



December 11, 2019

Rainforth Grau Architects Project No. 18-1381
DSA File and Application No. 39-H8 / 02-117815
PTN: 75499-143

ADDENDUM NO. 04
Tracy High School – New Parking Lot
Tracy, California

Rainforth Grau Architects



1. ALL WORKMANSHIP, MATERIALS, APPLIANCES AND EQUIPMENT which may be included in the following items shall be the same relative quantity as described for similar work set forth in the original or main specifications of which these Addendum items shall be considered a part.

2. ADDENDUM DRAWINGS: NONE

3. PROJECT MANUAL

As mentioned in Addendum No. 03 dated December 09, 2019, the following specification sections were inadvertently missed during the printing process and do not change, MODIFY or REVISE the DSA approved documents (drawings and specifications) for this project.

- A. Section 01 8113, Sustainable Design Requirements
 1. ADD Section 01 8113, included with this addendum.
- B. Section 02 4119, Selective Demolition
 1. ADD Section 02 4119, included with this addendum.
- C. Section 10 1400, Signage
 1. ADD Section 10 1400, included with this addendum.
- D. Section 26 0000, Electrical Work
 1. ADD Section 26 0000, included with this addendum.

- E. Section 26 0519, Low-Voltage Electrical Power Conductors and Cables
 - 1. ADD Section 26 0519, included with this addendum.
- F. Section 26 0526, Grounding and Bonding for Electrical Systems
 - 1. ADD Section 26 0526, included with this addendum.
- G. Section 26 0533, Raceway and Boxes for Electrical Systems
 - 1. ADD Section 26 0533, included with this addendum.
- H. Section 26 0553, Identification for Electrical Systems
 - 1. ADD Section 26 0553, included with this addendum.
- I. Section 26 2400, Switchboards and Panelboards
 - 1. ADD Section 26 2400, included with this addendum.
- J. Section 31 0000, Earthwork
 - 1. ADD Section 31 0000, included with this addendum.
- K. Section 31 1000, Site Clearing
 - 1. ADD Section 31 1000, included with this addendum.
- L. Section 31 2333, Trenching and Backfilling
 - 1. ADD Section 31 2333, included with this addendum.
- M. Section 31 3200, Soil Treatment
 - 1. ADD Section 31 3200, included with this addendum.
- N. Section 32 1200, Asphalt Concrete Paving
 - 1. ADD Section 32 1200, included with this addendum.
- O. Section 32 1600, Site Concrete
 - 1. ADD Section 32 1600, included with this addendum.
- P. Section 32 3113, Chain Link Fences and Gates
 - 1. ADD Section 32 3113, included with this addendum.

- Q. Section 32 3119, Decorative Metal Gates (All-Welded)
 - 1. ADD Section 32 3119, included with this addendum.
- R. Section 32 8000, Irrigation
 - 1. ADD Section 32 8000, included with this addendum.
- S. Section 32 9000, Landscaping
 - 1. ADD Section 32 9000, included with this addendum.
- T. Section 33 4000, Storm Drainage Utilities
 - 1. ADD Section 33 4000, included with this addendum.

4. DRAWINGS: NONE

* * * END OF ADDENDUM * * *

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general requirements and procedures for compliance with California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

- 1. Chapter 5- Non-Residential Mandatory Measures.

1.2 RELATED REQUIREMENTS

- A. Pertinent sections specifying erosion control.
- B. Section 01 6116, Volatile Organic Compound (VOC) Restrictions.
- C. Section 01 7419, Construction Waste Management and Disposal.
- D. Section 01 7700, Closeout Procedures.
- E. Pertinent sections specifying landscape irrigation.

1.3 DEFINITIONS

- A. CAL-Green Definitions: Certain terms are defined by CAL-Green in Chapter 5 of the code. Words and terms used in this section shall have the meanings shown therein.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect and the jurisdiction having authority regarding CAL-Green credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures. Document responses as informational submittals.

1.5 ACTION SUBMITTALS

- A. CAL-GREEN Submittals: Submit CAL-GREEN submittals required by code and in other Specification Sections.
 - 1. CAL-GREEN submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated CAL-GREEN requirements.
 - 2. Acceptable verification submittals are specified in the related sections.

SUSTAINABLE DESIGN REQUIREMENTS

SECTION 01 8113

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PART 2 - PRODUCTS

2.1 REQUIREMENTS - GENERAL

- A. Provide products and procedures necessary to confirm CAL-GREEN compliance required in this Section. Although other Sections may specify some CAL-GREEN requirements, the Contractor shall determine additional materials, techniques, means, methods and procedures necessary to comply with CAL-GREEN requirements.

2.2 STORM WATER POLLUTION PREVENTION PLAN

- A. Section 5.106.1: Comply with requirements of this code section, local ordinances, General Conditions, Special Provisions, and related sections specifying erosion control.

2.3 OUTDOOR WATER USE

- A. Section 5.304.3.1: Irrigation Controllers: Comply with requirements of this code section, local ordinances and Section 32 8000.

2.4 CONSTRUCTION WASTE REDUCTION

- A. Section 5.408 Construction Waste Management, Diversion and Recycling: Comply with requirements of this code section, local ordinances and Section 01 7419.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with Section 01 7419, Construction Waste Management and Disposal.
- B. Comply with execution requirements of related sections and applicable local codes and ordinances.

END OF SECTION

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Last Updated: April 8, 2019*

Collaborative for High Performance Schools (CHPS)

New Project Scorecard: 2014 CA-CHPS Criteria™

School Name:

Project #

Expected Completion:

Current Phase:

School District:

Website:

School Address:

City:

Zip:

School Contact:

Phone:

State:

E-mail:

Student Capacity:

Notes:

Approximate Square Feet:

Verification

Is this the final CHPS Scorecard?

Registered Principal Architect (Signature)

Project Manager (Signature)

Name, Title, Date (Please print)

Name, Title, Date (Please print)

Use this scorecard to track expected scores. Note that prerequisites have points associated with them even though they are required. This enables project teams to talk more meaningfully about the effort being put into each section of the Criteria. Prerequisite point columns are also highlighted for reference. Mark each credit as ready for review by using the appropriate column for each phase of the review.

Key: C - CALGreen Mandatory Measures; T - Title 24 Energy Standards; P - Prerequisite; PS - CHPS Plan Sheet Required; CD - Construction Documents Required; A - Attachment Required

Criteria	Title	Prerequisite	Possible Pts	CALGreen / Title 24	Points Targeted	Points Claimed	Responsible Team Member	Design Review Requirements	Ready for Design Review	Construction Review Requirements	Ready for Construction Review	Performance Review Requirements	Ready for Performance Review	Annotation
Integration and Innovation		Total	250											
II 1.0	Integrated Design	P	1											
II 1.1	Enhanced Integrated Design		1					CD						
II 2.1	District Level Commitment		2						A					
II 3.1	School Master Plan		1						A					
II 4.1	High Performance Transition Plan		2						A					
II 5.0	Educational Display	P	1					CD						
II 6.1	Educational Integration		2											
II 7.1	Demonstration Area		1					CD						
II 8.1	Climate Change Action / Carbon Footprint Reporting		3						A					
II 9.1	Crime Prevention Through Environmental Design		1						A					
II 10.1	Innovation (CHPS Verified Projects only)		4		0	0		VARIES						
II 11.1	District-Wide Sustainability Planning		1											
Indoor Environmental Quality		Subtotal	82											
EQ 1.0	HVAC Design - ASHRAE 62.1	P	10	C				PS1						
EQ 1.1	Enhanced Filtration		2					PS1	CD					
EQ 1.2	Dedicated Outdoor Air System		3					PS1	CD					
EQ 2.1	Pollutant and Chemical Source Control		2						CD	A				
EQ 3.0	Outdoor Moisture Management	P	1	C										
EQ 3.1	Outdoor Moisture Management		0						CD					

[illegible]

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENT

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED SECTIONS

- A. Section 01 1100, Summary of Work.
- B. Section 01 3516, Alteration Project Procedures.
- C. Section 01 5000, Temporary Facilities and Controls.
- D. Section 01 7700, Closeout Procedures.
- E. Section 01 8113, Sustainable Design Requirements.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 3300, Submittal Procedures.
- B. Shop Drawings: Indicate areas for demolition, removal sequence and location of salvageable items.

1.4 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as noted on drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01 7700, Closeout Procedures.
- B. Obtain required permits from authorities.
- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Do not close or obstruct egress width to exits.
- E. Do not disable or disrupt building fire or life safety systems without 3 day prior written notice to the Owner.
- F. Conform to procedures applicable when discovering hazardous or contaminated materials.

SELECTIVE DEMOLITION
SECTION 02 4119
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1.6 SEQUENCING

- A. Sequence work under the provisions of Section 01 1000, Summary of Work.

1.7 SCHEDULING

- A. Schedule work under the provisions of Section 01 3300, Submittal Procedures.
- B. Schedule work to coincide with new construction and Owners use of affected and unaffected facilities.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide, erect, and maintain temporary barriers and partitions at locations indicated or as needed to safeguard occupants and pedestrians.
- B. Erect and maintain temporary partitions to prevent spread of dust, odors and noise to permit continued Owner occupancy, as specified in Section 01 1100, Summary of Work.
- C. Clearly mark and protect existing materials and equipment which are not to be demolished.
- D. Prevent movement of structure; provide required bracing and shoring.
- E. Mark location of all utilities in work area prior to start of demolition.

3.2 PRE-DEMOLITION MEETING

- A. Prior to start of demolition operations, the Contractor shall meet with the General Contractor or Construction Manager and Inspector of Record to review the scope of the work.
- B. Systems intended to be maintained shall be carefully identified and clearly marked to avoid damage or unintentional removal.

3.3 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent areas.
- B. Cease operations immediately if structure appears to be in danger. Notify Architect. Do not resume operations until directed.
- C. Maintain protected egress and access to the work.

**SELETIVE DEMOLITION
SECTION 02 4119
18-1381**

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3.4 DEMOLITION

- A. Disconnect, cap and identify designated utilities within demolition areas.
- B. Demolish in an orderly and careful manner. Protect existing supporting structural member.
- C. Except where noted otherwise, remove demolished materials from site. Do not burn or bury materials on site.
- D. Remove demolished materials from site as work progresses. Upon completion of work, leave areas in clean condition.
- E. Remove temporary work.

3.5 REPAIR

- A. Where demolition or removal of specific items exposes or damages existing surfaces, repair such surfaces to match adjacent in material and finish.

3.6 SALVAGE AND PROTECTION

- A. Remove, store and protect the following materials and equipment:
 - 1. Items as indicated on the plans.
- B. Remove the following equipment to be retained by the Owner.
 - 1. None
- C. Owner will remove and keep the following material and equipment:
 - 1. None
- D. Protect the following materials and equipment:
 - 1. All systems, equipment and finishes which are to remain, as indicated on the plans.

- END OF SECTION -

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Last Updated: May 25, 2005*

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 01 8113, Sustainable Design Requirements.
- C. Division 26, Electrical.

1.3 QUALITY ASSURANCE

- A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- B. Use materials and products of one manufacturer whenever possible.
- C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- D. The adhesion of inlaid letters and symbols will be tested. See article 1.06 below.

1.4 SUBMITTALS

- A. Refer to Section 01 3300.
- B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.
- C. CAL-GREEN Submittals:
 - 1. Product Data – VOC Limits: For adhesives, sealants, fillers and primers, documentation including printed statement of VOC contents, comply with limits specified in Section 01 6116.
- D. Samples: The following samples are required. Submit per Section 01 3300.
 - 1. Submit sample for each type of material and letter font to Architect for review in full-size sample sign as described below.
 - 2. Manufacturer's full range of colors for Architect's selection.
 - 3. Submit full-size sample of other signs when requested by Architect

SIGNAGE

SECTION 10 1400

18-1381

ADDENDUM NO. 04

- E. Shop Drawings: Show all parts, connections and anchorages, adjacent materials, fully dimensioned and noted. Include dimensioned layout and installation details for field installation.
- F. Guarantee of Contractor/Subcontractor per Article 1.5.

1.5 GUARANTEE

- A. Refer to General Conditions and Section 01 3300.
- B. Submit fully executed Guarantee with submittal package required by Article 1.4.
- C. Provide manufacturer's guarantee against manufacturing defects. Text or symbols that can be removed from the sign face utilizing a sharp object or other conventional methods will be considered a manufacturing defect.

1.6 REFERENCES AND STANDARDS

- A. California Building Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on drawings, as adopted by the California Division of the State Architect (DSA).
- C. Title 19, CCR, Article 33.01(i).

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.
- B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.
- C. Transport, store and handle in strict accord with the manufacturer's written recommendations.
- D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.8 FIELD MEASUREMENTS

- A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC Limits for adhesives, sealants, fillers, coatings and primers. Comply with limits specified in related Section.
- B. Provide products conforming to local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product exceeds current requirement, provide conforming product at no additional cost. Provide written confirmation to Architect describing reason for revision and demonstrate compliance of replacement product with specified requirements.

2.2 METAL SIGNS

- A. Letter Style: The stroke thickness of the uppercase letter "I" shall be 10% minimum and 20% maximum of the height of the character. The width of the uppercase letter "O" shall be 60% minimum and 110% maximum of the height of the uppercase letter "I". Letter style to be Sans Serif, uppercase. Non-Tactile Signs shall comply with CBC, Section 703.
- B. Metal Reflectorized Signs: Blue reflective vinyl background with white copy or symbol on .080 aluminum unless noted otherwise:
 - 1. Parking Lot Entrance: 17 inches wide min. x 22 inches high min., with 1 inch high letters on dark blue background. Sign is to read:
 - a. "Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or special license plates issued for persons with disabilities will be towed away at the owner's expense. Towed vehicles may be reclaimed at Tracy Police Department or by telephoning 209-831-6550.
 - b. Blank spaces are to be filled in with appropriate information as a permanent part of the sign. Contact owner to confirm name and phone number of towing service. Information added later and which is not permanent copy on the sign is not acceptable.
 - 2. On-site Stop Sign: Red reflectorized vinyl background with white copy and border; Pole mounted; in compliance with State of California Business, Transportation and Housing Agency, Department of Transportation 1990 Uniform Sign Chart.
 - 3. Directional Signs: 18 in. x 36 in. in colors as selected by Architect and Owner. Copy and locations as noted on Drawings. Pole mounted.
 - 4. Traffic Control Signs (on-site and off-site): Signs shall comply with State of California Business, Transportation and Housing Agency, Department of Transportation 1990 Uniform Sign Chart, California Sign Chart and local ordinances.

SIGNAGE
SECTION 10 1400
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PART 3 - EXECUTION

3.1 INSPECTION

- A. Prior to installation, carefully inspect and verify that the installed work of other trades is complete to the point where this installation may properly commence.
- B. Verify that specified items may be installed in accordance with the approved design.
- C. In the event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.2 INSTALLATION OF SIGNS

- A. Pole Mounted: Mount signs using galvanized steel carriage bolt with hex nut and washer. Touch up bolt head with paint to match background. Install post as indicated in the drawings.
 - 1. Parking Lot Entry Sign: Locate sign at location and height as indicated in the drawings.
 - 2. Stop Sign: Locate sign at location and height as indicated in the drawings.
 - 3. Pole: 2 1/2" diameter x length as required or as shown in drawings. ASTM A-53, Grade B; Hot-dip process per ASTM A153.
 - 4. Foundations: Pole mounted signs to be mounted in 1'-0" diameter x 3'-0" deep concrete footing. Hold bottom of pole 6" above bottom of foundation.
- B. Locations of all signs must be per plans and approved Shop Drawings.
- C. Other Signs: Install at location as directed by the Architect. Use mounting method that is permanent, vandal resistant and has been approved by the Architect.

3.3 PROTECTION

- A. Protect work and materials of this Section and other Sections prior to and during installation, and protect the installed work and materials of all other trades.
- B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

3.4 ADJUSTING AND CLEANING

- A. Remove all dust, dirt, finger marks, etc. from signs and letters using cleaning methods as recommended by manufacturer

- END OF SECTION -

**ELECTRICAL WORK
SECTION 26 0000
18-1381**

ADDENDUM NO. 04

PART 1 - GENERAL

1.1 SUMMARY

- A. The Requirements of General Conditions and Special Conditions apply to Work of this Section as if fully repeated herein.

1.2 WORK INCLUDED

- A. Provide a complete working installation with all material and equipment as shown and specified.
- B. Provide submittals.
- C. Electrical products shall be anchored and fastened to building elements and finishes as follows:
 - 1. Concrete Structural Elements: Provide expansion anchors and powder actuated anchors.
 - 2. Steel Structural Elements: Provide beam clamps and spring steel clips.
 - 3. Concrete Surfaces: Provide expansion anchors.
 - 4. Solid Masonry Walls: Provide expansion anchors.
 - 5. Sheet Metal: Provide sheet metal screws.
 - 6. Wood Elements: Provide wood screws.
- D. Provide as-built drawings.

1.3 QUALITY ASSURANCES

- A. Requirements of Regulatory Agencies:
 - 1. Nothing in the Contract Documents shall be construed to permit Work not conforming to applicable codes, laws, ordinances, rules or regulations.
 - 2. All installed or connected equipment shall be labeled or certified for its use by a nationally recognized testing laboratory.
 - 3. All materials and equipment shall be installed in accordance with manufacturer's recommendations and in accordance with the National Electrical Contractors Association (NECA) Standard of Installation.

1.4 PERMITS, FEES AND INSPECTIONS

- A. Contractor shall obtain all permits and arrange for Owner to pay required fees to any governmental agency or utility company having jurisdiction over the work of this Section. Inspections required by any local ordinances or utility companies during construction shall be arranged by the Contractor.

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- B. All work and materials covered by these specifications and accompanying drawings shall at all times be subject to inspection by the Architect or his representative. Any material not in accordance with the plans and specifications, or not installed in a neat and workmanlike manner, shall, upon order from the Architect, be removed from the premises or corrective action taken within three (3) days; and if material in question has been installed, the entire expense for removing and reinstalling shall be borne by the Contractor.
- C. On completion of the work, satisfactory evidence shall be furnished to the Architect to show that all work has been installed in accordance with the Codes.

1.5 SPECIFICATIONS AND CONTRACT DRAWINGS

- A. Accuracy of data given herein and on the drawings is as exact as could be secured, but their extreme accuracy is not guaranteed. The drawings and specifications are for the assistance and guidance of the Contractor and exact locations, distances, levels, etc., will be governed by the construction and the Contractor shall accept same with this understanding.
- B. Layouts of equipment, accessories and wiring systems are diagrammatic (not pictorial and not exact), but shall be followed as closely as possible. Architectural, structural, mechanical, and other drawings shall be examined noting all conditions that may affect this work. Where connections to equipment provided by other divisions are shown on electrical drawings, refer to drawings of respective division for exact locations and electrical requirements of equipment.
- C. Report conflicting conditions to the Architect for adjustment before proceeding with work. Should Contractor proceed with work without reporting conflict(s), he does so on his own responsibility, and shall alter work if directed by the Architect, at his own expense.
- D. Right is reserved to make minor changes in locations of equipment and wiring systems shown, providing change is ordered before conduit runs and/or work directly connected to same is installed and no extra materials are required.
- E. Drawings and specifications may be superseded by later detail specification and detail drawings prepared by the Architect, and the Contractor shall conform to them and to such reasonable changes in the contract drawings as may be called for by these revised drawings without extra cost to the Owner.
- F. Contractor may request additional detail(s) and such shall be conformed to, without additional cost. Contractor may offer alternate detail(s), but such detail(s) shall be approved by Architect and authority having jurisdiction.

1.6 SUBMITTALS

- A. Submission Requirements
 - 1. Contractor is responsible for the scheduling of submittals in order to avoid detrimental impact to the construction schedule and to support the timely sequence of the Work. Allow a minimum of 15-working days for submittal review by the

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Engineer. Complex submittals or submittals which are not provided as complete packages may take longer than 15-working days for review. Contractor should allow time for potential rejection and re-submittal of submittals which are being offered as substitution to the specified products.

2. Contractor shall review submittals for completeness, coordination and conflicts between subcontractors and other work in the Contract Documents. Submittals made by Contractor which are not thoroughly reviewed by the Contractor will be returned. Submittals which vary significantly from the Contract Documents and are not so identified prior to submission, will be returned to the Contractor without review.
3. Make submissions within following number of days from issuance of Notice to Proceed or Start Letter
 - a. Items needed in initial stages of Work or requiring long lead-time for ordering: 15 calendar days.
 - b. All other items: 21 calendar days.
4. Before submitting a shop drawing or any related material, Contractor shall: review each such submission for conformance with the means, methods, techniques, sequences, and operations of construction, and safety precautions and programs incidental thereto, all of which are the sole responsibility of the Contractor; approve each such submission before submitting it; and stamp each such submission before submitting it. Engineer shall assume that no shop drawing or related submittal comprises a variation unless the Contractor advises the Engineer otherwise via a written instrument which is acknowledged by the Engineer in writing.
5. Engineer will check submittals for conformance with design concepts of project. Approval covers only such conformance. Effort will be made by Engineer to discover any errors, but responsibility for accuracy and correctness of all submittals shall be with the Contractor.
6. Approval of submittals will be on a general basis only and shall not relieve the Contractor from their responsibility for proper fitting and construction of the Work, nor from furnishing materials and labor required by the Contract which may not be indicated on the submittals when approved.
7. No portion of the work requiring submittals shall be commenced until the submittal for that portion of the work has been approved by Engineer. All such portions of work shall be in accordance with the approved submittal. Any work performed without approved submittals will be done so at the Contractor's own risk. Work found not to be in compliance with the approved submittals shall be removed and corrected at the Contractor's own expense.
8. Number of Copies Required - Contractor shall submit following number of copies:
 - a. Shop Drawings: 1-electronic copy in PDF format.
 - b. Product Data/Material Lists: 1-electronic copy in PDF format.
 - c. Samples: As specifically indicated in pertinent specification section.
 - d. Substitution Request: 1-copy in PDF format
9. Submittals shall include (where applicable):
 - a. Date and revision dates.

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- b. Project title and number.
 - c. The names of Architect, Engineer, Contractor, Subcontractor and supplier or manufacturer.
 - d. Identification of product or material.
 - e. Relation to adjacent structure or material.
 - f. Field dimensions, clearly identified as such.
 - g. Specification section number.
 - h. A blank space for Engineer's stamp.
 - i. Contractor's stamp on each, initialed or signed, certifying that submittal was reviewed, field measurements have been verified and submittal is in compliance with the applicable specification section and the overall Contract Documents.
10. Incomplete, inaccurate or non-complying submittals requiring revisions, re-submittal and additional review time, shall not be considered as a basis for Contract time extension.
11. Two reviews will be made for each submittal. Additional reviews will be charged to the Contractor. A rejection of a submittal or review of a partially presented submittal constitutes one submittal review. Incomplete submittals, such as product data submitted without required shop drawings, will be returned without review.

B. Required Submittals

- 1. Various specification sections may state additional information to be submitted.
- 2. Submittals are required for all materials even though the submitted material may be exactly as specified in the Project Manual.
- 3. Electrical Materials Submittal:
 - a. Submit product data only for materials that are being substituted. Product data is not required for materials that are being provided as specified.
 - b. Electrical materials include raceway, boxes, supports, finish material, etc.
- 4. Electrical Equipment Submittal:
 - a. Submit product data for all equipment.
 - b. Electrical equipment includes panelboards, switchboards, transformers, underground pullboxes, floor boxes, light fixtures, etc.

C. Product Data

- 1. Manufacturer's Standard Schematic Drawings:
 - a. Modify drawings to delete information which is not applicable to the Project.
 - b. Supplement standard information to provide additional information which is applicable to the Project.
- 2. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
 - a. Clearly mark each copy to identify pertinent materials, products or models. Mark out or remove all extraneous information.
 - b. Show dimensions and clearances required.

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- c. Show performance characteristics and capacities.
- d. Show wiring diagrams and controls.

D. Substitutions

1. Engineer's Approval Required:
 - a. Contract is based on materials, equipment and methods described in Contract Documents. Substitutions will not be reviewed and approved prior to the award of the contract.
 - b. Engineer will consider proposals during the submittal process for substitution of materials, equipment and methods only when such proposals are accompanied by full and complete technical data and all other information required by Engineer to evaluate proposed substitution. Substitution shall be submitted with completed Substitution Request Form.
 - c. Do not substitute materials, equipment or methods unless such substitution has been specifically approved for this work by Engineer.
2. "Or Equal": Whenever, in Contract Documents, any material, process or specified patent or proprietary name and/or by name of manufacturer is indicated, such name shall be deemed to be used for purpose of facilitating description of material and/or process desired, and shall be deemed to be followed by the words "or equal", or "accepted equal", and Contractor may offer any material or process which shall be equal in every respect to that so indicated or specified; provided, however, that if material, process or article offered by Contractor is not, in opinion of Architect, equal in every respect to that specified, then Contractor must furnish material, process or article specified or one that in opinion of Engineer is equal thereof in every respect.
3. "No Substitutions": Items indicated as "No Substitutions" must be provided as specified and no alternates will be allowed. These items are required either due to District standards by the Board or to match materials recently installed by others.
4. Coordination: Approval of substitution shall not relieve Contractor from responsibility for compliance with all requirements of Drawings and Project Manual, and Contractor shall be responsible at his own expense for any changes in other parts of his own work or work of others which may be caused by approved substitution.
5. DSA Approval: Substitutions of certain items may cause such items to require a Deferred Approval by DSA. Should a DSA Deferred Approval be required, the Contractor shall provide all information and documents necessary to complete the Deferred Approval process without any additional costs to the Owner, including engineering, calculation and modification of substitute products.

