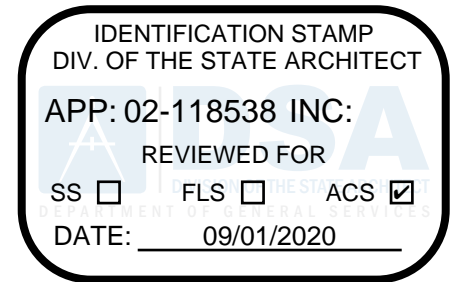


Fresno Unified School District
2309 Tulare Street
Fresno, CA 93721



PROJECT MANUAL FOR:

Site Improvements at Irwin O. Addicott Elementary School

4784 East Dayton Avenue
Fresno, CA 93726



Prepared by:

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SITE CLEARING AND DEMOLITION

SECTION 31 11 00

PART 1 - GENERAL

1.01 Summary:

A. This Section includes the following:

1. Provide all material, labor, equipment and services necessary to completely clear and demolish all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

1.02 Related Sections:

- A. All Division 00 Specification Sections
- B. All Division 01 Specification Sections
- C. Section 31 20 00 – Earthwork: Excavation, Filling, and Grading
- D. Section 31 22 22 – Soil Materials

1.03 Submittals

A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:

1. Closeout Submittals:

- a. Project Record Documents in accordance with Specification Section PROJECT DOCUMENTS.
 - 1) Identify and accurately locate capped utilities, subsurface structures, electrical and mechanical conditions.

1.04 Quality Assurance

A. Regulatory Requirements:

1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB: Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).

B. Meetings:

1. Minimum agenda shall be to discuss coordination of upcoming work, review the work progress, discuss field observations, identification of any potential problems which may impede planned progress; corrective measures to regain projected schedule; and maintenance of quality and work standards.
2. Meetings shall include Pre-Clearing and Demolition Meetings.
3. Participants (or designated representative of) invited to attend each of the above meetings shall be as follows:
 - a. Contractor.
 - b. Owner.
 - c. Architect/Engineer.
 - d. Testing Laboratory.
 - e. Local Governing Authorities as applicable.
 - f. Utility Representatives as applicable.
 - g. Owner's Inspector.
 - h. Clearing and Demolition Subcontractor.
 - i. Other subcontractors, as appropriate (including any accessory subcontractors).

1.05 Project Conditions or Site Conditions

A. Environmental Requirements:

1. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.
2. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
3. No construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan, if one is required.
4. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.
5. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The costs for any such fines or fees shall be included in the lump sum price bid for work under this contract and no additional payment will be made therefore.
6. Burning: No burning will be allowed on the site.
7. All work shall be done in accordance with the EPA, CARB, and applicable City and County Codes and Ordinances.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives, walks or occupied facilities.
 - a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and Authorities having jurisdiction.
 - b. Provide alternate routes around closed or obstructed traffic ways if required by Authorities having jurisdiction.
3. Locate and identify utilities.
 - a. Call a Local Utility Locator Service (USA – “Underground Service Alert” – [800] 227-2600) for the task of locating any applicable utilities in the area where the Project is located.
4. Carefully remove items indicated to be salvaged and store on Owner’s premises at the Owner’s direction.

PART 2 - PRODUCTS

(NOT APPLICABLE)

PART 3 - EXECUTION

3.01 Preparation

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - a. Coordinate limits of work under this Section with limits of work indicated on Plans for proposed improvements.
2. If this project contains a Storm Water Pollution Plan (SWPPP), coordinate with the requirements of that section for protection of the site and adjacent properties. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.
3. Coordinate site access with the Owner’s use of the property and with other contractors working in the vicinity of the project site.

B. Protection:

1. Protect and maintain all benchmarks and survey control points from disturbance during clearing and demolition operations.
 - a. Any damaged benchmarks or property corners shall be replaced by a California registered Land Surveyor or Civil Engineer, at the Contractor's expense.
2. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties.
3. Furnish and install temporary protection/barrier fencing surrounding the limits of demolition.
4. Protect trees, plant growth, and features not specifically designated for removal. Locate and clearly flag trees and vegetation to remain or to be relocated.
 - a. Protect turf, plants and trees that are to remain.
5. Protect existing improvements designated to remain from damage during construction.
 - a. Restore damaged improvements to their original condition, as acceptable to the Owner.

3.02 Construction

A. Tree, Shrub and Weed Removal:

1. Strip weeds and rooted topsoil from the project site to a minimum 4 inch depth.
2. Upon approval of the Geotechnical Engineer, stripped topsoil containing less than 3% organics by weight may be stockpiled for reuse in finish grading at planting areas. Coordinate with Owner to determine an acceptable stockpile location.
3. Remove excess and unsuitable material from the site.
4. Remove trees and shrubs as indicated on the Plans.
 - a. Remove stumps, root balls and all roots in excess of 1/2" diameter.

B. Existing Site Improvements Removal:

1. Remove existing above and below grade improvements as necessary to facilitate new construction.
 - a. Remove all asphalt paving, concrete slabs, curbs, mow strips, gutters, decomposed granite surfacing and fencing.

- 1) Neatly saw-cut length of existing pavement to remain before removing existing pavement, unless existing full-depth joints coincide with line of demolition. Saw-cut faces vertically.
 - b. Remove indicated utility improvements within the limits of construction.
 - 1) Excavate for and disconnect, seal or cap off underground utilities designated to be removed.
 - 2) Coordinate removal and/or relocation of utilities with the appropriate utility agencies.
 - c. Unless specifically indicated otherwise on the Plans, where existing underground utilities, irrigation pipes, leach fields, or underground tanks or other utilities are encountered, they must be removed or moved to a point at least 5 feet horizontally or a distance equal to the depth of the trench horizontally from the edge of the proposed foundation, whichever is greater, and 3 feet horizontally outside the concrete flatwork or asphalt pavement construction areas. All resultant cavities must be backfilled with engineered fill.
 - 1) If the project requires removal or abandonment of underground tanks, septic systems or wells, perform all work in accordance with applicable codes and jurisdiction requirements.
- C. Existing Utilities to Remain or be Relocated:
1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - a. Notify Architect/Engineer and the Owner not less than seven (7) days in advance of proposed utility interruptions and provide schedule for expected shutdown, including date and time for beginning and the expected duration of the interruption.
 - b. Arrange to shut off indicated utilities with utility companies.
- D. Disposal:
1. Legally dispose of all debris (surplus soil materials, unsuitable topsoil, demolished materials, waste materials, trash, etc.) resulting from site clearing, grubbing and demolition. Disposal of all materials shall be at a location secured by the Contractor off of the Owner's property.

END OF SECTION

SECTION 31 20 00

EARTHWORK: EXCAVATION, FILLING AND GRADING

PART 1 - GENERAL

1.01 SUMMARY

- A. Excavating soil and other material for surface improvements.
- B. Placing fill.
- C. Compaction of existing ground and fill.
- D. Preparation of subgrade for other improvements.
- E. Grading of soil.

1.02 RELATED SECTIONS

- A. Contract General Conditions and Division 1, General Requirements.
- B. Section 31 11 00 – Site Clearing.
- C. Section 31 22 22 – Soil Materials.
- D. Section 31 23 00 – Trench Excavation and Backfill.

1.03 REFERENCES

- A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.04 DEFINITIONS

- A. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.05 SUBMITTALS

- A. Submit in accordance with Specification Section - Submittal Procedures:
 - 1. Product Data:
 - a. Information indicating the source of all import material, the fill material type and where it is to be used. All import shall be tested and approved by the Geotechnical Engineer.

2. Quality Assurance/Control:
 - a. Material Test Reports:
 - 1) Classification of Soils.
 - 2) Compaction Characteristics of Soils.
 - 3) Density and Unit Weight of Soils in Place.
 - 4) Imported fill shall be tested and approved by the Owner's Geotechnical Engineer prior to import to the site, including testing for compliance with Department of Toxic Substances Control (DTSC) guidelines. Said testing and certification documents shall be paid for by the Owner.
3. Project Closeout: In accordance with Specification Section – PROJECT CLOSEOUT.
 - a. Drawings indicating the extent and depth of all engineered fill. This information shall be a part of the Project "As-Built" and Project "Record" Documents in accordance with the Specification Section – PROJECT DOCUMENTS.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.
- B. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB] and the Environmental Protection Agency [EPA].
 - b. CF City of Fresno, Codes and Ordinances
 - c. EPA Environmental Protection Agency.
 - d. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.

- e. DTSC Comply with all recommendations of the California Department of Toxic Substance Control (DTSC) regarding soil testing for potential contaminants.
- C. Certificates:
- 1. Installer's certification that all Earthwork installation meets or exceeds the requirements of this specification.
 - 2. Contractor's certification (on Contractor's letterhead paper) that the Earthwork materials and installation meets or exceeds the requirements of this specification.
- D. Meetings:
- 1. Pre-Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 - 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems which may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been filed.

1.07 COORDINATION

- A. Coordinate work with Owner's personnel.
- B. Provide required notification to the Owner and Geotechnical Engineer so that proposed sources of import soil may be tested and approved prior to being brought on-site.
- C. Provide required notification to the Owner and Geotechnical Engineer or the Engineer of Record so that a representative from the Owner's Geotechnical Engineering consultant can be present for all excavation, filling and grading operations to test and observe earthwork construction

- D. Verify that the locations of existing utilities have been indicated at work site by utility authorities and as specified on the Plans.

1.08 EXISTING CONDITIONS

A. Existing Conditions:

1. Examine the site and verify conditions with the Drawings and Specifications. Contractor shall familiarize himself with existing site conditions and any changes that have occurred at the site since the preparation of the contract documents and shall be responsible to account for any such changes in the price bid for this work.
2. Thoroughly investigate and verify conditions under which the Work is to be performed.
3. Locate and identify utilities:
 - a. Call a Local Utility Locator Service (USA - "Underground Service Alert" – [800] 227-2600) for the task of locating any applicable off-site and on-site utilities in the area where the Project is located.
4. No allowance for extra Work will be granted resulting from negligence or failure to meet requirements of Article titled "Existing Conditions" above.

B. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete work, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunk line utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. Under similar circumstance, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

D. Determine exact location of existing buried utilities by:

1. Marking on ground or pavement surface the alignment and extent of the facilities and the probable location of existing utilities using construction plans and existing surface features.
2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations, and notify Owner of said request concurrently.
3. Locate exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.

- E. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner's personnel.
- F. Provide Field Engineering to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under this Contract, submit detailed information to the Engineer for review and direction.
- G. Maintain all existing utility mains and service lines in constant service during construction of the Work.
- H. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work, and coordinate the timing of any such disruptions in advance with the District.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
 - 1. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.
 - 2. All land clearing, demolition, grubbing, scraping, excavation, land leveling, grading, and cut and fill activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by pre-soaking.
 - 3. When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions or at least six inches of freeboard space from the top of the container shall be maintained.
 - 4. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.
 - 5. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/ suppressant.
 - a. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.

- b. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. If required, Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
 - c. If a dust control plan is required, no construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan.
 - d. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.
 - e. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The cost shall be included in the lump sum price bid for work under this contract and no additional payment will be made therefore
- B. Burning: No burning will be allowed on-site.
- C. Rain: Work under this section shall not be started or maintained under threat of rain, unless the work is not affected by the rain.
- D. Do not place fill during weather conditions which will alter moisture content of fill materials sufficiently to make compaction to the specified densities difficult or impossible.
- E. When reference is made to SWPPP (Storm Water Pollution Prevention Plan, if any within this Project Manual), then comply with all environmental protection requirements included therein.
- F. In accordance with EPA and CF.
- G. Protection:
- 1. Protect cut and fill areas to prevent water running into excavation. Maintain areas free of water. Remove seeping water immediately by pumps.
 - 2. Protect cut slopes from erosion due to precipitation and other sources of runoff.
 - 3. Protect utilities to remain within the construction area and special construction. If utility lines are uncovered (water, electric, sewer, etc.) not shown on the drawings during excavation of site, notify the Architect promptly for its review and action.
 - 4. Do not permit access to undeveloped portions of the site, nor to areas that are outside of the limits of grading.

- H. Before being brought onto the site, all import soil must be sampled, tested and approved by Owner's Geotechnical Engineer. All import material must comply with DTSC recommendations and guidelines for environmentally clean soil suitable for school construction. Import testing will be provided and paid for by the Owner.

1.10 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of General Conditions and Division 1, General Requirements.
- B. Accurately record actual locations of utilities encountered including depth and horizontal location, as measured from permanent site features.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Fill in Turf or Other Planting Areas: Type S2 or S3 per Section 31 22 22.
- B. Fill in Non-planting Areas: Type S1, S2 or S4 per Section 31 22 22.
- C. Imported material: Type S3, S4 or S5 per Section 31 22 22.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify site conditions.

3.02 PREPARATION

- A. Layout of Work:
 - 1. Contractor shall be responsible for all lines and grades.
 - 2. Check all benchmarks, monuments and property lines and verify locations.
 - 3. Locate and maintain all grade stakes.
 - 4. Monuments moved or displaced during grading operation are to be replaced by a California Registered Civil Engineer or Surveyor, at Contractor's expense.
- B. Locate, identify, and protect existing above and below grade utilities from damage.
- C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

- D. Protect existing structures, fences, curbs, sidewalks, paving and other improvements to remain from damage from excavation equipment and vehicular traffic.
- E. Employ equipment and methods appropriate to the work site.
- F. Protect excavated areas from drainage inflow, and provide for drainage of all excavated areas.
- G. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.03 SITE STRIPPING:

- A. Within the areas of planned surface improvements and structures, the near surface soils containing vegetation, roots, organics, or other objectionable material must be stripped and removed from the site. Upon approval of the Geotechnical Engineer, suitable materials stripped from the site may stockpiled and incorporated into the finish fill for planting areas.
- B. Stripping depth is expected to be to at least 4-inches below existing site grades, but must continue to the depth required to expose acceptable soils that are free from deleterious matter. Geotechnical Engineer shall review surface after stripping activities and prior to overexcavation.

3.04 EXCAVATION

- A. Provide additional excavation as required to conform to the lines, grades and cross-sections shown on the plans.
- B. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw.
- C. Remove excess soil not to be used as fill in the Work from the site. Unless requested by Owner to be deposited at a site designated by Owner on the property, obtain a disposal site and legally dispose of said excess material, all at no additional cost to the Owner.
- D. Areas disturbed by demolition must be excavated to expose undisturbed soils.
- E. Excavated soils free of deleterious substances (organic matter, demolition debris, tree roots, etc.) and with less than 3% organic content by weight, may be returned to the excavations as engineered fill.

