Comply with Section 33 11 00 – Water Utility Distribution Piping.
- Master Valve: Superior 3300-020 2" normally open
- Quick Coupling Valves, Valve Keys and Key Lug: Rain Bird International, Inc., POB 37, Glendora, CA 91740-0037, Phone: 626-963-9311, Fax: 626-852-7343.
 - Quick Coupling Valves: Rain Bird Model 33DLRC.
¾-inch (20/27). Heavy-duty, brass construction, two-piece body design, stainless steel internal valve spring, locking rubber cover. Website:
<http://www.rainbird.com/landscape/products/valves/quickCouplingValves.htm>
 - Locking Cover Keys: Rain Bird Model #2049I. Furnish two cover keys per project.
Website: <http://www.rainbird.com/landscape/products/valves/lockingcoverkey.htm>

- Valve Keys: Rain Bird Model 33DK. ¾-inch (20/27). Key threads into top of quick-coupling valve to provide water access. Furnish two valve keys per quick coupling valve. Website: <http://www.rainbird.com/landscape/products/valves/valvekeys.htm>
- Flex Riser - KBI model FR or approved equal (6" length).
- Triple-Swing Assemblies - Rainbird SA series, KBI TSA-TT series, or approved equal. 12" length for 4" and 6" pop-up sprinklers, and 18" length for 12" pop-up sprinklers. Match sprinkler inlet size.
- Sprinkler Heads - Pop-up height: 4" minimum height for turf sprinklers; 12" minimum height for shrub sprinklers.
- Drip Emitters: Rainbird Xeri-Bug PC drippers.
- Drip Fittings: Powerloc twist type locking fittings
- Drip Line: .710 black heavy dripline.
- See detail drawings for surface drip and subsurface drip layout preferences.
- Jute Staples: Heavy 9 gauge type.

Campus Alternate

Two-Wire Path and Decoders:

The 2-Wire option shall provide support for up to one-hundred and twenty-eight (128), 2-Wire stations connected to a single controller and shall provide support for up to 6 points of connection (POC's). The 2-Wire cable shall either be Paige P7354D or Regency's Hunter® Decoder cable with a maximum length of 7,000 ft. A ground rod, 5/8-inch x 8-ft solid copper shall be required every 300-feet along the 2-Wire path as well as a single ground rod at the end of the cable run.

The station decoder shall be a 2-station decoder and shall be able to operate up to 2-solenoids using unique colored wires for each. A single controller shall be able to operate up to 70, 2-station decoders and it shall be intended that all wire runs between valves and 2-Wire decoders shall be direct pulls and have no splices except at the decoder location. All electrical connections must be waterproof and moisture-resistant and shall be done with 3M™ Scotchcast™ 3570G Connector Sealing Packs. The 2-Wire decoders shall use #14 AWG direct burial wire to connect to remote control valves and the maximum wire run between the decoder and the valve shall be 100-feet.

The POC decoder shall operate a single master valve and flow meter (model FM 2U). A single controller shall be able to operate up to six POC decoders with a maximum of 12-POC's in a chain, controllers using *FLOWSENSE™* technology. The maximum wire run between the POC

decoder and flow meter shall be 20-feet while the maximum wire run between the decoder and the master valve shall be 100-feet.

END OF SECTION 32 84 00

SECTION 32 91 00 - Planting Preparation

General Standards

- Chemical soil analysis will dictate soil amendment materials to adjust pH and nutrients for optimal plant growth.
- Soil organic matter content will not be less than 2% or greater than 5%
- Soil shall be free of stones larger than $\frac{3}{4}$ " in diameter
- Mulch - Keep 2" minimum from bark of plant.
- Deep Root Planters are not to be used.

Herbicide Use

- Post-emergence (existing weeds): "Roundup" or approve equal.
- Pre-emergence (non-turf areas, prior to seed germination): "Ronstar" or approved equal.
- Post-emergence (turf areas): Speed Zone Southern
http://gordonsprofessional.com/products-1.php?PRODUCT_CODE=6561126 or approved equal.

END OF SECTION 32 91 00

SECTION 32 91 13 - SOIL PREPARATION

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

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

4.2 SUMMARY

- A. This Section includes soil and soil amendments products, including all imported topsoil as required to make up deficiencies in quantity of soil available on site. Execute all labor to achieve soil preparation, complete as shown and as specified.
- B. Products Installed but Not Furnished Under This Section:

1. "Landscape Drainage", Perforated Pipe, Drainage Fabric

4.3 DEFINITIONS

- A. Existing Soil: Area of undisturbed native soil where no rough grading is to be performed. Surface cultivation and soil amending are included in this Section. See Drawings.
- B. Subgrade: Soil level resulting from the rough grading work under another Section. Cultivation of all subgrade areas prior to placement of topsoil is included in this Section.
- C. Topsoil: Soil stockpiled for spreading over prepared subgrade.
 1. Stockpiled Native Topsoil: Topsoil stripped from the site prior to rough grading work under another Section, to be spread and amended as work under this Section.
 2. Imported Topsoil: Off-site topsoil imported and stockpiled under this Section, to be spread and amended as work under this Section.

4.4 SUBMITTALS

- A. Product Data: Manufacturer's current catalog cuts and specifications of the following:
 1. Fertilizer
 2. Compost
 3. Herbicide
 4. Filter Fabric
 5. Any materials recommended by Soils Testing amendment recommendations
- B. Quality Control Submittals:
 1. Testing Agency: Waypoint Analytical 1101 S. Winchester Blvd. Suite G 173San Jose, CA 95128, Tel. [408] 727-0330, or approved equal.
 2. Test Reports:
 - a. Existing soil: Test for agricultural suitability, parasitic nematodes, and herbicide contamination. Report to include amendment recommendations.
 - b. Stockpiled Native Topsoil: Test for agricultural suitability, parasitic nematodes, and herbicide contamination. Report to include amendment recommendations.
 - c. Imported Topsoil: Test for agricultural suitability, parasitic nematodes, and herbicide contamination. Report to include amendment recommendations to meet or exceed amended existing soil.
 3. Confirming Test Report:
 - a. Prior to installation the contractor shall provide a confirming test report to ensure amendments have been properly installed.

- b. If needed the report should indicate any additional amendment needed to ensure soil are agriculturally suitable for plant success.
- 4. Certificates: Certify strict compliance with accepted soil mixes and amendments, including rate of application.

4.5 QUALITY ASSURANCE

- A. Composition: All off-site or import soil needed to bring levels of landscape areas up to rough or finish grades, fill planters and tree wells, or other landscape areas shall be friable, fertile, & within the following ranges:
 - 1. < 30% Clay
 - 2. < 30% Silt
 - 3. > 50% Sand
- B. Condition: Soil shall be free from chemicals, debris, trash, rocks, and other material larger than one inch in diameter. Supply test results from independent testing agency as described herein, including from which soil was taken and agricultural crops grown on that site for the previous two years.
- C. Restrictions: Do not obtain topsoil from poorly drained sites such as bogs or marshes. Do not obtain topsoil from zone deeper than one foot below existing finish grade of borrow area.