1.7 OPERATION AND MAINTENANCE MANUALS

- A. General: Contractor shall incorporate in Maintenance/Operation Manual(s) all brochures, manufacturer's catalogs and written instructions for equipment and materials needing regular care or maintenance and other items as required elsewhere in project documents. Prepare all such manuals in durable plastic loose leaf binders size to accommodate 8-1/2 x 11 sheets with following minimum data:

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1. Identification on or readable through, front cover stating general nature of manual.
2. Neatly typewritten index of all contents.
3. Site plan and building plans indicating location of equipment referenced (reduced scale).
4. Complete instructions regarding operation, maintenance, replacement instructions and programming instructions of all equipment involved.
5. Complete nomenclature of all replaceable parts, their part numbers, current cost and name and address of nearest vendor of parts.
6. Copy of all guarantees and warranties issued, in a separate binder as specified in this section.
7. Copy of approved shop drawings (reduced scale) with all data concerning changes made during construction.

B. Extraneous Data:

1. Where contents of manuals include manufacturer's catalog pages, clearly indicate precise items included in the Project installation and delete, or otherwise clearly indicate, all manufacturer's data with which the Project installation is not concerned.

C. Materials shall be organized in a logical and consistent manner, by specification section number, with separating tabs clearly marked.

D. Data shall be provided for:

1. Lighting Fixtures

1.8 RECORD DRAWINGS (AS-BUILTS)

A. At time of installation, installed locations of all underground work shall be recorded on prints by Contractor, and reviewed with Inspector. Record drawings are to be maintained and adjusted on a daily basis by the Contractor.

B. All information entered on drawings copy shall be neat, legible and emphasized by drawing "clouds" around changed items. Changes shall be made in an accurate manner by a qualified draftsman acceptable to Architect. Completed Record Drawings shall be signed by the Contractor.

C. Locate and dimension all major equipment and underground work, including stubs and pullboxes. Provide dimensions from curbs, foundations, or other permanent landmarks.

D. All symbols and designations used in preparing record drawings shall match those used in the Contract Drawings.

E. Record drawing shall be up-dated monthly.

F. Record drawing signoff:

1. At such time that the underground work has been completed, all the contractors and sub contractors notes, sketch and miscellaneous drawings documenting

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installed locations not currently part of the ongoing record drawing set shall be transferred. These updates shall be reviewed for accuracy by the inspector of record and architect. Once all corrections have been completed the inspector shall sign and date the record set coversheet noting it as acceptance of the underground phase of record drawings.

2. At project completion, the record drawings shall be submitted by the contractor for project inspector and architect review and comment. These will be returned to the contractor for revisions. Once all corrections have been completed the inspector shall sign and date the record set coversheet noting it as acceptance of the completed record drawings. The original record drawings are to be resubmitted to the architect along with a scanned electronic file set in PDF format with file names matching the drawing titles.

1.9 GUARANTEES

- A. Standard Guarantee: Provide individual as well as overall guarantees for all work executed under this Contract or any extra work to be absolutely free of all defects of workmanship and materials for a period of two years from the date of filing of notice of completion and acceptance by Owner. Repair and make good all such defects and repair any damage to other work caused thereby which may occur during same period at no cost to the owner.
- B. Indicate on Guarantee Form specific provisions required by individual specification sections. List all special requirements, extended periods, bonding, etc.
- C. Additional Guarantees: Provide additional guarantees (in excess of year(s) required by Standard Guarantee) where specifically required by pertinent Specification Sections.
- D. Binder: Provide a binder with all guarantees placed in the order in which they occur in the project manual. Include an Index of Guarantees listing each specification section, specific items covered and length of guarantee for each item.

1.10 SITE EXAMINATION AND CONDITIONS

- A. Examine site; verify dimensions and locations against Drawings and become informed of all conditions under which Work is to be done before submitting proposals.
- B. Where signal systems exist, and services of other firms are required, Contractor shall instruct those firms to investigate existing systems and determine labor and materials needed to add devices or modify systems.
- C. Where new conduits are to be run underground at existing sites, contractor shall visit site prior to bidding and walk routes of new underground conduits, note areas of concrete and asphalt being crossed, and include in bid all costs for cutting and patching.
- D. Where existing conduits are shown, their location is diagrammatic and their exact location may not be known.

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- E. No allowances shall subsequently be made in Contractor's behalf for any extra expense to which he or his "subs" may be put due to failure or neglect to discover conditions affecting the work.

1.11 UNDERGROUND UTILITIES:

- A. Existing underground utilities, services, circuits, piping, irrigation piping, etc., are present, but their exact locations are not known. Contractor shall locate and protect before trenching or excavating in any area. Consult utility companies, "as-built drawings" and Owner's maintenance personnel for location of existing underground work. If existing piping or utilities are damaged during construction. Contractor shall repair immediately at own expense. New underground work shall be modified as necessary to conform to existing conditions.

1.12 CLEANING AND CLEANUP

- A. After all work has been accomplished such as sanding, painting, etc., lighting fixtures, panelboards, and switchboards shall be cleaned to remove all dust, dirt, grease, paint, or other marks. All electrical equipment shall be left in a clean condition inside and out, satisfactory to the Architect. Keep buildings and premises free from accumulated waste materials, rubbish, and debris resulting from work herein, and, upon completion of said work, remove tools, appliances, surplus materials, waste materials, rubbish, debris, and accessory items used in or resulting from said work and legally dispose of off the site.

1.13 PROTECTION

- A. The Contractor shall protect from damage during construction the work and materials of other trades as well as the electrical work and material. Electrical equipment stored and installed on the job site shall be protected from dust, water, or any other damage.

1.14 WORKING SPACE

- A. Adequate working space shall be provided around electrical equipment in strict compliance with the Codes. In general, provide 6'6" of headroom and 36" minimum clear work space in front of switchboards, panelboards, transformers, disconnect switches and controls for 120/208 volts and 42" for 277/480 volts. Carefully coordinate locations and orientation of electrical equipment with other divisions to ensure that working space will be clear of piping, conduits, and equipment provided by others.

1.15 COOPERATION AND COORDINATION

- A. Cooperate and coordinate with other crafts in putting the installation in place at a time when the space required by this installation is accessible. Work done without regard to other crafts shall be moved at the Contractor's expense.

1.16 INSPECTION

- A. The Contractor shall cooperate with the Architect and shall provide assistance at all times for the inspection of the electrical work performed under this contract. He shall remove covers, operate machinery, or perform any reasonable work which, in the opinion of the Engineer, will be necessary to determine the quality and adequacy of the work.

1.17 MANUFACTURER'S DIRECTIONS

- A. Follow manufacturer's directions where these directions cover points not included on the drawings or in the specifications. When equipment is provided by other divisions, obtain directions from respective supplier.

1.18 WORKMANSHIP

- A. Good workmanship shall be evidenced in the installation of all electrical materials and equipment. Equipment shall be level, plumb and true with the structure and other equipment. All materials shall be firmly secured in place and adequately supported and permanent. The recommendations of the National Electrical Contractors Association Standard of installation shall be followed except where otherwise specifically directed.

1.19 OPERATING TEST

- A. After the installation is complete, and at such time as the Engineer and other authorities having jurisdiction may request, the Contractor shall conduct an operating test for approval.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 GENERAL

- A. Manufacturer's Directions: Follow manufacturer's directions where manufacturers of articles used furnish directions covering points not specified or shown.
- B. All Work shall be done in orderly, workmanlike manner and present neat appearing installation when completed.
- C. Equipment: Accurately set and level, neatly place support and anchor properly. Anchorage shall conform to the requirements of California Building Code. No allowance will be made for negligence to foresee means of placing, installing or supporting equipment in position.
- D. Electrical products shall be anchored and fastened to building elements and finishes as follows:
 - 1. Concrete Structural Elements: Provide expansion anchors and powder actuated anchors.
 - 2. Steel Structural Elements: Provide beam clamps and spring steel clips.
 - 3. Concrete Surfaces: Provide expansion anchors.
 - 4. Solid Masonry Walls: Provide expansion anchors.
 - 5. Sheet Metal: Provide sheet metal screws.

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6. Wood Elements: Provide wood screws.

3.2 TESTING AND ADJUSTING

- A. Furnish all labor and test equipment required for the Work of this Division. Testing work is defined as that work necessary to establish that equipment has been properly assembled, connected, and checked to verify that intent and purpose of Drawings, manufacturer's instruction manuals, and directions of Architect have been accomplished in satisfactory manner.
- B. Test each individual circuit at panel with equipment connected for proper operation.

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes building wire and cable, wiring connectors and connections.

1.2 REFERENCES

- A. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code with California Amendments.
 - 2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
- C. Underwriters Laboratories, Inc.:
 - 1. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

1.3 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. All wiring shall be copper.
 - 2. All wiring shall be installed in raceway.
 - 3. Solid conductor for feeders and branch circuits 10 AWG and smaller.
 - 4. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 5. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.
 - 6. 10 AWG conductors for 20 ampere or larger as designated on plans for 120 volt branch circuit home runs longer than 75 feet.
 - 7. 10 AWG conductors for 20 ampere or larger as designated on plans for 277 volt branch circuit home runs longer than 200 feet.
- B. Wiring Methods: Provide the following wiring methods:
 - 1. Exterior Locations: Use only building wire, Type XHHW-2 insulation, in raceway.
 - 2. Underground Locations: Use only building wire, Type XHHW-2 insulation, in raceway.

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1.4 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper.

1.5 SUBMITTALS

- A. Refer to 26 0000.

1.6 QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet when tested in accordance with NFPA 262.
- B. Perform Work in accordance with State, Municipality, Highways, and Public Work's standard.
- C. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.8 COORDINATION

- A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- B. Wire and cable routing indicated is approximate unless dimensioned.
- C. Determine required separation between wire, cable and other work. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Product Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Temperature Rating: 75 or 90 degrees C.
- E. Insulation Material: Thermoplastic.

2.2 PLASTIC TAPE:

- A. Black 7 mil thick general purpose electrical tape, Scotch 33 plus or equal.

2.3 INSULATING RESIN:

- A. Use two part liquid epoxy resin with resin and catalyst in premeasured, sealed mixing pouch. Scotchcast 4 or equivalent.

2.4 REDUCING ADAPTERS:

- A. Burndy, Thomas and Betts or approved equal.

2.5 TERMINATIONS

- A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

2.6 SPLICES:

- A. #10 and smaller, including fixture taps - pre-insulated coiled-spring type connectors, 3M Scotchlocks, T&B Piggys, or equal.
- B. #8 to #4, Split bolt service connectors, T&B locktite, Burndy Servit, or equal, insulated with Scotch #88, Okoweld four purpose tape, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 EXISTING WORK

- A. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.
- B. Extend existing circuits using materials and methods as specified.

3.4 INSTALLATION

- A. Route wire and cable to meet Project conditions.
 - 1. Wire and cable routing indicated is approximate unless dimensioned.

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2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
 3. Include wire and cable of lengths required to install connected devices within 10 ft. of location shown.
- B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- C. Identify and color code wire and cable. Identify each conductor with its circuit number or other designation indicated.
- D. Special Techniques--Building Wire in Raceway:
1. Pull conductors into raceway at same time.
 2. Install building wire 4 AWG and larger with pulling equipment.
 3. Use suitable cable fittings and connectors.
- E. Special Techniques - Wiring Connections:
1. Clean conductor surfaces before installing lugs and connectors.
 2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
 3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
 4. Install split bolt connectors with for copper conductor splices and taps, 8 AWG to 4 AWG.
 5. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
 6. Install suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
 7. Encapsulate below grade splices at outlet, pull and junction boxes with specified insulating resin kits. Make all splices watertight.
 8. Install waterproof wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller in outdoor or wet locations.
 9. Where oversized cables are used to accommodate voltage drop, whether a single or parallel feeder, provide appropriate reducing adapter and conductors for termination.
- F. Install stranded conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.
- G. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers.

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- H. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.
- I. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

3.5 WIRE COLOR

- A. General:
 - 1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
 - 2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.
- E. Ground Conductors:
 - 1. For 6 AWG and smaller: Green.
 - 2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.6 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

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- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wire.
 - 2. Mechanical connectors.
 - 3. Exothermic connections.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - 2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code, with California Amendments.
 - 2. NFPA 99 - Standard for Health Care Facilities.

1.3 SYSTEM DESCRIPTION

1.4 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 25 ohms maximum.

1.5 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.
- B. Perform Work in accordance with State, Municipality, Highways, and Public Work's standard.
- C. Maintain one copy of each document on site.

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1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

PART 2 - PRODUCTS

2.1 WIRE

- A. Material: Stranded copper.
- B. Grounding Electrode Conductor: Copper conductor insulated.
- C. Bonding Conductor: Copper conductor insulated.

2.2 MECHANICAL CONNECTORS

- A. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.3 EXOTHERMIC CONNECTIONS

- A. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove paint, rust, mill oils, surface contaminants at connection points.

3.2 EXISTING WORK

- A. Modify existing grounding system to maintain continuity to accommodate renovations.

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- B. Extend existing grounding system using materials and methods as specified.

3.3 INSTALLATION

- A. Install in accordance with IEEE 142 and 1100.
- B. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
- C. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
- D. Install grounding and bonding conductors concealed from view.
- E. Bond together each metallic raceway, pipe, duct and other metal object entering space under access floors. Bond to underfloor ground grid. Install 2 AWG bare copper bonding conductor.
- F. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- G. Connect to site grounding system.
- H. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.4 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
- C. Perform ground resistance testing in accordance with IEEE 142.
- D. Perform leakage current tests in accordance with NFPA 99.
- E. Perform continuity testing in accordance with IEEE 142.

3.5 INDEPENDENT TESTING ORGANIZATION AND PERSONNEL

- A. Obtain the services of an independent third-party testing organization to perform electrical tests.

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- B. Independent testing organization and personnel shall meet the requirements of NETA ATS 3.1 and 3.2.
- C. Tests shall be performed using a Megger Earth Tester or equivalent.
- D. Provide written test results and a final report of electrical tests per NETA ATS 5.4 to Engineer.

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes conduit, wireways, pull and junction boxes and concrete pullboxes.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 3. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - 4. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 5. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SYSTEM DESCRIPTION

- A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. All wiring shall be installed in raceway.
- C. Provide raceway as follows:
 - 1. Underground: Provide thickwall nonmetallic conduit. Provide cast metal boxes or nonmetallic handhole.
 - 2. In Slab Above Grade: Not permitted.
 - 3. Outdoor Locations, Above Grade: Provide galvanized rigid steel conduit. Provide cast metal outlet, pull, and junction boxes.
 - 4. Wet and Damp Locations: Provide galvanized rigid steel conduit. Provide cast metal outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.

1.4 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 0.75 inch unless otherwise specified.

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1.5 SUBMITTALS

- A. Refer to Section 26 0000.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 - 1. Record actual routing of conduits.
 - 2. Record actual locations and mounting heights of pull and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Protect PVC conduit from sunlight.

1.8 COORDINATION

- A. Coordinate Work of this Division and Work of other Divisions in advance of installation. Provide additional Work to overcome tight conditions at no increase in Contract Sum.

PART 2 - PRODUCTS

2.1 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Intermediate Metal Conduit (IMC): Rigid steel.
- C. Fittings and Conduit Bodies: NEMA FB 1. Fittings shall be steel/malleable iron with threaded fittings. Use insulated metallic bushings with lug where ground connections are required. Use plastic bushing for non-bonding applications.

2.2 PVC COATED METAL CONDUIT

- A. Product Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick.
- B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.3 NONMETALLIC CONDUIT

- A. Product Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

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2.4 WIREWAY

- A. Product Description: General purpose for indoor applications and raintight type for outdoor locations wire way.
- B. Knockouts: Manufacturer's standard.
- C. Cover: Hinged cover with full gaskets.
- D. Connector: Flanged.
- E. Fittings: Lay-in type with removable top, bottom, and side; captive screws and drip shield for outdoor.
- F. Finish: Rust inhibiting primer coating with gray enamel finish.

2.5 PULL AND JUNCTION BOXES

- A. Boxes having an internal volume less than 100 cubic inches shall be as specified for outlet boxes. Boxes having internal volume greater than 100 cubic inches shall be of panelboard type construction except that covers shall be secured by screws or bolts.
- B. Boxes exposed to rain or installed in wet locations shall be specifically designed for the purpose.
- C. All boxes shall be installed so that covers are accessible after completion of the installation.
- D. Boxes shall not be installed in finished areas unless specific approval for such installation is granted by Architect.

2.6 CONCRETE PULLBOXES AND VAULTS

- A. Boxes: Boxes shall be precast, high density reinforced concrete. In areas of vehicular traffic, boxes shall be H20 rated.
- B. Extensions: Extensions shall be provided at each pullbox. Provide a minimum of (1) extension. Provide additional extension(s) as required to provide space in box for code required cable bending.
- C. Covers: Covers in concrete or asphalt shall be galvanized. In all other areas, covers shall be steel checker plate. In areas of vehicular traffic, lids shall be galvanized steel, H20 rated. All covers shall be provided with hold-down bolts.
- D. Floor: Provide poured concrete slab as detailed on plans. At H20 rated boxes, provide manufacturer's concrete slab.
- E. Size: Provide size as noted on plans. If size is not shown, provide boxes sized per codes.

- F. Labeling: Covers shall be factory marked as shown on plans.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

- A. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.
- B. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or] as specified.

3.3 INSTALLATION

- A. Ground and bond raceway and boxes.
- B. Fasten raceway and box supports to structure and finishes.

3.4 INSTALLATION - RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Unless otherwise specified, all raceway shall be installed concealed.
- C. Arrange raceway supports to prevent misalignment during wiring installation.
- D. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Construct wire way supports from steel channel.
- F. Route conduit in and under slab from point-to-point.
- G. Maintain clearance between raceway and piping for maintenance purposes.
- H. Maintain 12-inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- I. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- J. Bring conduit to shoulder of fittings; fasten securely.

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- K. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- L. Install conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- M. Install no more than equivalent of three 90-degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2-inch size.
- N. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- O. Install fittings to accommodate expansion and deflection where raceway crosses seismic and expansion joints.
- P. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- Q. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- R. Close ends and unused openings in wire way.
- S. Excavating and trenching:
 - 1. Perform all excavations as required for the installation of the work included under this Section, including shoring of earth banks to prevent cave-ins and to protect workmen and equipment.
 - 2. Restore all surfaces, roadways, walks, curbs, walls, existing underground installation, etc., damaged or cut as a result of the excavations to their original condition in a manner approved by the Architect.
 - 3. Stop machine excavation for trenches, in solid ground, several inches above required grade line, then trim trench bottom by hand to accurate grade so that a firm and uniform bearing throughout entire length of duct is provided. In lieu of above hand excavation in bottom of trench, Contractor may excavate to depth no less than 6" below required grade line and place a bed of sand or granular soil, properly compacted to provide a uniform grade and to provide a firm support for duct throughout its entire length.
 - 4. Minimum conduit depth of pipe crown shall be 2'0" below finished or natural grade, unless detailed otherwise on Drawings. Conduits under parking lots, roadways, driveways, fire truck access routes, and other areas subject to vehicular traffic shall be installed a minimum of 24" below grade.
- T. Backfilling:
 - 1. No backfilling operations shall begin until the required tests and inspection has been made. Should any of the work be enclosed or covered up before it has been approved, Contractor shall, at his expense, uncover the work.

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2. After it has been inspected, tested, and approved, he shall make all repairs necessary to restore the work of other contractors to the condition in which it was found at the time of uncovering.
3. Except under existing paved area, walks, roads, or similar surfaces, and in cases where rock is encountered, backfill more than 12" above the top of the pipe shall be made using suitable excavated material placed in 6" layers measured before compaction, and tamped by machine.
4. Surface work shall be replaced to match the existing.
5. Entire backfill for bored excavations under existing pavement, walks, roads, or similar surfaces, shall be made with clean sand compacted by flooding.
6. The contractor shall install a marking tape 6" below grade and directly above all electrical conduits. The tape shall consist of a 4 mil insert plastic film specifically formulated for prolonged use underground. It shall be highly resistant to alkalis, acids and other destructive agents found in the soil. Tape shall have a minimum tensile strength of 20 lbs. per 3" with strips and a minimum elongation of 500%. Tape shall bear a continuous painted message repeated every 16" to 36" warning of the installation buried below. The message shall read "CAUTION – ELECTRICAL POWER LINE BURIED BELOW" or "CAUTION – ELECTRICAL SIGNAL LINES BURIED BELOW" as applies. Installation instruction for the tape shall be printed with each message along the entire length. The tape shall be as that manufactured by Reef Industries, Inc., or approved equal. For those installations involving non-metallic pipe, tape shall be aluminum foil encased in two layers of inert plastic film enabling the tape to be inductively located. Terre Tape "D" Warning Tapes are acceptable. When conduit below is plastic, tape shall have metallic content and shall respond to metal detectors. Do not exclude this. It will be required to verify the installation of this tape.

3.5 INSTALLATION – BOXES

- A. Boxes shall be accurately placed as shown on Drawings or as close thereto as possible. Contractor shall refer to Drawings, specifications, and submittals covering work of the other trades to coordinate outlet location. In the event of conflict between planned locations of outlet and other equipment or furnishing, Contractor shall not proceed until direction has been given by Architect.
- B. Support boxes independently of conduit.

3.6 INSTALLATION CONCRETE PULLBOXES AND VAULTS

- A. Install boxes flush with finished grade or surface material.
- B. Install hold down bolts for all covers.
- C. Ground bond steel cover plate with insulated green grounding conductor.
- D. Grout between box and extension(s).

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- E. Any box installed in areas of vehicular traffic shall be H20 rated. Contractor shall verify this requirement prior to ordering.

3.7 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wire markers.
 - 2. Underground warning tape.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Refer to section 26 0000.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with State, Municipality, Highways, Public Work's standard.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Accept identification products on site in original containers. Inspect for damage.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 - PRODUCTS

2.1 WIRE MARKERS

- A. Description: Self-adhering, pre-printed, machine printable or write-on, self-laminating vinyl wrap around strips. Blank markers shall be inscribed using the printer or pen recommended by manufacturer for this purpose.

2.2 UNDERGROUND WARNING TAPE

- A. Refer to applicable specification section for underground conduit or detail on plans.

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PART 3 - EXECUTION**

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Wire Markers
 - 1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
 - 2. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.
- B. Underground Warning Tape
 - 1. Refer to applicable specification section for underground conduit or to detail on plans.

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Main and distribution switchboards.
2. Distribution and branch circuit panelboards.

1.2 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
2. NEMA PB 2 - Deadfront Distribution Switchboards.
3. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less.
4. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
5. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
6. NEMA PB 1 - Panelboards.
7. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:

1. NFPA 70 - National Electrical Code with California Amendments.

D. Underwriters Laboratories Inc.:

1. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
2. UL 891 - Dead-Front Switchboards.
3. UL 50 - Cabinets and Boxes
4. UL 67 - Safety for Panelboards.
5. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
6. UL 1283 - Electromagnetic Interference Filters.
7. UL 1449 - Transient Voltage Surge Suppressors.

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PANELBOARDS
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8. UL 1699 - Arc-Fault Circuit Interrupters.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 CIRCUIT BREAKERS

- A. Product Description: UL 489, molded-case circuit breaker.
- B. All circuit breakers shall be bolt-on type.
- C. Current Limiting Circuit Breaker: Circuit breaker indicated as current-limiting have automatically-resetting current limiting elements in each pole. Let-through Current and Energy: Less than permitted for same size Class RK-5 fuse.
- D. Solid-State Circuit Breaker: Electronic sensing, timing, and tripping circuits for adjustable current settings; ground fault trip with integral ground fault sensing and zero sequence type ground fault sensor; instantaneous trip; and adjustable short time trip.
- E. Current Limiter: Designed for application with molded case circuit breaker.
1. Coordinate limiter size with trip rating of circuit breaker to prevent nuisance tripping and to achieve interrupting current rating specified for circuit breaker.
 2. Interlocks trip circuit breaker and prevent closing circuit breaker when limiter compartment cover is removed or when one or more limiter is not in place or has operated.

PART 3 - EXECUTION

3.1 EXISTING WORK

- A. Maintain access to existing switchboards and other installations remaining active.

3.2 INSTALLATION

- A. Install in accordance with NEMA PB 2.1.
- B. Modifications to existing equipment shall be as indicated on the Drawings. New equipment shall match existing where possible and in all cases be compatible with existing. Where new breakers are installed in existing equipment, provide all hardware and trim pieces as required for a complete closed installation. Provide new nameplates at equipment where existing breakers are identified by nameplates and provide new breaker identification in directory where existing breakers are identified in a directory.

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- C. Where new breakers are indicated to be installed in existing equipment, but insufficient space exists, provide enclosed circuit breakers externally and tap existing bussing. Tap conduit and wire sizes shall be same as breaker line side conduit and wire.

3.3 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.1.
- C. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.

- END OF SECTION -

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01 5000, Temporary Facilities and Controls.
- B. Section 01 5713, Erosion Control.
- C. Section 01 8113, Sustainable Design Requirements
- D. Section 31 2333, Trenching and Backfilling.
- E. Section 32 1200, Asphalt Concrete Paving.
- F. Section 32 1600, Site Concrete.
- G. Section 32 8000, Irrigation.
- H. Section 32 9000, Landscaping.
- I. Section 33 4000, Storm Drainage Utilities.