3.05 FILLING AND COMPACTING

- A. Once clearing, stripping and over-excavation operations are complete, scarify the surface to receive fill material or improvements, to a depth of 12-inches. Moisture condition to 2% above optimum moisture content, and compact to at least 92% of

the relative compaction in the planned building, structure and concrete flatwork areas. In areas to receive asphalt concrete pavement, scarify the top 12-inches and moisture condition to 2% above optimum moisture content, then compact to at least 95% relative compaction.

- B. Place and compact soil fill to finish subgrade of improvements to be placed thereon, or to finished surface grade where no improvements are to be placed thereon.
- C. Conform fill to the lines, grades and cross-sections shown on the plans.
- D. All fill placed in improvement areas (structures, pavement and site concrete improvements, is to be placed as engineered fill, as described below:
 - 1. Place fill materials in layers not exceeding 6 inches in uncompacted thickness and compact in accordance with 31 20 00/3.05.
 - 2. Maintain optimum moisture content of fill materials to attain required relative compaction.
- E. Fill materials to conform to 31 22 22/2.01.
- F. Provide, at no additional cost to Owner, imported soil material conforming to the requirements of Section 31 22 22/2.01, as needed to attain finished grades of Work.
- G. Utilize equipment which will not disturb or damage existing utilities and other improvements.
- H. In planting areas, compact the top 12-inches to 85% relative compaction.

3.06 PREPARATION OF SUBGRADE FOR SURFACE IMPROVEMENTS

- A. Where concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvements, or a layer of said surface improvements, are to be constructed on the soil surface, prepare the subgrade for said improvements in accordance with this section.
- B. Scarify the soil as specified and remove and dispose of (off the project site) all rocks, hardpan chunks or otherwise unsuitable material over 2.5 inches in size.
- C. Thoroughly moisture condition and compact as described above.
- D. Prior to commencing construction of surface improvements, pass a test roller of size and weight as approved by the Owner over the subgrade to establish the extent of soft or spongy areas requiring repairs.
- E. Conform finished subgrade surface to the lines, grades and cross-sections shown on the plans.

3.07 FINE GRADING

- A. Fine grade all finished surfaces to the lines, grades and cross-sections shown on the plans, and to blend to hard surface improvements.
- B. Rake and smooth all finished surfaces not to receive hard surface improvements.
- C. Use suitable stockpiled topsoil for the top 12-inches of areas to receive landscape improvements. Stockpiled topsoil may also be used in the top 12-inches of areas which will not receive surface improvements or structures.
- D. Import topsoil meeting the requirements of 31 22 22/2.01C, as required to complete finish grading.
- E. Topsoil may not be used in areas requiring engineered fill.

3.08 TOLERANCES

- A. Top surface of Subgrade for Non-Vegetative Surface Improvements or Layers thereof: Plus or minus 0.02 foot from planned elevation.
- B. Top surface of Subgrade for Vegetative Surface Improvements or for Bare Ground - Plus or minus 0.05 foot of planned elevation, or as required for finish surface to match adjacent improvements or ground.

3.09 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of General Conditions and/or Division 1, General Requirements.
- B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.
- C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest.
- D. All retesting required as a result of failure of initial test will be performed by Owner's testing agency, at the expense of the Contractor.

3.10 PROTECTION

- A. Protect graded areas from traffic, freezing, erosion, and all other sources of damage. Keep free of debris and trash.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed work becomes eroded, rutted, settled, or where it is damaged by subsequent construction operations or weather.
- C. Where settlement occurs prior to acceptance of the work, remove and replace surface improvements, excavate, replace, and re-compact in accordance with these specifications, and restore the surface improvements.

3.11 CLEANING

- A. Remove all surplus or unsatisfactory soil material, trash, and debris, and legally dispose of off of the Owner's property.

END OF SECTION

SECTION 31 22 22

SOILS MATERIALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavated (and re-used) materials and imported materials.

1.02 RELATED SECTIONS:

- A. Section 31 20 00 - Earthwork: Excavation, Filling and Grading.
- B. Section 31 23 00 - Trench Excavation and Backfill.

1.03 SUBMITTALS

- A. Samples: Submit, in air-tight containers, 10 lb. sample of Type S3, S4 and S5 fill to inspector.
- B. Soil Analysis: Submit for Type S3 and S4 soils to be imported.
- C. Materials Source: Submit location of imported materials source. Provide materials from same source throughout the work. Change of source requires approval.
- D. For imported soil, obtain Geotechnical Engineer and District approval prior to importing.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. Soil Type S1: Excavated and re-used material, graded; free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
- B. Soil Type S2: Excavated and reused material, graded; free of roots, lumps greater than one inch, rocks larger than 1/2 inch, debris, weeds and foreign matter.
- C. Soil Type S3: Imported topsoil, friable loam; reasonably free of roots, rocks larger than 1/2 inch, debris, weeds, and foreign matter.
- D. Soil Type S4: Imported borrow, suitable for purposes intended, meeting the following characteristics:
 - 1. Maximum Particle Size: 3"
 - 2. Maximum Plasticity Index: 10

3. Maximum Angle of Internal Friction: 32°
 4. Percent Passing ¾-Inch Sieve: 90% - 100%
 5. Percent Passing #4 Sieve: 65-100
 6. Percent Passing #200 Sieve: 15% - 40%
 7. Expansion Index: <20
 8. R-Value (in paved areas): Minimum 50
 9. Low Corrosion Potential:
 - a. Soluble Sulfates: Less than 1,000 mg/Kg
 - b. Soluble Chlorides: Less than 200 mg/Kg
 - c. Soil Resistivity: Greater than 5,000 ohm-cm
 - d. PH between 6.5 to 9.0
- E. Soil Type S5: Imported sand. Natural river or bank sand (sand equivalent greater than 30), washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

2.02 SOURCE QUALITY CONTROL

- A. Inspection of imported soil will be performed by the Geotechnical Engineer, at source of import and prior to being delivered to the site.

PART 3 - EXECUTION

3.01 STOCKPILING

- A. Stockpile excavated or imported material onsite at location designated by project inspector.
- B. Stockpile excavated or imported material in sufficient quantities to meet project schedule and requirements.

3.02 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.
- B. Dispose of excess material off-site.

END OF SECTION

SECTION 31 23 00
TRENCH EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavating trenches, holes and pits for constructing the Work.
- B. Backfill and compaction.
- C. Providing suitable bedding and backfill material, as specified herein.

1.02 RELATED SECTIONS

- A. Contract General Conditions and Division 1, General Requirements.
- B. Section 31 11 00 – Site Clearing
- C. Section 31 20 00 – Earthwork: Excavation, Filling and Grading
- D. Section 31 22 22 – Soil Materials

1.03 REFERENCES

- A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.04 DEFINITIONS

- A. Utility: Any buried or above ground pipe, conduit, cable, associate devices or appurtenances, or substructure pertaining hereto.

1.05 QUALITY ASSURANCE

- A. Qualifications
 - 1. Installer:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:

- a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB] and the Environmental Protection Agency [EPA].
 - b. CF City of Fresno, Codes and Ordinances
 - c. EPA Environmental Protection Agency.
 - d. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.
- C. Certificates:
- 1. Installer's certification that all trench backfill installation meets or exceeds the requirements of this specification.
 - 2. Contractor's certification (on Contractor's letterhead paper) that the trench backfill materials and installation meets or exceeds the requirements of this specification.
- D. Meetings:
- 1. Pre-Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 - 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems which may impede issuance of warranties or guaranties.
 - 4. Maintain installed work until the Notice of Substantial Completion has been filed.

1.06 COORDINATION

- A. Coordinate work with Owner's personnel.

- B. Verify that the location of existing utilities have been indicated at work site by utility authorities.

1.07 EXISTING UTILITIES

- A. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete work, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.
- B. Under circumstance similar to 31 23 00/1.7A, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.
- C. Determine exact location of existing buried utilities by:
 1. Marking on ground or pavement surface the alignment and extent of the proposed facilities and the probable location of existing utilities using construction plans and existing surface features.
 2. Requesting Underground Service Alert (USA) check to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations, and notify Owner of said request concurrently.
 3. Locate exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.
- D. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner's personnel.
- E. Provide Field Engineering per Contract General Conditions and Division 1 to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under the Contract, submit detailed information to the Owner's Inspector and Engineer for review and direction.
- F. Maintain all existing utility mains and service lines in constant service during construction of the Work.

- G. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

- A. Fill Type S1, S2, S4 and S5, as specified in Section 31 22 22/2.01.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.
- B. Protect existing structures, fences, sidewalks, curbs, and other improvements from excavation equipment and vehicular traffic.
- C. Maintain and protect above and below grade utilities which are to remain.
- D. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.02 EXCAVATION

- A. Excavate soil required to locate existing utilities and install the work.
- B. Use hand methods of excavation to locate existing utilities, and to excavate trenches, pits and holes in congested areas.
- C. Employ equipment and methods appropriate to the work site. Small mechanical excavators may be used only in areas where there is sufficient space so as not to damage adjacent improvements, and where the locations of all existing utilities have been determined by hand methods of excavating.
- D. Cut trenches just wide enough to enable installation and proper bedding and backfill, and to allow inspection.
- E. Do not interfere with 45 degree bearing splay of foundations.
- F. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose material.
- G. Excavate trenches, pits or holes bottoming in hardpan to a minimum of 6 inches below the grade for the bottom of the pipe and any couplings, and then backfill to the pipe grade with Type S2, S4 or S5 material, thoroughly compacted. No additional payment will be made for such over-excavation and refill.

- H. In all trenches or excavation sites where a firm foundation is not encountered, such as soft, spongy, or otherwise unsuitable material, remove the material to a minimum of 12 inches, or to a depth determined by the Geotechnical Engineer, below the bottom of the proposed pipe or structure, and backfill the space with Type S2, S4 or S5 material containing sufficient moisture to produce maximum compaction. No additional payment will be made for such additional excavation or backfill.
- I. Excavate trenches to provide the design grade of the facility, or as directed by the Engineer.
- J. Stockpile excavated material to be returned to trench adjacent thereto in location which will not be detrimental to existing improvements, or pedestrian or vehicular traffic. Remove from site all unsuitable or excess material not to be used.
- K. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw.
- L. Remove excess soil not used as backfill from the work site. Obtain a disposal site off of the Owner's property and legally dispose of said excess material, all at no additional cost to the Owner.
- M. If water is encountered during excavations, provide all dewatering measures necessary to construct improvements shown.

3.03 PROTECTION OF EXCAVATIONS

- A. Provide all shoring and bracing as required and those codified in local, state and federal safety regulations.
- B. Prevent water, caving or sloughing ground from entering excavations.
- C. Maintain excavations free of water.

3.04 BACKFILLING

- A. Provide pipe bedding as required by Plans and compact to 90% relative compaction.
- B. After installation of pipes and appurtenances and placement of pipe bedding material, backfill trenches and excavations to finished grade, or subgrade in areas to receive surface improvements
- C. Backfill trenches above pipe bedding material and to within 24 inches of finish subgrade with Type S1, S2, S4 or S5 soils
- D. Employ a placement method that does not disturb or damage existing or proposed pipes or other Utilities or Improvements.
- E. Place and compact all soil backfill in continuous layers not exceeding 6 inches in uncompacted thickness.

- F. Maintain optimum moisture content of fill materials to attain required relative compaction.
- G. Backfill final 12-inch thickness to finish subgrade in areas to receive concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvement, with Type S2, S4 or S5 soils.
- H. Backfill final 12-inch thickness to finish subgrade in areas to receive sod, other vegetation, or bare soil, with Type S2 or S3 soils.
- I. Compact backfill below the top 12-inches to 95% relative compaction in areas to receive vehicular concrete paving, asphalt-concrete, aggregate base, or other non-vegetative surface improvement, with Type S2, S4 or S5 soils.
- J. In areas to receive buildings, structures, or concrete flatwork, compact the top 12-inches to 92% relative compaction.
- K. In areas to receive asphalt concrete pavements, compact the top 12-inches to 95% relative compaction.
- L. In planting areas, compact the top 12-inches to 85% relative compaction.
- M. Buried metal conduits should have a protective coating in accordance with the manufacturer's specifications.

3.05 TOLERANCES

- A. Top Surface of Backfill under Paved or Concrete Areas: Plus or minus 0.02 feet from required elevations.
- B. Top Surface of General Backfilling: As required for finish surface to match adjacent improvements or ground.

3.06 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of General Conditions and/or Division 1.
- B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.
- C. If tests indicate work does not meet specified requirements, recompact, and retest. Retests required due to failure of initial tests shall be paid for by the Contractor.

3.07 PROGRESS AND PROSECUTION

- A. Backfill any excavation opened in any day on that same day.

END OF SECTION

SECTION 31 31 00
SOIL STERILIZATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work specified in this section.

1.02 SECTION INCLUDES

- A. Furnishing and installing soil sterilant under future resilient play surfacing.

1.03 RELATED SECTIONS

- A. Section 31 20 00 – Earthwork: Excavation, Filling, and Grading
- B. Section 31 23 00 – Trench Excavation and Backfill
- C. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to the work of this section.

1.04 STANDARDS

- A. In accordance with the following:

- CCR-T21 California Code of Regulations, Title 21 Public Works.
- CBC California Building Code, California Code of Regulations, Title 24, Part 2, CCR-T24.
- USDA United States Department of Agriculture.
- EPA Environmental Protection Agency.

All applicable Environmental Regulations and Standards.

1.05 QUALITY ASSURANCE

- A. Provide licensed operator to apply soil sterilant.
- B. All products shall comply with the current EPA laws at time of application. Should the products listed become unavailable because of changes in the law, submit substitute products for review by the Owner.

1.06 SUBMITTALS

- A. Submit in accordance with Specification Section Submittal Procedures 01 33 00 - Contract General Conditions.
- B. Certificates of application.
- C. Certificates of compliance for material.

1.07 COORDINATION

- A. Coordinate with other work, including subgrade preparation and asphalt-concrete paving.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Soil Sterilant: Treflan, weed and grass preventer, or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that site is ready for application.

3.02 PREPARATION

- A. Identify installation locations.
- B. Employ equipment and methods appropriate to the work site.
- C. Provide vehicular and traffic controls per Section 01 50 00.

3.03 APPLICATION

- A. Thoroughly water soak surface to be treated. Avoid excessive water runoff.
- B. Apply sterilant solution over surface to receive pavement or surfacing prior to the start of pavement or surfacing installation.
- C. Apply in spray form, at rate as allowable by State of California.
- D. Take all precautions to limit soil sterilant solution to areas immediately under proposed pavement or surfacing. Use shields as necessary, and do not apply under windy conditions.