PART 5 - PRODUCTS

5.1 MATERIALS

- A. Stockpiled Native Topsoil:
 - 1. Quantity: The approximate quantity of stockpiled native top-soil will not be known until demolition and rough grading have been completed under Civil work.
 - 2. Stockpiling: Stripped topsoil shall have been stockpiled on the site under Civil work.
 - 3. Composition: Fertile, friable, well-drained soil, of uniform quality, free of stones over 1 in. diameter, sticks, oils, chemicals, plaster, concrete, and other deleterious materials.
 - 4. Analysis: Obtain an agricultural suitability analysis of the proposed topsoil from an accepted, accredited Testing Agency at Contractor's cost.
 - 5. Test Results: Request Testing Agency to send one [1] copy of test results direct to the Landscape Architect and one [1] copy to the Owner. Imported topsoil shall be amended per soils analysis report.
- B. Imported Topsoil:
 - 1. Quantity: Import topsoil as soon as an insufficient quantity of native soil is verified. Quantity of topsoil to complete the work shall be calculated by the Contractor.

2. Stockpiling: Stockpile on site as directed by Owner.
3. Composition: To match or exceed in quality, accepted native stockpiled topsoil.
4. Analysis: Obtain an agricultural suitability analysis of the proposed topsoil from an accepted, accredited Testing Agency at Contractor's cost.
5. Review: The Landscape Architect reserves the right to take samples of the imported topsoil delivered to the site for conformance to the Specifications.
6. Rejected Topsoil: Immediately remove rejected topsoil off the site at Contractor's expense.

5.2 ACCESSORIES

- A. Fine Sand:
1. Physical Properties [by dry weight basis]:

<u>Percent</u> <u>Passing</u>	<u>Sieve Size</u>
100	4.76 mm[#4, 4 mesh]
95 - 100	1.00 mm [#18, 16 mesh]
65 - 100	500 micron [#35, 32 mesh]
0 - 50	250 micron [#60, 60 mesh]
0 - 20	105 micron [#140, 150 mesh]
0 - 5	53 micron [#270, 270 mesh]
 2. Chemical Properties: [by Saturation Extract Method]:
 - a. Soluble Salts/Salinity: Maximum conductivity of 3.0 millimhos/cm at 25 degrees C.
 - b. Boron: Maximum concentration of 1.0 ppm.
 - c. Sodium Absorption Ratio [SAR]: Maximum 6.0.
- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
1. Product: Spect(i)Cle – G, By Bayer Environmental Sciences
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.
1. Product: Cheetah Pro, by Nufarm,
<https://nufarm.com/usturf/product/cheetahpro/>
- D. Water: Clean, fresh, and potable, as available from Owner. Transport as required.
- E. Perforated Drain Pipe: See Division 32, Section "Landscape Drainage".
- F. Drain Rock:

1. Description: Hard, durable, clean, screened, uniformly sized broken stone or crushed gravel free of injurious materials or soil and all deleterious chemicals.
2. Size: $\frac{3}{4}$ " to 1" diameter, gap graded.

5.3 ORGANIC COMPONENTS

A. Yard Waste Compost:

1. Physical Properties:
 - a. Gradation: A minimum of 90% of the material by weight shall pass a $\frac{1}{2}$ " screen. Material passing the $\frac{1}{2}$ " screen shall meet the following criteria:

<u>Percent</u> <u>Passing</u>	<u>Sieve Designation</u>
85 - 100	9.51 mm [3/8"]
50 - 80	2.38 mm [No. 8]
0 - 40	500 micron [No.35]

- b. Organic Content: Minimum 50% based on dry weight and determined by ash method. Minimum 250 lbs. organic matter per cubic yard of compost.
 - c. Carbon to Nitrogen Ratio: Maximum 35:1 if material is claimed to be nitrogen stabilized.
 - d. pH: 5.5 - 8.0 as determined in a saturation extract.
 - e. Soluble Salts: Sodium should account for less than 25% of the total salinity level. The addition of the compost shall result in a final ECe of the amended soil of less than 4.0 ds/m @ 25 degrees C as determined in a saturation extract.
 - f. Moisture Content: 35 - 60 %
 - g. Contaminants: The compost shall be free of contaminants such as glass, metal, and visible plastic.
 - h. Maturity: Physical characteristics suggestive of maturity include:
 - 1) Color: Dark brown to black.
 - 2) Odor: No odors, soil-like, musty, and moldy are acceptable. Sour, ammonious, or putrid is unacceptable.
 - 3) Particle Characterization: Identifiable wood pieces are acceptable, but the balance of material should be soil-like without recognizable grass or leaves.
 2. Mulch and compost in stormwater management measures and general landscape areas shall meet sb 1383 regulatory requirements. Compost must be produced at a permitted composting facility; digestate, biosolids, manure, and mulch do not qualify as compost.
 3. Eligible mulch must be derived from organic materials and be produced at a permitted transfer station, landfill, or composting facility.
 4. Examples of allowed compost include arbor mulch and composted mulch.

5. Examples of allowed mulch include mulch made from recycled pallets and dimensional lumber, aged tree trimmings, wood fines, and screened compost overs.
6. Mulch must meet or exceed the physical contamination, maximum metal concentration, and pathogen density standards for land application specified in 14 ccr 17852(a)(24.5)(a)1 through 3.
7. Compost Source: per local sources, contractor to source acceptable matured material that meets the specification provided.
 - a. Use one source throughout the project.

5.4 CHEMICAL COMPONENTS:

- A. The following additives may or may not be used depending on the outcome of the soils report.
- B. Ground Limestone: Agricultural limestone containing not less than 85% of total carbonates, ground to such fineness that 50% will pass #100 sieve and 90% will pass #20 sieve.
- C. Dolomite Lime: Agricultural grade mineral soil conditioner containing 35% minimum magnesium carbonate and 49% minimum calcium carbonate, 100% passing #65 sieve.
- D. Gypsum: Agricultural grade product containing 80% minimum calcium sulphate.
- E. Iron Sulfate [Ferric or Ferrous]: Supplied by a commercial fertilizer supplier, containing 20% to 30% iron and 35% to 40% Sulphur.
- F. Sulphate of Potash: Agricultural grade containing 50% to 53% of water-soluble potash.
- G. Single Superphosphate: Commercial product containing 20% to 25% available phosphoric acid.
- H. Ammonium Sulphate: Commercial product containing approximately 21% ammonia.
- I. Ammonium Nitrate: Commercial product containing approximately 34% ammonia.
- J. Calcium Nitrate: Agricultural grade containing 15-1/2% nitrogen.
- K. Urea Formaldehyde: Granular commercial product containing 38% nitrogen.
- L. I.B.D.U. [Iso Butyldiene Diurea]: Commercial product containing 31% nitrogen.
- M. Soil Sulfur: Agricultural grade sulfur containing a minimum of 96% sulfur.

5.5 FERTILIZER FOR TURF AREAS (NON-ATHLECTIC FIELDS)

- A. Product: 6-24-24XB + as manufacture by BEST
 - 1. Dust free, homogeneous pellet now containing a 1-4-4 ratio of nitrogen, phosphorous and potassium with non-staining iron and sulfur.

PART 6 - EXECUTION

6.1 SOIL MOISTURE CONTENT

- A. General: Do not work soil when moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in air or that clods will not break readily. Apply water, if necessary, to bring soil to an optimum moisture content for tilling and planting.
- B. Range: Maintain within 2 percent above or below optimum moisture content at all times during the work.

6.2 CLEARING AND CULTIVATION

- A. Clearing: Clear all planting areas of stones 2 in. diameter and larger, weeds, debris, and other extraneous materials prior to soil preparation work.
- B. Cultivation of Existing Soil:
 - 1. Cultivation: Rip or cultivate areas of existing soil to receive planting to a depth of 12 in. immediately prior to applying soil amendments.
- C. Cultivation of Subgrade:
 - 1. Verification:
 - a. Verify that subgrades for installation of topsoil have been established under rough grading. Do not spread topsoil prior to acceptance of subgrade work.
 - b. Depth: Verify that subgrades are 12 in. minimum below finished grades. Report all variations.
 - 2. Cultivation: Rip or cultivate subgrade in planting areas to a depth of 12 in. immediately prior to spreading topsoil.