1.3 QUALITY ASSURANCE

- A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- C. The representatives of the Owner's testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner's testing lab representatives nor the testing by the Owner's testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting of inadequate compaction or moisture content is the sole responsibility of the contractor.
- D. Tests (See Part 3 for Compaction Testing).
- E. Contractor shall be solely responsible for all subgrades built. Failures resulting from inadequate compaction or moisture content are the responsibility of the contractor. Contractor shall be solely responsible for any and all repairs.

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1.4 SUBMITTALS

- A. Refer to Section 01 3300.
- B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.5 GUARANTEE

- A. Refer to General Conditions and Section 01 3300.

1.6 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- C. General: Site survey, included in the drawings, was prepared by Warren Consulting Engineers and is the basis for data regarding current conditions. While the survey is deemed generally accurate, there exists discrepancies and variations due to elapsed time, weather, etc. Existing dirt grades may vary 0.2 ft. from that shown.
- D. Site Visitation: All bidders interfacing with existing conditions shall visit the site prior to bid to verify general conditions of improvements. Discrepancies must be reported prior to the bid for clarification.
- E. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- F. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- G. ANSI/ASTM D1557-02e2 - 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.
- H. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).
- I. ANSI/ASTM D 422-63(2007) e1 Test Method for Particle Size Analysis of Soil.
- J. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.
- K. CALTRANS Standard Specifications Section 17.
- L. CAL-OSHA, Title 8, Section 1590 (e).

- M. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Transport, store and handle in strict accord with the local jurisdiction.
- B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.8 PROJECT CONDITIONS

- A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Architect before continuing work.
- B. Excavation dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for excavation dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled.

1.9 EXISTING SITE CONDITIONS

- A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 ON SITE UTILITY VERIFICATION AND REPAIR PROCEDURES

- A. Ground-breaking requirements:
 - 1. All underground work performed by a Contractor must be authorized by the District's Construction Manager or the Low Voltage Consultant prior to start of construction.
 - 2. The Contractor is to obtain and keep the original School's construction utility site plans on site during all excavation operations. Contractor can contact the District's Construction Manager, Facilities Manager, or the Low Voltage Consultant to procure the drawings.
- B. Underground Utility Locating:
 - 1. The contractor shall hire an Underground Utility Locating Service to locate existing underground utility pathways in areas effected by the scope of work for excavation.
 - 2. Contractor must use an underground utility locator service with a minimum of 3 years experience. The equipment operator must have demonstrated experience.

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- Contact Norcal Underground Locating (800/986-6722) or Precision Locating (800/577-7324)
3. The Underground Utility Locator Service must have the use of equipment with the ability to locate by means of inductive clamping, induction, inductive metal detection, conductive coupling, or TransOnde (Radiodetection) to generate signals, passive locating (free scoping) for "hot" electric, and metal detector.
 4. The Underground Utility Locator Service must be able to locate existing utilities at a depth of at least 72".
 5. The Underground Utility Locator Service must be able to locate but are not limited to locating the following types of utility pathways:
 - a. All conduit pathways containing 110 volt or greater 50-60Hz electrical wire.
 - b. All conduit pathways containing an active cable TV system.
 - c. All conduit pathways containing wire or conductor in which a signal can be attached and generated without damaging or triggering the existing systems.
 - d. All empty conduit pathways or pipe in which a signal probe or sonde (miniature transmitter) can be inserted.
 - e. All conduit pathways containing non-conductive cables or wires in which a signal probe or sonde (miniature transmitter) can be inserted.
 - f. All plastic and other nonconductive water lines in which a TransOnde Radiodetection) or other "transmitter" can be applied to create a low frequency pressure wave (signal) without damaging or triggering the existing systems.
 - g. All copper or steel waterlines and plastic or steel gas lines.
 6. All markings made by the Underground Utility Locator Service or other shall be clear and visible.
 7. The contractor shall maintain all markings made by Underground Utility Locator Service or other throughout the entire length of the project.
 8. The Underground Utility Locator Service shall provide the contractor with two sets of maps showing the location of utilities and average depth. They will be referenced to permanent buildings. Contractor will deliver one copy to the district at no additional charge.
 9. Contractor is responsible to contact Underground Service Alert (U.S.A. 800/227-2600) and receive clearance prior to any excavation operations.
 10. Contractor shall inform the (District's Construction Manager)(Architect)(Owner) no later than five (5) days prior to the date scheduled for the utility locator service to be on site.

1.11 PROTECTION

- A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

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- B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.
- C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.
- D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullyng of sides of excavation.
- E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.
- F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.
- G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.
- H. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

1.12 SEASONAL LIMITS

- A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.
- B. Excessively wet fill material shall be bladed and aerated per section 3.8, B.

1.13 TESTING

- A. General: Refer to Section 01 4523 - TESTING & INSPECTION SERVICES, AND STRUCTURAL TESTS AND INSPECTIONS LIST, DSA-103.
- B. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and backcharged to Contractor.
 - 1. If Contractor elects to process or mine onsite materials for use as Suitable Fill, Aggregate Sub Base, Aggregate Base, Rock, Crushed Rock or sand the cost of all testing of this material shall be paid for by the Contractor.
 - 2. Testing of import fill for compliance with Department of Toxic Substance Control (DTSC) shall be paid for by the Contractor.

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PART 2 - PRODUCTS

2.1 MATERIALS

- A. Engineered Fill Materials: All fill shall be of approved local materials supplemented by imported fill if necessary. "Approved" local materials are defined as local soils tested and approved by Geotechnical Engineer free from debris, and concentrations of clay and organics; and contain rocks no larger than 3-inches in greatest dimension. The soil and rock should be thoroughly blended so that all rock is surrounded by soil. This may require mixing of the soil and rock with a dozer prior to placement and compaction. Clods, rocks, hard lumps or cobbles exceeding 3-inches in final size shall not be allowed in the upper 12 inches of any fill.
- B. Imported Engineered Fill Material: Imported fill may be required to complete work. Proposed import fill material shall meet the above requirements; shall be similar to the native soils. Import fill shall meet the above requirements; shall have plasticity index of 15 or less; an Expansion Index of 20 or less; be free of particles greater than three-inch (3") in largest dimension; be free of contaminants and have corrosion characteristics within the acceptable limits. All import fill material shall be tested and approved by Soils Engineer prior to transportation to the site. Proposed fill material shall comply with DTSC guidelines to include Phase 1 environmental site assessment and related tests. Refer to the October 2001 DTSC Information Advisory for clean imported fill material.
1. DTSC TESTING: Site work contractor is to coordinate testing with an analytical lab, hired by the owner, licensed by the State of California for the DTSC testing. The costs associated with testing will be paid by the contractor.
 2. DTSC testing shall include documentation as to the previous land use, location, and history. Soils shall be analyzed for all compounds of concern to ensure the imported soil is uncontaminated and acceptable. Testing shall be performed per the recommendations included in DTSC Imported Fill Advisory ([http://www.dtsc.ca.gov/Schools/upload/SMP FS Cleanfill-Schools.pdf](http://www.dtsc.ca.gov/Schools/upload/SMP_FS_Cleanfill-Schools.pdf)). Soils shall be tested prior to import to the project site.
 3. Lab shall determine geographically which tests and analysis comparison will be appropriate for the testing. (CAM 17 / Title 22); (RWQCB) Regional Water Quality Control Board; or (OEHHA) Office of Environmental Health Hazard Assessment.
 4. Frequency of testing shall be conducted in accordance with DTSC's Imported Fill Advisory as follows;

Fill Material Sample Schedule	
Area Of Individual Borrow Area	Sampling Requirements
2 Acres or less	Minimum of 4 samples
2 to 4 Acres	Minimum of 1 sample every ½ acre
4 to 10 Acres	Minimum of 8 samples
Greater than 10 Acres	Minimum of 8 locations with 4 subsamples per location

Volume of Borrow Area Stockpile	
Up to 1,000 Cubic Yards	1 sample per 250 cubic yards
1,000 to 5,000 Cubic Yards	4 samples for the first 1000 cubic yards + 1 sample per each additional 500 cubic yards
Greater than 5,000 Cubic Yards	12 samples for the first 5,000 cubic yards + 1 sample per each additional 1,000 cubic yards

5. Reports/ Documentation
 - a. Results of the testing analysis shall be sent to the Owner; Architect; Project Inspector, Project Civil Engineer, DTSC, and DSA. Letter shall reference DSA file and application numbers.
- C. Landscape Backfill Material:
 1. The top 3" of native topsoil stripped from the site may be used for landscape backfill material provided it meets the requirements as specified in Section 329000
 2. Imported Topsoil may be required to complete work. See Section 329000 for requirements. Proposed Topsoil material shall comply with DTSC guidelines to include Phase 1 environmental site assessment and related tests. Refer to the October 2001 DTSC Information Advisory for clean imported fill material.
- D. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.
- E. Aggregate Base: Provide Class 2 3/4" Aggregate Base conforming to standard gradation as specified in Cal Trans Standard Specifications, Section 26,-1.02A.

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PART 3 - EXECUTION

3.1 INSPECTION LAYOUT AND PREPARATION

- A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point where this installation may properly commence
- B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. Layout and staking shall be done by a licensed Land Surveyor or Professional Civil Engineer.
- C. Verify that specified items may be installed in accordance with the approved design.
- D. In event of discrepancy, immediately notify Owner and the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.2 PERFORMANCE

- A. GENERAL:
 - 1. General: Do all grading, excavating and cutting necessary to conform finish grade and contours as shown. All cuts shall be made to true surface of subgrade.
 - 2. Archaeological Artifacts: Should any artifacts of possible historic interest be encountered during earthwork operations, halt all work in area of discovery and immediately contact the Architect for notification of appropriate authorities.
 - 3. Degree of Compaction: Percentage of maximum density, hereinafter specified as degree of compaction required, means density equivalent to that percentage of maximum dry density determined by ASTM D1557 Compaction Test method, and such expressed percentage thereof will be minimum acceptable compaction for specified work.
 - 4. Moisture Content: Moisture content shall be as noted below and as called for on the plans. Moisture content shall be maintained until subgrade is covered by surfacing materials.

3.3 DEMOLITION, DISPOSAL AND DISPOSITION OF UNDESIRABLE MAN-MADE FEATURES

- A. All other obstructions, such as abandoned utility lines, septic tanks, concrete foundations, and the like shall be removed from site. Excavations resulting from these removal activities shall be cleaned of all loose materials, dish shaped, and widened as necessary to permit access for compaction equipment. Areas exposed by any required over-excavation should be scarified to a depth of 12", moisture-conditioned to near optimum moisture content, and recompact to at least 90% of the maximum dry density.

3.4 TESTING AND OBSERVATION

- A. All grading and earthwork operations shall be observed by the Geotechnical Engineer or his representative, serving as the representative of the Owner.
- B. Field compaction tests shall be made by the Geotechnical Engineer or his representative. If moisture content and/or compaction are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified moisture or compaction. Notify Geotechnical Engineer at least 48 hours in advance of any filling operation.
- C. Earthwork shall not be performed without the notification or approval of the Geotechnical Engineer or his representative. The Contractor shall notify the Geotechnical Engineer at least two (2) working days prior to commencement of any aspect of the site earthwork.
- D. If the Contractor should fail to meet the compaction or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory, as determined by the Geotechnical Engineer or Architect/Engineer.
- E. After each rain event Geotechnical Engineer shall test fill material for optimum moisture. Do not place any fill material until desired moisture is achieved.

3.5 CLEARING AND GRUBBING

- A. Prior to grading, remove all debris off-site. Remove trees and brush including the root systems. Holes resulting from tree and brush removal should be prepared and backfilled in accordance with paragraphs 3.7, 3.8, 3.9, and 3.10. This may require deepening and/or widening the holes to adequately remove disturbed soil and provide room for compaction equipment. Strip the surface of all organics. Strippings meeting the requirements of Section 32 9000 may be used in landscape areas only.

3.6 CUTTING

- A. Building pads that are located within a cut/fill transition area will have to be overexcavated to provide a semi-uniform fill beneath the building pad. The portions of building pads located in cut areas shall be overexcavated to provide no more than 1 foot difference in fill placed in the same building pad.
- B. Do all cutting necessary to bring finish grade to elevations shown on Drawings.
- C. When excavation through roots is necessary, cut roots by hand.
- D. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities as shown on the survey, without additional claims or cost.

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3.7 SUBGRADE PREPARATION

- A. Grade compact and finish all subgrades within a tolerance of 0.10' of grades as indicated on Drawings and so as not to pool water. Subgrade within building pads and concrete walks shall be within 0.05' of grades indicated.
- B. After clearing, grubbing and cutting, subsurface shall be plowed or scarified to a depth of at least 12", until surface is free from ruts, hummocks or other uneven features. Moisture condition to optimum moisture content and recompact to at least 90% of the maximum dry density as determined by ASTM Test Method D1557. If the existing soils are at a water content higher than specified, the contractor shall provide multiple daily aerations by ripping, blading, and/or discing to dry the soils to a moisture content where the specified degree of compaction can be achieved. After seven consecutive working days of daily aerations, and the moisture content of the soil remains higher than specified, the contractor shall notify the architect. If the existing soils have a moisture content lower than specified, the contractor shall scarify, rip, water and blade existing soil to achieve specified moisture content. The contractor shall make proper allowance in schedule and methods to complete this work.
- C. After subgrade for fill within building pad area or within paved areas has been cleared, plowed and scarified, it shall be disked or bladed until uniform and free from large clods, brought to optimum moisture content and compacted to not less than 90% of maximum dry density, as determined by ASTM Test Method D1557, and such expressed percentage thereof will be minimum acceptable density for specified work.
- D. Subgrade in areas to receive landscaping shall be compacted to (90%).
- E. Where Contractor over-excavates building pads through error, resulting excavation shall be recompact as engineered fill at Contractor's expense.

3.8 PLACING, SPREADING AND COMPACTING FILL MATERIAL IN BUILDING PAD AND PAVEMENT AREAS

- A. Selected fill material shall be placed in layers which, when compacted, shall not exceed 6 inches in compacted thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity in moisture content.
- B. Selected fill material shall be moisture-conditioned to specified moisture content. Selected fill material shall be unfrozen. When moisture content of fill material is below that specified, add water until proper moisture content is achieved. When moisture content is above that specified, aerate by blading or other methods mentioned in 3.08 B until moisture content is satisfactory.
- C. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to a minimum of 90% as determined by the ASTM D1557 Compaction Test. Compact each layer over its entire area until desired density has been obtained.
- D. Recomposition of Fill in Trenches and Compaction of Fill Adjacent to Walls: Where trenches must be excavated, backfill with material excavated. Place in lifts that when compacted do not exceed 6", moisture conditioned to optimum moisture content, and

compact to a minimum of 90% relative compaction in building pad and paved areas, and to 90% relative compaction in landscape areas.

- E. Jetting of fill materials will not be allowed.

3.9 FINAL SUBGRADE COMPACTION

- A. Paved Areas: Upper 12" of all final subgrades supporting pavement sections and all other flatwork shall be lime treated. Refer to Section 313200.
- B. Other Fill and Backfill: Upper 12" of all other final subgrades or finish grades shall be compacted to 90% of maximum dry density.
- C. Gravel Fill: Do not place compacted gravel fill until after underground work and foundations are in place. Compact gravel fill with vibratory plate or similar equipment to preclude settlement.

3.10 PLACING, SPREADING, AND COMPACTION OF LANDSCAPE BACKFILL MATERIALS

- A. All landscaped areas shall receive topsoil. After subgrade under landscape area has been scarified and brought to 90% maximum dry density, top soil shall be placed evenly to depth of 12" at 85% of maximum dry density.
- B. Project Inspector must verify that materials are uniformly spread to minimum depth specified.

3.11 SLOPE CONSTRUCTION

- A. Cut slopes shall be constructed to no steeper than 2:1 (horizontal:vertical). Fill slopes shall be constructed to no steeper than 2:1 (horizontal:vertical). Prior to placement of fill on an existing slope the existing slope shall be benched. The benches shall be in a ratio of 2 horizontal to 1 vertical. The face of the fill slopes shall be compacted as the fill is placed, or the slope may be overbuilt and then cut back to the design grade. Compaction by track walking will not be allowed.

3.12 FINISH GRADING

- A. At completion of project, site shall be finished graded, as indicated on Drawings. Finish grades shall be "flat graded" to grades shown on the drawing. Mounding of finish grades will not be allowed unless otherwise directed on the landscape drawings. Tolerances for finish grades in drainage swales shall be $\pm 0.05'$. Tie in new and existing finish grades. Leave all landscaped areas in finish condition for lawn seeding. Landscaped planters shall be graded uniformly from edge of planter to inlets. If sod is used for turf areas the finish grade on which it is placed shall be lowered to allow for sod thickness.
- B. All landscape areas shall be left free of rock or foreign material as specified in Section 329000.
- C. All landscape areas shall be approved by Architect prior to any planting.

EARTHWORK
SECTION 31 0000
18-1831
ADDENDUM NO. 04

3.13 SURPLUS MATERIAL

- A. Excavated material not required for grading or backfill shall be removed from site at contractor's expense.

3.14 CLEANING

- A. Refer to Section 01 7700.
- B. Remove from fill all vegetation, wood, form lumber, casual lumber, and shavings, in contact with ground; buried wood will not be permitted in any fill.

- END OF SECTION -

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 CODES

- A. The following are minimum requirements and shall govern, except that all local, state and/or federal codes and ordinances shall govern when their requirements are in excess hereof.

1.3 DESCRIPTION

- A. Furnish all materials, labor, equipment, services, etc., necessary and incidental for the completion of all site clearing and removal work as shown on the drawings and as specified herein.
- B. All onsite and offsite work included consists of but is not limited to the following:
 - 1. Removal of existing sidewalks, drives, curbs, pavements, etc. per plans. Trees, shrubs, irrigation. See Abatement Report.
 - 2. Removal and capping off or relocation of existing underground utilities, underground structures, etc. per plans.
 - 3. Removal from site and disposal of all waste, debris and unusable material.
 - 4. Backfill all open excavations created by the removal of underground utilities, underground structures, etc.

1.4 RELATED SECTIONS

- A. Related work specified elsewhere:
 - 1. Section 01 8113, Sustainable Design Requirements.
 - 2. Section 31 0000 – Earthwork.

1.5 QUALITY ASSURANCE

- A. Obtain and pay for any permits, bonds, licenses, etc., required for Site Clearing and Removal work.
- B. All clearing and removal work shall be accomplished in strict accordance with all local and state building codes, requirements and regulations including but not limited to noise abatement, dust control, classification of disposal materials, etc.
- C. Any work within street or highway right-of-way shall be done in accordance with the requirements of the governmental agencies having jurisdiction and shall not begin until these governing authorities have been notified.

SITE CLEARING
SECTION 31 1000
18-1381
ADDENDUM NO. 04

1.6 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).

1.7 JOB CONDITIONS

- A. An attempt has been made to show all existing structures, utilities, drives, pavements, curbs, walks, etc. in their approximate location on the survey and/or working drawings. However, others that are not shown may exist and may be found upon visiting the site or during the clearing and removal work. It will be the responsibility of this contractor to accurately locate all existing facilities and to determine their extent. If such facilities obstruct the progress of the work and are not indicated to be removed or relocated, they shall be removed or relocated only as directed by the Owner.
 - 1. Report any existing site element not shown on the working drawings to the Architect of Record so that the proper dispensation of that element may be made.
- B. Natural features, existing structures, existing landscaping, existing utilities, etc. which are indicated to remain on the drawings and specifications shall be protected and shall not be defaced or damaged in any manner.
- C. Restore to their present conditions any pavement in the public right-of-way that is disturbed by the work under this section. All pavement restoration work in public rights-of-way shall be performed to the full satisfaction of the governmental agencies having local jurisdiction.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Noise producing activities shall be held to a minimum. Internal combustion engines and compressors, etc., shall be equipped with mufflers to reduce noise to a minimum. Comply with all noise abatement ordinances.
- B. Keep all areas within the clearing and removal area sufficiently dampened to prevent dust from rising due to clearing or removal operations. Comply with all anti-pollution ordinances.
 - 1. This contractor shall see to it that trucks leaving the site shall do so in such a manner that debris, vegetation, mud and earth will not be deposited on adjacent street pavements. Any debris, vegetation, mud or earth deposited on street pavements shall be promptly removed by this contractor.
- C. All clearing and removal operations shall be performed in a manner such as to prevent any wash-off of soils from the site into streams and/or storm drainage systems. Appropriate sedimentation ponds, dikes, silt fences, collars, and filter media shall be employed to insure compliance with these requirements. Where a specific statute governs these procedures, such statute shall be complied with in its entirety.

1.9 PROTECTION AND SHORING

- A. Protect all existing structures, utilities and landscaping indicated to remain on the drawings.
 - 1. All trees, shrubs, and other items, indicated to remain shall be protected during the entire progress of the work. This includes protection of the root system. The trees shall be fenced if they are located in or near an area being used for material storage or subject to damage by traffic during construction. Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be removed. All trimmings shall be done by skilled workman and in accordance with good tree surgery practices.
- B. Any damage done by this contractor to existing structures, pipe lines, utilities, landscaping, etc. indicated to remain shall be repaired by him and at his expense in a manner acceptable to the Owner of the damaged property. This contractor shall report any existing damage prior to the beginning of this work.
- C. All temporary shoring, bracing, etc., and maintenance there required for the completion of clearing and removal work shall be provided by the Contractor whose work requires protection.
 - 1. This contractor shall work in concert per local and state codes to insure the provisions of adequate bracing, shoring, temporary cross over for pedestrian and vehicular traffic including guard rails, lamps, warning signs and flags as required by agencies having jurisdiction as directed by the Owner. Remove same when necessity for protection ceases.

1.10 DRAINAGE MAINTENANCE

- A. During the entire course of clearing and removal operations, all existing drainage ways, both into and from the project area shall be rerouted as required and/or maintained in a functional condition.
- B. At all times during the clearing and removal operation, the exposed areas of subgrade shall be maintained in a condition compatible with positive drainage of the work area. Failure to maintain such drainage shall be considered adequate cause for the District Representative to order temporary suspension of the work.
- C. If it should become necessary to stop work for indefinite periods, take every precaution to prevent damage or deterioration of the work already performed. Provide suitable and functional drainage by installing ditches, filter drains, temporary cut-off lines, etc., and erect temporary protective structures where necessary. All embankments shall be back-bladed and suitably sealed to protect against adverse weather conditions.

SITE CLEARING
SECTION 31 1000
18-1381
ADDENDUM NO. 04
PART 2 - PRODUCT

2.1 MATERIALS

- A. All materials used to backfill excavations, trenches, holes, pits, etc. caused by utility, underground structure or underground storage tank removal shall meet the requirements for fill material and compaction indicated in Sections: Earthwork, and Trenching and Backfilling.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Visit the site so that a full understanding of the difficulties and restrictions attending complete clearing of the site and removal of underground tanks and utilities is obtained. Verify the location of all pertinent items.
- B. Verify with sewer department, water department, gas company, electric company, etc. that all existing utilities, services and overhead lines have been deactivated and abandoned prior to beginning removal work. Notify affected utility department or company prior to beginning removal work.
 - 1. Contact the local "USA North" to locate underground utilities prior to beginning clearing and removal work.

3.2 PREPARATION

- A. Cut drainage swales and provide temporary grading to carry storm water away from clearing area. No storm water will be permitted to stand in open excavations.
- B. Provide, erect and maintain temporary barriers and security devices as required. Protect all existing landscaping, structures, utilities and site elements which are not to be demolished.
- C. Notify all affected utility companies and local authorities and agencies prior to beginning the work.
- D. Identify and tag all existing trees and other landscaping designated to remain.
- E. Identify and locate a permanent stockpile area for topsoil. Verify with District Representative and see plans for fill soil stockpile area. Coordinate with Landscape Contractor.
- F. Identify and locate a waste area for temporary storage of removed materials and a permanent topsoil stockpile area.
 - 1. No materials may be buried or burned on the site as a means of disposal.

3.3 PERFORMANCE

- A. This contractor shall be responsible for all clearing, grubbing, removing and disposing of trash and debris and for clearing and stockpiling all topsoil which are within the designated limits of the property, easements and roadway rights-of-way, unless otherwise indicated on the drawings.
- B. Prior to rough grading, storage of construction materials or the installation of any temporary construction facilities, strip areas per plans to be occupied by site improvements.
- C. This contractor shall be responsible for removal of sidewalks, pavements, curbs and gutters, exterior slabs and sidewalks indicated to be removed on plans.
- D. This contractor shall be responsible for removal of all underground utilities, underground structures, etc., according to plans.
- E. Protect any existing structures, utilities and all appurtenances to remain. Prevent movement or settling. Provide bracing and shoring as required.
 - 1. Cease cleaning and removal operations immediately if any existing structure or utility appears in danger. Notify the District Representative and Civil Engineer of Records. Do not resume operations until directed.
- F. All broken construction material, trash and debris, tree slash, sidewalks, curbs, etc. will be considered "waste" and shall be removed from the site.
- G. "Waste" material shall be removed from the site as soon as possible and shall not be allowed to accumulate. Short-term storage of removed material shall be restricted to previously designated "waste" areas or as directed by the District Representative.
 - 1. No burning or burying of "waste" material will be permitted.
- H. Continuously dampen all clearing and removal areas to prevent dust from rising during the operation. Provide hoses and/or water trucks as required.

3.4 FIELD QUALITY CONTROL

- A. The Owner shall retain an independent inspection firm or contact local officials and inspectors at locations where local building codes require special inspections.