3.04 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of 01 45 23.

END OF SECTION

SECTION 32 13 13
SITE CONCRETE IMPROVEMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide all material, labor, equipment and services necessary to completely install exterior Portland cement flatwork, cast-in-place concrete, and architectural flatwork concrete, accessories and other related items, slabs, ramps and sidewalks and walkways, curb and gutter, mowstrips, and other miscellaneous concrete items of the form and dimensions shown on the plans and necessary to complete the project, and in accordance with the requirements of the Standard Specifications as modified and supplemented by these Special Provisions
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to the work of this section.

1.02 RELATED SECTIONS:

- A. Section 31 20 00 – Earthwork: Excavation, Filling, and Grading
- B. Section 32 13 15 - Concrete Reinforcement

1.03 REFERENCES

- A. SSCDOT - Standard Specifications, Department of Transportation, State of California (Caltrans), latest edition, except for references to method of payment, and references to any state furnished materials.
- B. ACI standards, including but not limited to #304, 305, 306, 308, 309 and 347.
- C. ASTM standards, including but not limited to #C-33, C-39, C-94, C-136, C-143, C-150, and C-309.

1.04 QUALITY ASSURANCE

- A. Furnish concrete materials conforming with SSCDOT.
- B. Perform work in accordance with SSCDOT, unless noted otherwise herein.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
 - 1. Certificates of compliance for materials and mix designs.
 - 2. Load tags for delivered material.
 - 3. Strength testing as required by the approving agency.

4. Integral color sample, where applicable.
5. Application instructions for the architectural finish materials.
6. Accessories and manufacturer's installation specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Mix Design and Proportions in accordance with SSCDOT:

1. Mix designs with Fly Ash content no greater than 15 percent of the total weight of cementitious materials shall be proportioned by SSCDOT.
2. Provide a maximum of 4 percent air entrainment, unless noted otherwise.
3. Owners Testing laboratory shall review all mix designs prior to placement.
4. All concrete shall have the following minimum compressive strengths in accordance with ACI 318 and SSCDOT at 28 days and shall be proportioned within the following limits:
 - a. Site Concrete: Use for exterior concrete slabs on grade including, but not limited to sidewalks, curbs, gutters, mow strips, utility appurtenances and miscellaneous site improvements.

1) Strength:	3,000 psi at 28 days
2) Maximum Aggregate Size:	1-inch Per SSCDOT
3) Cement:	Type II
4) Cement Content:	6.0 sacks/yd minimum
5) Max Water/Cement Ratio:	Per SSCDOT
6) Admixture	Per SSCDOT
 - b. Vehicular Concrete Paving: Use for exterior concrete slabs on grade subject to vehicular traffic.

1) Strength:	4,000 psi at 28 days
2) Maximum Aggregate Size:	1-inch Per SSCDOT
3) Cement:	Type II
4) Cement Content:	6.5 sacks/yd minimum
5) Max Water/Cement Ratio:	Per SSCDOT
6) Admixture	Per SSCDOT
 - c. Slurry Backfill: Use for backfill of over-excavated trenches and site utility piping.

1) Maximum Aggregate Size:	3/8-inch
2) Cement:	Type II
3) Cement Content:	2.0 sacks/yd minimum

B. If provided, reinforcement shall be per plans.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Subgrade shall conform to the requirements of Section 31 20 00. The District may elect to verify compacted subgrade elevations by measurement made from adjacent existing improvements or by a template supported by forms.

3.02 GENERAL CONCRETE

- A. Concrete placement shall conform to the applicable requirements of Section 51. Concrete shall not be placed when the air temperature in the shade at the project site exceeds 95° F or is below 45° F, or when the temperature of the concrete exceeds 85° F.
- B. After the concrete has been placed, it shall be struck off to proper section and compacted with a grid of parallel metal bars until a layer of mortar not less than 3/8 inch thick has been brought to the surface. All exposed concrete surfaces shall receive a medium broom finish applied transversely to the line of pedestrian traffic or to the longest dimension of the concrete, as applicable.
- C. General concrete surfaces shall be cured by the curing compound method and shall be protected in accordance with the provisions of Subsections 90-7 and 90-8 of the Standard Specifications.

3.03 PROTECTION OF CONCRETE

- A. The Contractor shall be responsible for the condition of all concrete work until such time as all work has been completed and is accepted by the District. The Contractor shall limit vehicular travel across concrete until such time as the concrete has achieved strength sufficient that it can support traffic without damage. In no case, however, will vehicles be allowed to travel across new concrete improvements until seven calendar days have passed since the concrete was placed.

3.04 CONCRETE JOINTS

- A. Expansion joints and weakened plane joints shall be constructed at the locations shown on the plans or as directed by the Architect or Engineer. Where joint locations are not specified on the plans, expansion joints shall be constructed at maximum intervals of 30 feet, and weakened plane joints shall be constructed at maximum intervals of 10 feet.
- B. Expansion joints shall be considered as weakened plane joints for the purpose of spacing weakened plane joints. Expansion joints shall be tooled with a 3/8 inch maximum radius edger, and shall be filled with 3/8 inch pre-formed expansion joint filler.

3.05 CONCRETE FINISHES

- A. Where concrete is being installed adjacent to or near existing concrete improvements, match the finish of similar concrete surfaces, i.e. new sidewalks shall match existing sidewalks, new curbs shall match existing curbs, etc.
- B. Sidewalks and Mowstrips: Medium sweat finish or medium broom finish as required to match existing finishes.
- C. Curbs: Trowel smooth and finish with a light brush.

- D. Gutters: Medium broom finish
- E. Drive approaches and wheelchair ramps: Broom Finish, perpendicular to the direction of travel

3.06 INSTALLATION OF ACCESSORIES

- A. Strictly comply with manufacturer's instructions and recommendations and approved details. Securely anchor work to substrate.

3.07 REPAIR AND CLEAN-UP

- A. Contractor shall legally remove all trash, debris, containers and excess materials from the site on a periodic basis, and shall keep the work broom clean until Owner's acceptance.
- B. The Contractor shall be held responsible for the repair and/or replacement of new or existing improvements damaged as a result of this work to the satisfaction of the Owner.
- C. The Contractor shall provide roll-off bins for wash-out of ready mix concrete trucks and pumpers. Do not allow concrete debris or cement water onto soils scheduled for landscape planting.

END OF SECTION

SECTION 32 13 15
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Concrete reinforcement
- B. RELATED SECTIONS
 - 1. Section 32 13 13 - Site Concrete Improvements.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTALS and the Contract General Conditions.
 - 1. Mill test certificates identifying chemical and physical analysis of each load of reinforcing steel delivered. If mill test reports are not available and the quantity of steel for a structure exceeds 5 tons, provide a laboratory test to prove yield strength and bending.
 - 2. Drawings and placing diagrams for each grade slab including dowels and corner bars.
 - 3. On the placing diagrams, show all openings for pipelines and architectural features. Include additional reinforcing at openings and corner bar arrangements at intersecting beams, walls, and footings.
 - 4. Coordinate placing diagrams with the concrete placing schedule.

1.4 PRODUCT DELIVERY

- A. Deliver reinforcement to project site in bundles marked with tags indicating bar size and length.
- B. Store on wooden supports above ground surface.

PART 2 - PRODUCTS

2.1 BARS

- A. Bars shall be deformed billet steel conforming to ASTM A 615, Grade 60. Mixing of steel grades will not be allowed.

2.2 BAR SUPPORTS

- A. Bar support shall be concrete or metal chairs, spacers or hangers. Reinforcing bars shall not be supported by forms.

2.3 TIE WIRE

- A. Tie wire shall be annealed steel wire of not less than 16-gauge.

PART 3 - EXECUTION

3.1 PLACEMENT

- A. Position reinforcement in accordance with the drawings, secure with wire ties or suitable clips at all intersections, and support by an adequate number of concrete or metal chairs, spacers, or metal hangers such that reinforcing bars do not sag more than one quarter of an inch (1/4") between supports. Do not place reinforcement or supports in contact with the forms. Bend tie wires away from the forms in order to provide the specified concrete coverage. To secure reinforcement in position, the Contractor may elect to locate bars additional to those shown on the drawings, but at no additional cost to the Owner.
- B. Set reinforcing dowels and anchor bolts in place prior to placing concrete. Do not press them into the concrete after the concrete has been placed.

3.2 SPLICES

- A. Splice bars only at locations shown on the drawings. Where splices are not detailed, lap bars 36 bar diameters and 18 inches minimum and stagger adjacent splices 48 bar diameters.

3.3 CLEANING

- A. Remove dirt, form oil, excessive rust, cement coating from previous pours, and foreign matter that will reduce bond with concrete.

3.4 PROTECTION DURING CONCRETING

- A. Keep reinforcing steel in proper position during concrete placement.

END OF SECTION

SECTION 32 31 13
CHAIN LINK FENCING

PART 1 - GENERAL

1.01 Section Includes

- A. Provisions of constructing chain link fence at locations shown on the Construction Documents, including but not limited to:
 - 1. Site chain link fencing and gates.

1.02 Related Sections:

- A. Contract General Conditions and Division 1 Specifications.
- B. Section 31 20 00 – Earthwork: Excavation, Filling, and Grading
- C. Section 32 13 13 – Site Concrete Improvements.

1.03 Quality Assurance

- A. Qualifications of Installer
 - 1. Throughout the progress of installation of the work of this Section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this Section.
 - 2. In actual installation of the work of this Section, use adequate numbers of skilled workmen to insure installation in strict accordance with the contract documents.
 - 3. In acceptance or rejection of work performed under this Section, the Engineer will make no allowance for lack of skill on the part of the workmen.

1.04 Product Handling

- A. Protection
 - 1. Use all means necessary to protect the materials of this Section before, during and after installation, and to protect the work of other trades.
- B. Replacements
 - 1. In the event of damage, immediately make all repairs and replacements necessary to the satisfaction of the Engineer and at no additional cost to the Owner.

PART 2 - PRODUCTS

- 2.01 The materials and fabrication of chain link fabric shall conform to these specifications, and as shown on the plans and details.
- 2.02 All ferrous materials shall be new and galvanized. Imperfectly galvanized material or material upon which serious abrasions of the galvanizing occur shall not be used.
- 2.03 Height - all fencing shall stand at the heights shown on the plans.
- 2.04 Fabric - chain link fabric shall conform to the specifications of ASTM, designation: A392, Class 1. The wire used in the manufacture of the fabric shall be 9-gauge. All chain link fabric shall be woven into approximately 2 inch mesh. Fabric shall be furnished with knuckling at all selvages. The knuckled selvage shall be used along all corners and edges. Fabric shall be GBW, galvanized before weaving.
- 2.05 Posts, braces and gate frames - the base material for the manufacture of steel pipe used for posts and braces shall conform to the specifications of ASTM, designation: A53, standard weight, Schedule 40, and the base material for the manufacture of other steel sections used for posts and braces shall be good commercial quality weldable steel.
- 2.06 All posts, braces and gate frames shall conform to the size and weight designations shown on the plans.
- 2.07 All posts shall be fitted with rainproof caps designed so as to fit securely over the top of the posts.
- 2.08 All posts shall be of a total length of not less than the depth of the concrete footing as shown on the plans, plus the length required above ground.
- 2.09 Posts and braces shall be galvanized in accordance with specifications of ASTM, designation: A123.
- 2.10 All horizontal braces shall be attached to posts by approved steel fixtures.
- 2.11 All welding shall conform to the requirements of the California Building Code, CBC, Chapter 22.
- 2.12 Where the galvanized surface has been burned by welding, all surfaces of the welded connections shall be thoroughly cleaned by wire brushing and all traces of the welding flux and loose or cracked galvanizing removed. The damaged area and weld shall then be painted in accordance with the following details:
- A. All galvanized, welded, or damaged surfaces that are to be painted shall first be cleaned by washing with mineral spirit solvent sufficient to remove any oil, grease or other materials foreign to the galvanized coating.
 - B. After washing, all areas shall be roughened by abrasive blasting using an abrasive that is no larger than 30-mesh. Galvanizing shall not be removed by this operation.

- C. After preparation, all galvanized surfaces that are to be painted shall be covered with one application of zinc dust-zinc oxide primer, federal specification TT-P-641, Type II. The zinc dust-zinc oxide paint shall be applied by spraying to produce a complete covering of the galvanized surface.
 - D. After the application of the zinc dust-zinc oxide paint, one application of pre-treatment, vinyl wash primer, Section 91-2.7 of the state Standard Specifications, shall be applied to such surfaces. The vinyl wash primer shall be applied by spraying to produce a uniform wet film on the surface.
 - E. Such surfaces shall then be covered with two separate applications of white tint base vinyl finish coat, Section 91-2.22 of the state standard specifications, sufficient to completely cover the preceding color. Paint for the first application shall be tinted with a compatible coloring agent to slightly contrast with the color of the second application. After drying for 24 hours, one application of aluminum paint, finish coat, Section 91-2.8 of the state standard specifications, shall be painted on the welded areas.
- 2.13 Stretcher bars and other required fittings and hardware shall be steel and shall be galvanized in accordance with the specifications of ASTM, designation: A153.
- 2.14 All swinging gates and walk gates shall be installed with a gate holdback, Trimco 1209HOHA-626. Holdbacks shall installed in the concrete mowstrip, unless otherwise noted.
- 2.15 Concrete mowstrip shall be in accordance with Section 32 13 13.
- 2.16 Walk gates shall be constructed as per detailed drawings and in accordance with CBC sections 11B-206.5 and 11B-404.
- 2.17 Non-accessible swinging gates shall comply with the following:
- A. Have a lockable fork latch.
 - B. Have heavy-duty malleable iron hinges
- 2.18 Accessible walk gates on an accessible path-of-travel shall comply with the following:
- A. Gate night latch hardware, Von Duprin AX22-210NL SP28-299 Hex-Key Dogging – GBK.
 - B. Accessible gates shall have a minimum 10 inch high steel bottom kick plates on both sides of the gate.
 - C. Accessible gates with night latch lever or at a security perimeter (e.g. at the site perimeter or through a security fence) shall have two self-closing hinges Locinox Mammoth 180 and shall comply with CBC 11B-404.2.8.1. Install steel angles to round posts and gate for mounting self-closing hinges.