6.3 SPREADING OF TOPSOIL

- A. General: Spread Stockpiled topsoil over accepted subgrade prior to incorporating amendments.
- B. Restrictions: Do not commence spreading of topsoil prior to acceptance of soil cultivation above. Do not place topsoil under muddy [or frozen] conditions.
- C. Topsoil Depth: Minimum depth of 12 in. after natural settlement and light rolling conforming to finished grades shown on Drawings.

6.4 SOIL AMENDMENT

- A. Amending of Existing Soil:
 - 1. Preparation: Do not commence amending of existing soil prior to acceptance of soil cultivation above. Do not work soil under muddy conditions.
 - 2. Soil Amendments per 1,000 Square Feet: Incorporate thoroughly with top six [6] in. of all existing planting and lawn areas:
 - a. 4 cubic yards organic amendment as specified
 - b. 50 pounds preplant fertilizer - 6-20-20 [N-P-K]
 - c. Chemical additives per soils report, if any
- B. Amending of Spread Topsoil:
 - 1. Soil Amendments per 1,000 square feet: Incorporate thoroughly with top six [6] in.:
 - 4 cu. yd. Yard waste compost
 - 30 lbs. 6-20-20 Commercial Fertilizer
 - 50 lbs. Dolomite Lime
 - 10 lbs. Iron Sulfate
- C. Intent: The above amendments and quantities are approximate and are for bidding purposes only. Following an on-site topsoil analysis by Testing Agency, composition of amendments may change. Contract Price will be adjusted accordingly.

6.5 PRE-EMERGENT HERBICIDE

- A. Apply pre-emergent weed control to all [on-grade] areas to receive woody, non-lawn ornamental planting after incorporating soil amendments.
- B. Apply strictly according to manufacturer's current printed specifications.

6.6 FIELD QUALITY CONTROL

- A. Tests: Contractor shall take samples of soil mixes or prepared soil for testing for conformity to Specifications.
- B. Rejected Materials: Remove off site at Contractor's cost. Pay cost of testing of materials, not meeting Specifications.

END OF SECTION 32 91 13

SECTION 32 93 00 PLANTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes planting complete, as shown and as specified.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's current catalog cuts and specifications of the following:
 - 1. Mulch.
 - 2. Supplemental Planting Additive
 - 3. Tree Stakes System Materials.
 - 4. Herbicides
 - 5. Pre-Emergent Herbicide
 - 6. Steel Header
- B. Plant Materials Information:
 - 1. List of all plant material indicated on the drawings including size and nursery source.
 - 2. Provide images of all plant materials. Images should be taken from the nursery of organ.
- C. Samples:
 - 1. Mulch: One [1] pint, each type.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Do not deliver to the site diseased or insect-infested plant materials.
- B. Labeling: Furnish standard products in manufacturer's standard containers bearing original labels legibly showing quantity, analysis, genus/species and name of manufacturer/grower.
- C. Storage: Protect metal containers from sun during summer months with temperatures above 80 degrees F. Keep plants that cannot be planted immediately upon delivery in the shade, well-protected, and well-watered.
- D. Handling: Do not lift or handle plants by tops, stems, or trunks at any time. Do not bind or handle plants with wire or rope at any time, except wrapped rootball of field dug material.

1.5 PROJECT/SITE CONDITIONS

- A. Replacement of Damaged Plants:
 - 1. Replace existing plants to remain that are damaged by Contractor during construction with accepted plants of the same species and size as those damaged at no additional cost to Owner.
 - 2. Campus Landscape Services Representative and/or Landscape Architect will determine extent of damage and value of damaged plants.

1.6 SEQUENCING AND SCHEDULING

- A. Acceptance: Do not install plant materials prior to acceptance of finish grades [and main line trenching/installation of irrigation system].
- B. Coordination: Coordinate with work of other sections to insure the following sequence of events:
 - 1. General: Sprinkler system to be installed and operable prior to installation of plant materials. Schedule hand watering of all plant materials installed prior to sprinkler irrigation system.
 - 2. Headers: Install prior to installation of adjacent sprinkler irrigation system.
 - 3. Trees in Paving: As necessary, install prior to installation of paving under another Section. See Drawings.
 - 4. Pruning: Do not prune plant materials prior to installation and acceptance. Request review by Landscape Architect or Campus Landscape Services Representative prior to pruning.

1.7 WARRANTY

- A. Warrant that all plants planted under this Contract will be healthy and in flourishing condition of active growth one [1] year from date of Final Acceptance. Similarly warrant groundcover for a period of six [6] months from date of Final Acceptance.
- B. Correct Species: Warrant that all plant materials are true to species and variety.
- C. Delays: Delays caused by the Contractor in completing planting operations that extend the planting into more than one planting season shall extend the Warranty Period correspondingly.
- D. Condition of Plants: Plants shall be free of dead or dying branches and branch tips, with foliage of normal density, size, and color.
- E. Replacements: As soon as weather conditions permit, replace, without cost to Owner all dead plants and all plants not in a vigorous, thriving condition, as determined by Landscape Architect during and at the end of Warranty Period.
- F. Exclusions: Contractor shall not be held responsible for failures due to neglect by Owner, vandalism, and natural disaster, during Warranty Period. Report such conditions.

1.8 MAINTENANCE PERIOD AND FINAL ACCEPTANCE

- A. See Division 32 - Section 'Landscape Establishment'.

1.9 REPLACEMENTS

- A. Failed Materials:
 - 1. Repair and/or replace at no cost to the Owner all plant materials exhibiting conditions which are determined as unacceptable due to workmanship by the Contractor.
 - 2. Closely match replacements to adjacent specimens of the same species. Apply requirements of this Specification to replacements.
 - 3. Contractor shall be held responsible for a maximum of two [2] replacements for each failed tree, shrub and vine, and same area of groundcover planting after final acceptance during warranty period.
- B. Incorrect Materials:
 - 1. During Warranty Period, replace at no cost to Owner plants revealed as being untrue to name and species.
 - 2. Provide replacements of a size and quality to match the planted materials at the time the mistake is discovered.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plant Materials: Verify that all container stock [excluding annuals] has been grown in the containers in which delivered for at least one growing season, but not over two [2] years.
 - 1. Growing Conditions: Plants shall be nursery-grown in accordance with good horticultural practices under climatic conditions similar to those of project for at least two years unless otherwise specifically authorized.
 - 2. Appearance: Trees shall be exceptionally heavy, symmetrical, tightly knit, and so trained or favored in development and appearance as to be superior in form for their species, with regard to number of branches, compactness, and symmetry.
 - 3. Vigor: Plants shall be sound, healthy, vigorous, well branched, and densely foliated when in leaf. They shall be free of disease, insect pests, eggs, or larvae. They shall have healthy, well-developed root systems. Plants shall be free from physical damage or adverse conditions that would prevent thriving growth.
- B. Condition of Root System: Samples must prove to be completely free of circling, kinked or girdling trunk surface and center roots and show no evidence of a pot-bound condition. Upon inspection by Landscape Architect at the job site, if five [5] percent or more of the plants of each species are found to contain kinked, circling, or girdling roots, all plants of that species will be rejected.
- C. Measurements:
 - 1. General: Take caliper measurement at a point on the trunk 6 in. above natural ground line for trees up to 4 in. in caliper [and at a point 12 in. above the natural ground line for trees over 4 in. in caliper.]
 - a. Measure foliage across mean foliage dimension when branches are in their normal upright position.
 - b. For trees to be supplied in "raised up" condition, foliage origin along main trunk shall be measured from soil line after installation.
 - c. Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Properly trimmed plants shall measure the same in any direction. If a plant is unevenly grown, it shall be classified in the size category of the smallest dimension.
 - 2. Size Range: If a range of size is given, do not use plant materials less than the minimum size. The measurements specified are the minimum size acceptable and are the measurements after pruning, where pruning is required. Plants that meet the measurements specified, but do not possess a normal balance between height and spread shall be rejected.
 - 3. Substitutions: Substituted plants shall be true to species and variety and shall conform to measurements specified except that plants larger than specified may be used if accepted. Use of such plants shall not increase Contract price. If larger plants are accepted, increase the ball of earth in proportion to the size of the plant. Plants overgrown for their container size will be rejected.