SITE CLEARING
SECTION 31 1000
18-1381

ADDENDUM NO. 04

3.5 CLEAN UP

- A. Material designated for removal shall become the property of this contractor, and any salvage value therefrom will accrue to this contractor.
- B. Remove from the site and make legal disposition of all waste and debris. No waste or debris shall be burned or buried on the site as a means of disposal.

- END OF SECTION -

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PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01-5000, Temporary Facilities and Controls.
- B. Section 01-8113, Sustainable Design Requirements.
- C. Section 31 0000, Earthwork.
- D. Section 32-8000, Irrigation.
- E. Section 33-4000, Storm Drainage Utilities.

1.3 QUALITY ASSURANCE

- A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- C. Contractor / Installer shall have been in business for five (5) years providing/finishing similar size projects and complexity.

1.4 SUBMITTALS

- A. Refer to Section 01 3300.
- B. Submit Manufacturers data and shop drawings.

1.5 GUARANTEE

- A. Submit fully executed Guarantee for work and materials in this Section per 01 3300.

1.6 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- C. California Plumbing Code (CPC), edition as noted on the drawings.

TRENCHING AND BACKFILLING

SECTION 31 2333

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ADDENDUM NO. 04

1.7 DELIVERY, STORAGE AND HANDLING

- A. Transport, store and handle in strict accord with the local jurisdiction.
- B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.8 PROJECT CONDITIONS

- A. Contractor shall acquaint himself with all existing site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.
- B. Field verify that all components, backing, etc. by others are installed correctly to proceed with installation of products as herein specified.
- C. Trench dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for trench dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled.

1.9 PROTECTION

- A. Adequate protection measures shall be provided to protect workers and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations. Repair all trenches in grass areas with new sod (seeding not permitted) and "stake-off" for protection.
- B. Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.
- C. Any construction review of the Contractor's performance conducted by the Architect or Owner is not intended to include review of the adequacy of the Contractor's safety measures, in, on or near the construction site.
- D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullyng of sides of excavation.
- E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. Keep all excavations free from water during entire progress of work, regardless of cause, source or nature of water.
- F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

TRENCHING AND BACKFILLING
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- G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance.
- H. Trees: Carefully protect existing trees which are to remain.

1.10 TRENCH SAFETY PROVISIONS

- A. General Contractor shall be solely responsible for safety design, construction and coordination with agencies having jurisdiction. If such plan varies from shoring system standards established by Construction Safety Orders, plan shall be prepared by registered civil or structural engineer.
- B. Nothing herein shall be deemed to allow use of shoring, sloping or protective system less effective than that required by Construction Safety Orders of California State Division of Industrial Safety.
- C. When trenching through paved surface, provide steel trench plates to cover open trenches daily until trenches are backfilled.

1.11 SEASONAL LIMITS

- A. No backfill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, full operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.
- B. Material above optimum moisture shall be processed per Section 31 0000, 3.8, B.

1.12 TESTING

- A. General: Refer to Section 31 0000 – Quality Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backfill materials: Pipeline and conduit trench backfill as shown on the plans and as specified below.
 - 1. ¾ inch crush rock.
 - 2. Native Materials: Soil native to Project Site, free of wood, organics, and other deleterious substances. Rocks shall not be greater than 3-inches.
 - 3. Sand: Fine granular material, free of organic matter, mica, loam or clay.
 - 4. Lean Mix Concrete: 3 sacks of cement per yard plus sand.
 - 5. Class 2 aggregate base, ¾" rock, per Caltrans Section 26-1.02B
 - 6. Controlled Density Fill: 3 sack slurry backfill.
- B. Water: Furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

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- C. Provide other bedding and backfill materials as described and specified in Section 33 0000, Section 33 4000 and Divisions 22 and 26.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verification of Conditions:
 - 1. Examine areas and conditions under which work is to be performed.
 - 2. Identify conditions detrimental to proper or timely completion of work and coordinate with General Contractor to rectify.

3.2 COORDINATION

- A. General Contractor shall coordinate work as herein specified, in accordance with drawings and as required to complete scope of work with all related trades.

3.3 INSTALLATION

- A. Perform work in accordance with pipe manufacturer's recommendations, as herein specified and in accordance with drawings.

3.4 TRENCHING

- A. Make all trenches open vertical construction with sufficient width to provide free working space at both sides of trench around installed item as required for caulking, joining, backfilling and compacting; not less than 12 inches wider than pipe or conduit diameter, unless otherwise noted.
- B. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities as shown on the survey, without additional claims or cost.
- C. Trench straight and true to line and grade with bottom smooth and free of edges or rock points.
- D. Where depths are not shown on the plans, trench to sufficient depth to give minimum fill above top of installed item measured from finish grade above the utility as follows:
 - 1. Sewer pipe: depth to vary
 - 2. Storm drain pipe: depth to vary
 - 3. Water pipe - Fire Supply: 36 inches
 - 4. Water pipe – Domestic Supply: 30 inches
- E. Where trench through existing pavement saw cut existing pavement in straight lines. Grind existing asphalt on each side of trench 3" wide x 1/2 the depth of the section. Apply tack coat to vertical surfaces before installing new asphalt. Replace asphalt and concrete pavement sections to matched existing conditions. In concrete

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pavement provide expansion and control joints to match existing joint layout.

3.5 BACKFILL

- A. Pipe Trench Backfill is divided into three zones:
 - 1. Bedding: Layer of material directly under the pipe upon which the pipe is laid.
 - 2. Pipe Zone: Backfill from the top of the bedding to 6 inches (compacted) over the top of the pipe.
 - 3. Upper Zone: Backfill between top of Pipe Zone and to surface of subgrade.
- B. Bedding: Type of material and degree of compaction for bedding backfill shall be as defined in the Details and Specifications.
- C. Pipe Zone and Upper Zone Backfill:
 - 1. Type of material and degree of compaction Pipe Zone and Upper Zone Backfill shall be as required by Drawings, Details, & Specifications.
 - 2. Upper Zone Backfill shall not be placed until conformance of Bedding and Pipe Zone Backfill with specified compaction test requirements has been confirmed.
 - 3. Backfill shall be brought up at substantially the same rate on both sides of the pipe and care shall be taken so that the pipe is not floated or displaced. Material shall not be dropped directly on pipe.
- D. Backfill Compaction:
 - 1. Backfill shall be placed in layers which, when compacted shall not exceed 6 inches in thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity. Do not backfill over, wet, frozen or soft subgrade surfaces. Employ a placement method that does not disturb or damage foundation walls, perimeter drainage, foundation damp-proofing, waterproofing or protective cover.
 - 2. When moisture content of fill material is below that required to achieve specified density, add water until proper moisture content is achieved. When moisture content is above that required, aerate by blading or other methods until specified moisture content is met, see section 310000, 3.8, B.
 - 3. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to 90% of maximum dry density while at specified moisture content. Compact each layer over its entire area until desired density has been obtained.
 - 4. Compaction: All backfill operations shall be observed by the Inspector of Record and/or Geotechnical Engineer. Field density tests shall be made to check compaction of fill material. If densities are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified densities. Notify Inspector and Architect at least 24 hours in advance of any operation.
- E. Backfill in Areas Previously Lime or Cement Treated

TRENCHING AND BACKFILLING

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1. Where trenching occurs in areas that have been lime or cement treated, class 2 aggregate bases or approved controlled density backfill material shall be used for the top 12-inches minimum of the trench or thickness shall match the depth of treated material.

3.6 TRENCH AND SITE RESTORATION

- A. Finished surface of trenches shall be restored to a condition equal to, or better than the condition as existed prior to excavation work.

3.7 PROTECTION

- A. Protect existing surfaces, structures, and utilities from damage. Protect work by others from damage. In the event of damage, immediately repair or replace to satisfaction of Owner.
- B. Repair existing landscaped areas to as new condition. Replant trees, shrubs or groundcover with existing materials if not damaged or with new materials if required. Replace damaged lawn areas with sod, no seeding will be permitted.
- C. Replace damaged pavement with new compatible matching materials. Concrete walks to be removed to nearest expansion joint and entire panel replaced. Asphalt to be cut neatly and replaced with new materials.
- D. Any existing materials removed or damaged due to trenching to be returned to new condition.

3.8 SURPLUS MATERIAL

- A. Remove excess excavated material, unused materials, damaged or unsuitable materials from site.

3.9 CLEANING

- A. Refer to Section 01 7700.
- B. Contractor will keep the work areas in a clean and safe condition so his rubbish, waste, and debris do not interfere with the work of others throughout the project and at the completion of work.
- C. After completion of work in this section, remove all equipment, materials, and debris. Leave entire area in a neat, clean, acceptable condition.

- END OF SECTION -

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 SCOPE OF WORK

- A. Description: Provide Lime Stabilization Treatment, including spreading and mixing lime and water with in-place materials, and compacting the mixture to the lines, grades and dimensions shown on the plans and/or specified.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01 5000, Temporary Facilities and Controls.
- B. Section 01 8113, Sustainable Design Requirements.
- C. Section 31 2333, Trenching and Backfilling.
- D. Section 32 1200, Asphalt Concrete Paving.
- E. Section 32 1600, Site Concrete.
- F. Section 33 4000, Storm Drainage Utilities.

1.4 QUALITY ASSURANCE

- A. General: All Quality Assurance procedures specified on the drawings shall apply to this Section in addition to those shown below.
- B. Testing:
 - 1. Geotechnical Engineer: Owner is retaining a Geotechnical engineer to determine compliance of Lime Stabilization Treatment with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except that costs incurred for re-tests or re-inspection will be paid by Owner and backcharged to Contractor.
- C. Inspection: Work shall not be performed without the physical presence and approval of Geotechnical Engineer. The Contractor shall notify the Geotechnical Engineer at least two working days prior to commencement of any aspect of site earthwork.
- D. Field Density: Field density and phenolphthalein reaction tests shall be made by the Geotechnical Engineer after completion of compaction. Where compaction equipment has disturbed the surface to a depth of several inches, density tests shall be taken in the compacted material below the disturbed surface.

SOIL TREATMENT
SECTION 31 3200
18-1381
ADDENDUM NO. 04

- E. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- F. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- G. The representatives of the Owner's testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner's testing lab representatives nor the testing by the Owner's testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.
- H. Tests (See Part 3 for Compaction Testing).
- I. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction is the responsibility of the contractor.

1.5 SUBMITTALS

- A. Refer to Section 01 3300.
- B. Weighmaster Certificates: Provide certificates as required in Section 2.1B.

1.6 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).

1.7 WARRANTY

- A. Refer to General Conditions and Section 01 3300.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lime Treated Engineered Fill: The materials to be treated shall consist of on-site soils or approved import material as described in Section 31 0000.
- B. Lime: The percentage of lime shall be based on a soil weight of 100 pcf; hence, 1 pound lime should be utilized per square foot. A certification of compliance shall be submitted to the Geotechnical Engineer with each delivery of lime/cement.
- C. Water: Water shall be added during the preliminary mixing operations and, if necessary, during final mixing and to keep the cured material moist until curing is

complete. The amount of water added shall be subject to the approval of the Geotechnical Engineer at all times.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Layout all work, establish grades, locate existing underground utilities, set markers and stakes, set up and maintain barricades and protection facilities; all prior to beginning actual earthwork operations.

3.2 EQUIPMENT

- A. Lime Spreader: The lime shall be spread by equipment which shall uniformly distribute the required amount of lime. The rate of spread per square foot of blanket shall not vary more than 5 percent from the designated rate, unless otherwise approved by the Geotechnical Engineer.
- B. Mixing Equipment: Mixing equipment shall be capable of mixing or remixing the materials to a uniform mixture free of streaks or pockets of lime to the full required depth.

3.3 START OF WORK UNDER THIS SECTION

- A. General: Prior to starting physical work under this Section, the property line is to be clearly staked and identified. No lime treated materials shall be allowed to contaminate areas outside of the property.

3.4 LIME SPREADING

- A. Engineered Fill: Provide lime treatment in areas shown on plans, to a depth of at least 12-inches.
- B. Temperature: Lime shall not be spread while the atmospheric temperature is below 35 degrees Fahrenheit or when conditions indicate that the temperature may fall below 35 degrees Fahrenheit within 24 hours.

3.5 MIXING

- A. Lime shall be added to the material to be treated at a rate of 5 pounds lime per square foot based on a soil unit weight of 100 pcf.
- B. Lime shall be spread by equipment that will uniformly distribute the required amount of lime for the full width of the prepared material. The rate of spread per linear foot of blanket shall not vary more than five percent (5%) from the designated rate.
- C. The spread lime shall be prevented from blowing by suitable means selected by the Contractor. Quicklime shall not be used to make lime slurry. The spreading operations shall be conducted in such a manner that a hazard is not present to construction

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personnel or the public. All lime spread shall be thoroughly mixed into the soil the same day lime spreading operations are performed.

- D. The distance which lime may be spread upon the prepared material ahead of the mixing operation will be determined by the Geotechnical Engineer.
- E. No traffic other than the mixing equipment will be allowed to pass over the spread lime until after the completion of mixing.
- F. Mixing equipment shall be equipped with a visual depth indicator showing mixing depth, an odometer or footmeter to indicate travel speed and a controllable water additive system for regulating water added to the mixture.
- G. Mixing equipment shall be of the type that can mix the full depth of the treatment specified and leave a relatively smooth bottom of the treated section. Mixing and re-mixing, regardless of equipment used, will continue until the material is uniformly mixed (free of streaks or pockets of lime), moisture is at approximately two percent (2%) over optimum and the mixture complies with the following requirements:

Minimum Sieve Size	Percent Passing
1-1/2 inch	100
1 inch	95
No. 4	60

- H. Non-uniformity of color reaction when the treated material, exclusive of one inch or larger clods, as tested with the standard phenolphthalein alcohol indicator, will be considered evidence of inadequate mixing.
- I. Lime-treated material shall not be mixed or spread while the atmospheric temperature is below 35°F. The entire mixing operation shall be completed within seventy-two (72) hours of the initial spreading of lime, unless otherwise permitted by the Geotechnical Engineer.

3.6 SPREADING AND COMPACTING

- A. The treated mixture shall be spread to the required width, grade and cross-section. The maximum compacted thickness of a single layer may be determined by the Contractor provided he can demonstrate to the Geotechnical Engineer that his equipment and method of operation will provide uniform distribution of the lime and the required compacted density throughout the layer. If the Contractor is unable to achieve uniformity and density throughout the thickness selected, he shall rework the affected area using thinner lifts until a satisfactory treated subgrade meeting the distribution and density requirements is attained, as determined by the Geotechnical Engineer, at no additional cost to the Owner.
- B. The finished thickness of the lime-treated material shall not vary more than one-tenth foot (0.1') from the planned thickness at any point.

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- C. The lime-treated soils shall be compacted to a relative compaction of not less than ninety-five percent (95%) as determined by the ASTM D1557-01 Compaction Test.
- D. Initial compaction shall be performed by means of a sheepsfoot type roller or a vibratory padfoot roller. Final rolling shall be by means of a smooth drum roller.
- E. Areas inaccessible to rollers shall be compacted to meet the minimum compaction requirement by other means satisfactory to the Geotechnical Engineer.
- F. Final compaction shall be completed within thirty-six (36) hours of final mixing. The surface of the finished lime-treated material shall be the grading plane and at any point shall not vary more than eight one hundredths of a foot (0.05') foot above or below the grade established by the Civil Engineer except that when the lime-treated material is to be covered by material which is paid for by the cubic yard the surface of the finished lime-treated material shall not extend above the grade established by the Civil Engineer.
- G. Before final compaction, if the treated material is above the grade tolerance specified in this section, uncompacted excess material may be removed and used in areas inaccessible to mixing equipment. After final compaction and trimming, excess material shall be removed and disposed of. The trimmed and completed surface shall be rolled with steel or pneumatic-tired rollers. Minor indentations may remain in the surface of the finished materials so long as no loose material remains in the indentations.
- H. At the end of each day's work, a construction joint shall be made in thoroughly compacted material and with a vertical face. After a part-width section has been completed, the longitudinal joint against which additional material is to be placed shall be trimmed approximately three inches (3") into treated material, to the neat line of the section, with a vertical edge. The material so trimmed shall be incorporated into the adjacent material to be treated.
- I. An acceptable alternate to the above construction joints, if the treatment is performed with cross shaft rotary mixers, is to actually mix three inches (3") into the previous day's work to assure a good bond to the adjacent work.

3.7 FINAL GRADING

- A. Finish all lime treated engineered fill grades to within a tolerance of 1/100 foot of grades shown for top of lime stabilization treatment.
- B. Leave all areas in suitable condition for subsequent work.
- C. Excess materials not needed for final grading operations shall be removed from the site.

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3.8 CURING

- A. Curing: The surface of compacted and finish graded lime treated soils shall be kept moist until covered by pavement surface or crushed rock layer for buildings.

- END OF SECTION -

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01 5000, Temporary Facilities and Controls.
- B. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- C. Section 01 8113, Sustainable Design Requirements.
- D. Section 31 0000, Earthwork.
- E. Section 31 2333, Trenching and Backfilling.
- F. Section 32 8000, Irrigation.
- G. Section 33 4000, Storm Drainage Utilities.

1.3 QUALITY ASSURANCE

- A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- C. The representatives of the Owner's testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner's testing lab representatives nor the testing by the Owner's testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.
- D. Contractor shall provide verification that asphalt mix temperature meets the requirements of this specification at time of application.
- E. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction is the responsibility of the contractor.

1.4 SUBMITTALS

- A. Refer to Section 01 3300.

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- B. **Manufacturer's Data:** Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.
- C. **CAL-GREEN Submittals:**
 - 1. **Product Data – VOC Limits:** For adhesives, sealants, fillers and primers, documentation including printed statement of VOC contents, comply with limits specified in Section 01 6116.
- D. **Guarantee of Contractor/Subcontractor per Article 1.5.**

1.5 GUARANTEE

- A. Refer to General Conditions and Section 01 3300.
- B. Submit fully executed Guarantee with submittal package required by Article 1.4.

1.6 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- C. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- D. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- E. ANSI/ASTM D1557-02 - 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.
- F. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).
- G. ANSI/ASTM D 422-63 Test Method for Particle Size Analysis of Soil.
- H. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.
- I. CALTRANS Standard Specifications.
- J. CAL-OSHA, Title 8, Section 1590 (e).
- K. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Transport, store and handle in strict accord with the local jurisdiction.
- B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.8 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Base Course: Do not lay base course on muddy subgrade, during wet weather, or when atmospheric temperature is below 40 degrees F.
 - 2. Asphalt Surfacing: Do not apply asphaltic surfacing on wet base, during wet weather, or when atmospheric temperature is below 50 degrees F.

1.9 EXISTING SITE CONDITIONS

- A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 PROTECTION

- A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.
- B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.
- C. Any construction review of the Contractor's performance conducted by the owner's representative is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.
- D. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.
- E. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

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- F. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

1.11 SEASONAL LIMITS

- A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

1.12 TESTING

- A. General: Refer to Section 01*4523 – TESTING & INSPECTION SERVICES AND STRUCTURAL TESTS AND INSPECTIONS LIST, DSA-103.
- B. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and backcharged to Contractor.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC Limits for adhesives, sealants, fillers, coatings and primers. Comply with limits specified in related Section.
- B. Provide products conforming to local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product exceeds current requirement, provide conforming product at no additional cost. Provide written confirmation to Architect describing reason for revision and demonstrate compliance of replacement product with specified requirements.

2.2 MATERIALS

- A. Sterilant: Soil sterilizer shall be CIBA GEIGY's Pramitol 25-E, Treflan EC or Thompson-Hayward Casoron.
 - 1. Soil sterilizer shall be applied in strict accordance with manufacturer's instructions.
- B. Base Course Aggregate: State Specifications, Section 26, Class 2 aggregate base (3/4" max.).
- C. Asphalt Binder: Steam-refined paving asphalt conforming to State Specifications, Section 92, viscosity grade PG 64-10. Asphalt binder additives for WMA per Caltrans approved list of manufacturer's.
- D. Liquid Asphalt Tack Coat: Per CALTRANS section 94.

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- E. Surface Course Aggregate: Mineral aggregates for Type "B" asphalt concrete, conforming to State Specifications 39-2.02, Type B, ½" maximum, medium grading. 3/8" maximum grading at Playcourt.
- F. Seal Coat: shall be a pre-mixed asphalt emulsion blended with select fillers and fibers such as:
 - 1. "Park-Top No. 302", Western Colloid Products.
 - 2. "Overcoat", Reed and Gram.
 - 3. "Drivewalk", Conoco Oil.
- G. Wood Headers and Stakes: Pressure treated.
- H. Pavement Marking: Colors as directed by Architect. Colors of painted traffic stripes and pavement markings must comply with ASTM D 6628.
 - 1. Waterborne traffic line - colors white, yellow and red, State specification PTWB-01R3.
 - 2. Waterborne traffic line for the international symbol of accessibility and other curb markings – blue, red and green, Federal specification TT-P-1952F.
- I. Precast Concrete Bumpers: 3000 psi at 28 day minimum strength; 48" length unless otherwise indicated; provide with steel dowel anchors and concrete epoxy.
- J. Pavement Epoxy; K-Lite; KtepX-590; Ennis Epoxy HPS2 or an approved equal.
- K. Crack Filler; QPR model CAR08, 10oz asphalt crack filler; Star STA-FLEX Trowel Grade crack filler or approved equal.
- L. Reclaimed Asphalt Paving (RAP). HMA Type A or Type B may be produced using RAP providing it does not exceed 15% of the aggregate blend.

2.3 MIXES

- A. General: Plant mixed conforming to State Specifications, Section 39, Type B, ½" maximum, medium grading. 3/8" maximum grading shall be used at hardcourt.
- B. Temperature of Hot Mix Asphalt: Not less than 275 degrees F nor more than 325 degrees F when added to aggregate.
- C. Temperature of Hot Mix Aggregate: Not less than 250 degrees F nor more than 325 degrees F when asphalt is added.
- D. Temperature of Hot Mix Asphalt Concrete: Asphalt shall be not less than 285 degrees at time of application, nor more than 350 degrees. Asphalt not meeting the required temperature shall not be used.
- E. Temperature of Warm Mix Asphalt: Mixing and placement; per the approved manufacturer's heat range recommendations for mixing and placement.

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PART 3 - EXECUTION

3.1 EXAMINATION OF CONDITIONS

- A. Conditions of Work in Place: Subsurfaces which are to receive materials specified under this Section shall be carefully examined before beginning work hereunder, and any defects therein shall be reported, in writing, to the Architect. Work shall not be started until such defects have been corrected. Starting of work shall imply acceptance of conditions as they exist.

3.2 PREPARATION

- A. Sub-Grade: Clean, shape and compact to hard surface free from elevations or depressions exceeding 0.05' in 10' from true plan. Compact per Section 31 2000. Compaction and moisture content shall be verified immediately prior to placement of aggregate base. Proof roll subbase in presence of geotechnical engineer prior to placement of aggregate base.

3.3 INSTALLATION

- A. Headers:
 - 1. General: Install as edging to asphalt paving, except where adjoining existing pavement, concrete curbs, walks or building.
 - 2. Existing Headers: Remove existing headers where new paving will join existing. Saw cut existing asphalt to provide clean edge.
 - 3. Lines and Levels: Install true to line and grade. Cut off tops of stakes 2-inches below top of header so they will not be visible on completion of job.
- B. Asphalt Paving:
 - 1. Base Course: Install in accord with State Specifications, Section 26. Compact to relative compaction of not less than 95%, ASTM D1557. The material shall be deposited on the subgrade in such a manner as to provide a uniform section of material within five percent tolerance of the predetermined required depth. Deposition will be by spreader box or bottom dump truck to prevent segregation of the material. The material so deposited on the subgrade shall have sufficient moisture which, in the opinion of the Architect is adequate to prevent excessive segregation. It shall then be immediately spread to its planned grade and cross section. Undue segregation of material, excessive drifting or spotting of material will not be permitted. If in the opinion of the site geotechnical engineer, the material is unsuitably segregated, it shall be removed or completely reworked to provide the desired uniformity of the material.
 - a. Moisture content and compaction of base material shall be tested immediately prior to placement of asphalt paving.
 - 2. Sterilant: Apply specified material at manufacturer's recommended rate. Applicator of sterilant material shall be responsible for determining location of all planter areas. Apply specified material over entire base course area just prior to application of asphalt. Follow manufacturer's printed directions.