PART 3 - EXECUTION

- 3.01 All posts shall be set in concrete footings as shown on the plans to within 3 inches of bottom.
- 3.02 All vertical line and end posts shall be braced to the nearest adjacent vertical post with galvanized horizontal braces as shown on the plans.
- 3.03 Perimeter fencing chain link fabric shall be fastened to the outside of the fence.
- 3.04 All fabric shall be stretched and securely fastened to the posts, as follows:
 - A. The fabric shall be fastened to end, corner and gate posts with ¼ inch by ¾ inch stretcher bars and not less than 1/8 inch by 3/4 inch stretcher bar tension bands spaced at one foot intervals for whatever widths of fabric are supplied. The fabric shall be fastened to line posts with tie wires or post clips. Tie wires shall be at least 9-gauge (0.148 inch diameter) steel. Post clips shall be at least 6-gauge (0.192 inch diameter) steel. The wire or clip fasteners shall be spaced at approximately 14 inches on line posts, with a minimum of 5 fasteners per 6 foot high post. Top and bottom edges of the fabric shall be secured to each horizontal brace with tie wires or fastened to tension wire with hog rings spaced at 15 inch maximum intervals. Hog rings shall be at least 9-gauge (0.148 inch diameter) steel. Wire ties shall be given at least one complete turn. Hog rings shall be closed with ends overlapping. The distance from the selvage to the braces or top rails shall be 2-inch maximum and shall be fastened to the brace or rail by wire fasteners spaced at approximately 14 inches with a minimum of 8 fasteners per each 10 foot horizontal span.
- 3.05 Construct concrete mowstrip to the dimensions shown on the plans.

END OF SECTION

IRRIGATION SYSTEM**SECTION 32 84 00****PART 1 - GENERAL**

1.01 DESCRIPTION

- A. Provide all materials, labor, equipment and services necessary to furnish and install the Irrigation System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded. The extent of the underground irrigation system is shown on the drawings.
- B. RELATED WORK SPECIFIED ELSEWHERE
 - 1. Contract Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 1 Specification Sections, apply to work of this section.
 - 2. Section 31 23 00 – Trench Excavation and Backfill
 - 3. Section 32 90 00 – Landscape Planting

1.02 CODES AND REGULATIONS

- A. All work and materials shall be in full accordance with the following codes adopted and amended by the authority having jurisdiction. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes. The specifications shall govern in the event that the drawings or specifications call for material or methods of construction of higher quality or standard than required by these codes.
 - 1. California Plumbing Code
 - 2. California Administrative Codes:
 - a. Title 8, Industrial Relations
 - b. Title 19, Public Safety
 - 3. California Electrical Code
 - 4. Standards and Regulations of other agencies or organizations as listed in this specification relating to products or procedures. For example, American Society for Testing and Materials.

1.03 EXPLANATION OF DRAWINGS

- A. The intent of the drawings and specifications is to indicate and specify a complete and efficient sprinkler irrigation system ready for use in accordance with the manufacturer's recommendations, and all applicable local codes and ordinances. Questions concerning interpretation of irrigation plans and specifications shall be the responsibility of the Landscape Architect.
- B. All plot dimensions are approximate. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and shall report any variations to the Project Inspector and Landscape Architect.
- C. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc. which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all his work, and plan his work accordingly,

furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner, so that conflicts between sprinkler systems, planting, utilities, and architectural features will be avoided. Contractor shall provide and install any and all material, labor, operations necessary to provide a complete fully functional irrigation system as deemed acceptable by the Owner. No additional compensation will be given to the Contractor for work required by the Owner.

- D. All work called for on the drawings by notes shall be furnished and installed whether or not specifically mentioned in the specifications.
- E. The Contractor shall not willfully install the irrigation facilities as indicated on the drawings when it is obvious in the field that unknown obstructions might not have been considered in the engineering. Such obstructions or differences should be brought to the attention of the Project Inspector.
- F. The Contractor shall examine carefully the site of work contemplated and the proposal, plans, specifications, and all other contract documents. It will be assumed that the Contractor has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantity of work to be performed and materials to be furnished, and as to the requirements of the specifications. The Contractor shall take necessary precautions to protect existing site conditions that are to remain. Should damage be incurred, the Contractor shall make the necessary repair or replacement to bring it back to its original condition at his own expense.
- G. Prior to cutting into the soil, the Contractor shall coordinate with the Project Inspector to locate all cables, conduits, sewers, septic tanks, and other such utilities as are commonly encountered underground and he shall take proper precaution not to damage or disturb such improvements. If a conflict exists between such obstacles, notify the Project Inspector who will consider realignment of the proposed work. The Contractor will proceed in the same manner if a rock layer or any other condition encountered underground makes change advisable. Should utilities not shown on the plans be found during excavations, Contractor shall promptly notify the Project Inspector for instructions as to further action. Failure to do so will make Contractor liable for any and all damage thereto arising from his operations subsequent to discovery of such utilities not shown in the plans.
- H. The Contractor shall verify the correctness of all finish grades within the work area in order to insure the proper soil coverage (as specified) of the sprinkler system pipes. The Contractor shall verify and be familiar with location and size of the proposed water supply (P.O.C.). He shall make approved type connection and install new work.
- I. The Contractor shall be responsible for notifying the Project Inspector in the event any equipment or methods indicated on the drawings or in the specifications conflict with local codes, are incompatible or an error is apparent prior to installing. In the event the Contractor neglects to do this, he will accept full responsibility for any revisions necessary. No additional compensation will be given to the Contractor for necessary revisions resulting from this event.

1.04 PERMITS AND INSPECTIONS

- A. The Contractor shall obtain and pay required fees to any governmental or public agency. Any permits for the installation or construction of any of the work included under this contract, which are required by any of the legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. He shall also arrange for and pay all costs in connection with any inspections and examination required by these authorities.
- B. In all cases, where inspection of the irrigation system work is required and/or where portions of the work are specified to be performed under the direction and/or inspection of the Owner authorized Representative the Contractor shall notify the Owner's Authorized Representative, at least 48 hours in advance of the time when such inspection and/or direction is required. Any necessary re-excavation or alterations to the system needed because of failure of the Contractor to have the required inspection, shall be performed at the Contractor's own expense.

1.05 GUARANTEE

- A. Irrigation system shall be guaranteed for one year from date of final acceptance by the Architect.

1.06 OPERATIONS AND MAINTENANCE INSTRUCTIONS/RECORD DOCUMENTS

- A. The Contractor shall prepare and deliver to the Owner Representative within ten (10) calendar days prior to completion of the construction, all required and necessary descriptive material in complete detail and sufficient quantity, properly prepared in two individually bound sets of Operating and Maintenance Manuals.

These manuals shall describe the material installed and shall be in sufficient depth to permit operating personnel to understand, operate and maintain all equipment. Spare part lists and related manufacturer identification shall be included for each installed equipment item. Each complete, bound manual shall contain the following information:

1. Index sheet stating Contractor's address and telephone number, duration of guarantee period, and list of equipment, with names and addresses of local manufacturer representatives.
 2. The Contractor to issue a "CERTIFICATE OF CONSTRUCTION COMPLIANCE" to the Project Inspector which indicates that all work done, materials and equipment used and installed are in compliance with the approved plans, specifications and all authorized revisions.
 3. Complete operating and maintenance instruction on all major equipment.
 4. Complete set of manufacturer's literature and specifications of material installed, including parts list.
 5. Diagrams for all wiring of controller, controller valves, etc.
 6. Initial electrical data on each control valve.
 - a. Ohmmeter reading for each valve taken at the controller and valve.
 - b. Voltmeter reading for each valve.
- B The contractor shall furnish one set of bond copy As-Built drawings and one set of Autocad 2004 drawing files on compact disk of As Built information

has been transferred to the CAD files.

1. Label first page of each document, or set of documents, "PROJECT RECORD" in neat large printed letters on lower right hand corner. Record information concurrently with construction progress. Prints for this purpose may be obtained from the Project Inspector. This set of drawings shall be kept on the site and shall be used only as a record set. Do not conceal any work until required information is recorded. These drawings shall also serve as work in progress sheets, and the Contractor shall make neat and legible annotations thereon daily as the work progresses, showing the work as actually installed. These drawings shall be available at all times for inspection and shall be kept in a location designated by the Project Inspector.
 2. Drawings: Legibly mark to record actual construction:
 - a. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Give sufficient horizontal and vertical dimensions to accurately trace route and invert of each concealed line or item. Accurately locate each capped, plugged or stubbed line.
 - b. Field changes of dimension and detail.
 - c. Changes made by Field Order, by Addenda, or by Change Order.
 - d. Details not on original Contract Drawings.
 3. Deliver all Record Documents (As-Builts) to Project Inspector. Accompany submittal with transmittal letter in duplicate, containing:
 - a. Date.
 - b. Project title.
 - c. Contractor's name and address.
 - d. Title and number of each Record Document (As-Built).
 - e. Signature of Contractor or his authorized representative.
- C. The Contractor shall provide one controller chart for each controller installed. The chart will show the area irrigated by the controller and shall be the maximum size the controller door will allow. The chart may be a reduced drawing of the actual plans. The chart shall be colored with a different color for each station. The chart shall be laminated or covered in a watertight envelope.
- D. The Contractor shall provide three (3) copies of laminated, typewritten legible controller programming charts for each individual controller. The chart shall show all stations on controller, run times, start times and program.

1.07 SUBMITTALS

- A. Contractor shall submit six (6) copies of complete lists of proposed materials to the Landscape Architect, including manufacturer's name and catalog numbers. No substitution will be allowed without prior written approval by the Landscape Architect.
- B. Shop drawings shall follow for all equipment, including dimensions, capacities, and other characteristics as listed in product specifications. Materials and equipment shall not be ordered until given written approval by the Landscape Architect.
- C. When specific name brands of equipment and materials are used, they are intended as preferred standards only. This does not imply any right upon the part of the Contractor to furnish other materials unless specifically approved in writing

as equal in quality and performance by the Landscape Architect. Decisions by the Landscape Architect shall govern as to what name brands of equipment and materials are equal to those specified on the plans and his decisions shall be final. It shall be the responsibility of the prospective bidder to furnish proof as to equality of any proposed equipment or material.

- D. Approval of any item, alternate or substitute indicates only that the products apparently meet the requirements of the drawings and specifications on the basis of the information or samples submitted. Manufacturer's warranties shall not relieve the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.
- E. Acceptance of any submittals, deliverables, or other work product of the Contractor shall not be construed as assent that contractor has complied, nor in any way relieved the Contractor of, compliances with (i) the applicable standard of care of (ii) applicable statutes, regulations, rules, guidelines, and contract requirements.

1.08 DEFINITIONS

- A. Piping: All pipe fittings, valves, and accessories as required for a complete piping system.
- B. PVC: Polyvinyl Chloride.
- C. Agencies and Organizations:
 - 1. ASTM- American Society for Testing and Materials
 - 2. AWWA- American Water Works Association
 - 3. IAPMO- International Association of Plumbing and Mechanical Officials
 - 4. NEC - National Electrical Code.
 - 5. UL - Underwriter's Laboratories

1.09 REJECTION OF MATERIAL OR WORK

- A. The Owner reserves the right to reject any material or work which does not conform to the contract plans, specifications without any written approval from the Landscape Architect. The rejected material or work shall be removed or corrected by the Contractor at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Piping:
 - 1. Pressure pipe 2 inch and greater/upstream of control valve:
 - a. Bell end 'O' ring gasketed purple tinted for 'Non-potable' water PVC 1120 Class 200, SDR21, high impact pipe (ASTM D2241 & ASTM D1784).
 - 2. Pressure pipe less than 2 inch, and Lateral line/downstream of control valve:
 - a. Solvent weld bell end purple tinted for 'Non-potable' water PVC 1120 Schedule 40 high Impact pipe (ASTM D1784 & ASTM D1785).

3. Sleeving under paving:
 - a. Solvent weld bell end PVC 1120 Schedule 40 high impact pipe (ASTM D1784 & ASTM D1785).
 4. All pipe shall be continuously and permanently marked and conform with the following information: Manufacturer's name or trademark, nominal pipe size, schedule and type of pipe, pressure rating in PSI and (NSF) seal of approval. Pipe shall be a improved rigid polyvinyl chloride (PVC) compound manufactured by Lasco Industries or approved equal.
- B. Fittings:
1. For PVC plastic pipe: white rigid polyvinyl chloride (PVC) Schedule 40 type I and II grade 1, solvent weld socket fittings ASTM D2466 for all lateral line pipe 2 ½" and smaller. Gray rigid polyvinyl chloride (PVC) Schedule 80, grade 1, solvent weld socket fittings ASTM D2467 for all lateral line pipe 3" and larger, and main line pipe less than 2".
 2. For all mainline pipe 2" and greater: Ductile Iron deep bell epoxy coated gasketed fittings, AWWA C153, Class 350, Grade 65-45-12, ASTM A-536, push on joints with EPDM gaskets meeting ANSI / AWWA C111 / A21.11 and four (4) cast lugs for joint restraints as manufactured by Leemco, Inc. (909) 422-0088, or approved equivalent.
 3. Joint restraints shall be provided at all elbow, tees, bends, etc. Joint restraints shall be Leemco, Inc. (909) 422-0088 epoxy coated LH series joint restraint for IPS pipe, or equivalent. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable (IPS) schedule, and (NSF) seal of approval.
 4. All plastic fittings and connectors shall be injection molded of an improved polyvinyl chloride compound featuring high tensile strength, high chemical resistance and high impact strength in terms of current ASTM standards for such fittings and as manufactured by Lasco Industries or approved equal. Where threads are required in plastic fittings, these shall be injection molded also.
 5. For connections between main lines and electric control valves: Schedule 80 PVC ASTM D2464.
 6. Saddles shall be used for connections between the irrigation mainline blow off valves, quick coupling valves and electric control valves. Saddles shall be coated ductile iron with two (2) stainless steel straps. Romac Industries (800) 426-9341, # 202NS or equal.
- C. Galvanized pipe and fittings:
1. Galvanized Pipe shall be hot dip galvanized continuous welded, seamless steel pipe SCH 40 conforming to applicable current (ASTM) standards.
 2. Galvanized Fittings shall be galvanized malleable iron ground joint SCH 40 conforming to applicable current (ASTM) standards.
- D. Solvent Weld Adhesive:
1. All socket type connections shall be joined with primer and PVC solvent cement which shall meet the District Standards and requirements of ASTM F656 for primer and ASTM D2564, "Standard Specification for

Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings." Solvent cement joints for plastic pipe and fittings will be made as prescribed by manufacturer. The high chemical resistance of the pipe and fitting compounds specified in the foregoing sections makes it mandatory that an aggressive colored primer, which is a true solvent for (PVC) be used in conjunction with a solvent cement designed for the fit of pipe and fittings of each size range specified. A medium bodied solvent cement to be used on pipe joints with interference fits only and not with Schedule 80 fittings. A heavy bodied solvent cement can be used for all classes and schedules of pipe and fittings.