- D. Unacceptable Trees: Trees that have damaged or crooked leaders, will be rejected. Trees having a main leader shall not have been headed back. Trees with abrasions of the bark, sunscalds, disfiguring knots, or fresh cuts of limbs over 3/4 in. which have not completely callused, will be rejected.
- E. Pruning: Do not prune plants before delivery. Consult Landscape Architect for pruning after installation.

2.2 MIXES

- A. Backfill Mix for Plant Pits: See Drawings.
- B. Commercial Fertilizers:
 - 1. Top-dress Fertilizer: Complete fertilizer, 16-6-8 (N-P-K). 50 percent of the nitrogen to be derived from natural organic sources or urea-form. Available phosphoric acid shall be from superphosphate, bone, or tankage. Potash shall be derived from muriate of potash containing 60 percent potash.
- C. Supplemental Mycorrhizal Inoculum:
 - 1. Supplemental Mycorrhizal Inoculum Tablets: Endo-Ecto Tablets containing 17 Endo-Ecto Mycorrhizal inoculum and 17-9-5 NPK. Product shall increase water and nutrient holding capacity in the soil and naturally increase root mass.
 - a. Product: Tri –C Myco Tabs or Equal.

2.3 PESTICIDES AND HERBICIDES

- A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
 - 1. Product: Spect(i)Cle – G, By Bayer Environmental Sciences
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.
 - 1. Product: Cheetah Pro, by Nufarm, <https://nufarm.com/usturf/product/cheetahpro/>

2.4 ACCESSORIES

- A. Tree Staking:

1. Stakes: Lodgepole Pine with 10 in. tapered driving point and chamfered top, treated with copper naphthanate to heartwood.
 2. Ties: Black rubber tire tie or other tie as accepted by Landscape Architect.
 3. Spreader Board: 1" x 4" treated wood, length determined by stake spacing.
- B. Wood Chip Mulch:
1. Type: Composted pine or fir bark, free of sticks, dirt, dust, and other debris, as accepted. No painted bark will be accepted.
 2. Size: 3/4 in. to 1-1/2 in. diameter.
 3. Mulch and compost in stormwater management measures and general landscape areas shall meet sb 1383 regulatory requirements. Compost must be produced at a permitted composting facility; digestate, biosolids, manure and mulch do not qualify as compost. Eligible mulch must be derived from organic materials and be produced at a permitted transfer station, landfill, or composting facility. Examples of allowed compost include arbor mulch and composted mulch. Examples of allowed mulch include mulch made from recycled pallets and dimensional lumber, aged tree trimmings, wood fines, and screened compost overs. Mulch must meet or exceed the physical contamination, maximum metal concentration, and pathogen density standards for land application specified in 14 ccr 17852(a)(24.5)(a)1 through 3.
 4. Builder/contractor shall supply final sb 1383 compost and mulch reporting form and attach all approved compost, mulch, and related product submittals used for the project after completion of landscape work. Attach all technical data sheets for all products identified in reporting form.
- C. Steel Header:
1. Size: As shown on Drawings, or as required by site conditions. 3/16 in. x 4 in. powder coated steel with 16 in. long stakes.
 2. Color: Black or Natural
- D. Water:
1. Clean, fresh and potable, furnished by Owner, and paid for by the contractor
 2. Transport as required.

2.5 SOURCE QUALITY CONTROL

- A. Review: Submit a written request for review of plant materials and quantity at place of growth at least thirty [30] calendar days prior to shipment to site. Right is reserved to refuse review at this time if a sufficient quantity of plants is not available.
- B. Transportation: Contractor shall accompany Landscape Architect to all review[s] of plant materials at the nursery. Landscape Architect will tag plants at place of growth and review upon delivery for conformity to specifications.

- C. Distant Material: Submit photographs with a person adjacent to each plant type for preliminary review. Such review shall not impair the right of review and rejection during progress of the work.
- D. Unavailable Material: If proof is submitted that a specified plant is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. Substantiate such proof in writing no later than 30 days after award of contract.
- E. Special Conditions: The above provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 - 1. Finish Grades: Finish grades for planting areas shall have been established. Verify that all grades are within 1 in. plus or minus of required finish grade.
 - 2. Soil Preparation: Do not commence planting work prior to completion and acceptance of soil preparation.
 - 3. Irrigation: Verify that irrigation system has been installed and accepted.

3.2 PREPARATION

- A. Layout and Staking: Lay out plants at locations shown on Drawings. Stake each tree, not specifically located by dimension or alignment.
- B. Review: Locations of plants will be checked in the field and will be adjusted to exact position before planting begins. Right is reserved to refuse review at this time if, in the Landscape Architect's opinion, an insufficient quantity of plants is available.
- C. Digging Plant Pits: Dig tree pits and scarify all sides of the tree pit after excavation - see below. Do not use an auger or tree spade.
- D. Containerized Plant Pits: Excavate square plant pits to depth of rootball as follows:

	<u>Width</u>	<u>Depth</u>
Boxed Trees	Box + 24 in.	Box
Container Trees/Shrubs	Container + 18 in.	Container
Vines	Container + 12 in.	Container

3.3 DRAINAGE TEST OF PLANT PITS/OBSTRUCTIONS

- A. Testing: Immediately after completion of excavation, test drainage of plant pits by filling with water twice in succession. Give written notification of conditions permitting the retention of water in plant pits for more than twenty-four [24] hours.
- B. Correction: Submit for acceptance a written proposal and cost estimate for the correction of poor drainage conditions before proceeding with planting.
- C. Obstructions: If rock, underground construction work, tree roots or other obstructions are encountered in the excavation of plant pits, acceptable alternate locations may be used at direction of Landscape Architect.
- D. Percolation Test Pit:
 - 1. Location: At four [4] locations as determined by the Landscape Architect on site.
 - 2. Restrictions: Do not perform test on a rainy day [or during freezing weather]. Repeat all tests interrupted by rain or cold.
 - 3. Procedure:
 - a. Dig test pit of a size specified for the tree pits, a minimum of 4 ft. deep. Legibly calibrate a stake at 1 in. intervals and drive it firmly into the undisturbed soil at the bottom of the pit.
 - b. Fill test pit with water to within 1 ft. of the finish grade. Immediately record water level on the stake.
 - c. After 3 hours, record water level again. Repeat recording of water level once each hour for the succeeding five hours.
 - 4. Documentation: Submit written documentation of all test pit results dated and signed by the tester.
 - 5. Acceptable Rate: 2 in./hr. or more. Marginal Rate: 1 in. to 2 in./hr. Unacceptable Rate: 1 in./hr. or less.