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3. Liquid Asphalt Tack Coat: Apply as "tack coat" to all vertical surfaces of existing paving, curbs, walks, and construction joints in surfacing against which paving is to be placed.
4. Asphalt Concrete Surface Course:
 - a. Comply with State Specifications, 39-6 except as modified below.
 - 1) Final gradation shall be smooth, uniform and free of ruts, humps, depressions or irregularities, with a minimum density of 95% of the test maximum density determined by California Test Methods #304 and 375. Maximum variation 1/8 inch in 10' when measured with steel straightedge in any one direction. Test paved areas for proper drainage by applying water to cover area. Correct portions that do not drain properly by patching with plant mix. In no case shall accessible parking spaces or loading and unloading areas exceed 2% slope in any direction.
 - 2) Asphalt material shall be delivered to the project site in a covered condition to maintain acceptable temperature.
5. Placement and adjustment of Frames, Covers, Boxes and Grates: The Contractor shall set and adjust to finish grade all proposed and existing frames, covers, boxes, and grates of all manholes, drop inlets, drain boxes, valves, cleanouts, electrical boxes and other appurtenant structures prior to placement of asphaltic concrete.
6. Water Testing: All paved areas shall be water tested, to check drainage, in the presence of the project inspector prior to placement of seal coat. The surface of asphalt paving shall not vary more than 1/8 inch above or below the grade established on the plans. If variations in grade are present, they will be corrected by overlaying paving and/or pavement removal and replacement as directed by the Architect.
7. Patching: Cut existing paving square and plumb at all edges to be joined by new paving. In trenches; grind existing asphalt on each side of trench 3" wide x 1/2 the depth of the section. Apply tack coat to vertical surfaces before installing new work. Warp carefully to flush surface, with seal over joints, and feather edge. Sawcut, remove and patch existing paving where cutting is necessary for installation of piping or conduits under Divisions 15, 16 and 33.
8. Seal Coat:
 - a. Seal coat shall be applied no sooner than 30 days from time of asphalt placement in a two coat application.
 - b. Surface Preparation: surface shall be clean of all dirt, sand, oil or grease. Hose down entire area with a strong jet of water to remove all debris. Remove soft, loose, or otherwise damaged areas of asphalt concrete to full depth of damage and replace with compacted asphalt concrete as specified herein. Minor holes and imperfections may be patched using hot mix asphalt or mastic using sand/SS-1-H. Use wire brush for removal of oil and grease; prime with shellac or synthetic resin as recommended by manufacturer of pavement sealer material.

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- c. Seal Coat Seal Application: Thoroughly mix materials in the presence of the onsite inspector. Failure to do so will be cause for rejection. Apply in accordance with manufacturer's written instructions.
 - d. Clean-Up and Precautions: As recommended by pavement sealer material manufacturer.
- C. Pavement Marking: painted pavement markings shall be done only after the seal coat has thoroughly dried. On clean surfaces to be painted with traffic paint of dust, dirt, grime, oil, rust or other contaminants which will impair the quality of work or interfere with proper bond of paint coats. Surfaces shall be cleaned to the extent and by whatever means that will satisfactorily accomplish the purpose without damage to asphalt concrete. Provide measured layouts, temporary markings, templates, and other means necessary to provide required marking. Prepare and apply paint in accordance with manufacturer's instructions; paint shall be applied by spray and shall achieve complete coverage free from voids and thin spots. Where indicated on the Drawings, paint parking stall strips, lettering, arrows, accessible symbols, playground markings, game striping, maps, etc. on concrete paving or asphalt concrete paving. Paint stripes shall be 4 inches wide (except otherwise indicated) and applied with two (2) coats of herein specified Traffic Line Paint; white (except as otherwise specified or indicated).
 - 1. International Accessible Symbol: Symbol shall be white figures on a blue background. Blue shall be equal to color No. 15090 in Fed. Std. 595c. Lines and symbols shall be accurately formed and true to line and form; lines shall be straight and uniform in width. Painted edges shall be clean cut and free from raggedness, and corners shall be cut sharp and square. Tolerances: Apply striping within a tolerance 1/2 inch in 50 feet. Apply markings and striping to widths indicated with a tolerance of 1/4 inch on straight sections and 1/2 inch on curved sections.
- D. Colors: As directed by Architect
- E. Precast Concrete Bumpers: Install where shown, using steel dowels, and epoxy applied for length to wheel stop without damage to bumpers or asphalt concrete paving.

3.4 CLEANING

- A. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.
- B. Clean excess material from surface of all concrete walks and utility structures.

- END OF SECTION -

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01.4523, Testing & Inspection Services.
- B. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- C. Section 01 8113, Sustainable Design Requirements.
- D. Section 31-0000, Earthwork.

1.3 QUALITY ASSURANCE

- A. Use only new materials and products.
- B. Use materials and products of one manufacturer whenever possible.
- C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- D. Sieve analysis from testing laboratories identifying rock/sand percentages within the concrete mix; or class 2 aggregate base shall have the current project name and project location identified on the report. Outdated analytical reports greater than 90 days old will not be accepted.

1.4 SUBMITTALS

- A. Refer to Section 01 3300.
- B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.
- C. CAL-GREEN Submittals:
 - 1. Product Data – VOC Limits: For adhesives, sealants, fillers and primers, documentation including printed statement of VOC contents, comply with limits specified in Section 01 6116.
- D. Materials list: Submit to the Architect a complete list of all materials proposed to be used in this portion of the work. Submitted items should include but are not limited to

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sand, gravel, admixtures, surface treatments, coloring agents, sealers, fibers, cast-in-place accessories, forming and curing products and concrete mix designs.

- E. With concrete submittal, provide documented history of mix design performance.
- F. Guarantee of Contractor/Subcontractor per Article 1.5.

1.5 GUARANTEE

- A. Refer to General Conditions and Section 01 3300.
- B. Submit fully executed Guarantee with submittal package required by Article 1.4. See Part 3 of this specification regarding concrete finishing and defective concrete.

1.6 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- C. ACI Standards, ACI 211.1, ACI 318-05, ACI 302, IR-04, ACI 301-05, ACI 305R-99, ACI 306R-02, ACI 308-98.
- D. ASTM C-94, Specification for Ready-Mixed Concrete.
- E. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice (latest edition).
- F. ACI 347 Recommended Practice for Concrete Formwork.
- G. ASTM – American Society for Testing and Materials.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.
- B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.
- C. Transport, store and handle in strict accord with the manufacturer's written recommendations.
- D. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.
- E. Store cement in weather tight building, permitting easy inspection and identification. Protect from dampness. Lumpy or stale cement will be rejected.

- F. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregate. Use only one supply source for each aggregate stock pile.

1.8 TESTING

- A. Cement and Reinforcing shall be tested in accordance with CBC Section 1913A. Testing of reinforcing may be waived in accordance with Section 1913A.4 when approved by the Structural Engineer and DSA.

1.9 ADEQUACY AND INSPECTION

- A. Design, erect, support, brace and maintain formwork and shoring to safely support all vertical and lateral loads that might be applied until such loads can be carried by concrete.
- B. Notify Inspector, Architect and DSA at least 48 hours prior to placing of concrete.

1.10 PROTECTION

- A. Finish surfaces shall be protected at all times from concrete pour. Inspect forming against such work and establish tight leak-proof seal before concrete is poured. Finish work damaged, defaced or vandalized during the course of construction shall be replaced by contractor at contractor expense.

1.11 FIELD MEASUREMENTS

- A. Make and be responsible for all field dimensions necessary for proper fitting, slopes and completion of work. Report discrepancies to Architect before proceeding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC Limits for adhesives, sealants, fillers, coatings and primers. Comply with limits specified in related Section.
- B. Provide products conforming to local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product exceeds current requirement, provide conforming product at no additional cost. Provide written confirmation to Architect describing reason for revision and demonstrate compliance of replacement product with specified requirements.

2.2 MATERIALS

- A. Cement: Portland cement, ASTM C150, Type II, per ACI 318 Section 3.2.
- B. Concrete Aggregates: Normal weight aggregates shall conform to ASTM C33, except as modified by this section. Combined grading shall meet limits of ASTM C33.

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Lightweight aggregate shall conform to ASTM C330, suitably processed, washed and screened, and shall consist of durable particles without adherent coatings.

- C. Water: Clean and free from deleterious amounts of acids, alkalis, scale, or organic materials and per ACI 318 Section 3.4.
- D. Fly Ash: Western Fly Ash, conforming to ASTM C618 for Class N or Class F materials (Class C is not permitted). Not more than 15% (by mass) may be substituted for portland cement.
- E. Water Reducing Admixture: Admixture to improve placing, reduce water cement ratio, and ultimate shrinkage may be used. Provide WRDA 64 by Grace Construction Products or approved equal. Admixture shall conform to ASTM C494 and ACI 318 Section 3.6. Such admixture must receive prior approval by the Architect, Structural Engineer, and the Testing Lab, and shall be included in original design mix.
- F. Air-entraining Admixture: Daravair 1000 by Grace Construction Products or approved equal. Admixture must conform to ASTM C260 and CBC Section 1904 A.2.1.
- G. Surface Retarder (for exposed aggregate finishes): Rugasol-S by Sika Corporation or approved equal.
- H. Surface Treatments and Coloring Agents:
 - 1. Glare Reduction Colorant: "L10 Glare Reducer" as manufactured by Master Builders/L.M. Scofield or approved equal. Provide at all exterior concrete slabs, walks, ramps, stairs (including bleachers) and other exposed flatwork to eliminate glare. Omit glare reduction colorant where Color Hardener, Integral Color or Stain are utilized. Provide 2-pounds of colorant per cubic yard of concrete. This is a maximum amount and Architect may adjust proportion to a lesser amount if desired. Add colorant to mix in accordance with manufacturer's printed instructions.
 - 2. Heavy Duty Color Hardener: "Emerchrome" Floor Hardener; dust on non-slip, non-rusting, non-polishing, colored/uncolored hardener as manufactured by the L. M. Scofield Company or approved equal. Colors as selected by Architect. Apply "Lithrochrome Colorwax", color-matched curing material by L.M. Scofield or accepted equal, following installation of color hardener per manufacturer's recommendations. Colors to be selected by Architect from standard colors.
 - 3. Integral Color-Exterior Concrete: "Chromix P/Chromix L", colored, water reducing, set controlling admixture by L.M. Scofield or approved equal. Apply "Lithrochrome Colorwax", color-matched curing material by L.M. Scofield or accepted equal, following installation of Integral color concrete per manufacturer's recommendations. Colors to be selected by Architect from standard colors.
 - 4. Stain-Exterior Concrete: "Lithochrome Tintura" by L.M. Scofield. Apply per manufacturers recommendations. Apply "Cementone", clear, low-gloss sealer by L.M. Scofield or accepted equal, following installation of stained concrete per manufacturer's recommendations. Colors to be selected by Architect from standard colors.

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- I. Form Material (Concrete Exposed to View): 5/8" (min) APA B-B Ply-form, steel or Sonotubes.
- J. Form Material (Concrete concealed from View): 5/8" (min) APA B-B Plyform, steel or 1 x 8 DF. No. 2 or better.
- K. Form Ties: Snap off metal of fixed length: leaving no metal within 1-1/2 inches of surface and no fractures, spalls or other surface defects larger than one-inch diameter; manufactured by Burke, Dayton Superior, or accepted equal.
- L. Spreaders: Metal (no wood permitted).
- M. Form Coating: Material which will leave no residue on concrete surface that will interfere with surface coating, as approved by the Architect.
- N. Chamfer Strips: Rigid PVC, 3/4" x 3/4", in maximum possible lengths; manufactured by Burke, Greenstreak, Vulco, or accepted equal.
- O. Expansion Joint Material: Preformed 3/8" fiber material, with bituminous binder manufactured for use as concrete expansion joint material, as accepted by the Architect.
- P. Reinforcement Bars: New billet steel deformed bars conforming to requirements of ASTM A615 or ASTM A706; Grade 60. Dowels for installation through expansion joints or construction joints to existing sidewalks or concrete features shall be smooth or shall be sleeved on one end for slippage.
- Q. Reinforcing supports: Galvanized metal chairs or spacers or metal hangers, accurately placed 3'-0" O.C.E.W. Staggered and each support securely fastened to steel reinforcement in place. Bottom bars in footings may be supported with 3" concrete blocks with embedded wire ties. Concrete supports without wire ties will not be allowed.
- R. Truncated Domes: Vitriified Polymer Composite (VPC), Cast-In-Place Detectable/Tactile Warning Surface Tiles; "Armor-Tile", "Access Tile Tactile Systems", or approved equal. Tiles shall comply with Americans with Disabilities Act and the California Code of Regulations (CCR) Title 24, Part 2, Chapter 11B. Install tiles as recommended by manufacturer.
 - 1. Color: As selected by the Architect.
- S. Curing Compound (for exterior slabs only): Burke Aqua Resin Cure by Burke by Edoco, 1100 Clear by W.R. Meadows or accepted equal. Water based membrane-forming concrete curing compound meeting ASTM C 309 and C1315.
- T. Concrete Bonding Agent: Weld-Crete by Larson Products Corp., Daraweld C by Grace Construction Products or accepted equal.
- U. Patching Mortar: Meadow-Crete GPS, one-component, trowel applied, polymer enhanced, shrinkage-compensated, fiber reinforced, cementitious repair mortar for

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horizontal, vertical and overhead applications as manufactured by W.R. Meadows or accepted equal.

- V. Non-shrink Grout: Masterflow 713 Plus by Master Builders or approved equal. Premixed, non-metallic, no chlorides, non-staining and non-shrinking per CRD-C621, Corps of Engineers Specification and ASTM C 1107, Grades B and C.
- W. Aggregate Base: Class 2 AB per Caltrans specification section 26-1.02A.
- X. Joint sealant for expansion joints: Single component silicone sealant, Type S, ASTM D5893.
 - 1. Reference Standard: ASTM C920, Grade P, Class 25, Use T.
 - 2. Dow Corning 890-SL (self-leveling) Silicone, or accepted equal.
 - 3. Dow Corning 888-NS (non-sagging) Silicone, at slopes exceeding 5%. May not be used at asphalt surfaces.
 - 4. Color: Custom color as selected by Architect.
- Y. Pre- Formed plastic Expansion Joint; W.R. Meadows 3/8" "Snap Cap", Tex-Trude expansion joint cap, or an approved equal.

2.3 CONCRETE DESIGN AND CLASS

- A. Designed Strength and Classes of Concrete: The following mixes are not applicable to concrete items exceeding 4 feet in height above the adjacent grade.
 - 1. Class "B": Concrete shall have 1" max. size aggregate, shall have 3000 psi min. at 28 day strength with a maximum water to cementitious ratio no greater than 0.50. Use for exterior slabs, including walks, vehicular paved surfaces, manhole bases, poured-in-place drop inlets, curbs, valley gutters, curb & gutter and other concrete of like nature.
 - 2. Class "D" concrete of 1" max. size aggregate shall have 3500 psi 28 day strength with a maximum water to cementitious materials ratio of 0.55. Use for footings and retaining walls not attached to buildings, and planter walls, monument signs, and other site concrete not described for use in Class "B".
- B. Slump Limits: Provide concrete, at point of final discharge, of proper consistency determined by Test Method ASTM C143 with a slumps of 4" plus or minus 1".
- C. Mix Design: All concrete used in this work will be designed for strength in accordance with provisions of CBC, Section 1905A.3. Should the Contractor desire to pump concrete, a modified mix design will need to be submitted for review. Fly ash may be used in concrete to improve workability in amounts up to 15% of the total cementitious weight.
- D. Air Entrainment: Provide at concrete paving / flatwork, including concrete ramps and stairs, per the Local Jurisdiction minimum requirements, but no less than 3%.

2.4 MIXING OF CONCRETE

- A. Conform to requirements of CBC, Chapter 19A.
- B. All concrete shall be mixed until there is uniform distribution of material and mass is uniform and homogenous; mixer must be discharged completely before the mixer is recharged.
- C. Concrete shall be Ready-mixed Concrete: Mix and deliver in accordance with the requirements set forth in ASTM C94 and ACI 301. Batch Plant inspection may be waived in accordance with CBC Section 1704A.4A, when approved by Structural Engineer and DSA.
 - 1. Approved Testing Laboratory shall check the first batching at the start of the work and furnish mix proportions to the Licensed Weighmaster.
 - 2. Licensed Weighmaster to positively identify materials as to quantity and to certify to each load by ticket.
 - 3. Ticket shall be transmitted to Project Inspector by truck driver with load identified thereon. Project Inspector will not accept load without load ticket identifying mix and will keep daily record of pours, identifying each truck, its load and time of receipt and will transmit two copies of record to DSA.
 - 4. At end of project, Weighmaster shall furnish affidavit to DSA on form satisfactory to DSA, certifying that all concrete furnished conforms in every particular and to proportions established by mix designs.
 - 5. Placement of concrete shall occur as rapidly as possible after batching and in a manner which will assure that the required quality of the concrete is maintained. In no case may concrete be placed more than 90 minutes from batch time.
 - 6. Water may be added to the mix only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. In no case shall more than 10 gallons of water shall be added to a full 9 yard load, or 1 gal. per yard on remaining concrete within the drum providing load tag indicates at time of mixing at plant will allow for additional water.

2.5 MATERIALS TESTING

- A. Materials testing of concrete and continuous batch plant inspection may be waived in accordance CBC Sections 1705A.3.3 when approved by Structural Engineer and DSA.
- B. Testing of concrete shall be performed per article 3.12 of this specification.

2.6 EQUIPMENT

- A. Handling and mixing of concrete: Project Inspector may order removal of any equipment which in his opinion is insufficient or in any way unsuitable.

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PART 3 - EXECUTION

3.1 APPROVAL OF FORMS AND REINFORCEMENTS

- A. Forms and reinforcements are subject to approval by the Project Inspector, and notice of readiness to place first pour shall be given to DSA, Architect and Structural Engineer 48 hours prior to placement of concrete. Before placing concrete, clean tools, equipment and remove all debris from areas to receive concrete. Clean all reinforcing and other embedded items off all coatings oil, and mud that may impair bond with concrete.
- B. All reinforcing steel shall be adequately supported by approved devices on centers close enough to prevent any sagging.
- C. All reinforcing bar lap splices shall be staggered a minimum of 5 ft.
- D. Additional reinforcing steel shall be placed around all utility boxes, valve boxes, manhole frames and covers that are located within the concrete placements.
 - 1. The bars shall be placed so that there will be a minimum of 1 ½" clearance and a maximum of 3" clearance. The reinforcing steel shall be placed mid-depth of concrete slab.
- E. At all right angles or intersections of concrete walks, additional 2'x2' #5, 90 degree bars shall be added at all inside corners for additional crack control. The bars shall be placed 2" from concrete forms and supports at mid-depth of slab.

3.2 PROTECTION

- A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.
- B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

3.3 CLEANING

- A. Reinforcement and all other embedded items at time of placing concrete to be free of rust, dirt oil or any other coatings that would impair bond to concrete.
- B. Remove all wood chips, sawdust, dirt, loose concrete and other debris just before concrete is to be poured. Use compressed air for inaccessible areas. Remove all standing water from excavations.

3.4 FORMING

- A. Form material shall be straight, true, sound and able to withstand deformation due to loading and effects of moist curing. Materials which have warped or delaminated, or require more than minor patching of contact surfaces, shall not be reused.

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- B. Build forms to shapes, lines, grades and dimensions indicated. Construct form work to maintain tolerances required by ACI 301. Forms shall be substantial, tight to prevent leakage of concrete, and properly braced and tied together to maintain position and shape. Butt joints tightly and locate on solid backing. Chamfer corners where indicated. Form bevels, grooves and recesses to neat, straight lines. Construct forms for easy removal without hammering, wedging or prying against concrete.
- C. Space clamps, ties, hangers and other form accessories so that working capacities are not exceeded by loads imposed from concrete or concreting operations.
- D. Build openings into vertical forms at regular intervals if necessary to facilitate concrete placement, and at bottoms of forms to permit cleaning and inspection.
- E. Build in securely braced temporary bulkheads, keyed as required, at planned locations of construction joints.
- F. Slope tie-wires downward to outside of wall.
- G. Brace, anchor and support all cast-in items to prevent displacement or distortion.
- H. During and immediately after concrete placing, tighten forms, posts and shores. Readjust to maintain grades, levels and camber.
- I. Concrete paving, Curbs, Curb and Gutters, Ramps:
 - 1. Expansion Joints: Install at locations indicated, and so that maximum distance between joints is 20' for exterior concrete unless otherwise shown. Expansion joint material shall be full depth of concrete section. Recess for snap cap and sealant when required.
 - 2. Curbs, Valley Gutter, and Curb & Gutter: Install expansion joints at 60' on center, except when placing adjacent to concrete walks, the expansion joints shall align with the expansion joints shown for the concrete walks. Expansion joint material shall be full depth of concrete section. Recess for snap cap and sealant when required.
 - 3. Isolation Joints: 3/8" felt between walls and exterior slabs or walks so that paved areas are isolated from all vertical features, unless specifically noted otherwise on plans.
 - 4. Exterior Concrete Paving: Install expansion joints at 20' on center maximum, both directions, unless shown otherwise on plans.
 - 5. Ramps; whether shown or not all ramps shall have control joints and expansion joints.
 - a. Control joints on ramps shall be aligned and be placed in between with the vertical posts for the handrails. The curbs, if required shall have control joints that align with the handrail posts.
 - b. Expansion joints shall be placed at the upper, intermediate, and bottom landings.

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3.5 FORM COATING

- A. Before placement of reinforcing steel, coat faces of all forms to prevent absorption of moisture from concrete and to facilitate removal of forms. Apply specified material in conformance with manufacturer's written directions.
- B. Before re-using form material, inspect, clean thoroughly and recoat.
- C. Seal all cut edges.

3.6 INSTALLATION

- A. General: Reinforcement shall be accurately placed at locations indicated on the drawings within required tolerances and providing required clearances. Reinforcement shall be secured prior to placement of concrete such that tolerances and clearances are maintained. Coverage shall be in accordance with Section 1907A.7 of the CBC. Keep a person on the job to maintain position of reinforcing as concrete is placed. Reinforcement must be in place before concreting is begun. Install dowels as shown on drawings. Give notice whenever pipes, conduits, sleeves, and other construction interferes with placement; obtain method of procedure to resolve interferences. All expansion and construction joints in concrete shall have dowels of size and spacing as shown, or as approved by Architect.
- B. Placing Tolerances:
 - 1. Per ACI 301 or CRSI/WCRSI Recommended Practice for Placing Reinforcing Bars, unless otherwise shown.
 - 2. Clear distance between parallel bars in a layer shall be no less than 1", the maximum bar diameter not 1 ½ times the maximum size of coarse aggregate.
- C. Splices:
 - 1. General: Unless otherwise shown on drawings, splice top reinforcing at midspan between supports, splice bottom reinforcing at supports and stagger splices at adjacent splices 5 foot minimum. Bar laps shall be wired together. Reinforcing steel laps shall be as follows:
 - a. Lap splices in concrete: Lap splice lengths shall not be less than 62 bar diameter for No. 5 bar, 56" minimum for No. 6 bars. No. 4 bar shall have a minimum of 24" splice. 93 bar diameters for No. 7 bars and larger.
 - b. All splices shall be staggered at 5 feet minimum.

3.7 INSPECTION

- A. Approval of reinforcing steel, after installation, must be received from Inspector. Architect, Structural Engineer and DSA must be notified 48 hrs. in advance of beginning of concrete placement operations.

3.8 PLACING OF CONCRETE

- A. Adjacent finish surfaces shall be protected at all times during the concrete pour and finishing. Verify that all formwork is tight and leak-proof before concrete is poured. Finish work defaced during the concrete pour and finishing shall be replaced at no extra cost to the owner.
- B. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients. Deposit as close as practicable in final position to avoid re-handling or flowing. Partially hardened concrete must not be deposited in work. Concrete shall not be wheeled directly on top of reinforcing steel.
- C. Placing: Once started, continue concrete pour continuously until section is complete between predetermined construction joints. Prevent splashing of concrete onto adjacent forms or reinforcement and remove such accumulation of hardened or partially hardened concrete from forms or reinforcement before work proceeds in that area. Free fall of concrete shall not to exceed 4'-0" in height. If necessary, provide lower openings in forms to inject concrete and to reduce fall height.
- D. Remove form spreaders as placing of concrete progresses.
- E. Place footings as monolithic and in one continuous pour.
- F. Keep excavations free of standing water, but moisture condition sub-grade before concrete placement.
- G. Compacting: All concrete shall be compacted by mechanical vibrators. Concrete shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms. Vibrating shall not be applied to concrete which has already begun to initially set nor shall it be continued so long as to cause segregation of materials.
- H. Concrete Paving:
 - 1. All concrete paving shall be formed and finished to required line and grades. Concrete paving shall be true and flat with a maximum tolerance of 1/8" in 10' for flatness. Concrete paving which is not flat and are outside of the maximum specified tolerances shall be made level by the Contractor at no additional expense to the Owner.
- I. Placing in hot weather: Comply with ACI 305R-91. Concrete shall not exceed 85 degrees F at time of placement. Concrete shall be delivered, placed and finished in a sufficiently short period of time to avoid surface dry checking. Concrete shall be kept wet continuously after tempering until implementation of curing compound procedure in accordance with this specification.
- J. Placing in cold weather: Comply with ACI 306R-02. Protect from frost or freezing. No antifreeze admixtures are permitted. When deposited concrete during freezing or near-freezing weather, mix shall have temperature of at least 50 degrees F but not more than 90 degrees F. Concrete shall be maintained at temperature of at least 50 degrees

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F for not less than 72 hours after placing or until it has thoroughly hardened. Provide necessary thermal coverings for any flat work exposed to freezing temperatures.

- K. Horizontal construction joint: Keep exposed concrete face of construction joints continuously moist from time of initial set until placing of concrete; thoroughly clean contact surface by chipping entire surface not earlier than 5 days after initial pour to expose clean hard aggregate solidly embedded, or by approved method that will assure equal bond, such as green cutting. If contact surface becomes contaminated with soil, sawdust or other foreign matter, clean entire surface and re-chip entire surface to assure proper adhesion.