- E. Pipe Thread Sealant:
 - 1. A non-hardening all purpose sealant and lubricant similar to Permatex #51 or Lasco blue pipe thread sealant which is certified by the manufacturer to be harmless to PVC pipe and fittings. Apply sealant to clean male threads, brushing into grooves and to the first three threads of the female threads. A good quality grade of teflon tape recommended by the manufacturer for use with plastics may also be used. Minimum width of tape to be used is 3/4". A minimum of two wraps and a maximum of three wraps to be used.

2.02 VALVES

- A. Electric Control Valves: Globe valves operated by low-power solenoid, normally closed, manual flow adjustment. Provide control valves with non-potable / reclaimed water ID. Sizes and types as shown on drawings.
- B. Control Wire: Paige P7072D twisted pair solid core with polyethylene jacket, AWG-UF type UL approved for direct burial, minimum size #14.
- C. Control Wire Connectors: 3M DBR/Y-6 Direct Bury splice kit, and connectors or equivalent.
- D. Control Wire Marking: Christy wire marker or equivalent.
- E. Control Valve Boxes: Oldcastle Precast, Christy Concrete Products (888) 965-3227 concrete valve box with concrete lid or equivalent.
- F. Mainline and Quick Coupler valve boxes: Oldcastle Precast, Christy Concrete Products (888) 965-3227, concrete valve box with concrete lid or equivalent.
- G. Mainline valve: Nibco cast iron resilient wedge with operating nut or equivalent. Conforming to AWWA C509 Standards.
- H. Control valve box marking: Stencil in black paint on top of lid with 2" high letters showing controller letter and station number.

2.03 CONTROLLER

- A. Solid state microcomputer controller, completely automatic in operation, which shall electrically start the sprinkler cycle and program and time the individual stations. Controller shall have attached instruction booklet, integral 24V

transformer, clock indicating time of day and day of week, 24V master valve circuit and terminal connection strip. Controller shall be universal remote ready with pre-installed connectors.

- B. Controller shall be capable of receiving weather data and adjust controller schedules based upon evapotranspiration data. Possessing modular construction with input-output modules, self contained diagnostic, and capable of wi-fi communications.

2.04 IRRIGATION HEADS

- A. Spray Head: Molded plastic body with plastic nozzles. Refer to schedule on drawings. Manufacturer's numbers are listed with description.
- B. Rotor Head: Molded plastic and stainless steel construction, Gear driven with memory arc, balanced nozzle sets. Refer to schedule on drawings. Manufacturer's numbers are listed with description.
- C. Dripline: Polyethylene tubing with inline emitter. Self cleaning, pre-emergent impregnated emitter welded to dripline wall. Manufacturer's numbers are listed with description.

2.06 BACKFLOW PREVENTER

- A. The existing backflow preventer assembly is existing and shall remain in place.

2.07 OTHER MATERIALS

- A. Materials not specifically indicated but necessary for proper execution of this work shall be of first quality as selected by the Contractor subject to the acceptance of Landscape Architect.
- B. All materials appearing in the legend and details of the irrigation drawings are part of this job. Contractor is responsible for installation according to plans and details. The system shall efficiently and uniformly irrigate all areas and perform as required by these plans and specifications.

PART 3 - EXECUTION

3.01 SYSTEM DESIGN

- A. Design pressure and system flow as indicated on drawings.
- B. Contractor shall verify design layout and specifications as specified on drawings and inform the Project Inspector and the Landscape Architect of discrepancies, errors or incompatibility in writing prior to installation of irrigation system. Failure to inform the Project Inspector or Landscape Architect of any discrepancy seven working days prior to beginning system installation will institute the responsibility of corrective action to the Contractor at no expense to the Owner.

3.02 PIPING INSTALLATION

A. General:

1. Any equipment installed by the Contractor and deemed to be for the use of the Owner in various situations (i.e., control valves, control panels, etc.) shall be so installed to be readily accessible and quickly operable. Equipment deemed by the Owner to be inoperable for its intended purpose shall be reinstalled by the Contractor in an operable position before approval will be given. Any changes made by the Contractor shall be done without any additional cost to the Owner.
2. The Contractor shall be responsible for layout of proposed facilities and any minor adjustments required due to differences between site and drawings. Any such deviations in layout shall be within the intent of the original drawings, and without additional costs to the Owner. The Owner will indicate the proposed precise location of the control panels. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage with a minimum spray on non-planted areas. Where head spacing is not noted, Contractor is to install sprinkler heads evenly along the irrigation area's perimeter. Flush all lines prior to installation of heads.
3. Support piping without strain on joints or fittings and allow for piping expansion and contraction. "Snake" pipe into trench in accordance to manufacturer's recommendations to allow for expansion. Lay on solid sub-base, at uniform depth.

- B. The Contractor shall examine all other portions of working drawings and plan trenching and pipe lays so that no conflict will arise between irrigation and any other work. Any corrective action will be the Contractors responsibility at no further expense to the Owner.

C. Excavations:

1. Excavations shall be open vertical construction, sufficiently wide to provide free working space around the work installed and to provide ample space for backfilling and tamping.
2. Trenches for pipe and equipment shall be cut to required grade lines, and compacted to provide an accurate grade and uniform bearing for the full length of the line.
3. When two pipes are to be placed in the same trench, it is required to maintain a minimum four inch (4") horizontal separation between pipes.
4. Depth of trenches shall be sufficient to provide a minimum cover above the top of the pipe as follows:
 - a. 24-inch over main lines.
 - b. 18-inch minimum over non-pressure (rotary pop-up) lateral lines.
 - c. 12-inch minimum over non-pressure (pop-up spray head) lateral lines.
 - d. 24-inch minimum over lines located out in road surface area of paved streets.
5. Maximum cover above the top of the pipe shall not exceed twelve inches (12") greater than the required minimum cover.

D. Assemblies

1. Routing of pressure supply lines as indicated on drawings is diagrammatic. Install lines (and various assemblies) in such a manner as to conform with details on plans.
2. Install all assemblies specified herein according to the respective detail drawings or specifications pertaining to specific items required to complete the work.
Perform work according to best standard practice, with prior approval.
3. Install no multiple assemblies on plastic lines. Provide each assembly with its own outlet.
4. All brass pipe and fittings shall be assembled using an approved teflon tape, or equivalent, applied to the male threads only. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved teflon tape will be required.
5. All plastic and galvanized steel threaded pipe and fittings shall be assembled using an approved teflon tape applied to the male threads only. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved teflon tape will be required.
6. No elbows, tees or valves are to be located closer than five (5') feet of each other without prior approval of the Project Inspector.

E. Line Clearance

1. All lines shall have a minimum clearance of four inches (4") from each other, and six inches (6") from lines of other trades. Parallel lines shall not be installed directly over one another.

F. Plastic to Steel Connections

1. At all plastic (PVC) pipe connections, the Contractor shall work the steel connections first. Connections shall always be plastic into steel, never steel into plastic. An approved teflon tape shall be used on all threaded (PVC) to steel, never steel into plastic. An approved teflon tape shall be used on all thread (PVC) to steel pipe joints applied to the male threads only, and light wrench pressure is to be applied. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved 3/4" wide teflon tape will be required.
2. A non-hardening sealant and lubricant similar to Permatex #51 or LASCO blue pipe sealant may be used in lieu of teflon tape. Apply sealant to clean male threads brushing into grooves and to the first three threads of the female threads.

G. Plastic Pipe

1. The Contractor shall exercise care in handling, loading, unloading, and storing plastic pipe and fittings. All plastic pipe and fittings shall be stored under a weatherproof roofed structure before using and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lie flat so as not to be subject to undue bending or concentrated external load at any point.
 - a. All lumber, rubbish, rubble, concrete and rocks shall be removed from the trenches by the Contractor. Pipe shall have a firm uniform bearing for the entire length of each pipe line to prevent uneven settlement. Wedging or blocking under riser tees shall be done only if specified on the plans. Pad trenches with soil as necessary to

- provide uniform bearing surfaces.
- b. Where extensive lengths of pipe are installed, snake pipe in trench from side to side to allow for expansion and contraction. One additional foot per one hundred (100) feet of pipe is the minimum allowance for snaking. Never lay pipe when there is water in the trench or when the temperature is 32 degrees F or below.
 - c. All changes in direction of pipe shall be made with fittings, not by bending.
 - d. Make solvent weld joints with a non-synthetic bristle brush in the following sequence:
 - 1) Make sure pipe is cut square and all rough edges and burrs are removed. All connecting surfaces are properly cleaned and dry prior to application of pipe primer.
 - 2) Apply an even coat of colored primer to pipe and fitting prior to application of solvent.
 - 3) Apply an even coat of solvent to the outside of the pipe, making sure that the coated area is equal to the depth of the fitting socket.
 - 4) Apply an even light coat of solvent to the inside of the fitting.
 - 5) Apply a second coat of solvent to the pipe.
 - 6) Insert the pipe quickly into the fitting and turn pipe approximately one-eighth to one-quarter turn to distribute the solvent and remove air bubbles. Hold the joint for approximately fifteen seconds so the fittings do not push off the pipe.
 - 7) Using a clean rag, make sure to wipe off all excess solvent to prevent weakening at the joint.
 - 8) Exercise care in going to the next joint so that pipe is not twisted, thereby disturbing the last completed joint.
 - 9) Allow at least fifteen minutes setup time for each welded joint before moving.
 - 10) Repairing plastic pipe when damaged shall be done by replacing the damaged portion of pipe.

H. Concrete Thrust Blocks:

1. Concrete anchors or thrust blocks shall be provided on main pipelines at abrupt changes in pipeline grade, changes in horizontal alignment (elbows, tees and crosses), reduction in pipe size (reducers, reducing tees or crosses), end-line caps or plugs, and in-line valve to absorb any axial thrust of the pipeline. The pipe manufacturer's recommendation for thrust control shall be followed. Thrust blocks must be formed against solid unexcavated earth (undisturbed). Do not enclose entire joint in concrete. Provide a minimum of three (3) cubic feet of 3,500 PSI concrete for each concrete thrust block.

3.03 SPRINKLER HEAD INSTALLATION

- A. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage with a minimum spray on non-planted areas. Flush all lines prior to installation of heads.

- B. Rotary pop-up sprinkler heads adjacent to walks or mowstrips shall be set four inches (4") and pop-up spray heads adjacent to walks or mowstrips shall be set one inch (1") minimum / two inches (2") maximum from edge of walk or mowstrips or as noted otherwise on the plans and details.
- C. Upon completion of the installation, the Contractor shall adjust sprinkler heads to properly distribute water flow and shall place entire irrigation system in first-class operating condition.
- D. Adjustable sprinkler heads shall be adjusted by fully opening the sprinkler furthest from the control. Adjust sprinkler heads which spray toward buildings in shrub areas so that water spray does not contact side of buildings.
- E. Install irrigation heads in accordance with details on plans.

3.04 PIPE DEPTH AND BACKFILL

- A. Backfill shall not be placed until the installed system has been inspected and approved by the Project Inspector.
- B. Backfill material shall be approved soil. Unsuitable material, such as pipe remnants and wire including clods and rocks over two inches (2") in size, shall be removed from the premises and disposed of legally at no cost to the Owner. Backfill for first six inches (6") around mainline pipe and control wires shall be native soil.
- C. All backfilling shall be done carefully and shall be properly tamped. All soil shall be tamped and puddled to eliminate any voids.
- D. Surplus earth remaining after backfilling shall be disposed of as directed by the Project Inspector.
- E. Backfilling for all pipe shall be carried out in two basic stages.
 1. Stage One Backfilling: This shall be accomplished as soon as possible after the pipe is laid. A bedding of uniform depth with no voids must be provided along the entire length of the pipe. The bedding dirt should be placed in the trench and tamped into the areas under the pipe, using a suitable tool. Joints should be left exposed until hydrostatic tests are completed. Cover only those portions of the pipe necessary to prevent movement or damage.
 2. Stage Two Backfilling: This shall be completed after all hydrostatic tests are completed and the piping system has been thoroughly checked for leaks or other defects. Continue to add backfill soil in four inch (4") layers and hand tamp to achieve density similar to adjacent soil. After twelve inches (12") in main line trenches and eight inches (8") in lateral line trenches of hand tamped soil is in place over the pipe and fittings, backfilling can be continued, using light machinery to place dirt in the trenches in six inch (6") layers and to compact the dirt to conform to adjacent soil. Extreme care should be taken to avoid damage to the pipe from machinery that is too heavy. All trenches shall then be water jetted to assure uniform settling and compaction. Backfilling operations will not be considered complete until the top surface has been graded to conform to the adjacent soil. All rocks uncovered and not used as backfill must be collected and removed from the site.

- F. PVC piping and fittings shall not be backfilled during periods of extreme heat or when a sudden lowering of temperature of the pipe may cause separation of joints or fittings.

3.05 CONTROL WIRE

- A. Install control wires in PVC conduit. Provide long radius sweep elbows at all turns and control valve boxes. Provide minimum of six inches (6") separation to irrigation mainline. Minimum cover shall be 24 inches. Crimp wires together at valve manifold with connector. Seal splice with 3M DBR/Y-6 splice kit. Tag all control wire splices and at control valve and controller with approved control wire markers.
- B. Wire size shall be determined by the number of valves operating on a given wire and the distance from the controller to the farthest valve, as specified by the charts furnished by the remote control valve manufacturer. Splices are not encouraged but allowed. All splice connections must be provided in valve box.

3.06 ELECTRIC CONTROL VALVES

- A. Electric control valves shall be adjusted so the most remote heads operate at the pressure recommended by the head manufacturer. Electric control valves shall be adjusted so a uniform distribution of water is applied by the heads to the planting areas for each individual valve system. The Contractor shall make all necessary connections for operation. Where pressure regulating electric control valves are called for, the Contractor shall adjust the valve so a uniform distribution of water is applied by the heads.
- B. Valve boxes and lids shall be set to finished grade or as indicated on the Construction Plans. Stencil electric control valve identification numbers on top of valve box with two inch (2") high letters in black paint. Not more than one electric control valve may be installed in each box.
- C. Electric control valves shall be connected and aligned to provide the most efficient flow of water to the irrigation heads. Each valve is to be enclosed in the specified valve box. The valve box shall be secured on firm soil clear of valves and wiring connections. Backfill carefully to prevent settlement and subsequent damage.
- D. A valve box must be provided at all underground irrigation control wire splice connections.