- 3.4 HEADERS:** Lay out locations of headers for review prior to final installation. Install per details in Drawings true to line and grade.

3.5 TREE, SHRUB AND VINE PLANTING

- A. Handling and De-potting of Plant Materials:
 - 1. Damage: Avoid damage to [containers] [wrappings] and root balls. If rootball is cracked or broken during handling and de-potting, plant will be rejected. Do not remove plant from container prior to completion of plant pit preparation.
 - 2. Containerized Trees and Shrubs: Metal Containers: Cut container on two sides with accepted cutting tool. Do not use spade. Plastic Containers: Tip container to horizontal orientation and shake carefully to remove shrub. Support rootball during installation to prevent cracking or shedding of soil.

3. Boxed Trees: Lift from bottom with forklift or from sides with 2 in. x 4 in. rails nailed to each side of box. Do not remove box prior to settling tree in plant pit. Remove sides of box after acceptance by Landscape Architect and prior to backfilling. Bottom of box may be left in place.
 4. Balled and Burlapped Plants: Lift and carry by bottom of ball only. Do not remove wrapping until plant is set in plant pit. Cut all wire and peel wire and burlap away from upper 1/3 of rootball prior to backfilling.
- B. Installation:
1. Scarification:
 - a. Plant Rootball: After removing plant from container, scarify the sides of the rootball to a depth of 1 in. at four to six equally spaced locations around the perimeter of the ball or at 12 in. intervals on sides of boxed materials. Cut and remove circling roots over 3/8 in. diameter.
 - b. Plant Pit: Scarify sides of plant pit, thoroughly breaking up surfaces and eliminating "glazed" areas.
 2. Positioning: Backfill plant pit to allow setting crown of tree 2 in. above new finish grade and crown of shrub 1 in. above finish grade. Thoroughly foot tamp all backfill. Position plant in planting pit, maintaining plumb condition. Maintain throughout all planting operations.
 3. Backfilling:
 - a. Use backfill mix to backfill [on-grade] plant pits as shown on Drawings. [Use lightweight permeable planting soil mix to backfill on-structure plant pits.] Brace each plant plumb and rigidly in position until planting soil has been tamped solidly around the ball and roots.
 - b. When plant pits have been backfilled approximately 2/3 full, water thoroughly and saturate rootball, before installing remainder of the backfill mix to top of pit, eliminating all air pockets.
 4. Staking and/or Guying: When required, stake or guy as specified below.
 5. Fertilizer Tablets: Place evenly distributed in plant pits when backfilled 2/3 according to the following schedule or per Manufacturer's latest specifications.

1-gallon containers	2 tablets	24 in. box	8 tablets
5-gallon containers	4 tablets	36 in. box	10 tablets
15-gallon containers	6 tablets	48 in. box	12 tablets
- C. Watering Basin: Form saucer with 3 in. high berm centered around tree and shrub pits 12 in. wider than ball diameter. Do not form saucers around trees in lawn areas.
- D. Watering: Immediately water all plants after completion of planting operations.

3.6 STAKING AND GUYING

- A. General:
1. Trees shall be able to stand upright without support and shall return to the vertical after their tops have been deflected horizontally and released. Stake or guy trees that do not meet this qualification.
 2. Trees shall remain plumb and straight from installation through the warranty period.
- B. Staking: Stake all trees under 3-1/4 in. caliper in accordance with the following table:

Tree Caliper @ 12 in.

<u>Above-Grade</u>	<u>Qty. of Stakes</u>	<u>Stake Size</u>
To 1-3/4 in.	2	2 in. diam. x 8 ft. min.
2 in. to 3 in.	2	3-1/2 in. diam. x 10 ft. min.

1. Locate stakes as detailed in the Drawings, perpendicular to prevailing wind and as close to the main trunk as is practical, avoiding root injury. Drive stakes at least 36 in. into firm ground.
2. Nail 1 in. x 4 in. spreader board to stakes at detailed height making sure minimum trunk clearance is maintained.
3. Remove nursery-supplied stake and tie to new stakes using two tree ties. Find proper height for point of tree tie and attach as follows:
 - a. Hold trunk in one hand, pull top to one side and release. Height at which trunk will snap back to upright position while hand-held is Base Height. Attach tree ties to trunk 6 in. above Base Height.
 - b. Nail rubber ties to stakes using two [2] galvanized roofing nails at each end of tie. After total securement, cut off stakes to an even height determined by the Landscape Architect.

3.7 PESTICIDES AND HERBICIDES

- A. Apply pre-emergent weed control to all [on-grade] areas to woody, non-lawn ornamental planting after incorporating soil amendments.
- B. Apply strictly according to manufacturer's current printed specifications.
- C. Install per the manufacture current specifications and recommendations for all installations and applications.

3.8 MULCHING

- A. Install a 3 in. deep layer of mulch over all shrub areas including tree and shrub watering basins.
1. Mulch shall be pulled back from the base of plant materials at a 3" distance typical.

END OF SECTION 32 93 00

SECTION 32 93 43 - Trees

Tree Planting

Trees are to be placed so the crown of the ball is 2" above surrounding grade and backfill with native soil in 6" lifts. Backfill soil should be watered to settle the soil after each lift. Fertilizer tablets should be distributed evenly around root ball at midway. 3" high water basins shall be built around tree pit and thoroughly watered. The same process should be performed for smaller plants but appropriate basin to the relative size of the plant.

Staking/Grates/Guards

- Tree stakes shall be driven 3'-0" into the ground alongside the root ball at 18" apart. Tie trees to stakes at 12" from top of stake and 36" from top of stake utilizing cinch-ties with ties interlocked around trees as approved by the University. Cinch-ties should be stapled to stakes with staples over cinch-tie, not through it.
- Tree grates shall be installed according to manufacturer's recommendations
- Tree guards will be placed only as required to protect the tree from direct contact with vehicles.

Approved Trees for Campus Planting:

Scientific Name	Common Name
<i>Acacia pendula</i>	Weeping myall
<i>Alectryon excelsus</i>	New Zealand ash or titoki
<i>Angophora costata</i>	Rose gum
<i>Bischofia javanica</i>	Toog tree
<i>Caesalpinia ferrea</i>	Leopard tree
<i>Callistemon salignus</i>	Willow bottlebrush
<i>Castanospermum australe</i>	Moreton Bay chestnut
<i>Cryptocarya rubra</i>	Red laurel
<i>Dalbergia sissoo</i>	Sissoo
<i>Elaeocarpus sylvestris</i>	Japanese blueberry tree
<i>Eucalyptus spathulata</i>	Swamp mallet
<i>Ficus sur</i>	Cape fig
<i>Harpephyllum caffrum</i>	Kaffir plum