3.9 CONCRETE FINISHES

- A. Concrete Paving Finishing: Finish surface as required by ACI 302.1R. Use manual screeds, vibrating screeds to place concrete level and smooth. Use "jitterbugs" or other special tools designed for the purpose of forcing the coarse aggregate below the surface leaving a thick layer of mortar 1 inch in thickness. After tamping the concrete, wood float surface to a true and even plane. After floating with a wood bull float, make 2 passes with a steel Fresno trowel to start sealing the concrete surface. While concrete is still wet but sufficiently hardened to bear a persons weight on knee boards, start troweling with a steel hand trowel or a machine trowel in larger areas. Use sufficient pressure to bring moisture to surface. After surface moisture has disappeared, finish concrete utilizing steel, hand or power trowel. Surface shall be free from trowel marks, depressions, ridges or other blemishes. Tolerance for flatness shall be 1/8" in 10'. Provide final finish as follows:
1. Flatwork, medium broom finish: Typical finish to be used at all exterior walks and stairs.
 2. Ramps, heavy broom finish: Concrete surfaces with slope greater than 5% including all ramps. Brooming direction shall run perpendicular to slope to form non-slip surface
 3. Under no circumstances can water be added to the top surface of freshly placed concrete.
- B. Curb Finishing: Steel trowel.
- C. Joints and Edges: Mark-off exposed joints, where indicated, with 1/4" radius x 1" deep jointer or edging tool. Joints to be clean, cut straight, parallel or square with respect to concrete walk edge. Tool all edges of control joints, walk edges, and wherever concrete walk adjoins other material or vertical surfaces. Expansion joints shall be constructed as detailed on plans.
1. The expansion joints shall be full depth as shown in the plan details. Failure to do so will result in non-compliance and shall be immediately machine cut by the contractor at his expense.
- D. Exposed Concrete Surface Finishing (not including top surface of flatwork): Remove fins and rough spots immediately following removal of forms from concrete which is to be left exposed. Damaged and irregular surfaces and holes left by form clamps and

sleeves shall be patched with grout. Tie wires are to be removed to below exposed surface and holes pointed up with neat cement paste similar to procedure noted under "Patching" below. Removal of tie wires shall extend to distance of 2" below established grade lines. Ends of tie wires shall be cut off flush at all other, unexposed locations. Care shall be taken to match adjacent finishes of exposed concrete surface. After patching, all concrete that is to remain exposed, shall be sacked with a grout mixture of 1-part cement, 1 1/2- parts fine sand and sufficient water to produce a consistency of thick paint. After first wetting the concrete surface, apply mixture with a brush and immediately float entire surface vigorously using a wood float. Keep damp during periods of hot weather. When set, excess grout shall be scraped from wall with edge of steel trowel, allowed to set for a time, then wiped or rubbed with dry burlap. Entire finishing operation of any area shall be completed on the same day. This treatment shall be carried to 4" below grade, and all patching and sacking shall be done immediately upon removal of the forms.

3.10 CURING

- A. Cured Concrete in Forms: Keep forms and top on concrete between forms continuously wet until removal of forms, 7 days minimum. Maintain exposed concrete in a continuous wet condition for 14 days following removal of forms.
- B. Concrete paving, Curb, Curb and gutter, Valley Gutter: Cure utilizing Curing Compound. If applicable, the Contractor shall verify that the approved Curing Compound is compatible with the approved colorant system. Upon completion of job, wash clean per manufacturer's recommendations.
 - 1. Curing compound shall be applied in a wet puddling application. Spotty applications shall be reason for rejection and possibly concrete removal and replacement at the contractor's expense with no compensation from the owner.
- C. No Curing Compound shall be applied to areas scheduled to receive resilient track surface including, curbs, ramps, run ways, etc.

3.11 DEFECTIVE CONCRETE

- A. Determination of defective concrete shall be made by the Architect or Engineer. His opinion shall be final in identifying areas to be replaced, repaired or patched.
- B. The Owner reserves the right to survey the flatwork, if it is determined to be outside of the maximum tolerance for flatness. If the flatwork is found to be out of tolerance, then the Contractor will be required to replace concrete. The Contractor will be responsible for reimbursing the Owner for any surveying costs incurred. Determination of flatwork flatness, surveying and any remedial work must be completed far enough in advance so that the project schedule is maintained, delays are avoided and the new flatwork or flatwork repairs are properly cured.
- C. As directed by Architect, cut out and replace defective concrete. All defective concrete shall be removed from the site. No patching is to be done until surfaces have been examined by Architect and permission to begin patching has been provided.

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- D. Permission to patch any area shall not be considered waiver of right, by the Owner, to require removal of defective work, if patching does not, in opinion of Architect, satisfactorily restore quality and appearance of surface.
- E. Defective concrete is:
 - 1. Concrete that does not match the approved mix design for the given installation type.
 - 2. Concrete not meeting specified 28-day strength.
 - 3. Concrete which contains rock pockets, voids, spalls, transverse cracks, exposed reinforcing, or other such defects which adversely affect strength, durability or appearance.
 - 4. Concrete which is incorrectly formed, out of alignment or not plumb or level.
 - 5. Concrete containing embedded wood or debris.
 - 6. Concrete having large or excessive patched voids which were not completed under Architect's direction.
 - 7. Concrete not containing required embedded items.
 - 8. Excessive Shrinkage, Traverse cracking, Crazing, Curling; or Defective Finish. Remove and replace if repair to an acceptable condition is not feasible.
 - 9. Concrete that is unsuitable for placement or has set in truck drum for longer than 90 minutes from the time it was batched.
 - 10. Expansion joint felt that is not isolating the full depth of the concrete section, and recessed as required for backer rod and sealant where required.
 - 11. Concrete that is excessively wet or excessively dry and will not meet the minimum or maximum slump required per mix design.
 - 12. Finished concrete with oil stains from equipment use, and or rust spots that cannot be removed.
 - 13. Control joints (weakened planed joints) that do not meet the required minimum depth shown on the drawings.
- F. Patching: Install specified Patching Mortar per manufacturer's recommendations. REPAIRS TO DEFECTIVE CONCRETE WHICH AFFECT THE STRENGTH OF ANY STRUCTURAL CONCRETE MEMBER OR COMPONENT ARE SUBJECT TO APPROVAL BY THE ARCHITECT AND DSA.

3.12 CONCRETE TESTING

- A. Comply with CBC Section 1903A, 1905A.3, 1916A and as specified in B. below. Costs of tests will be borne by the Owner.
- B. Four identical cylinder samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs or walls. In addition, samples for strength tests for each class of concrete shall be taken for seven-day tests at the beginning of the concrete work or whenever the mix or aggregate is changed.

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- C. Strength tests will be conducted by the Testing Lab on one cylinder at seven (7) days and two cylinders at twenty-eight (28) days. The fourth remaining cylinder will be available for testing at fifty-six (56) days if the 28-day cylinder test results do not meet the required design strength.
- D. On a given project, if the total volume of concrete is such that the frequency of testing required by paragraph B. above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
- E. Cost of retests and coring due to low strength or defective concrete will be paid by Owner and back-charged to the Contractor.
- F. Each truck shall be tested for slump before concrete is placed.

3.13 REMOVAL OF FORMS

- A. Remove without damage to concrete surfaces.
- B. Sequence and timing of form removal shall insure complete safety of concrete structure.
- C. Forms shall remain in place for not less than the following periods of time. These periods represent cumulative number of days during which temperature of air in contact with concrete is 60 degrees F and above.
 - 1. Vertical forms of foundations, walls and all other forms not covered below: 5 days.
 - 2. Concrete paving edge screeds or forms: 7 days.
- D. Concrete shall not be subjected to superimposed loads (structure or construction equipment) until it has attained its full design strength and not for a period of at least 21 days after placing. Concrete systems shall not be subjected to construction loads in excess of design loads.

3.14 SEALANT

- A. Sealant Application: Apply sealant in compliance with manufacturer's application instructions, using hand guns or pressure equipment with proper nozzle size, on clean, dry, properly prepared substrates. Force sealants into joint against sides of joint to make uniform. Avoid pulling of the sealant from the sides. Fill sealant space completely with sealant. Finished joints shall be straight, uniform, smooth, and neatly finished. Remove any excess sealant from adjacent surfaces of joint utilizing the manufacturer's recommended solvent and cleaning processes. Leave the work in a neat, clean condition.

3.15 WATER REPELLENT & ANTI-GRAFFITI COATING

- A. General: Provide at exposed architectural concrete where indicated.
- B. Surface Preparation: Concrete must be clean, dry, and free of efflorescence and dust.

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- C. Application: Apply over concrete as specified in Section 07 1900, Water Repellents & Anti-Graffiti Coatings.
- D. Protect adjacent work from overspray as recommended.

3.16 CLEANING

- A. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.
- B. Clean excess material from surface of all concrete walks and utility structures.
- C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

- END OF SECTION -

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Chain link fences

1.2 RELATED REQUIREMENTS

- A. Section 01 8113, Sustainable Design Requirements, for CAL-Green general requirements and procedures.
- B. Section 32 1600, Site Concrete.

1.3 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- C. Chain Link Fence Manufacturers' Institute (CLFMI):
 - 1. Products Manual.
- D. ASTM International (ASTM):
 - 1. C 33/C 33M: Standard Specification for Concrete Aggregates.
 - 2. C 150/C 150M: Standard Specification for Portland Cement.
 - 3. A 153: Zinc Coating (Hot Dip) on Iron and Steel Products.
 - 4. A 392: Zinc Coated Steel Chain Link Fence Fabric.
 - 5. A780/A 780M: Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - 6. C 94: Ready-mixed Concrete.
 - 7. F 1083: Pipe, Steel, Hot-Dipped Zinc Coated (Galvanized) Welded, for Fence Structures

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures:
 - 1. Action Submittals and Informational Submittals shall be submitted in accordance with Section 01 3300, Submittal Procedures.
 - 2. Sustainable Design Submittals shall comply with the additional requirement of Section 01 8113, Sustainable Design Requirements.

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3. Closeout Submittals shall be submitted in accordance with Section 01 7700, Closeout Procedures.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage and schedule of components.
- B. Products Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.

1.6 CLOSEOUT SUBMITTALS

- A. Warranty: Submit executed warranty.

1.7 QUALITY ASSURANCE

- A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- B. Use materials and products of one manufacturer whenever possible.
- C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Project Inspector. Work not so inspected is subject to uncovering and replacement.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.
- B. Store materials in protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.
- C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

1.9 FIELD CONDITIONS

- A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report discrepancies to Architect before proceeding.

1.10 WARRANTY

- A. Manufacturer: Contractor's Standard Guarantee warranty.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

- A. Industry Standards: Materials and installation shall conform to the requirements of the Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual."
- B. Use new components from defects affecting service and appearance.
- C. Sizes specified or shown are minimum.
- D. Provide ferrous material except as otherwise indicated or specified.

2.2 WORKMANSHIP

- A. Galvanizing: Hot dip galvanize ferrous materials after fabrication. Repair zinc coating damaged in shop or during field erection by re-coating with hot repair compound, Re Galv, Galvalloy, Galveweld-alloy, or equal, applied in accord with manufacturer's recommendations.

2.3 MATERIALS

- A. Galvanized Fabric: Steel wire with no less than 1.20 ounce of zinc coating per square foot (Class 1) of surface area and complying with ASTM A 392.
 - 1. **Typical:**
 - a. **Wire Diameter: 9 gage, coated size.**
 - b. **Mesh Opening: 1-3/4 inches.**
 - 2. Edges: Knuckle fabric at bottom selvage and twist at top selvage.
 - 3. Fabric widths shall be one piece.
- B. Round Steel Pipe Fence Framework:
 - 1. Round steel pipe and rail, Schedule 40 standard weight pipe, in accordance with ASTM F1083, 1.8 oz/sq. ft (550 g/sq. m) hot dip galvanized zinc exterior and 1.8 oz/sq. ft (550 g/sq. m) hot dip galvanized zinc interior coating.
 - a. Regular Grade: Minimum steel yield strength 30,000 psi (205 MPa)
- C. Line Posts:
 - 1. Without Slats or Windscreen: Regular Grade.
 - a. To 8'-0" High Maximum: 2-3/8 inch outside diameter pipe at 3.65 pounds per linear foot.
 - b. 8'-1" to 10'-0" High Maximum: 2-7/8 inch outside diameter pipe at 5.79 pounds per linear foot.
 - c. 10'-1" to 12'-0" High Maximum: 4-1/2 inch outside diameter pipe at 10.79 pounds per linear foot.

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- D. End, Corner and Pull Posts: End, corner and pull posts shall also comply with gate post requirements, where occurs.
 - 1. Without Slats or Windscreen: Regular Strength.
 - a. To 8'-0" High Maximum: 2-7/8 inch outside diameter pipe at 5.79 pounds per linear foot.
 - b. 8'-1" to 10'-0" High Maximum: 4 inch outside diameter pipe at 9.11 pounds per linear foot.
 - c. 10'-1" to 12'-0" High Maximum: 5-9/16 inch outside diameter pipe at 14.62 pounds per linear foot.
- E. Post caps: Cast or malleable iron ball or acorn shape; with opening for top rail.
- F. Top Rail, **Bottom Rails**, and Braces: 1-5/8" outside diameter pipe at 2.27 pounds per linear foot., or 1-5/8 inch x 1-1/4 inch roll formed section, 14 gauge.
 - 1. Brace Assembly:
 - a. Equally spaced between top rail and bottom fabric selvage and run from end, gate, or corner post to first line posts with suitable malleable iron fittings.
 - b. Truss from line post to end, gate, or corner post with 3/8 inch round rod.
- G. Wire Ties: Specified spacing is minimum. Manufacturer's standard procedure may require more ties.
 - 1. Tying Fabric to Posts: 9 gauge steel wire spaced 12 inches on center.
 - 2. Tying Fabric to Rails and Braces: 9 gauge steel wire spaced 24 inches on center.
- H. Bands: 14 gauge x 1 inch wide steel spaced 15 inches on center. for securing stretcher bars to end and gate posts.
 - 1. Bands may be used in conjunction with special fitting for securing rails to end and gate posts.
 - 2. Chamfer to ease projecting edges of bands.

2.4 ADDITIONAL MATERIALS AND COMPONENTS

- A. Galvanizing Repair: Zinc coating damaged in shop or during field erection shall be by re-coated using a hot repair compound; "Regalv" repair stick by Rotometals, San Leandro, CA, or equal, applied in accordance with manufacturer's recommendations.
- B. Concrete:
 - 1. Materials:
 - a. Portland cement, ASTM C 150.
 - b. Aggregate: ASTM C33.
 - c. Water: Potable and free from substances harmful to concrete.
 - 2. Mix materials to obtain low slump concrete with 28 day compressive strength of 2,500 psi.

- a. Maximum Size Aggregate: 1-1/2 inch.
- b. Re-tempering not permitted.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

- 1. Execute work in accord with best trade practice for industrial fence installations.
- 2. Make welds neat and secure, grind off excess exposed metal.
- 3. Securely set posts plumb in alignment at proper depth and height, and rigid bracing where needed; install fabric under tension and securely tie to posts, rails and braces.

B. Setting Posts:

- 1. General: Space posts as indicated but not more than 10 feet on center.
- 2. Pour and tamp concrete leaving no voids.
 - a. Check posts for vertical and top alignment and hold in position.
 - b. Dome top of concrete and trowel smooth to shed water away from post.
 - c. Align posts in footings as follows:
- 3. Without Slats or Windscreen: Footings for End, corner and pull posts shall also comply with gate post requirements, where occurs.
 - a. Line Posts to 8'-0" High Maximum: 1'-0" diameter, 3'-3" minimum embedment.
 - b. End, Corner and Pull Posts to 8'-0" High Maximum: 1'-0" diameter, 4'-3" minimum embedment.
 - c. Line Posts 8'-1" to 10'-0" High Maximum: 1'-0" diameter, 3'-9" minimum embedment.
 - d. End, Corner and Pull Posts 8'-1" to 10'-0" High Maximum: 1'-6" diameter, 5'-3" minimum embed.
 - e. Line Posts 10'-1" to 12'-0" High Maximum: 1'-6" diameter, 5'-0" minimum embedment.
 - f. End, Corner and Pull Posts 10'-1" to 12'-0" High Maximum: 1'-6" diameter, 6'-0" minimum embed.
 - g. End, Corner and Pull Posts to 8'-0" High Maximum: 1'-6" diameter, 5'-6" minimum embedment.
 - h. Line Posts 8'-1" to 10'-0" High Maximum: 1'-6" diameter, 6'-0" minimum embedment.
 - i. End, Corner and Pull Posts 8'-1" to 10'-0" High Maximum: 1'-6" diameter, 6'-0" minimum embed.
 - j. Line Posts 10'-1" to 12'-0" High Maximum: 1'-6" diameter, 6'-9" minimum embedment.

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- k. End, Corner and Pull Posts 10'-1" to 12'-0" High Maximum: 2'-0" diameter, 7'-0" minimum embed.
- C. Where posts occur adjacent to structures or other work where concrete foundations may conflict with post footing, block out to allow post installation or use off-set post. Hold post 4 inches clear from face of structure.
- D. Fabric: Leave about 1-1/2 inches between ground and bottom barbs.
 - 1. Pull fabric taut and tie to posts, rails.
 - 2. Install fabric on security side of fence.
 - 3. Fabric shall remain under tension after pulling force is released.
- E. Tie Wires:
 - 1. Install with one tight turn to hold fabric firmly to frame.
 - 2. Bend ends of wire inward to prevent hazard to persons or apparel.
- F. Fasteners:
 - 1. Install nuts for tension band and hardware bolts on side of fence opposite fabric side.
 - 2. Spoil ends of bolts to prevent removal of nuts.

3.2 ADJUSTING

- A. Repair exposed zinc coatings damaged in shop or during field erection using specified repair system and in compliance with ASTM A 780,

END OF SECTION

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PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. All-welded decorative metal fences and gates.

1.2 RELATED REQUIREMENTS

- A. Section 01-6116, Volatile Organic Compound (VOC) Content Restrictions; for VOC limits pertaining to adhesives, sealants, fillers, primers, and coatings.
- B. Section 01-8113, Sustainable Design Requirements, for CAL-Green general requirements and procedures.
- C. Section 32-1600, Site Concrete.

1.3 REFERENCES AND STANDARDS

- A. California Building Code (CBC), edition as note on the Drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the Drawings, as adopted by the California Division of the State Architect (DSA).
- C. ASTM International (ASTM):
 1. A 500/A 500M: Standard Specification for Cold-Formed Welded Carbon and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 2. A 513/A 513M: Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
 3. A 123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 4. A 153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 5. A 384: Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
 6. D 6386: Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel product and Hardware Surfaces for Painting.
 7. D 7396: Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures:

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1. Action Submittals shall be submitted in accordance with Section 01 3300, Submittal Procedures.
 2. Sustainable Design Submittals shall comply with the additional requirement of Section 01 8113, Sustainable Design Requirements.
 3. Closeout Submittals shall be submitted in accordance with Section 01 7700, Closeout Procedures.
- B. Coordinate installation of anchorages. Furnish setting drawings, diagrams, templates, and directions for installing anchorages, including sleeves, inserts, anchor bolts, and items with integral anchors, to be embedded in concrete.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: Submit showing all parts, connections and anchorages, adjacent materials, fully dimensioned and noted.
1. Indicate plan layout, spacing of components, locations and sizes of support structures, post foundation dimensions, hardware anchorage and schedule of components.
 2. Provide evidence that mounting plates, lock boxes, and similar items have been sized, located and coordinated properly with the finish hardware supplier and installer where applicable.
- B. Product Data: Submit list and complete descriptive data of all products and finishes proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.
- C. Samples: Typical frame member, 12 inches long, finished as specified.
- D. CAL-GREEN Submittals:
1. Product Data – VOC Limits: For adhesives, sealants, fillers and primers, documentation including printed statement of VOC contents to verify compliance with limits specified in Section 01 6116.

1.6 CLOSEOUT SUBMITTALS

- A. Submit executed guarantee and warranty as specified.

1.7 QUALITY ASSURANCE

- A. Use only new materials and products.
- B. Use materials and products of one manufacturer whenever possible.
- C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Project Inspector. Work not so inspected is subject to uncovering and replacement.

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1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver undamaged products to job in manufacturer's sealed containers and/or original bundles with tags and labels intact.
- B. Store materials in weather protected, dry conditions off of ground and in areas so as to not interfere with the progress of the work.
- C. Transport, store and handle in strict accord with the manufacturer's written recommendations.

1.9 FIELD CONDITIONS

- A. Make and be responsible for all field dimensions necessary for proper fitting and completion of work. Report any discrepancies to Architect before proceeding.

1.10 GUARANTEE AND WARRANTY

- A. Contractor: Furnish Owner with a fully executed extended guarantee for five years covering all materials and workmanship.
- B. Manufacturer:
 - 1. In addition to the Contractor's Guarantee, furnish Owner with a 10 year commercial material warranty covering specified coating materials.
 - 2. Contractor shall be responsible to assure manufacturer's requirements for access and inspection of the work, surface preparation, and coating application are performed to meet coating manufacturer's requirements for providing specified warranty.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

- A. General:
 - 1. Use new components free from defects affecting service and appearance.
 - 2. Sizes specified or shown shall be considered minimum size.
 - 3. If modifications to designs indicated are proposed in order to meet code requirements, indicate them as such on shop drawing submittals. Work with Architect to arrive at an acceptable design that is sufficiently similar to the design indicated.
- B. Structural Performance of Railing Assemblies and Guardrails:
 - 1. Top Rails of Guards:
 - a. Uniform load of 50 pounds/foot applied in any direction.
 - b. Concentrated load of 200 pounds applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.

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- 2. Infill of Guards:
 - a. Concentrated load of 50 pounds applied horizontally on an area of 1 square foot.
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Industry Standards:
 - 1. Comply with "Metal Rail Manual" of National Ornamental and Miscellaneous Metals Association (NOMMA).
- D. Sustainable Design:
 - 1. VOC Limits for field-applied adhesives, sealants, fillers, coatings and primers shall comply with limits specified in Section 01 6116.

2.2 DECORATIVE METAL FENCING

- A. General:
 - 1. Assembly: Fence shall be all-welded construction. No mechanical fasteners or connectors are permitted.
 - 2. Tubing for Fence Pickets, Rails and Posts: ASTM A 500 or ASTM A 513, hot-rolled or cold-rolled steel tubing depending on size.
 - a. Steel tubing for fence pickets shall have a minimum yield strength of 33 ksi. All other tubing to be 50 ksi.
 - b. Steel shall not be pre-galvanized or pre-coated prior to the hot-dip preparation and coating process.
 - c. Steel shall be hot dipped galvanized before fabrication as specified.
- B. Fence Components: Deliver to the project site prefabricated.
 - 1. Fence panels and gate assemblies shall be shop welded and delivered to the project site prefabricated. Shop coat weld joints, scratches and other areas where hot-dip galvanized coating was removed or damaged with specified galvanized metal repair primer.
 - 2. Pickets: 3/4-inch square, 16-gauge tubular steel, spaced as indicated on the drawings.
 - 3. Rails: 1-1/2-inch square, 14-gauge tubular steel, spaced as indicated on the drawings.
 - 4. Intermediate Rail: 1-1/2-inch x 3/4 inch, 14-gauge tubular steel, spaced as indicated on the drawings.
 - 5. Line Posts: 3-inch square, 11-gauge tubular steel.
 - 6. Corner and End Posts: 4-inch square, 11-gauge tubular steel.
- C. Fittings and Accessories:
 - 1. General: Provide all necessary fittings and accessories as required for a complete fence system.

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2. Post Caps: Pressed steel, pyramid style as supplied by King Architectural Metals or approved equal. Weld all around to top of post and hot-dip as one assembly.

2.3 GALVANIZING

- A. Hot-dip galvanize interior and exterior surfaces of all steel fence components.
 1. Fence components shall include pickets, horizontal rails, posts, post caps, fittings, plates and other components as shown in assembly.
- B. Surface Preparation Prior to Galvanizing: In accordance with SSPC Specification SP-10, "Near White Blast Cleaning."
- C. Comply with ASTM A153 for galvanizing of iron and steel hardware.
- D. Comply with ASTM A123 for galvanizing of assembled steel products and rolled, pressed, and forged-steel shapes, plates, bars, and strips 1/8 inch thick and heavier.
- E. Newly galvanized items shall not be water quenched or chromate quenched after galvanizing if they are scheduled to receive a paint coating.

2.4 PROTECTIVE PAINT COATINGS

- A. General:
 1. Comply with manufacturer's preparation and application instructions for each coating and NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Manufacturer's instructions shall govern in event of conflict.
 2. Coatings shall be shop-applied to the greatest extent possible, including galvanized items, except surfaces and edges to be field welded.
 3. Corrosion Control: Prevent galvanic action and other forms of corrosion by insulating metals from direct contact with incompatible materials.
 4. Steel members shall be protected and be free of corrosion when ready to receive field-applied finish coatings. Apply coatings before rusting occurs.
 5. Metal shall be degreased.
 6. Finish exposed fasteners to match adjacent metal.
- B. Products:
 1. Galvanized Metal Repair Compound: "ZRC Galvalite", single component, high zinc dust content (zinc rich) repair compound for iron, steel and galvanized metal by ZRC Worldwide, or equal.
 2. Finish Paints:
 - a. General:
 - 1) Materials specified are from PPG Industries, Inc. and are intended to establish standard of quality for the specified coating system. Coatings of equal quality, appearance, and performance and offering

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the same or better warranty as specified will be considered by the Architect.

- 2) Coating Color: Each coat shall be applied in a different color or shade from the preceding coat to aid in determining the uniformity, mil thickness and coverage of the coating.
- b. First Coat: "Pitt-Guard Rapid Coat" Direct-to-Rust Epoxy Mastic, 5.0 to 7.0 mils DFT.
- c. Second and Third Coats: "Pitthane Ultra" Acrylic Aliphatic Urethane, 2.5 mils DFT per coat.
 - 1) Color: Match existing.
- d. Do not exceed manufacturer's recommended total system thickness.
- e. Paint additives are prohibited unless specified and approved by the Architect or the coating manufacturer.