3.07 AUTOMATIC CONTROLLER

- A. Contractor shall be required to program and schedule the controller to maximize and utilize the design flow indicated. Programming and scheduling shall be compatible with controller on site. It shall be the complete responsibility of the Contractor to ensure that the interface between the irrigation booster pump and controller provide for a fully functioning, smooth running irrigation system. Contractor shall provide all wiring and rewiring of irrigation controller necessary to accomplish programming and scheduling which utilizes the design flow indicated.
- B. Install controller, pedestal, and accessories per manufacturer's approved details, construction plans and contract requirements.
- C. Install automatic controller chart in laminated or watertight plastic envelope inside controller cover showing which valves are connected to which stations on controller.

- D. Controller Charts:
1. The Contractor shall provide one controller chart for each controller supplied.
 2. The chart shall show the area controlled by the automatic controller and shall be the maximum size that the controller door will allow.
 3. The chart may be a reduced drawing of the actual as-built system. However, in the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced.
 4. The chart shall be colored with a different color for each station.
 5. The chart shall be a bond copy or approved equal and enclosed in a waterproof envelope or laminated.
 6. Provide three (3) copies of laminated, typewritten, legible programming charts for each controller. Charts shall show all stations on the controller, run times, start times for each individual program on the controller.

3.08 ELECTRICAL SERVICE

- A. Electrical service shall be provided to control panel, as indicated on the plans. All work shall be in conformance to all local ordinances, codes, regulations and P.G. & E. requirements. All cost for the electrical service is to be the responsibility of the Contractor.

3.09 TESTING

- A. General: Unless otherwise directed, tests shall be witnessed by the Project Inspector. Work to be concealed shall not be covered until prescribed tests are made. Should any work be covered before such tests, the Contractor shall, at his expense, uncover, test and repair his work and that of other contractors to original conditions. Leaks and defects shown by tests shall be repaired and entire work re-tested. Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the test.
- B. Piping Upstream of Control Valves (Mainline): Maintain 100 PSI water pressure for a duration of four (4) hours. There shall be no drop in pressure during test except that due to ambient temperature changes (+ 5PSI).

3.10 INSPECTION

- A. Inspection of Work:
1. Installation and operations must be approved by the Project Inspector.
 2. In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval of the Project Inspector. Any work covered prior to inspection shall be opened to view by the Contractor at his expense.
- B. General Inspection: Periodic inspections shall be required for basic operations and installations during progression of the project. Such inspections will include but not necessarily be limited to the following items:
1. Layout and flagging of sprinkler heads and system.
 2. Trenching.
 3. Wire placement.
 4. Partial fill compaction of trenches.

5. Control valve installation.
 6. Irrigation controller installation and operation.
 7. Mainline sustained pressure check.
- C. Coverage Test: When the irrigation system is completed, the Contractor in the presence of the Project Inspector shall perform a coverage test of water afforded in the planting and turf areas. The Contractor shall furnish all materials and labor required to correct any inadequacies of coverage disclosed. The Contractor shall inform the Project Inspector and the Landscape Architect of any deviation from the plan required due to wind, planting, soil, or site conditions, that bear on proper coverage. If such corrections or additions are required in the irrigation system, the Contractor shall make all adjustments and corrections without any extra cost to the Owner.
- D. Completion: The work will be accepted in writing when the entire project improvements have been completed satisfactorily to the Landscape Architect as stated in Section 32 93 00 Plants Part 3.7. In judging the work, no allowance for deviation from the original plans and specifications will be made unless already approved in writing at proper time. Should it become necessary, due to developed conditions, to occupy any portion of the work before the contract is fully completed, such occupancy shall not constitute acceptance. The Contractor will not be responsible for any damage caused by the Owner's work forces.
- E. Submittal of Irrigation Equipment: When the Contractor desires to transfer the required irrigation equipment to the Project Inspector, he must submit along with the equipment an itemized list. The Contractor is solely responsible to obtain a written confirmation by the Project Inspector that all materials received by the Project Inspector matches his material list. Without any written confirmation will mean that no transfer of material has taken place.

3.11 MAINTENANCE

- A. Adjustments: Irrigation system shall be maintained and adjusted as required to provide proper coverage throughout the 90 day maintenance period. Irrigation system maintenance shall commence upon general inspection following irrigation installation, planting operations and general clean-up. Maintenance shall be continued until final acceptance.
- B. After the system has been completed, the Contractor shall instruct an authorized representative of the Owner in the operations and maintenance of the system and shall set the desired controller irrigation time for each station.

3.12 GUARANTEE

- A. The entire irrigation system shall be guaranteed by the Contractor to give satisfactory service and to the quality of materials equipment and workmanship including settling of backfilled areas below finish grade for a period of one (1) year following the date of the final acceptance of all the work by the Architect. If, within one year from the date of completion and final acceptance of all of the work, any trouble develops resulting from inferior or faulty materials or workmanship or settlement occurs and adjustments in pipes, valves, and heads, sod, or paving to the proper level of the permanent grades, the Contractor, as part of the work under his contract, shall make all adjustments and corrections without extra cost to the Owner, including the complete restoration of all damaged planting, paving, or other improvements of any kind.

- B. The Owner reserves the right to make temporary repairs as necessary to keep the irrigation system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibilities under the terms of the guarantee as herein specified.
- C. Should any operational difficulties in connection with the irrigation system develop within the specified guarantee period which in the opinion of the Owner may be due to inferior material and/or workmanship, said difficulties shall be immediately corrected by the Contractor to the satisfaction of the Owner at no additional cost to the Owner including any and all other damage caused by such defects.

END OF SECTION

LANDSCAPE PLANTING

SECTION 32 90 00

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all material, labor and equipment necessary to install all landscape work as indicated in the plans and specifications.
- B. The landscape work includes but is not necessarily limited to the following:
 - 1. Fine grading, conditioning and amending planting topsoil.
 - 2. Installation of turfgrass sod
 - 3. Installation of mulch.
 - 4. Sixty (60) day maintenance.
- C. Related Work Specified Elsewhere
 - 1. Contract Drawings, Addenda, general provisions of the Contract, including General and Supplemental Conditions, and Division 1 Sections apply to work of this section.
 - 2. Section 31 20 00 - Earthwork
 - 3. Section 31 22 22 - Soil Materials
 - 4. Section 32 01 90 – Existing Landscape Protection
 - 5. Section 32 84 00 - Irrigation System

1.02 1.03 DEFINITIONS

- A. Unless noted otherwise, the term "approved" shall mean by the Owner in writing.
- B. Agencies and Organizations:
 - 1. ASTM- American Society for Testing and Materials
 - 2. ANSI – American National Standards Institute
 - 3. ISA – International Society of Arborists
 - 4. SSPWC – Standard Specifications for Public Works Construction, by the American Public Works Assoc./Associated General Contractors of California.
 - 5. TPI – Turfgrass Producers International
- C. Owner: The Owner's authorized representative or authorized consultant.

1.03 QUALITY ASSURANCE

- A. The work of this Section shall be performed by a single firm experienced in landscape planting and holding a current California Contractor's A or C27 License.
- B. Botanical names shall take precedence over common names. Provide plants that are true to name. Tag one representative plant of each species and size with the botanical name and size.
- C. Inspection:
 - 1. All landscape work and materials shall comply with applicable Federal, State, County and City regulations.

2. All plant material shall be reviewed onsite by the Owner's Representative and/or Landscape Architect prior to positioning and planting. Review shall not limit the right of rejection during any stage of the work until Final Acceptance for any reason including condition of the foliage or root ball, size, variety, form, appearance, latent defects or injuries. Rejected plants shall be removed from the site and replaced immediately by the Contractor at no additional cost to the Owner.
- D. Qualifications of Workers
1. Employ skilled workers who are thoroughly trained experienced in landscape planting and who are completely familiar with specified requirements and methods needed for proper performance of the work in this section.
 2. Provide adequate supervision by a qualified foreman fluent in English that will be continuously onsite during the performance of this work.
 3. Weed control pesticides shall only be applied by an individual holding a valid Qualified Applicator Certificate (Category A) issued by the Department of Pesticides Regulation. Submit a copy of the Certificate.
- E. Any pruning of existing trees specified as part of this Work shall be performed under the direct supervision of an ISA Certified Arborist and in compliance with ANSI A300-Part 1 Standard Practices (Pruning).

1.04 SUBMITTALS

- A. In accordance with the Submittal section, submit:
1. A complete materials list of all items proposed to be furnished including estimated quantities.
 2. Laboratory analyses of soil conditioning materials shall have been performed within one year of the submittal date.
 3. Quality Certificates and/or Certificates of Inspection required by government agencies (providing duplicate copies for the Owner's Representative).
 4. Qualified Applicator Certificate, and DPR Registration Certificates and Material Safety Data Sheets for all pesticides/herbicides proposed for use.
- B. Soil amendments: Submit one (1) pint sample and an analysis of organic compost and mulch.
- C. Other Samples: When requested by the Landscape Architect and/or Owner's Representative.
- D. Soil Fertility Analysis and Recommendations:
1. The Contractor shall provide and pay for a fertility analysis of the existing topsoil and any proposed import planting topsoil. After mass grading operations are completed, native soil samples shall be collected for the fertility analysis by collecting a minimum of 5 representative samples of the soil per acre throughout the area of work. Separate samples shall be produced for cut and fill areas, and for any other area composed of soils not similar to the existing soils. Each sample shall be a minimum of one pint each, and shall be thoroughly mixed together to prepare a homogenous sample. A one quart representative sample for cut, fill and any other special conditions shall be submitted to the soil testing laboratory as a representative sample for fertility analysis. The fertility analysis shall at a

- minimum provide the following data:
- a. soil texture class and percent sands, silts and clays per ASTM D422
 - b. estimated soil infiltration and percolation rates
 - c. pH
 - d. organic matter (%)
 - e. total soluble salts (ECe)
 - f. Cation Exchange Capacity (CEC) and Percent Cation Saturation for K, Mg, Ca and Na
 - g. major and minor nutrients (ppm).
2. Recommendations for improvement of the soil conditions for optimum plant growth shall be made by the testing laboratory, and at a minimum shall include the following:
 - a. A fertilizer and amendment application program (including macro and micro nutrients) for both pre-planting and maintenance fertility applications for broad area tillage and for planting pit backfill (pre-plant only).
 - b. Treatments to neutralize soil pH and to correct any adverse conditions as warranted.
 - c. Recommendations shall address soil conditioning for both planting area tillage and tree/plant planting pit backfill.
 3. The soil analysis and recommendations shall be performed by one of the following laboratories capable of providing the above analyses by a licensed soil scientist:
 - a. D&D Agricultural Laboratory. Contact Darrin Peters at 559-348-1818.
 - b. Wilber-Ellis Company. Contact Michael Cline at 209-442-1220.
 4. The Contractor shall submit the results of the soil testing investigations and shall receive written direction from the Landscape Architect before proceeding with any soil conditioning activities such as fertilizing and/or tillage of amendments.
- E. Within seven days from the start of the maintenance period, submit a calendar of maintenance activities, including scheduled dates for mowing, fertilizing, weed control and all other activities. Provide the quantities of maintenance fertilizer and any other materials scheduled to be used in each application during the maintenance period.
- F. Submit invoices and/or delivery tags from material suppliers for all amendments, fertilizer, seed, plants, mulch and any other materials provided for the landscape planting installation and applied during the maintenance period. Submit tags from seed packaging indicating seed varieties, percent purity and percent germination minimums. The invoices and/or delivery tags shall be provided directly to the Owner's Representative/Inspector of Record within 24 hours of delivery to the site, as well as to the normal submittal recipients per the Contract Documents.
- G. Close-out Documents: Submit prior to the end of the maintenance period. Acceptance of the Close-out documents in a condition for scheduling a Final Acceptance review. Provide two bound copies of the following:
1. Cover sheet stating Contractor's address and telephone number, duration of guarantee period, and a list of plant nurseries, materials and equipment vendors with names and addresses of the vendor/manufacturer representatives and warranty periods.

2. A "CERTIFICATE OF CONSTRUCTION COMPLIANCE" which indicates that all work done, materials and equipment used and installed are in compliance with the approved plans, specifications and all authorized revisions.
3. Maintenance Manuals and Instructions: Submit a monthly schedule of procedures to be established by Owner for maintenance of landscapes (trees, mixed planting and turfgrass) for one full year and shall include recommendations for fertilizing, pest and disease control, weeding, mowing, aeration and top dressing.
4. Soil Amendment and/or Seed/Stolon confirmation form noting the installed quantities of materials, tags or invoices from Subsection F. above, and the person who confirmed the delivery and installation of the materials.
5. Operations and Maintenance Manuals and Warranty certificates for any maintenance equipment turned over to the Owner.
6. As-built Record Drawings with all modifications to the Drawings noted in red ink, and the Landscape Planting Observation Log completed.

1.05 AVAILABILITY

- A. The Contractor shall confirm availability of plants, supplies, and materials prior to submitting his landscape bid. Plant variety substitutions are not desired.

1.06 EXISTING CONDITIONS

- A. The Contractor is to visit the job site to verify existing conditions including soils, vegetative growth, subsurface conditions, existing grade and drainage, irrigation system etc. making allowances in his bid for any required work to provide the landscape installation as specified in the construction documents.
- B. The Contractor shall notify the Owner to locate underground lines prior to hole boring or trenching. Do not permit heavy equipment such as trucks, rollers, or tractors to damage utilities. Hand excavate as required to minimize possibility of damage to underground utilities. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned. Prevent damage to temporary risers of underground irrigation system and similar obstructing work located in the landscape areas.
- C. If there is a conflict with existing utilities, improvements and/or planting and the proposed planting, Contractor shall promptly notify the Owner's Representative for instructions as to further action. Failure to do so will make Contractor liable for any and all damage or corrective actions arising from his operations.
- D. Prior to the start of this work, the Contractor and the Owner's Representative shall verify the operational condition of that portion of the existing irrigation system pertaining to the proposed planting area. The Contractor shall notify the Owner's Representative of any repairs and/or corrections necessary for proper functioning and coverage. The repairs and/or corrections shall be completed before any plant material is planted. Failure to perform system verification and provide notification prior to the start of this work will make the Contractor liable for any and all repairs and/or corrections necessary for proper functioning and coverage, as well as any required plant replacement, without any additional cost to the Owner.