Scientific Name	Common Name
<i>Melaleuca styphelioides</i>	Prickly-leaved paperbark
<i>Peltophorum dubium</i>	Yellow poinciana
<i>Quercus hypoleucoides</i>	Silverleaf oak
<i>Robinsonella cordata</i>	Blue hibiscus tree
<i>Sophora secundiflora</i>	Texas mountain laurel
<i>Syzygium smithii</i>	Lilly-pilly
<i>Taxodium huegelii</i>	Montezuma bald cypress
<i>Tupidanthus calyptratus</i>	Mallet flower
<i>Agathis spp.</i>	Kauri pines
<i>Brahea edulis</i>	Guadalupe palm
<i>Brahea armata</i>	Blue Hesper palm
<i>Caryota spp.</i>	Fishtail palm
<i>Cedrela fissilis</i>	Brazilian cedarwood
<i>Ceiba insignis</i>	White floss-silk tree
<i>Cercidiphyllum japonicum</i>	Katsura tree
<i>Chiranthodendron pentadactylon</i>	Monkey hand tree
<i>Dipteronia sinensis</i>	Chinese Dipteronia
<i>Dombeya spp.</i>	Snowball tree
<i>Ficus auriculata</i>	Roxburgh fig
<i>Ficus sycomorus</i>	Sycamore fig
<i>Glyptostrobus pensilis</i>	Water pine
<i>Griselinia spp.</i>	Puka
<i>Harpullia pendula</i>	Tulipwood
<i>Harpullia arborea</i>	Tulipwood
<i>Howea forsteriana</i>	Kentia palm
<i>Howea belmoreana</i>	Curly palm
<i>Lagunaria patersonii</i>	Primrose tree
<i>Liquidambar orientalis</i>	Turkey sweet gum
<i>Liriodendron chinense</i>	Chinese tulip tree
<i>Markhamia lutea</i>	African trumpet tree

Scientific Name	Common Name
<i>Melia azedarach</i>	Chinaberry
<i>Parkinsonia aculeata</i>	Mexican palo verde
<i>Parkinsonia</i> x ' <i>Desert Museum</i> '	Desert museum palo verde
<i>Persea indica</i>	Ornamental avocado
<i>Pinus densiflora</i>	Japanese red pine
<i>Pinus roxburghii</i>	Chir pine
<i>Pinus torreyana</i>	Torrey pine
<i>Pittosporum angustifolium</i>	Willow Pittosporum
<i>Platanus orientalis</i>	Eastern sycamore
<i>Platanus occidentalis</i> *	Western sycamore
<i>Platanus Mexicana</i> *	Mexican sycamore
<i>Pseudotsuga macrocarpa</i>	Bigcone spruce
<i>Pseudotsuga menziesii</i>	Douglas-fir
<i>Quercus virginiana</i>	Southern live oak
<i>Quercus engelmannii</i>	Engelmann oak
<i>Sciadopitys verticillata</i>	Japanese umbrella pine
<i>Spathodea campanulata</i>	African tulip tree
<i>Taxus spp.</i>	Yews
<i>Tilia spp.</i>	Lidens
<i>Torreya californica</i>	California nutmeg tree
<i>Tristaniaopsis laurina</i>	Water gum
<i>Ulmus pumila</i>	Siberian elm
<i>Sophora japonica</i>	Japanese pagoda tree
<i>Allocauarina torulosa</i>	Forest oak
<i>Corynocarpus laevigata</i>	New Zealand laurel
<i>Meryta sinclairii</i>	Puka
<i>Olea africana</i>	African olive
<i>Quillaja saponaria</i>	Soapbark tree
<i>Taxodium mucronatum</i>	Montezuma cypress
<i>Trachycarpus wagnerianus</i>	Dwarf Chusan palm

Scientific Name	Common Name
* Riparian Locations Only	

Tree Transplanting

Palm Tree Transplanting and Planting

Size of palms to plant

- Large palms are easier to planted or transplanted.
- Containerized palms, with little or no root disturbance, size is dependent on the capacity of the equipment to move and handle large, heavy specimens safely.

For palms transplanted from one site to another or field-grown plants dug in a nursery, it is Important to select specimens with some visible trunk or stem because they are more tolerant of root disturbance and will reestablish more quickly and successfully.

Do not transplant the following species with visible above-ground trunks:

- *Sabal* (palmetto palm)
- *Bismarckia* (Bismark palm)
- *Latania* (Latan palm)

When to plant/transplant

- Root growth is essential for rapid and successful establishment. Root growth is highest during warmer months.
- Transplant palms in the beginning of the warm season to ensure several months of high temperatures for adequate root growth.
- Container palms can be planted safely year-round.
- Size of root ball
 - Most palm species with root balls extending out 12 inches from the trunk and 12 to 24 inches deep are adequate for transplanting.
 - A deeper root ball will help to stabilize taller specimens.
 - The larger the root ball the more successful and quick is establishment.
 - Palms with excessively large root balls are more difficult and expensive to move due to their size and weight.
 - The hole left after a palm with a large root ball has been dug usually must be filled, requiring more labor and expense, and perhaps even additional soil.

Leaf removal/Tie up

- Consult Cal Poly Landscape Representative to determine if this is necessary. The practice has little value when transplanting in cooler, more humid coastal areas.
- To protect the palm and for ease of handling, tie up leaves during digging, transporting, and replanting. In appropriate situations, untie leaves once the palm is replanted.

Transport

- Palm specimens must be well supported and protected during moving and handling to prevent injury to the apical bud or meristem and trunk.
- Protect palm bark; wounds and injuries are permanent and potential sites for disease and insect entry.
- Some species, like *Archontophoenix cunninghamiana* (king palm), are sensitive to handling. They and other slender trunked palms with heavy crowns should have a wooden splints attached along the trunk and extending into the leaves to prevent the weight of the crown from damaging the apical bud.
- Tie stems together of the multi-trunked species for additional protection.
- Use nylon and/ or burlap slings and ties to support and grasp palms to prevent injury to the trunk when moving and handling with heavy equipment.
- Stack or shingle palms securely on the vehicle, either standing them up at an angle from the wind or laying them down with the root balls forward and the crowns at the rear.
- Cover root balls and crowns with shade cloth or other protective material during transport to prevent wind and sun damage and excessive drying.

Planting

- Backfill with the same unamended soil excavated from the hole.
- To support the stability of larger palms, consider backfilling with washed builder's sand to pack more easily and uniformly.
- There is no benefit to amending the backfill with organic matter. Use organic matter as mulch several inches deep and several feet out from the palm's base. Tamp out air pockets.
- If stabilization is required for large palms:
 - Use 2 x 4 or 4 x 4 wooden bracing attached against one-foot lengths of 2 x 4 vertically strapped or banded around the trunk.
 - Protect the trunk with nylon, burlap, or other suitable material where the one-foot lengths of 2 x 4 are secured.
 - Do not nail into the trunk; nailing will cause permanent wounds, and disease and insect entry sites.
 - Palms may also be secured with guy wires or cable instead of wooden bracing.

- Do not stabilize palms by planting them deeper in the hole; although some palms survive deep planting, most do not.
- Construct an irrigation berm four to six inches around the root ball and hole.
- Provide a two- to three- inch layer of mulch around the base of the palm to encourage new root growth, conserve moisture, and suppress weeds.
- Irrigate deeply and thoroughly.

Post-planting care

- Schedule irrigations based on need, not a clock or calendar.
- Irrigate sensibly, keeping the root ball and backfill evenly moist but not saturated.
- Keep turf grass and weeds away from the trunk base.
- Maintain a regular and complete fertilizer program once the palm is fully established.

END OF SECTION 32 96 43

SECTION 32 98 13 - LANDSCAPE ESTABLISHMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes landscape establishment, complete as specified during progress of the work, after installation, and for a period of 2 years after Preliminary Acceptance.