C. Surface Preparation – Galvanized Surfaces:

1. General: Surfaces shall be cleaned and profiled prior to receiving applied coatings in accordance with ASTM D 6386 or ASTM D 7396 for sheet products.
 - a. Methods shall be selected based on age of galvanized coating, condition of surface and specified paint coating.
 - b. High spots and rough edges shall be smoothed out.
 - c. Care shall be taken not to damage the zinc coating.
2. Cleaning: Surface shall be prepared in accordance with SSPC SP-1 followed by application of pre-paint conditioner.
3. Comply with the additional requirements of the following:
 - a. Recommendations included in the AGA document "Duplex Systems: Painting Over Hot Dip Galvanized Steel."
 - b. Procedures required by the coating manufacturer.
4. Repair hot-dipped galvanized coating damaged in shop or during field erection/welding by coating with specified galvanized metal repair primer applied in accordance with manufacturer's recommendations.

D. Priming:

1. Surface Preparation: As specified.
2. Apply air-dried primer after cleaning and pretreatment, to provide a minimum dry film thickness.
3. Apply primer within 8 hours of preparation of surface or sooner if necessary to prevent rusting.

E. Preparation:

1. Before a surface is coated, it shall be cleaned carefully of all dust, dirt, mud, grease, oil, loose rust and other contaminants.
2. Galvanized surfaces shall be prepared and repaired as specified.

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3. Immediately prior to painting, the prepared surface shall be inspected for compliance with the manufacturer's specified degree of surface preparation and requirements for warranty including subsequent inspection between coats.
 4. Prepared, galvanized steel shall be coated within 8 hours of proper and accepted preparation.
- F. Field Application of Coatings:
1. Materials shall be delivered to the job site in the original and unopened containers, plainly marked with the proper designation of the product, as well as the name of the manufacturer.
 - a. Coating materials at the job site shall be subject to inspection.
 - b. Materials shall be stored in a clean, dry, well ventilated place, protected from sparks, flame, direct rays of the sun, and excessive heat or cold.
 - c. The Contractor shall be solely responsible for the protection and safety of the materials stored at the job site.
 2. Application Conditions:
 - a. Exterior painting shall only take place when good weather conditions prevail.
 - b. Painting shall not be undertaken during foggy or misty conditions or when precipitation is imminent.
 - c. The temperature of the surface to be painted shall be at least 5-degrees F above the dew point. When substrate temperatures are high, care shall be taken during paint application to prevent formation of voids, pin holes, and bubbles due to the rapid evaporation of solvent. These requirements also apply during the curing stage of the coatings.
 3. Protection of Surrounding Area:
 - a. Surrounding area and surfaces not to be painted shall be protected during cleaning, preparation and painting operations.
 - b. Drifting of overspray shall be controlled and contained during painting operations so that finish is contained to the work only.
 4. Comply with the additional requirements specified in Section 09 9100, Painting.
- G. Curing Time: The manufacturer's required minimum or maximum curing time between coats shall be strictly adhered to. Applicator shall verify curing times with manufacturer.
- H. Application and Repair: The application shall leave no sags, runs or holidays. Damage, imperfections or holes in any coat shall be cleaned and repaired to conform to manufacturer's requirements in order to maintain the warranty prior to final inspection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the conditions under which the fencing is to be installed and advise the General Contractor of any conditions detrimental to the proper and timely completion of the work.

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Work shall not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

- B. The Contractor shall take field measurements for this work and notify the Architect of any discrepancies between plan and field dimensions.

3.2 INSTALLATION

- A. Install all-welded metal fencing system as indicated on the Drawings, reviewed submittals, and in accordance with industry standard and best practices.
- B. Upon receipt at job site, materials shall be checked to ensure that no damage occurred during handling or shipping. Contractor shall repair or replace material at no additional cost to the Owner.
- C. Fence Posts:
 - 1. Dig post holes in firm, undisturbed compacted soil.
 - 2. For fence posts footing shall be no less than 12-inches in diameter and 3'-6" deep with posts set 6-inches above bottom of excavation.
 - 3. Set fence posts a maximum of 8'-0" on center. Dimensions vary when going up or down grades.
- D. Install all posts and panel sections plumb and level in accordance to plans in a workmanlike manner.
- E. At slopes, step panel sections to accommodate grade changes. Do not slope panel sections.
- F. Field Welding:
 - 1. Comply with applicable AWS specification for procedures of manual shielded metal arc welding, for appearance and quality of welds and for methods used in correcting welding work.
 - 2. Weld connections shall be limited to locations where fabrication cannot be shop welded because of shipping size limitations or conditions of installation.
 - 3. Grind exposed welded joints smooth and restore finish to match finish of adjacent surfaces.
- G. Field Finishing: Provide painted finish utilizing preparation, coatings, and application process specified in Part 2.

END OF SECTION

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

The General Conditions, Supplementary Conditions and Division 01 are fully applicable to this Section, as if repeated herein.

1.2 DESCRIPTION

- A. Scope of Work: Furnish all labor, materials, tools, equipment, and transportation required to perform and complete the installation of an automatic sprinkler irrigation system, including all piping, sprinkler heads, controls, connections, testing, etc. as shown on the Drawings and as specified herein. The water source for this project is potable water.
- B. Utilize and accept as standards manufacturer's recommendations and/or installation details for any information not specifically detailed on the Drawings.

1.3 RELATED SECTIONS

- A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 01 3300, Submittal Procedures.
- C. Section 01 7700, Closeout Procedures.
- D. Section 01 8113, Sustainable Design Requirements.
- E. Section 31 0000, Earthwork.
- F. Section 32 9000, Landscaping.

1.4 GUARANTEE

- A. Refer to General Conditions and Section 01 3300.
- B. Guarantee all workmanship and materials hereunder against defective workmanship and materials, including damage by leaks and settlement of irrigation trenches, for the duration specified in Division 01 of these Specifications. (The Contractor is not responsible for vandalism or theft after date of final acceptance.)

1.5 QUALITY CONTROL

- A. Qualifications of Contractor: Work must be completed by a licensed Landscape Contractor. Provide proof of five years of continuous experience in landscaping and irrigation of projects of similar size (+/- 20% of the construction cost) and scope for education campuses. Contractor to have a minimum of two projects either completed or in construction in the last five years.

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- B. Work Force: Ensure that an experienced foreman is present at all times during installation. Keep the same foreman and workers on the job from commencement to completion.
- C. Reviews: Specifically request reviews of all items listed below in "Inspection Requirements" prior to progressing to the next level of work.
- D. Certification: Ensure that the contractor installing the Central Control System is trained and certified in the installation of the Central Control System. The training and certification must have been completed within two years prior to the installation date.
- E. Standards:
 - 1. Provide work and material in full accordance with the rules and regulations of the National Electric Code; the Uniform Plumbing Code; and other applicable state or local laws or regulations.
 - 2. Furnish, without extra charge, additional material and labor required to comply with these rules and regulations, though the work may not be specifically indicated in the Specifications or Drawings.
 - 3. Where the Specification requirements exceed those of the above-mentioned codes and regulations, comply with the requirements in the Specifications.
- F. Delivery, Storage, and Handling:
 - 1. Use all means necessary to protect irrigation system materials before, during, and after installation and to protect related work and material.
 - 2. Handle plastic pipe carefully, especially protecting it from prolonged exposure to sunlight. Store pipe on beds that are the full length of the pipe, and keep pipe flat and off the ground with blocks.
- G. Comply with the requirements of Section 01⁴ 7700, Closeout Procedures.

1.6 INSPECTION REQUIREMENTS

- A. Request and hold a pre-construction meeting prior to beginning the work of this Section. Parties required to be in attendance are the Landscape Contractor, Project Inspector, Owner's Representative, and the Landscape Architect.
- B. Prior to commencement of the work of this Section, obtain written verification from the project Civil Engineer that the rough grade in landscape areas is in conformance with Section 31 0000 - Earthwork.
- C. Obtain verification from Project Inspector for the following at the appropriate times during construction and prior to further progression of work in this Section:
 - 1. Pressure testing of all mainlines and lateral lines (See "Hydrostatic Tests – Open Trench" in Article 3.12 of this Section),
 - 2. Trench depth,
 - 3. Sleeves under pavement,
 - 4. Flushing of all mainlines and lateral lines,

5. Backfill and pipe bedding,
 6. Layout of heads,
 7. Operation of system and coverage adjustments (with Landscape Architect) after system is fully automated and operational, backfill of trenching is completed, and surface has been restored to original grades.
- D. In case of failure to obtain any verification by the Project Inspector as required above, remove and replace work as necessary to obtain the verification at no additional cost to the Owner.

1.7 SUBMITTALS AND SUBSTITUTIONS

- A. Comply with requirements of Section 01 3300 – Submittal Procedures.
- B. Product names are used as standards; provide proof as to equality of any proposed material and do not use other materials or methods unless approved in writing by the Owner's Representative. Submit no more than one request for substitution for each item. The decision of the Owner's Representative is final.
- C. Use equipment capacities specified herein as the minimum acceptable standards.
- D. List materials in the order in which they appear in Specifications; include substitutions. Submit the list for approval by the Owner's Representative.
- E. Make any mechanical, electrical, or other changes required for installation of any approved, substituted equipment to satisfaction of Owner's Representative and without additional cost to Owner. Approval by Owner's Representative of substituted equipment and/or dimensional drawing does not waive these requirements.
- F. Do not construe approval of material as authorization for any deviations from Specifications unless attention of Owner's Representative has been directed to specified deviations.
- G. CAL-GREEN Submittals:
 1. Product Data – VOC Limits: For adhesives and primers, documentation including printed statements of VOC contents, comply with limits specified in Section 01 6116.

1.8 REFERENCE AND STANDARDS

- A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).

1.9 PROJECT CONDITIONS, AND PROTECTION

- A. Information on Drawings relative to existing conditions is approximate. During progress of construction, make deviations necessary to conform to actual conditions, as

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approved by Owner's Representative, without additional cost to Owner. Accept responsibility for any damage caused to existing services. Promptly notify Owner's Representative if services are found which are not shown on Drawings.

- B. Protect existing trees-to-remain as specified in "Existing Tree Protection" in Article 3.02 of this Section.
- C. Protect existing utilities within construction area. Repair damages to utility lines that occur as a result of operations of this work.
- D. Verify dimensions at building site and check existing conditions before beginning work. Make changes necessary to install work in harmony with other crafts after receiving approval by Owner's Representative.

1.10 MAINTENANCE AND OPERATING INSTRUCTIONS

- A. Furnish three complete sets of operating maintenance instructions bound in a hardback binder and indexed. Start compiling data upon approval of list of materials. Do not request final inspection until booklets are approved by Owner's Representative.
- B. Incorporate the following information in these sets:
 - 1. Complete operating instructions for each item of irrigation equipment.
 - 2. Typewritten maintenance instructions for each item of irrigation equipment.
 - 3. Manufacturer's bulletins which explain installation, service, replacement parts, and maintenance.
 - 4. Service telephone numbers and/or addresses posted in an appropriate place as designated by Owner's Representative.

1.11 RECORD DRAWINGS

Upon completion of work, and as a precedent to final payment, deliver to Owner's Representative one complete set of reproducible originals of Drawings showing work exactly as installed. (See "Record Drawings" in Article 3.15 of this Section)

PART 2 - PRODUCTS

2.1 GENERAL

Use materials as specified; any deviation from the Specifications must first be approved by the Owner's Representative in writing. All material containers or certificates shall be clearly marked by manufacturer as to contents for inspection.

2.2 PERFORMANCE REQUIREMENTS

- A. VOC Limits for adhesives and primers. Comply with limits specified in related Section.

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- B. Provide products conforming to local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product exceeds current requirements, provide conforming product at no additional cost. Provide written confirmation to Architect describing reason for revision and demonstrate compliance of replacement product with specified requirements.

2.3 MATERIALS

- A. Automatic Control Valves: As indicated on Drawings.
- B. Gate Valve: As indicated on Drawings.
- C. Pipe and Fittings:
 - 1. PVC pipe: As indicated on Drawings.
 - 2. PVC fittings for all lateral lines: High impact, standard weight, Schedule 40, molded PVC as manufactured by George Fischer, Lasco, Spears, or approved equal.
 - 3. PVC fittings: High impact, standard weight, Schedule 40, molded PVC as manufactured by George Fischer, Lasco, Spears, or approved equal.
 - 4. All plastic pipe and fittings: Continuously and permanently marked with manufacturer's name, type of material, IPS size, schedule, NSF approval, and code number.
 - 5. Threaded PVC pipe and nipples: IPS Schedule 80 when necessary to use threaded connections to gauges, valves, or control valves. Threaded adapters may be used in place of nipples when making pipe to valve connections.
 - 6. Use 45-degree fittings for changes in depth of pipe, and at transition from main line to automatic control valves.
 - 7. Piping above ground: Schedule 40 galvanized steel with cast-iron fittings.
- D. PVC Primer: Weld-On P-70 Purple Primer or approved equal.
- E. PVC Glue: Weld-On 711 Gray heavy bodied PVC Cement or approved equal.
- F. Sprinkler Heads: As indicated on Drawings.
- G. Quick Coupler Valves: As indicated on Drawings.
- H. Sleeves: As indicated on Drawings.
- I. All Valve Boxes and Covers: Manufactured, green with "Irrigation – Non-Potable" permanently embossed on cover. Carson, Rainbird or approved equal.

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J. Automatic Sprinkler Control Wire:

1. Connections between remote control valves and controller: UF-14 direct burial plastic coated two-wire cable. Common wire to be white, and lead wire to be colored. If multiple controllers are used, a different color is to be used for each controller's lead wire. (Use red for the first controller). Spare wires are to be yellow.
2. UL Listed waterproof sealing pack for wire connections: 3M DBR/Y-6, or approved equal.
3. Provide adequate working space around electrical equipment in compliance with local codes and ordinances.
4. Electrical, other than low voltage, such as power wiring, conduit, fuses, thermal overloads and disconnect switches, is included under Division 26 of these Specifications.

K. Unions And Flanges:

1. Steel unions and flanges two inches (2") and smaller: 150 lb. screwed black (brass to iron seat) or galvanized malleable iron (ground joint).
2. Steel unions and flanges two and one-half inches (2 ½") and larger: 150 lb. black flange union, flat-faced, full gasket.
3. Gaskets: One-sixteenth inch (1/16") thick rubber Garlock No. 122, Johns-Manville or approved equal.
4. Flange Bolts: Open-hearth bolt steel, square heads with cold pressed hexagonal nuts, cadmium plated in ground. Provide copper-plated steel bolts and nuts or brass bolts and nuts for brass flanges.

L. Sand for Trench Backfill: Natural sand, free of roots, bark, sticks, rags, or other extraneous material.

PART 3 - EXECUTION

3.1 SITE CONDITIONS

Locations of existing utilities and other improvements shown on the Drawings are approximate. Verify existing conditions and, should any utilities be encountered that are not indicated on the plans, notify the Owner's Representative immediately. Accept responsibility for any damages caused to existing services.

3.2 PREPARATION

- A. Scheduling: Notify the Project Inspector prior to commencing and/or continuing the work of this Section. Remove and replace, at no cost to Owner, any work required as a result of failure to give the appropriate notification.
- B. Examination: Examine conditions of work in place before beginning work; report defects.

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- C. Measurements: Take field measurements; report variance between plan and field dimensions.
- D. Protection: Maintain warning signs, shoring and barricades as required. Prevent injury to, or defacement of, existing improvements. At no additional cost to Owner, repair or replace items damaged by installation operations.
- E. Existing Tree Protection:
 - 1. Avoid unnecessary root disturbance, compaction of soils within drip line, or limb breakage.
 - 2. Do not store material or dispose of any material other than clean water within the drip line.
 - 3. Provide adequate irrigation during construction.
 - 4. Replace any tree damaged during construction with a tree of equal size and value at no additional cost to Owner.
 - 5. Adjust trench locations in field to minimize damage to existing elements and plant roots of trees-to-remain at no additional cost to Owner.
- F. Surface Preparation: Prior to beginning sprinkler irrigation work, complete placement of topsoil as specified in Section 31 0000 – Earthwork. Notify Project Inspector of irregularities if any.

3.3 GRADING

Install all irrigation features to their finished grade and at depths indicated. Complete and /or accommodate all rough grading and/or finish grading before commencing with trenching.

3.4 LAYOUT

- A. Lay out work as accurately as possible to Drawings. Drawings are generally diagrammatic to extent that swing joint offsets and fittings are not shown. Record all changes on the Record Drawings.
- B. Do not willfully install the irrigation system as shown on Drawings when it is obvious, in the field, that obstructions or other discrepancies exist which may not have been considered in the design. Notify Owner's Representative of discrepancies before proceeding.

3.5 EXCAVATING AND TRENCHING

- A. General: Perform excavations as required for installation of work included under this Section, including shoring of earth banks to prevent cave-ins. Restore surfaces, existing underground installations, etc., damaged or cut as result of this work to their original condition and in a manner approved by the Landscape Architect.

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B. Width:

1. Make trenches wide enough to allow a minimum of six inches (6") between parallel pipelines and three inches (3") between side of pipe and side of trench. Do not allow stacking of pipe within trench.
2. Allow a minimum clearance of twelve inches (12") in any direction from parallel pipes of other trades.

C. Preparation of Excavations: Remove rubbish and rocks from trenches. Bed pipe on a minimum of three inches (3") of clean, rock-free soil to provide a firm, uniform bearing for entire length of pipeline. Cover pipe with a minimum of three inches (3") of clean, rock-free soil. If clean, rock-free soil is not available, use sand for pipe bedding and three inches (3") of backfill above the pipe. The remainder of the trench backfill material can be native soil. Do not allow wedging or blocking of pipe.

D. Minimum depth of cover: Unless shown otherwise, provide the following minimums:

1. Mainline: twenty-four inches (24") cover.
2. Lateral line: twelve inches (12") cover.

E. Conflicts with other trades:

1. Hand-excavate trenches where potential conflict with other underground utilities exist.
2. Where other utilities interfere with irrigation trenching and piping work, adjust the trench depth as instructed by Owner's Representative.

3.6 BACKFILL AND COMPACTING

A. General: Do not begin until hydrostatic tests are completed. When system is operating and after required tests and inspections have been made, backfill trenches under paving areas to the compaction rate specified in Section 31 0000 – Earthwork.

B. Place backfill in six-inch (6") layers and compact with an acceptable mechanical compactor.

1. Compact backfill material in landscape areas to eighty-five percent (85%) maximum dry density of the soil.
2. If settlement occurs along trenches, make adjustments in pipes, valves, and sprinkler heads, soil, sod or paving as necessary to bring the system, soil, sod or paving to the proper level or the permanent grade, without additional cost to the Owner.

C. Excess Soil: Remove all rocks, debris, and excess soil that results from sprinkler irrigation trenching operations, landscape planting, and soil preparation operations off site at no additional cost to the Owner. If soil meets topsoil requirements in Section 31 0000 – Earthwork, it may be used for finish grading.

D. Finishing: Dress-off areas to eliminate construction scars.

3.7 DECODER CABLE

- A. General: Install control wires beneath sprinkler main line whenever possible.
- B. Slack Cable: Provide eighteen inches (18") of slack cable at each automatic control valve. Slack cable shall be coiled and left in the valve box.
- C. Expansion and Contraction: Snake cable in trench to allow for contraction of cable.
- D. Cable Passing Under Existing or Future Paving or Construction: Encase in PVC Schedule 40 or galvanized steel conduit extending at least twelve inches (12") beyond edges of paving or construction.
- E. Connections: Install cable connections in a waterproof sealing pack.
- F. Splicing: Permit splicing only on runs exceeding 500 feet. Locate all splices within valve boxes.
- G. Cable Termination: Install cable in a valve box with eighteen inches (18") of slack cable coiled and individually capped with approved waterproof sealing pack. Ground cable at all cable terminations.

3.8 FLUSHING LINES

Thoroughly flush lines prior to installing valves, performing hydrostatic testing, or installing sprinklers. Divert water to prevent washouts.

3.9 AUTOMATIC CONTROL AND QUICK COUPLER VALVES

- A. Install where shown and where practical; place no closer than twelve inches (12") to walk edges, building walls, or fences. Refer to detail for example.
- B. Thoroughly flush mainline before installing valve.
- C. Install valves in ground cover areas where possible.

3.10 PIPING

- A. General: Install in conformance with reference standards, manufacturer's written directions, as shown on Drawings and as herein specified.
- B. Workmanship:
 - 1. General: Install sprinkler irrigation equipment in planted areas throughout the site.
 - 2. Coordination: Organize location of sleeves with other trades as required.
- C. Pipe Line Assembly:
 - 1. General:
 - a. Cutting: Cut pipe square; remove rough edges or burrs.

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- b. Solvent-welded Connections: Use materials and methods recommended by the pipe manufacturer.
 - c. Brushes: Use non-synthetic brushes to apply solvents and primer.
 - d. Cleaning: Clean pipe and fittings of dirt, moisture, and debris prior to applying solvent or primer.
 - e. Assembly: Allow pipe to be assembled and welded on the surface or in the trench.
 - f. Expansion and Contraction: Snake pipe from side to side of trench to allow for expansion and contraction.
 - g. Location: Locate pipes as shown on Drawings except where existing supply valves, utilities or obstructions prohibit or where slight changes are approved to better suit field conditions.
- 2. Connections:
 - a. Threaded Plastic Pipe Connection:
 - 1.) Use Teflon tape or pipe joint compound.
 - 2.) When assembling to threaded pipe, take up joint no more than one full turn beyond hand-tight.
 - b. Metal Valves and Plastic Pipe: Use threaded plastic male adapters.
 - c. Metal to Metal Connections:
 - 1.) Use specific joint compound or gasket material for type of joint made. Where pipe of dissimilar metals are connected, use dielectric fittings.
 - 2.) Where assembling, do not allow more than three full threads to show when joint is made up.
 - d. Where assembling soft metal (brass or copper) or plastic pipe, use strap-type friction wrench only; do not use a metal-jawed wrench.
 - e. Threading:
 - 1.) Do not permit the use of field-threading of plastic pipe or fittings. Use only factory-formed threads.
 - 2.) Use factory-made nipples wherever possible. Permit the use of field-cut threads in metallic pipe only where absolutely necessary. When field-threading, cut threads accurately on axis with sharp dies.
 - 3.) Use pipe joint compound for all threaded joints. Apply compound to male thread only.
- 3. Sleeves and conduits:
 - a. Use sleeves of adequate size to accommodate retrieval for repair of wiring or piping and extend a minimum of twelve inches (12") beyond edges of walls or paving.
 - b. Provide removable, non-decaying plug at end of sleeve to prevent entrance of soil.
- 4. Unions: Locate unions for easy removal of equipment or valve.
- 5. Capping: Plug or seal opening as lines are installed to prevent entrance materials that would obstruct pipe. Leave in place until removal is necessary for completion of installation.

- D. Drip Irrigation Tubing: Install as per Drawings.

3.11 SPRINKLER HEADS

- A. Sprinkler heads: Locate as shown on the Drawings except where existing conditions prohibit, or slight changes are approved to achieve as good or better coverage under the same conditions. Do not allow sprinkler head spacing to exceed the maximum shown on the Drawings. Plumb heads.
- B. Handling, Assembly of Pipe, Fittings, and Accessories: Allow only skilled tradesmen to handle and assemble pipe, fittings and equipment. Keep interior of pipes, fittings and accessories clean at all times. Close ends of pipe immediately after installation; leave closure in place until removal is necessary for completion of installation. Do not permit bending of pipe.
- C. Flushing: Remove end heads and operate system at full pressure until all rust, scale, and sand is removed. Divert water to prevent ponding or damage to finished work.
- D. Coverage: Accept responsibility for full and complete coverage of irrigated areas to satisfaction of Landscape Architect and make necessary adjustments to better suit field conditions at no additional costs to Owner.

3.12 FIELD QUALITY CONTROL

- A. Visual Inspection: Verify that all pipe is homogenous throughout and free from visual cracks, holes, or foreign materials. Inspect each length of pipe. All materials are subject to impact test at the discretion of the Landscape Architect.
- B. Hydrostatic Tests – Open Trench:
 - 1. Center-load piping with a small amount of backfill to prevent arching or slipping under pressure.
 - 2. Request the presence of the Project Inspector in writing at least forty-eight hours in advance of testing.
 - 3. At no additional cost to Owner, test in the presence of the Project Inspector.
 - 4. Apply continuous static water pressure of 100 psi when welded plastic joints have cured at least twenty-four hours, and with the risers capped, as follows: test main lines and submains for four hours; test lateral lines for two hours.
 - 5. Repair leaks resulting from tests; and repeat tests.
 - 6. Test to determine that all sprinkler heads function according to manufacturer's data and give full coverage according to intent of Drawings. Replace any sprinklers not functioning as specified with ones that do, or otherwise correct system to provide satisfactory performance.
- C. Continuity Testing: Test locating device and control wires for continuity prior to and after back-filling operations.

3.13 CLEAN-UP

Remove debris resulting from work of this Section.