- E. No plants shall be planted in situations that show poor drainage infiltration or low areas that result in standing water. Such situations shall be corrected by the Contractor as directed by the Landscape Architect or Civil Engineer. Failure by the Contractor to notify the Owner of poor drainage conditions prior to proceeding with the conditioning or planting operations shall place the responsibility for any plant removals, additional soil conditioning and replanting on the Contractor without any additional cost to the Owner. Any corrections of finish grading not in compliance with the Contract Documents including plant removal, soil conditioning and replanting shall be performed by the Contractor at no additional cost to the Owner.

1.07 PROTECTION

- A. The Contractor shall guarantee repair of damage to any part of the premises resulting from but not limited to leaks, defects in materials or workmanship, operation of equipment, storage of materials and/or equipment, installation of underground or overhead utilities. The Contractor shall be liable for any and all accidents resulting from his work, including open holes and trenches during construction.
- B. Protect new and existing landscape areas in the area of work from theft, loss, damage and deterioration during storage, installation and maintenance. Protect from unauthorized persons (trespassers) as well as from operations by other contractors and tradesmen, and landscape operations. Protect all planted turf and shrub areas from persons as well as operations of other contractors and the Owner. Cost of protection shall be born by the Contractor with means of protection such as temporary fencing as approved by Owner. Cost for protection shall be included in the Contractor's bid for the work.
- C. Contractor shall repair or replace damaged work and/or damage to existing improvements/landscape as identified by the Owner's Representative to a condition acceptable to the Owner's Representative. No additional payment will be made to the Contractor for repair or replacement of damaged work and/or damage to existing improvements/landscape.

1.08 OBSERVATIONS

- A. The Owner's Representative, Project Inspector or Landscape Architect shall perform periodic observations and shall record the observation on the Landscape Planting Observation Log form on the As Built Record Drawings. Such observations shall include but are not necessarily be limited to:
 - 1. Soil conditioning of the planting area.
 - 2. Planting of shrubs, ground cover and turfgrass.
- B. Any corrective action called for shall be immediately performed by the Contractor.
- C. Failure by the Contractor to obtain the above observations shall place the responsibility on the Contractor for any relocation and/or replacement of planted trees or shrubs.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Plant label shall identify each species and variety. A label shall be attached to

each individual plant or block of identical plants grouped together.

- B. Adequately protect plants from sun and wind prior to planting. Do not allow stored plant material to dry out at any time.
- C. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at the site. Store materials and equipment in a location as directed by the Owner's Representative.

1.10 PESTICIDE NOTIFICATION

- A. A written notification of any and all pesticide/herbicide products scheduled for use by the Contractor or their representative on the Owner's property must be submitted to the Owner's Representative at least seven days prior to the scheduled application. Notification shall include the product name, manufacturer's name, the pesticide active ingredient, the U.S. EPA and CalDPR registration numbers, the scheduled date and application areas, and the reason (target species) for the application.

1.11 REPAIR OF DAMAGED EXISTING PLANTING AREAS

- A. The Contractor shall be responsible to repair all damage and/or distress to existing planting areas including turfgrass, shrubs, ground covers, perennials, etc., whether specifically shown on the Contract Documents or not, as a result of construction operations, material and/or equipment storage, site access, site offices, utility and/or irrigation line installations or other actions.
- B. Replacement shrubs shall be 15 gallon size, replacement ground cover and perennial plants shall be 5 gallon size, and turfgrass shall be full width sod. Damaged areas shall be amended and finish graded per the Contract Documents prior to planting. Non-turfgrass planting areas shall also receive wood mulch as specified herein. The limits of repair shall be determined by the Owner.

PART 2 - PRODUCTS

2.01 TOPSOIL

- A. Topsoil used in planting areas shall be a clean, friable soil with no noxious weeds, clods or stones larger than 0.5 inch in diameter, subsoil, hardpan, wood, debris, fine organic material greater than 5%, undesirable insects, plant disease or any other natural or extraneous objects detrimental to normal plant growth to a minimum depth of 18 inches from finish grade.
- B. The Contractor shall provide a particle size analysis, fertility testing and amendment recommendations of proposed native and/or import topsoil, and the Landscape Architect reserves the right to reject topsoil not conforming to the minimum specifications. Stockpiled onsite topsoil may be used if analysis and testing determines compliance with these requirements prior to placement. Failure to meet minimum specifications shall result in the removal of any unauthorized placed topsoil at the Contractors expense.

- C. Particle size distribution for topsoil shall meet the following per ASTM D422:
 - 1. 100% passing a 12.2 mm (1/2") screen.
 - 2. Minimum 95% passing a 9.5 mm (3/8") screen.
 - 3. Minimum 75% passing a 2.36 mm (No. 8) screen.
 - 4. Maximum 45% passing a No. 200 screen.
 - 5. Silt content shall be a maximum 35%.
 - 6. Clay content shall be a maximum 25%.
 - 7. Silt to Clay ratio shall be less than 2 and greater than 0.5.

- D. Other characteristics shall conform to the following:
 - 1. Permeability rate shall be not less than one (1.0) inch per hour or not more than 20 inches per hour.
 - 2. The sodium absorption ratio (SAR) shall not exceed 3.0 and the electrical conductivity (ECe) shall not exceed 2.5 milliohms per centimeter at 25 degrees centigrade.
 - 3. Soluble boron shall be no greater than 1.0 part per million (mg/l).
 - 4. Soil pH range shall be 6.5 – 7.9.
 - 5. Maximum concentration of soluble chloride shall be 150 parts per million.
 - 6. Maximum concentration of heavy metals shall not exceed the following when the pH is between 6 and 7:
 - a. Arsenic: 0.5 ppm
 - b. Cadmium: 0.5 ppm
 - c. Chromium: 5 ppm
 - d. Cobalt: 1 ppm
 - e. Lead: 15 ppm
 - f. Mercury: 0.5 ppm
 - g. Nickel: 2.5 ppm
 - h. Selenium: 1.5 ppm
 - i. Silver: 0.25 ppm
 - j. Vanadium: 1.5 ppm
 - 7. Petroleum hydrocarbons shall not exceed 100 mg/kg dry soil.
 - 8. Aromatic volatile organic hydrocarbons shall not exceed 2 mg/kg dry soil.

2.02 SOIL AMENDMENTS

- A. Organic Compost: "Harvest Premium" as supplied by Harvest Power (559) 435-1114; "WonderGrow Compost" by Grover, Inc. (866) 764-5765, or "Allgro Compost" by Synagro (559) 341-5158, and conforming to the following minimums:
 - 1. Certified as "Mature" or better per the California Compost Quality Council Maturity Index.
 - 2. Pass EPA Class A standards for pathogens and heavy metals.
 - 3. Particle size: 1/8" maximum
 - 4. pH: 6.5-7.9
 - 5. Macro-nutrients: Minimum of 1.0% Nitrogen, 0.5% Phosphorus, 0.5% Potassium.
 - 6. AgIndex ratio (Nutrients/Salts) 10 or more.
 - 7. Ammonia N/Nitrate N ratio: rated Mature or Very Mature
 - 8. Organic matter content greater than 25% dry weight.
 - 9. Carbon/Nitrogen ratio: less than or equal to 15.
 - 10. Salinity (ECe): less than 5.0 dS/m.

11. Odor shall be soil-like (musty, earthy) without any sour, ammonia-like or putrid smell.
- B. Gypsum shall be mined agricultural grade gypsum composed of no less than 100% $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ hydrated calcium sulfate in a pelletized form. Elemental Sulfur shall be a minimum 95% pure agricultural grade.
- C. Dry Humate organic soil conditioner comprised of a minimum 40% humic acid from Leonardite.
- D. Endo 120 Mycorrhizae containing a minimum 60,000 living propagules per pound.
- E. Amendment material types and application rates may be subject to change based on the findings and recommendations of the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

2.03 FERTILIZER

- A. The pre-plant fertilizer shall be a commercial homogeneous, granular pellet:
 1. Pre-plant fertilizer for turfgrass shall be:
 - a. BEST 6-24-24-5S XB+ with Avail
- B. The maintenance fertilizer shall be a commercial homogeneous, granular pellet:
 1. Maintenance fertilizer for turfgrass shall be one or more of the following:
 - a. Urea 46-0-0
 - b. BEST Ammonia Sulfate 21-0-0-24S, standard grade, or equal
 - c. BEST Nitra King 21-2-4-14S-2Fe, or equal.
 - d. BEST Nitex 20-2-3-12S-5Fe, or equal.
- C. Fertilizer material types and analysis may be subject to change based on the findings and recommendations from the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

2.04 MULCH

- A. Mulch for on-grade or raised native soil planters shall be a walk-on type of chipped and aged greenwaste woody material without leaves, green wood, sticks, dirt, stones, dust and other non-organic debris as accepted by the Landscape Architect. Particle size 1/2" to 3" in general size.

2.05 TURFGRASS SOD

- A. Sod shall be produced from certified or approved seed/stolons, fresh and labeled in accordance with U. S. Department of Agriculture Rules and Regulations. Sod quality shall be Premium or Standard Grade per TPI specifications.
- B. Sod shall be neatly mowed and be mature enough that when grasped at one end it can be picked up and handled without damage, delivered to the project site, adequately protected and installation commenced within 24 hours of harvesting.
- C. Turfgrass shall be a species and variety as specified in the Contract Drawings. If a warm-season grass is specified and the installation is to be performed between the

months of October and April, a species with an established perennial ryegrass overseeding shall be installed. Submit the overseeded product information for approval prior to the installation.

2.06 HERBICIDES

- A. Herbicide products for removal of unwanted grass and broad-leaved weeds shall be registered and approved for use by the U.S. EPA and CalDPR, and shall comply with the Owner's Standards and with the "Healthy Schools Act" with current amendments.
- B. Provide a post-emergent, selective herbicide formulations for use on turfgrass areas.
- C. Provide a non-selective contact herbicide formulation for use on existing established weeds. The herbicide shall be certified for organic use, broad-spectrum with systemic function, 'Weed Slayer' by Agro Research International, or equal.

2.07 OTHER MATERIALS

- A. Materials not specifically indicated, but necessary for proper execution of the work, shall be of first quality as selected by the Contractor subject to approval of the Landscape Architect.

PART 3 - EXECUTION

3.01 EXAMINATION & PREPARATION

- A. General: Verify that existing site conditions are as specified and indicated before beginning this work.
- B. Damaged Earth: Verify that earth rendered unfit to receive planting due to concrete water, mortar, limewater, hydrocarbons or any other contaminant dumped on it has been removed and replaced with clean earth from a source approved by the Owner's Representative.
- C. Examine the area and conditions under which the work in this section is to be performed. Verify that any existing irrigation system within the limit of work is in proper working order with full coverage. Correct conditions detrimental to the timely and proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of the work signifies acceptance of the existing conditions.
- D. Protection:
 - 1. Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment within the area of work prior to commencing work.
 - 2. Mark existing irrigation heads, valves, valve boxes and other below grade equipment or components that are scheduled to remain. Protect in place.
- E. Runoff and Erosion Control: Furnish equipment, materials and labor necessary to control the flow, drainage, and accumulation of excess water running off the work

area and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site per the approved SWPPP.

3.02 ROUGH GRADING, SOIL PREPARATION, PLANTER BACKFILL

- A. In areas receiving new mulch, till to a minimum depth of 4 inches using manual spading shovels, forks and/or broadforks and working around major tree roots and/or utilities while protecting any existing plants and their root system. Break up and/or remove rocks and clods.
- B. Do not work soil when moisture content is so great that excessive compaction will occur, or when it is so dry that dust will form in air or clods will not break up readily, or when a full ripping depth cannot be achieved. Apply water, if necessary, to bring soil to an optimum moisture content for tilling and dust control. Maintain within 2 percent above or below optimum moisture content for the existing soil type at all times during the work.
- C. After soil ripping and preliminary finish grading is completed, the topsoil shall be cleared of all concrete, wire, sticks, roots, debris and foreign materials. Remove native stones and clods as follows:
 - 1. In shrub/ground cover/mulched areas, remove stones and clods greater than one (1.0) inches in diameter from the top 3 inches of finish grade.
 - 2. In general, non-traffic turfgrass areas, remove stones and clods greater than three-quarter (0.75) inch in diameter from the top 3 inches of finish grade.
- D. Add clean planting topsoil where needed to bring grade to elevation to promote positive drainage. Spread approved planting topsoil over ripped subgrade prior to incorporating amendments.

3.03 WEED CONTROL

- A. Weed control pesticides shall only be applied by an individual holding a valid Qualified Applicator Certificate (Category A) issued by the Department of Pesticides Regulation.
- B. The Contractor shall treat any weeds in proposed new turfgrass and planting areas with a non-selective contact weed killer at the manufacturer's approved rates and procedures prior to any commencement of work at the site including any irrigation work, ripping of soils or fine grading.
- C. Weed eradication shall be ongoing throughout the course of the landscape installation. The Contractor shall apply a pre-emergent herbicide after shrub/ground cover planting and prior to mulch installation. Manually remove weed seed heads. At no time will weeds be allowed to become established. Contractor shall provide all weed control operations as directed by the Owner's Representative.
- D. All weed control operations using pesticides/herbicides shall comply with the CalDPR and Owner Standards as well as AB2260 "Healthy Schools Act". The Contractor shall comply with the notification and posting requirements of the "Healthy Schools Act".
 - 1. The Contractor shall notify the Owner per Subsection 1.11, A.

2. The Contractor shall post highly visible signs around the treatment area in conformance with the "Healthy Schools Act" warning of a scheduled pesticide/herbicide application a minimum of 24 hours before to 72 hours after a pesticide application.
- E. A non-selective contact herbicide, 'Weed Slayer' by Agro Research International, shall be applied at a rate of 2 quarts per gallon per acre. Mix in water treated to a pH of 4.0. Only apply to dry surfaces, and a minimum of 8 hours before a rain event. Allow a minimum of 10 days from herbicide application to commence any planting.
- F. Prior to any mulch installation, apply an approved pre-emergent herbicide per the manufacturer's recommended rates.