1.3 SUBMITTALS

- A. Quality Control Submittals:

1. Schedule of establishment operations and monthly status report including list of equipment, materials proposed for the job, and watering schedule.
 2. Licenses, permits and insurance required by the City of San Luis Obispo and the State or Federal government pertaining to establishment work.
 3. Monthly record of all herbicides, insecticides, and disease control chemicals used for the project.
 4. Written application recommendation by a licensed agricultural pest control advisor for all weed, pest, and disease controls restricted by the Director of Agriculture proposed for this work.
- B. Project Close-out Submittal: Include in a single, 3-ring binder a landscape establishment manual containing an indexed collection of all schedules, records, and permits listed above, as well as a documentation of accepted condition of planting and irrigation at Final Acceptance.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Experience: The landscape contractor or maintenance subcontractor shall have a full-time employee assigned to the job as foreman for the duration of the contract. He/she shall have a minimum of four [4] years' experience in landscape maintenance supervision, with experience or training in [turf management], entomology, pest control, soils, fertilizers, and plant identification.
 2. Labor Force: The landscape maintenance labor force shall be thoroughly familiar with, and trained in, the work to be accomplished and shall perform the task in a competent, efficient manner acceptable to the Owner.
- B. Requirements:
1. Supervision: The foreman shall directly supervise the work force at all times. Notify Owner of all changes in supervision.
 2. Identification: Provide proper identification at all times for landscape maintenance firm's vehicles and labor force. Be uniformly dressed in a manner satisfactory to the Owner.

1.5 PROJECT/SITE CONDITIONS

- A. Site Visit: At beginning of establishment period, visit and walk the site with the Owner's representative to clarify scope of work and understand existing project/site conditions.
- B. Documentation of Conditions: Document general condition of existing trees, shrubs, vines, groundcovers, and lawn recording all plant materials which are healthy, thriving, damaged, dead, or dying.

- C. Irrigation System: Document general condition of existing irrigation system, making sure that faulty electrical controllers and broken or inoperable sprinkler heads [or emitters] are reported.

1.6 SEQUENCING AND SCHEDULING

- A. Perform all maintenance during hours mutually agreed upon between Owner and Contractor.
- B. Work force shall be present at the project site at least once a week and as often as necessary to perform specified maintenance in accordance with the approved planting establishment schedule.

1.7 WARRANTY

- A. Specific Requirements: Refer to the following sections:
 - 1. Division 32, Section "Planting".

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: All materials and equipment shall be provided by the Contractor, except as specified below.
- B. Water: Clean, potable, and fresh, as available from Owner
- C. Fertilizers:
 - 1. Tightly-compressed, slow-release, and long-lasting complete fertilizer tablets bearing manufacturer's label of guaranteed analysis of chemicals present.
 - 2. Balanced, once-a-season application, controlled-release fertilizers with a blend of coated prills which supply controlled-release nitrogen, phosphorus, and potassium, and uncoated, rapidly soluble prills containing nitrogen and phosphorus.
- D. Herbicides, Insecticides, and Fungicides:
 - 1. Best quality materials with original manufacturers' containers, properly labeled with guaranteed analysis.
 - 2. Use non-staining materials.
- E. Lawn Seed for Reseeding: Match existing lawn mix, as needed per project requirements.

- F. Lawn Sod for Resodding: Match existing sodded lawn, as needed per project requirements.
- G. Replacement Tree Guys, Stakes, Ties and Wires: Match originally accepted existing materials on the site.

2.2 EQUIPMENT

- A. General: Use only the proper tool for each job. Maintain all tools in sharp, properly functioning condition. Clean and sterilize pruning tools prior to usage.
- B. Insect/Disease Prevention: Take all measures to prevent introduction of insect or disease-laden materials onto the site. See Division 32, Section "Planting".

PART 3 - EXECUTION

3.1 STARTING THE PLANTING ESTABLISHMENT PERIOD

A. Criteria for Start of Establishment Period: At the request of the Contractor, the Landscape Architect shall review the progress of landscape installation for substantial completion. Landscape installation is substantially complete based on the judgment of the Landscape Architect and the following criteria:

- 1. Irrigation System is completely installed and automatically operated by the specified controller. Use of a temporary controller to attain substantial completion does not meet the criteria for substantial completion and will be rejected until the specified controller is installed and operable.
- 2. Planting: Planting is substantially complete if the Landscape Architect determines that between 80% to 100% of the planning has been installed based on the planting indicated on the planting plan.
 - a. Trees: All trees planted at the time of review shall be staked and basins installed per plans and specifications.
 - b. Sodded/Seeded lawns: Seeded lawns shall have been installed before time of review.

B. Date of Review: Notify Landscape Architect at least five [5] workings days prior to anticipated date of review for substantial completion.

C. Beginning of the Establishment Period: The date on which the Campus issues a letter of Substantial Completion to the Contractor.

3.2 PREPARATION

A. Protection:

1. Protect all new planting areas from damage of all kinds from beginning of work until sufficiently established or until Final Acceptance.
2. Provide temporary protection fences, barriers, and signs as required for protection.

B. Replacements:

1. Immediately treat or replace all plants which become damaged or injured as a result of Contractor's operations or negligence, as directed by Landscape Architect, at no cost to Owner.
2. Replacement plants shall match size, condition, and variety of plants replaced.

3.3 PLANTING

A. Watering Basins:

1. Maintain all watering basins around plants so that enough water can be applied to establish moisture through major root zones.
2. For supplemental hand watering of watering basins, use a water wand to break the water force. Do not permit use of "jet" type watering equipment. Do not permit crown roots to become exposed to air through dislodging of soil and mulch.
3. Maintain originally called for depth of mulch to reduce evaporation and frequency of watering.
4. In rainy season, open basins to allow surface drainage away from the root crown where excess water may accumulate. Restore watering basins at the end of rainy season.

B. Resetting: Reset plants to proper grades and upright position.

C. Weed Control:

1. All areas between plants, including watering basins, shall be weed free at all times.
2. Use only recommended and legally approved herbicides to control weed growth.
3. Avoid frequent soil cultivation that destroys shallow roots and breaks the seal of pre-emergent herbicides.

D. Pruning:

1. Prune trees to select and develop permanent scaffold branches that are smaller in diameter than the trunk or branch to which they are attached, and which have vertical spacing of 18 in. to 48 in. and radial orientation so as not to overlay one another.
2. Prune trees to eliminate diseased or damaged growth, and narrow V-shaped branch forks that lack strength. Reduce toppling and wind damage by thinning out crowns.
3. Prune trees to maintain growth within space limitations, maintaining a natural appearance and balancing crown with roots.
4. No stripping of lower branches ["raising up"] of young trees will be permitted.

5. Retain lower branches in a "tipped back" or pinched condition to promote caliper trunk growth [tapered trunk]. Do not cut back to fewer than six buds or leaves on such branches. Only cut lower branches flush with the trunk after the tree is able to stand erect without staking or other support.
6. Thin out and shape evergreen trees when necessary to prevent wind and storm damage. Do primary pruning of deciduous trees during the dormant season. Do not permit any pruning of trees prone to excessive "bleeding" during growth season.
7. Prune damaged trees or those that constitute health or safety hazards at any time of year as required.
8. Make all cuts clean and close to the trunk, without cutting into the branch collar. "Stubbing" will not be permitted. Cut smaller branches flush with trunk or lateral branch. Make larger cuts [1 in. in diameter or larger] parallel to shoulder rings, with the top edge of the cut at the trunk or lateral branch.
9. Branches too heavy to handle shall be precut in three stages to prevent splitting or peeling of bark. Make the first two cuts 18 in. or more from the trunk to remove the branch. Make the third cut at the trunk to remove the resulting stub.
10. Do not prune or clip shrubs into balled or boxed forms unless specifically called for by design.
11. Clip shrubs to be hedged when branches project 2 in. beyond limit of clipped hedge shown on the Drawings.
12. Take extreme care to avoid transmitting disease from one infected plant to another. Properly sterilize pruning tools before going from one infected plant to all other plants.

E. Staking and of Trees:

1. Inspect stakes and guys at least once a month to check for rubbing that causes bark wounds.
2. Repair and replace staking and guying as shown and as specified.

3. 4 GROUNDCOVERS

A. Watering:

1. Check for moisture penetration throughout the root zone at least twice a month.
2. Water as frequently as necessary to maintain healthy growth of groundcovers.

B. Weed Control:

1. Control weeds, preferably with pre-emergent herbicides and with selective systemic herbicides.
2. Minimize hoeing of weeds in order to avoid plant damage.

C. Fertilization:

1. Recently installed plant materials: Verify with Owner actual completion date of planting installation and rate of prior application of fertilizers.

2. New plant materials: Place one [1] 5-gram tablets [20-10-5; N-P-K] beside the root ball about an inch from root tips.
 3. Established Plant Materials: Do not use complete fertilizers unless soil test shows specific nutrient deficiencies.
- D. Mowing and Edging:
1. Edge groundcovers to keep in bounds. Trim top growth as necessary to achieve an overall even appearance.
 2. Groundcovers which lend themselves to mowing shall be mowed to specified height above finished grade in order to renew growth, improve density and attractiveness.
- E. Replacements:
1. Replace dead and missing plants after obtaining Owner's agreement to pay for replacement.
 2. Damages due to Contractor's negligence shall be paid for without charge to Owner.

3.5 LAWNS

- A. Watering:
1. Water lawns at such frequency as weather conditions require, to replenish soil moisture to 6 in. below root zone.
 2. Provide a total of 1-1/2 in. of water weekly during hot summer weather, in three [3] applications per week.
 3. Water at night if irrigation system is electrically controlled. Otherwise, watering shall be done during early mornings.
- B. Weed Control:
1. Control broadleaf weeds with selective herbicides.
 2. In areas where crabgrass has infested the lawn, apply a selective post-emergent herbicide as soon as possible, and prior to flowering.
 3. Apply pre-emergent herbicides such as Dacthal, Balan, or Betasan prior to crabgrass germination.
 4. Do not irrigate for 48 hours after application of herbicidal sprays.
 5. Coordinate application of herbicides with thatch control and reseeding schedule as described below.
- C. Mowing and Edging:
1. Mow lawns when they reach 2-1/2 in. high.
 2. Trim edges at least twice a month or as needed for neat appearance. Vacuum clippings.
- D. Reseeding of Lawn Areas: Match existing seed mix of adjacent areas.

E. Fertilizers:

1. Recently seeded/sodded lawn areas: Verify with Owner previous applications of fertilizer[s].
2. Established lawn areas: Apply a slow release [3 to 5 months] fertilizer [21-8-8; N-P-K] once in spring and again in the fall at the following rates:

<u>Program</u>	<u>1000 sq. ft.</u>	<u>Acre</u>
Optimum	15 lbs.	650 lbs.
Medium	12 lbs.	500 lbs.
Low	8 lbs.	350 lbs.

3. Apply fertilizer when grass is dry and preferably after mowing. Do not apply during hot weather or when grass is under stress. Water immediately after application.
4. Apply only nitrogen unless a soil test shows a specific nutrient deficiency.
5. If soil pH gets below 6.0, then a basic fertilizer such as calcium nitrate may be preferable to an acidic fertilizer. Follow the soil chemist's recommendation when deficiencies appear.

3. 6 PERENNIALS

A. Watering:

1. Species, sizes of plants, container sizes and orientation shall dictate frequency of watering. Submit to Owner a watering schedule for different seasonal requirements.

B. Weed Control: All planters with annuals and perennials shall be weed-free at all times.

C. Pruning:

1. Limit pruning to removal of damaged or dead twigs and foliage.
2. Remove spent flowers on a weekly basis.

D. Fertilization: Incorporate slow-release fertilizers per manufacturer's current specifications and rake smooth.

3. 7 INSECTS, PESTS, AND DISEASE CONTROL

A. Inspection: Inspect all plant materials for signs of stress, damage, and potential trouble from the following:

1. The presence of insects, moles, gophers, ground squirrels, snails, and slugs in planting areas.
2. Discolored or blotching leaves or needles.
3. Unusually light green or yellowish green color inconsistent with normal green color of leaves.

B. Personnel: Only licensed, qualified, trained personnel shall perform spraying for insect, pest, and disease control

- C. Application: Spray with extreme care to avoid all hazards to any person or pet in the area or adjacent areas.

3.8 IRRIGATION SYSTEM

- A. General:
 - 1. Repair without additional charge to Owner all damages to system caused by Contractor's operations. Perform all repairs within one [1] watering period.
 - 2. Report promptly to Owner all accidental damage not resulting from Contractor's negligence or operations.
 - 3. Do not run the irrigation system during the rainy season. Set and program automatic controllers for seasonal water requirements.
 - 4. Twice a month, use a probe or other acceptable tool to check the root ball moisture of representative plants as well as the surrounding soil.
- B. Cleaning and Monitoring the System:
 - 1. Continually monitor the irrigation systems to verify that they are functioning properly as designed. Make program adjustments required by changing field conditions.
 - 2. Prevent spraying on walls, game courts by balancing the throttle control on the remote-control valves and the adjustment screws on the sprinkler heads. Do not allow water to atomize and drift.

3.9 TERMINATION OF THE ESTABLISHMENT PERIOD

- A. Final Acceptance Procedure:
 - 1. Work will be accepted by the Landscape Architect upon satisfactory completion of all work, including establishment period, but exclusive of replacement of materials under the Warranty Period.
 - 2. Submit a written request to Campus Representative for review for Final Acceptance at least five [5] working days prior to anticipated Final Review date, which is at the end of the Establishment Period.
- B. Corrective Work:
 - 1. Work requiring corrective action or replacement shall be performed within ten [10] calendar days after the Final Review.
 - 2. Perform corrective work and materials replacement in accordance with the Drawings and Specifications and shall be made by the Contractor at no cost to the Owner.
 - 3. After corrective work is completed, the Contractor shall again request a Final Review for Final Acceptance as outlined above.
 - 4. Continue establishment of all landscaped areas until such time as all corrective measures have been completed and accepted.

- C. Conditions for Acceptance of Work at End of Establishment Period:
 - 1. Each plant shall be alive and thriving, showing signs of growth and no signs of stress, disease, or any other weaknesses.
 - 2. Replace all plants not meeting these conditions. An additional Warranty Period equal in length to the original shall be commenced for all such plants and planted areas.
- D. Final Acceptance Date: The date on which the Landscape Architect issues a Letter of Final Acceptance. Upon Final Acceptance, the Owner will assume responsibility for establishment of the work.

3.10 CLEANING

- A. Dispose of all pruned materials, vacuum all lawn clippings and leaves, sweep all walkways, and rake smooth all mulched areas.
- B. Remove from the site all containers and evidence of establishment activities.

3.11 CLOSE OUT

- A. Landscape Establishment Record: Submit binder to Owner with all documentation and records required and utilized during the establishment period.
- B. Keys and Identification: Return all keys and identification materials supplied by Owner for the purpose of site access.

END OF SECTION 32 98 13