3.04 SOIL CONDITIONING

- A. Before commencement of any soil conditioning, weed and rock removal shall be completed as outlined above.
- B. Uniformly amend the entire area of topsoil in turfgrass and mixed planting areas per the following bid rates and per the approved modifications as a result of the soils analysis recommendations:
 1. Turf and Non-Sloped (less than 4h:1v) Planting Area Soil Conditioning (per 1,000 square feet).
 - a. Compost at a rate of four (4.0) cubic yards (a 1.33 inch thick layer).
 - b. Gypsum at a rate of 100 pounds, or Sulfur at 19 pounds, or an equivalent combination.
 - c. Humate soil conditioner at a rate of thirty (30) pounds.
 - d. A pre-planting fertilizer to turfgrass areas at a rate of 1.0 pounds of actual P and K.
 - e. Endo 120 per Subsection 3.06, Mycorrhizae Application.
- C. Till soil amendments into the entire planting area soil to a minimum depth of six (6) inches. Perform the cultivation in at least two passes, one in each perpendicular directions to the first, so that the amendments are homogeneously incorporated into the topsoil. All cultivation inside the dripline of existing trees shall be preformed manually with minimal disturbance to the root system.
- D. Amendment material types and application rates may be subject to change based on the findings and recommendations of the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

3.05 FINE GRADING

- A. Upon completion of soil preparation, fine grade all planting and turfgrass areas to a smooth and even slope conforming to and establishing drainage patterns per the approved Grading Plan. Grading shall eliminate all humps and hollows and promote positive drainage in all planting and turfgrass areas.
- B. Where hardscape is installed in existing planting areas, a minimum transition grade width of 2 feet adjacent to the edge of hardscape shall be constructed unless noted otherwise. The maximum slope of any transition grade shall be 20

percent. The area of transition grading shall be planted or repaired as specified herein.

- C. Tolerance of grade differential for planting and general turfgrass areas shall be plus or minus 0.04 foot. If requested, the Contractor shall water test all turf and planting areas after the grading operations are completed in the presence of the Owner's Representative and Landscape Architect. The water test shall consist of applying water to the turf and planting areas to the point where water begins to run over the soil to show the drainage pattern. Make all corrections to the finish grading as required by the Owner's Representative to re-established positive drainage patterns. Acceptance of the finish grading shall be obtained in writing from the Owner's Representative and Landscape Architect prior to proceeding with soil conditioning and planting operations.
- D. After the finish grading process, relative compaction of the soil in turf and planting areas shall range between 82% and 85% relative density. Compaction/moisture levels are generally acceptable if an Oakfield probe is able to penetrate a minimum of six inches into the cultivated planting topsoil with moderate pressure. The Owner reserves the right to require the Contractor to test for over compaction. If the compaction is within the acceptable range, the test will be paid for by the Owner. All testing due to non-compliance will be paid for by the Contractor.
- E. Remove all rocks produced as a result of the soil conditioning and finish grading operations per the requirements of Subsection 3.02.
- F. Finish grades shall be one-half inch (1/2") to three-quarter inch (3/4") for turfgrass sod areas, flush (0.0") for turfgrass seed/stolon areas and two inches (2") for shrub/ground cover planting areas below the finish surface of all adjacent walks, curbs, mowstrips and utility/valve boxes or collars. Transition any grade modification in existing planted areas at a maximum 12h:1v slope to existing grade, unless shown otherwise on the grading plan.

3.06 MYCORRHIZAE APPLICATION

- A. In turfgrass planting areas, after fine grading is completed broadcast Endo 120 Mycorrhizae at a rate of one and one half (1.5) pounds per 1,000 square feet (65 lbs. per acre). Lightly rake into the top one inch (1") of topsoil immediately prior to turfgrass installation.
- B. In shrub and/or ground cover planting areas, the Mycorrhizae inoculant shall be incorporated into the soil with the other soil amendments at three (3.0) pounds per 1,000 square feet (130 lbs. per acre) per Subsection 3.04, Soil Conditioning. Inoculant shall also be incorporated into the planting backfill per Subsection 3.04, E.

3.07 MULCH

- A. Prior to any mulch application, perform weed control operations as specified herein.
- B. Where mulch is to be installed in an existing planting area, breakup/till the existing soil in open areas around existing plantings to a minimum 4" depth per section

3.02, and adjust finish grade adjacent to hardscape elements per section 3.05 where not prohibited by existing plantings.

- C. Install a minimum 3" layer of mulch in all non-turf planting areas, except for slopes greater than 3h:1v and seeded areas. Install a minimum 2" layer of mulch in all areas receiving flatted plants.

3.08 TURFGRASS SOD

- A. The area to be planted shall be finish graded to present a smooth and even surface free of humps and hollows and conforming to the finish grading plans. Where new sod is abutting existing turfgrass, fine grade to allow for the thickness of the new sod soil so that the new and existing sod grades are flush. Immediately prior to planting, the surface of the area to be planted shall be sufficiently loose and friable, with adequate moisture to receive the sod. Avoid laying sod on hot or dry soil.
- B. Lay first strip of sod slabs along a straight line (use a string in irregular areas). Butt joints tightly. Do not overlap edges. On second strip, stagger head joints (similar to a running bond brick pattern). Use a sharp knife to cut sod in order to fit curves, edges, and sprinkler heads.
- C. As the sod is being installed, water the sod lightly to prevent drying out. Continue to lay sod and lightly water until installation is complete.
- D. After laying sod, roll to eliminate irregularities and to form good contact between sod and soil. Avoid a too heavy roller or excessive initial watering which may cause roller marks.
- E. Water the completed lawn surface thoroughly. Topsoil should be constantly moist for a minimum two inches deep. Repeat irrigating at regular intervals to keep sod moist until rooted. The areas shall not be watered to the extent of saturating the soil and causing "flotation" or "flowing" of the top surface of the soil. After water has once been applied, no portion of the planted areas shall be allowed to dry out during the entire maintenance period. After sod roots are established, decrease frequency and increase amount of water per application as necessary to maintain good soil moisture to a minimum 6" depth without standing water or excess runoff. The Contractor shall be responsible to monitor the site and alter the watering times and frequencies to meet site and climatic conditions.
- F. Prior to the start of the maintenance period, fill all seam joint gaps greater than 1/8 inch and less than 0.5 inch with washed concrete sand. Fill any joint gaps of 0.5 inch or greater width with a minimum two foot long replacement sod section in order to achieve a tight joint.
- G. Replace dead or distressed sod with equivalent material as directed by the Landscape Architect.

3.09 CLEAN-UP AND REPAIR

- A. All areas shall be maintained in a neat and orderly condition at all times. All reasonable precautions shall be taken to avoid damage to existing planting and

structures. Disturbed and/or damaged areas, whether a part of this work or from the work of other trades, shall be restored to their original condition.

- B. Plants and/or turfgrass shown to remain and damaged or removed by construction operations and/or utility/electrical/drainage lines shall be replaced with plants that match as closely as possible to the existing plant species, variety and size. The replacement turfgrass sod variety shall be the same as shown in the Planting Legend if for new work, or shall match the existing turfgrass variety where the turfgrass is existing. Adjust the finish grade so that the new turfgrass sod abuts flush to the existing turfgrass or to hardscape. The replacement plants and/or turfgrass sod shall be maintained as part of the original scope of work.
- C. After the planting operations are completed, the Contractor shall remove all trash, excess soil, empty containers or any other debris accumulated by the work from the site. All damage caused by the work shall be repaired at the Contractor's expense and the site shall be left in a neat and orderly condition to the satisfaction of the Owner.

3.10 PRE-MAINTENANCE REVIEW

- A. A general review will be held prior to the start of the maintenance period upon conclusion of the planting operations, irrigation system installation and after clean-up has occurred. The Owner's Representative shall be informed in writing a minimum of seven (7) working days prior to the time the work is ready for review in order to arrange a suitable time and date for such review.
- B. At the time of review, Contractor shall have all planting areas free of weeds and neatly cultivated and fine graded. All plant basins shall be in good repair. All trees shall be properly staked and tied. All planting areas shall be clear of weeds.
- C. The establishment of turfgrass is herein defined as being all work necessary to grow a full, healthy, uniform stand of smooth and even texture and grade with clean straight edges without weeds, distressed areas or bare spots, and has been mowed at least twice per the specifications. The establishment of turfgrass is further defined as being all work necessary to develop a minimum rooting depth of 2 inches into site soil.
- D. Work requiring corrective action or replacement in the judgment of the Owner's Representative shall be performed within five (5) days after the inspection. Corrective work and materials replacement shall be in accordance with the drawings and specifications and shall be made by the Contractor at no cost to the Owner. A subsequent review shall then be arranged.
- E. If after the review, the Landscape Architect is of the opinion that all the work has been performed as per the Contract Documents, and a uniform stand of healthy dense turfgrass has been established without weeds or bare spots, the Contractor will be given written notice that the maintenance period may begin.

3.11 MAINTENANCE - GENERAL

- A. After all work indicated on the drawings or herein specified has been completed, reviewed, and approved, and the turfgrass has been successfully established per

the requirements below, the Contractor shall commence a sixty (60) calendar day maintenance period in which the Contractor shall continuously maintain all areas included in the contract during the progress of the work and throughout the maintenance period, or until Final Acceptance of the project, whichever is greater.

- B. Establishment and maintenance work includes monitoring the site to control all watering, replanting, fertilizing, mulching, weeding, cultivating and mowing necessary to bring the planted areas to a healthy and vigorous growing condition, and any additional work needed to keep the areas neat, edged, weed and trash free, and attractive.
- C. All trees, shrubs, ground cover shall be kept at optimum growing condition by watering weeding, replanting, fertilizing, cultivating, tree stake repair, spraying for diseases and insects, replace dead or dying materials, pruning as directed, maintaining proper grades of plants, and providing any other reasonable operations of maintenance and protection required for successful completion of the project.
- D. Any date when the Contractor fails to adequately water, replace unsuitable planted areas and other work determined to be necessary by the Owner, will **NOT** be credited as part of the establishment/maintenance period.
- E. No additional payment will be made for additional time necessary for turfgrass establishment. The maintenance period shall not start until all contract work has been completed and all close-out documents and materials have been submitted. Turfgrass will be considered weed-free if there is a maximum of one percent undesirable turfgrass species, and nine weeds or less per 50 square yards (one per 50 square feet).
- F. During the progress of the maintenance period, the Contractor and the Owner's Representative shall conduct reviews at no less than 21 day intervals to determine that ongoing maintenance activities have been conducted by the Contractor. If in the opinion of the Owner, ongoing maintenance has not been conducted by the Contractor in a satisfactory manner the maintenance period shall be suspended. The Contractor shall provide remedial work as directed by the Owner's Representative to correct the found deficiencies and schedule another review. If after the subsequent review the work is deemed acceptable, the maintenance period shall resume.

3.12 MAINTENANCE – MOWING AND DRESSING

- A. For new sod, mow when 1.4 inch tall and cut down to 1.0 inch.
- B. Turfgrass areas shall be mowed during the growing season a minimum of twice a week for warm-season varieties and a minimum of once a week for cool-season varieties, or at any time the grass reaches 1.4 times its mowing height. Turfgrass shall be edged weekly. The Contractor shall coordinate his watering and weed control schedules to accommodate his mowing schedule. If the Contractor is unable to mow the turf areas on the required day, he has until 5:00 pm of the next day to do the work. After that time, the Owner reserves the right to secure the services of an alternate mowing entity to perform the work. The cost for the alternate mowing will be deducted from monies owed to the Contractor. The

Contractor will remain responsible to perform all scheduled mowings and maintenance of the site. The turfgrass shall be mowed and edged, and all trash and debris removed prior to Final Acceptance.

3.13 MAINTENANCE - FERTILIZATION

- A. The Contractor shall fertilize the warm-season turfgrass (Bermudagrass) at the start of the maintenance period and every twenty-eight (28) days with the turfgrass maintenance fertilizer at a rate of 0.75 lb. of actual N /1,000 s.f. and as modified by the soil fertility recommendations and as directed by the Landscape Architect. The Contractor shall continue the fertilizer applications until the established turf is accepted.

3.14 MAINTENANCE – REPAIR AND WEEDING

- A. Between the twenty-first (21) day and the twenty-eighth (28) day after turfgrass planting, the Contractor shall perform the following: replant all spots or areas where normal germination or growth is not evident; remove all rocks or other debris that would constitute a hindrance to mowing or cultivating; repair all damage done by his operations. Where poorly compacted trench backfill shows settlement, remove turfgrass or plants, fill all depressions and eroded channels with sufficient conditioned topsoil to raise to proper grade, compact lightly and replant the filled areas. Roll all planted or replanted turfgrass areas with a lightly weighted turf roller in order to provide a smooth and even mowing surface.
- B. Visible weeds shall be removed at least weekly during the maintenance period. At the end of the maintenance period, all planting areas shall be without weeds. If weeds are present, the Contractor shall manually remove the weeds and shall then apply a granular, selective pre-emergent herbicide at manufacturer's approved rates. Coordinate application with the Owner's Representative and provide certificates of application to Owner's Representative. The turfgrass will be considered weed-free if there are 9 weeds or less per 50 square yards (one per 50 square feet).

3.15 FINAL REVIEW

- A. A Final Review will not be scheduled until all Close-out Documents and materials have been submitted and accepted.
- B. A Final Review will be performed before the end of the Maintenance Period or upon the pending Final Acceptance of the work, whichever is earlier, provided all deficiencies revealed during the maintenance period have been corrected. If deficiencies have not been corrected by the end of the stated maintenance period, the Contractor shall continue to fully maintain the project at his own expense. After all deficiencies have been corrected, a Final Review will be held with the Landscape Architect, Owner's Representative, and Contractor.
- C. Final Acceptance of turfgrass is contingent on a weed free, healthy uniform stand without dead, bare or distressed areas with a minimum rooting depth of five (5) inches into site soil.
- D. If after the Final Review, the Landscape Architect and Owner's Representative are

of the opinion that the work is acceptable and complete, the Contractor's maintenance responsibility shall terminate on an agreed upon date.

3.16 WARRANTY AND REPLACEMENT

- A. All trees and plants provided under this Contract shall be guaranteed to be in good, healthy, disease/pest free and in a flourishing condition one growing year from the date of Final Acceptance of the work, provided the Owner maintains the plants properly and in accordance with accepted horticultural practices. Species and size of any tree and/or plant replacements, either prior to or after Final Acceptance, shall be equal to that of the same adjacent trees and/or plants at the time of replacement as determined by the Landscape Architect.
- B. The Contractor shall be responsible to replace all lost plants due to theft, vandalism or any other preventable causes till Final Acceptance of the work by the Owner. Replacement trees and plants shall be planted as originally specified and detailed. Replacement trees and plants shall be guaranteed as specified above from the date of replacement. The maintenance period may be extended for a duration of not more than the original maintenance period duration for the establishment of replacement plants.
- C. The Contractor shall be held responsible for repair and/or replacement of damages to new or existing improvements resulting from the defects or actions of trees, plants, materials, equipment or workmanship one year from the date of Final Acceptance or the Notice of Completion, whichever is later.

END OF SECTION