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3.14 ADJUSTMENTS AND MAINTENANCE

- A. Adjusting System: Prior to acceptance, satisfactorily adjust and regulate entire system. Set watering schedule on controller appropriate to types of plants and season of year. Adjust remote control valves to operate sprinkler heads at optimum performance based on pressure and simultaneous demands through supply lines.
- B. System Layout: Provide reduced prints of Record Document irrigation plans, laminated in four (4) mil. plastic, of size to fit controller door. Enlarge remote-control valve designations as necessary for legibility. Color-code areas covered by each station. Affix plans to inside of controller door.
- C. Instructions: Upon completion of work, instruct maintenance personnel on operation and maintenance procedures for entire system.
- D. Flow Charts: Record and prepare an accurate flow-rate chart for each automatic control valve.

3.15 RECORD DRAWINGS

- A. Regularly update plans of the system and any changes made to the system throughout the project. Record all changes on this plan before trenches are back-filled.
- B. Record the as-built information on reproducible plans provided by the Architect. Complete and submit the Record Drawings to the Architect before applying for payment for work installed.
- C. As-built drawings are to be completed electronically with a pdf editing software or computer aided drafting software. As-built drawing done by hand will not be accepted for final submittal.
- D. Show the following on the Record Drawings accurately to scale and dimensioned from two permanent points of reference:
 - 1. Distance of mainline from nearby hardscape.
 - 2. Location of automatic control valves, quick couplers, and gate valves.
 - 3. Location and size of all sleeves.
 - 4. Location of automatic control wires and spares.

3.16 OPERATION MANUALS

Deliver two complete sets of manufacturer's warranties, Contractor guarantees, instruction sheets, parts list and operation manuals to the Architect before requesting final acceptance of the project. Do not request final inspection until the sets are approved.

END OF SECTION

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 DESCRIPTION

- A. Scope of Work: Furnish all labor, materials, tools, equipment, and transportation required to perform and complete the following work as specified herein:
 - 1. Soil Preparation and Fertilization
 - 2. Planting
 - 3. Weed Control
 - 4. Mulch
 - 5. Clean-up
 - 6. Landscape Maintenance Period
 - 7. Guarantee
- B. Work not included in this Section: Landscape elements such as concrete walks, fencing, outdoor lighting, rough grading, and clearing are not a part of this Section unless shown on the landscape Drawings.

1.3 RELATED SECTIONS

- A. Section 01 3300, Submittal Procedures.
- B. Section 01 7700, Closeout Procedures.
- C. Section 01 8113, Sustainable Design Requirements.
- D. Section 31 0000, Earthwork.
- E. Section 32 8000, Irrigation

1.4 GUARANTEE

- A. The guarantee period for lawn and plant material shall be the duration of the landscape maintenance period, from commencement until final acceptance of the work of this Section. See Division 01 for other applicable guarantee requirements.
- B. During the guarantee period, repair and/or replace plants and lawn not in satisfactory growing condition, as determined by Owner's Representative, without additional cost to Owner. Plants are to be replaced as per "Landscape Maintenance" in Article 3.9 of this Section, using plants of the same kind and size specified in plant list.

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1.5 QUALITY CONTROL

- A. Qualifications: Work must be completed by a licensed Landscape Contractor. Provide proof of five years of continuous experience in landscaping and irrigation of projects of similar size (+/- 20% of the construction cost) and scope for education campuses. Contractor to have a minimum of two projects either completed or in construction in the last five years.
- B. Work Force: Ensure that an experienced foreman is present at all times during installation. Keep the same foreman and workers on the job from commencement to completion.
- C. Reviews: Specifically request reviews of all items listed below in "Inspection Requirements" prior to progressing to the next level of work. The Owner's Representative reserves the right to inspect and reject material, both at place of growth and at site, before and/or after planting, for compliance with requirements for name, variety, size and quality.
- D. Reference Standards: Meet or exceed Federal, State and County laws requiring inspection of all plants and planting materials for plant disease and insect control.
- E. Delivery, Storage, and Handling:
 - 1. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
 - 2. Bulk Materials:
 - a. Do not dump or store bulk materials near structures, utilities, walkways or pavements, or on existing turf areas or plants.
 - b. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - c. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
- F. Plant Material:
 - 1. Conform to the current edition of Horticultural Standards for quality of Number 1 grade nursery stock as adopted by the American Association of Nurserymen. Conform to sizes specified on plant legend. Select plants which have a natural shape and appearance.
 - 2. Select only plants that are true to name, and tag one of each bundle or lot with the name of the plant in accordance with the standards of practice of the American Association of Nurserymen. In all cases, botanical names shall take precedence over common names.
 - 3. Tag each plant of a patented variety with the variety and identification number, where applicable, as it is delivered to the job site.

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4. Select only plants which have been nursery-grown in accordance with good horticultural practices and which have been grown under climatic conditions similar to those in the locality of the project for at least one year.
5. Select only plants which are typical of their species or variety; have normal habits of growth; are sound, healthy, vigorous, well-branched and densely-foliated when in leaf; are free of disease, insect pests, eggs or larvae; and have a healthy and well-developed root system.
6. Select only container stock that has been grown in the containers in which delivered for at least six (6) months, but not over two (2) years. Provide samples to show that there are no root-bound conditions.
7. Do not use plants that are severely pruned or headed-back to meet size requirements.
8. Do not plant container-grown plants that have cracked or broken balls of earth when taken from the container. Remove canned stock carefully from cans after containers have been cut on two sides with tin snips or other approved cutter.
9. Coordinate a time for the Landscape Architect to inspect the plants upon their delivery to the project site.
10. At any time prior to final acceptance, be prepared to replace any plants that are rejected by the Owner's Representative because of physical damage to the plant.
11. Do not remove container-grown stock from containers before time of planting.
12. Be prepared to replace plants which are rejected by the Owner's Representative for the following reasons:
 - a. Trunk bark damage caused by sunburn,
 - b. Trunk bark wounds caused by rubbing stakes or ties,
 - c. Trunk bark damage caused by ties that have girdled the tree,
 - d. Tree head development that is lopsided and not symmetrical in form,
 - e. Tree branches that cross or touch,
 - f. Tree branches with double leaders (unless multi-trunk trees are specified).
13. Stake shrubs with one-inch by one-inch by eighteen-inch (1"x1"x18") stakes in such manner that the stakes are not visible, and tie to upright position if they lean and/or are not growing in a vertical position.
14. Furnish quantities necessary to complete the work as shown on the Drawings and, if necessary, make up for any discrepancies in the quantities given in the Plant List at no additional cost to Owner.

- G. Comply with the requirements of Section 01 7700 – Closeout Procedures.

1.6 REFERENCE AND STANDARDS

- A. California Building Code (CBC), edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- B. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- C. EPA - Federal Insecticide, Fungicide and Rodenticide Act.

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1.7 INSPECTION REQUIREMENTS

- A. Landscape Architect reserves the right to examine and reject plant material both at place of growth and at site, before and after planting, for compliance with requirements of name, variety, size, and quality.
- B. Request and hold a pre-construction meeting prior to beginning the work of this Section. Parties required to be in attendance are the Landscape Contractor, Project Inspector, Owner's Representative, and Landscape Architect.
- C. Obtain verification from Project Inspector for the following at the appropriate times during construction and prior to further progression of work in this Section:
 - 1. Rough grading is to tolerances specified in Section 31 0000 – Earthwork.
 - 2. The placement of landscape backfill material is as specified in this Section.
 - 3. Prior to the commencement of the work specified in this Section, the coverage and operation of the sprinkler irrigation system are as specified in Section 32 8000 - IRRIGATION.
 - 4. The soil amendment does not include any metal fragments. (Obtain a letter from the manufacturer stating that the material submitted for use on this project has no metal or foreign objects. Submit this letter as part of the Data Sheet submittal package [see "Submittals and Substitutions" in this Section])
 - 5. Required Test: For each load of soil amendment delivered to the site, spread at least two cubic yards (2 cy) of material onto a paved surface approximately two inches (2") deep. Pass a magnetic rake over the material in two directions. If any metal is found, test the entire load in the same manner. Perform all testing in the presence of the Project Inspector.
 - 6. Soil amendments, fertilizer, bark mulch and materials used for hydroseeding have been delivered to the site by the supplier, the invoices from the supplier indicate the project name and quantities delivered, and the Project Inspector has received copies of all such documents.
 - 7. Prior to planting, amendments and conditioners have been incorporated as per pre-planting recommendations, and planting areas have been made ready to receive planting.
- D. In case of failure to obtain any verification by the Project Inspector as required above, remove and replace work as necessary to obtain the verification at no additional cost to the Owner.
- E. Beginning of Maintenance Period: Verify all work is complete, then request and hold a meeting to include the Landscape Architect, Project Inspector, Architect and Owner's Representative for authorization to begin the landscape maintenance period.
- F. End of Maintenance: Verify that all work is complete and acceptable, and that the maintenance has been completed per specifications; and continue to provide landscape maintenance until the Owner's Representative has accepted the work.

1.8 SUBMITTALS AND SUBSTITUTIONS

- A. See Section 01 3300 – Submittal Procedures for additional requirements.
- B. Plant Material: Within fifteen (15) days after award of contract, locate plant materials required for construction. Ensure that trees and shrubs are contract- grown from a certified nursery. Notify Owner's Representative of plant material "tied off" for review at selected nursery. If specified material is not obtainable, submit the following to Owner's Representative: proof of non-availability, proposal for use of equivalent material, photographs of alternative choices of plant material. Include clear, written description of type, size, condition, and general character of plant material.
- C. Data Sheets: Provide product data for each type of landscape material indicated in the Drawings and Specifications.
- D. Samples: Submit samples of the following materials to Landscape Architect for approval:
 - 1. Soil amendment: (3) one-quart zip-locked plastic bags.
 - 2. Bark Mulch: (3) one-quart zip-locked plastic bags.
 - 3. Imported Topsoil: (3) one-quart zip-locked plastic bags. (if needed)
- E. Provide soils analysis reports prepared by a qualified soils laboratory in compliance with the Soil Testing Requirements under "Soil Testing" in Article 3.2 of this Section.
- F. Prior to planting, submit copies of all trucking or packaging tags for all soil amendment, fertilizer and other additives to Landscape Architect so the quantities can be verified.

1.9 PROTECTION AND CLEAN-UP

- A. Provide protection for persons and property throughout progress of work. Use temporary barricades as required. Proceed with work in such manner as to minimize spread of dust and flying particles and to provide safe working conditions for personnel. Store materials and equipment where directed.
- B. Existing Construction: Execute work in an orderly and careful manner to protect paving, work of other trades, and other improvements.
- C. Existing Utilities: Provide protection for existing utilities within construction area. At no additional cost to Owner, repair any damages to utility lines that occur as a result of this work.
- D. Landscaping: Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods.
- E. Paving: Maintain cleanliness of paving areas and other public areas used by equipment, and immediately remove spillage; remove rubbish, debris, and other material resulting from landscaping work, leaving site in a safe and clean condition.

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1.10 PLANTING SCHEDULE / ENVIRONMENTAL REQUIREMENTS

- A. Install, establish, and maintain all lawn areas for a minimum of ninety (90) days prior to date of substantial completion. Coordinate schedule with other work and overall project schedule. Failure to install lawn areas by this date shall result in assessment of liquidated damages.
- B. Proceed with work in an orderly and timely manner to complete installation of landscaping within contract limits.
- C. Planting Season Limits: Do not plant when grounds are wet or temperature is below 25° F. Do not proceed with any soil preparation and fertilization if all planting cannot be completed within Planting Season Limit.

1.11 LANDSCAPE MAINTENANCE PERIOD REQUIREMENTS

- A. Beginning of Landscape Maintenance Period:
 - 1. General: Landscape Maintenance Period does not begin until all work is as determined by Landscape Architect, in writing.
 - 2. On-site Inspection: When all work is complete, request and hold a meeting to include the Landscape Architect, Project Inspector, Architect and Owner's Representative who must together authorize and determine the start date for the landscape maintenance period. Coordinate and give notice of the date and time of the on-site meeting to all parties at least forty-eight (48) hours in advance.
 - 3. Acceptability: In cases where the lawn has reached adequate fullness and germination in some areas but not all, and authorization has not been given to begin the maintenance period, proceed with mowing, trimming, spraying, etc., as necessary prior to the beginning of the maintenance period.

- B. Duration of Landscape Maintenance Period:

The Landscape Maintenance Period shall continue for a minimum of ninety (90) calendar days. During this time, continuously maintain all areas involved until final acceptance of the work by the Owner's Representative. See Landscape Maintenance Period procedure in Article 3.12 of this Section.

- C. Final Acceptance of the Landscape Maintenance Period:

Request the final inspection forty-eight (48) hours in advance. If items require attention, hold on-site meetings until Landscape Architect can certify, in writing, and in concurrence with the Owner's Representative, the successful completion of the Landscape Maintenance Period.

1.12 RECORD DRAWINGS

Upon completion of work, and as a precedent to final payment, deliver to Owner's Representative one complete set of reproducible originals of Drawings showing work exactly as installed.

PART 2 - PRODUCTS

2.1 GENERAL

Use material in new and perfect condition as specified. Any deviations or substitutions from the Specification and Drawings must first be approved by Owner's Representative in writing prior to use.

2.2 SOIL PREPARATION MATERIALS

- A. Topsoil: Fertile; friable; natural loam surface soil; reasonably free of subsoil, clay lumps, brush, weeds and other litter; and free of roots, stumps, stones/rocks, and other extraneous or toxic matter harmful to plant growth.
- B. Soil Amendment: One-percent nitrogen-impregnated bark product with a ninety-percent (90%) bark base and zero to one-quarter inch (0-1/4") particle size, or approved equivalent. **Do not spread until testing requirements have been satisfied.**
- C. Fertilizer/Soil Conditioner: Gro-Power Plus or approved equal.
- D. Fertilizer for Trees and Shrubs: Seven-gram Gro-Power Planting Tablets (12-8-8 NPK) or approved equal.
- E. Vitamin B-1: "Superthrive", "Liquinox Start", "Cal-Liquid", or approved equal.

2.3 MISCELLANEOUS LANDSCAPE MATERIALS

- A. Bark Mulch: Untreated, shredded cedar.
- B. Tree-staking System: As indicated on Drawings.
- C. Pre-Emergent Weed Control: Oxadiazon, "Treeflan", "Ronstar 2G", "Surflan" (Elano Products Company), or approved equal.
- D. Root Barrier: As indicated on Drawings.

2.4 PLANT MATERIAL:

- A. Nursery Plant Stock:
 - 1. As indicated on Drawings. Do not remove container-grown stock from containers until planting time. Plants shall be true to name.
 - 2. Healthy, shapely, well-rooted, not pot-bound, free from insect pests or plant diseases and properly "hardened off" before planting. Replace plants that are not alive or are not in satisfactory growing condition, as determined by the Landscape Architect, without additional cost to Owner. The Landscape Architect may reject plants before and/or after planting.
 - 3. Labeled. Label at least one tree and one shrub of each species with a securely-attached, waterproof tag bearing legible designation of botanical and common name.

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PART 3 EXECUTION

3.1 SITE CONDITIONS

- A. Examine the site, verify grade elevations, and observe conditions under which work is to be performed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Owner's Representative.
- B. Proceed with complete landscape work as rapidly as portions of the site become available, working within seasonal limitations for each kind of landscape work required.
- C. Determine location of underground utilities and perform work in a manner which will avoid possible damage. 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 parties concerned.
- D. When conditions detrimental to sod or plant growth are encountered, such as rubble fill, adverse drainage condition, or other obstructions, notify the Owner's Representative before planting.

3.2 SOIL TESTING

- A. Coordinate soil testing in an expeditious and timely manner as required for on-site topsoil materials. Contract with a soil laboratory and include cost of sampling and testing in contract price. Take one (1) sample for every 5,000 square feet of landscape area up to a maximum of six (6) samples under the direction of and in the presence of the Owner's Representative.
- B. Submit each sample, according to the quantity of soil required by testing laboratory, to a competent laboratory approved by the Owner's Representative.
- C. Provide analysis of soil samples for pH, salinity, ammonia, phosphate, potassium, calcium, magnesium, boron, and sodium levels. Provide appraisal of chemical properties, including particle size determination, and recommendations for types and quantities of amendments and fertilizers.

3.3 PREPARATION

- A. Clearing of Vegetation:
 - 1. If live perennial weeds exist on site at the beginning of work, spray with a non-selective systemic contact herbicide as recommended and applied by an approved licensed landscape pest control advisor and applicator. Leave sprayed plants intact for at least 15 days.
 - 2. Clear and remove existing weeds by mowing or grubbing off all plant parts at least one-quarter inch (¼") inch below surface of soil over entire areas to be planted.

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B. Soil preparation:

1. Loosen soil in all planting areas, and on slopes flatter than 3:1 gradient, to a depth of six to eight inches (6" - 8") below finish grade. All debris, foreign matter, and stones shall be removed prior to the placing of any fertilizers or conditioners. Soil preparation is for all shrub planting beds, lawn hydroseeded areas and sodded lawn areas.
2. Conduct the required soil tests and instruct the lab to include a minimum of the following soil improvements in the recommendation on the soils report.
 - a. Soil Amendment: Two cubic yards (2 cy) per 1,000 square feet.
 - b. Gro-Power Plus: One hundred fifty pounds (150 lbs) per 1,000 square feet.
 - c. If the lab recommends less than six cubic yards (6 cy) of soil amendment, the excess bid amount shall be applied to the cost of any additional recommended soil improvements, or returned to the Owner as a credit
3. Apply amendments as follows, using rates recommended by the soils testing laboratory (the rates of amendments shown below are for bidding purposes only):
 - a. Fertilizer/Soil Conditioner: Broadcast 150 pounds of Gro Power Plus per 1,000 square feet in all planting areas and rototill to a depth of six to eight inches (6" - 8"). Remove from the site any rock and debris brought to the surface by cultivations.
 - b. Apply soil amendment to all planting areas at the rate of six cubic yards (6 cy) per 1,000 sf and rototill into the top six to eight inches (6" - 8").
4. Upon completion of finish grading, request a review and obtain approval of Landscape Architect prior to commencement of planting or hydroseeding.

C. Finish Grading for all Planting areas

1. Refer to Earthwork Specification Section for Rough Grading.
2. Grade to elevations and contours shown on Drawings. Fill low spots with landscape backfill material and grade to surface drain in manner indicated on Drawings.
3. Finish-grade so that the entire area within the contract lines has a natural and pleasing appearance as specified and as directed by Landscape Architect.
4. Adjust sprinkler heads flush to finish grade in preparation to receive hydroseeding or one-half inch above finish grade in preparation to receive sod. Reset sprinkler heads flush to grade after turf has germinated.
5. Flag the sprinkler heads and valve markers.

D. Planting Pits for Trees:

1. Excavate pits with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage.
2. Set container-grown stock in center of pit on earth pedestal. Separate roots and/or prune roots as directed by Landscape Architect. In hot weather, pre-wet pit. Loosen outside roots from sides and bottom of root ball. When set, place additional backfill around base and sides of root ball. Work each layer to settle

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backfill and eliminate voids and air pockets. Water after placing final layer of backfill.

3. Loosen hard subsoil in bottom of excavation. Extend excavation as required to insure proper drainage from plant pits.
4. Fill excavated planting pits with water to half the depth of pit. Pits should drain within four hours (4 hrs). If planting pits do not drain, notify Project Inspector immediately. Do not proceed with planting until Landscape Architect has resolved a method to provide drainage.

E. Planting Pits for Shrubs/Groundcover:

1. Excavate pits and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage.
2. Loosen hard subsoil in bottom of excavation. Extend excavation as required to insure proper drainage from plant pits.
3. Fill excavated planting pits with water to half the depth of pit. Pits should drain within four hours (4 hrs). If planting pits do not drain, notify Project Inspector immediately. Do not proceed with planting until Landscape Architect has resolved a method to provide drainage.

3.4 ROOT BARRIER INSTALLATION

- A. Root barriers location are specifically shown on the plan. If a tree is moved during construction to a location where root barrier is not shown on the plan, the following minimum requirements are to be met:
 1. Install root barrier where trees are planted within sixty inches (60") of paving or other hardscape elements, such as walls, curbs, and walkways.
 2. Install root barrier continuously for a distance of five feet (5') in each direction from the tree trunk, for a total distance of ten feet (10') per tree. If trees are spaced closer, use a single continuous piece of root barrier.
- B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.
- C. Position top of root barrier just below the top of adjacent hardscape element but above finish grade of the soil so that is visible.
- D. If there are concrete spoils or overpour that is impeding the root barrier from being installed directly adjacent to the hardscape element, the contractor is to remove the extra concrete in a manner that does not damage the integrity of the hardscape element.
- E. Do not distort or bend root barrier during construction activities.
- F. Do not install root barrier surrounding the root ball of tree.

3.5 PLANTING

A. Trees, Shrubs, and Groundcover:

1. Lay out individual tree and shrub locations and areas for multiple plantings. Stake the locations, outline the areas, and secure the Owner's Representative's acceptance before beginning the planting work. Make minor adjustments as requested.
2. Scarify root ball prior to planting. Plant in holes twice the diameter of the root ball and to a depth equal to the container's height. Place the shrub and/or groundcover so the top of the root ball is one inch (1") higher than the surrounding grade; place the tree so that the crown of the trunk is two inches (2") higher than the surrounding grade. Set container-grown stock in center of pit. In hot weather, pre-wet the pit. When set, place additional backfill around base and sides of root ball. Work each layer to settle backfill and eliminate voids and air pockets. Thoroughly compact lower half of backfill in plant pit. See staking or guying detail. Water after planting. Provide a berm or watering basin for each tree. Add Vitamin B-1, in the proper solution as recommended by the manufacturer, to the second watering of the basin.
3. Place fertilizer planting tablets in root zone and alongside each plant. Follow manufacturer's instructions for number of tablets to use for each container size.
4. See Drawings for additional information.
5. Grooming and Staking of Trees:
 - a. Prune, thin-out and shape trees in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by Landscape Architect, do not cut tree leaders, and remove only injured or dead branches from flowering trees.
 - b. Paint cuts over one-half inch (½") in size with standard tree paint or compound, covering exposed, living tissue. Use paint that is waterproof, antiseptic, adhesive, elastic and free of kerosene, coal tar, creosote, and other substances harmful to plants. Do not use shellac.
 - c. Stake or guy trees immediately after planting, as indicated on Drawings.
 - d. Remove nursery stakes on all trees unless directed by the Landscape Architect once trees are properly staked.
6. Grooming of Shrubs:
 - a. Prune, thin-out and shape shrubs in accordance with standard horticultural practice. Prune shrubs to retain natural character and to accomplish their use in landscape design. The required plant size is its size after pruning.
 - b. Remove and replace excessively pruned or malformed new plants resulting from improper pruning.

- B.** Request review by the Landscape Architect after locating, but prior to planting all trees. Under the direction of the Landscape Architect, make slight adjustments to plant material location as necessary to reflect original intention of Drawings.

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3.6 WEED CONTROL

Apply pre-emergent weed control to all planting areas (except lawn) after completion of all planting and one complete watering. Follow manufacturer's directions. To prevent washing away of weed control, do not over-water after its application. Do not allow any weed control into lawn areas. Treat any existing noxious weeds, such as Johnson grass, with Roundup in successive treatments until all roots are destroyed, then remove all grass and roots. Notify Owner's Representative of time of installation for verification of application.

3.7 BARK MULCH

Apply mulch at the rate of three inches (3") deep to all planting areas, exclusive of lawn, after the planting and weed control are completed. Twelve inches (12") from planter edges, taper full depth of mulch to meet adjacent grades. Do not place mulch within three inches (3") of trunk or stems.

3.8 CLEAN-UP

- A. During construction, keep the site free of rubbish and debris, and clean up the site promptly when notified to do so. Take care to prevent spillage on streets from hauling and immediately clean up any such spillage and/or debris deposited on streets due to the work of this Section.
- B. During all phases of the construction work, take all precautions to abate dust nuisance by clean-up, sweeping, sprinkling with water, or other means as necessary.

3.9 LANDSCAPE MAINTENANCE

- A. The Landscape Maintenance Period will begin when all the Landscape Maintenance Period Requirements have been met (See Part 1 of these Specifications).
- B. Cleaning: Maintain cleanliness on paving areas and other public areas used by equipment and immediately remove all spillage. Remove from project site all rubbish and debris found thereon and all material and debris resulting from landscaping work, leaving the site in a safe and clean condition.
- C. Maintenance:
 - 1. Sprinkler Irrigation System:
 - a. Check system weekly for proper operation. Flush lateral lines out after removing last sprinkler head or two at each end of lateral. Adjust all heads as necessary for unimpeded coverage.
 - b. Set and program automatic controllers for seasonal water requirements. Provide the Owner's Representative with keys to the controllers and instructions on how to turn off system in case of emergency.
 - c. Repair all damages to sprinkler irrigation system as part of the contract work. Make repairs within one watering period or one week, whichever is the least amount of time.

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2. Trees and Shrubs:
 - a. Water enough that moisture penetrates throughout root zone and only as frequently as necessary to maintain healthy growth.
 - b. Construct and/or remove water basins around each plant, depending on the time of the year and as directed.
 - c. Do not prune unless directed by the Landscape Architect.
 - d. Re-stake and re-tie trees as needed and as directed by the Landscape Architect. Do not allow tops of tree stakes to protrude into head of tree.
 - e. Replace any dead, dying or vandalized plant material on a weekly basis throughout the Landscape Maintenance Period.
3. Insecticide and Herbicide Application:
 - a. If needed, control weeds with selective herbicides and sprays. In areas where crabgrass has infested the lawn, apply pre-emergent herbicides such as Dacthal by Amvac, Balan, or Betasan by Gowan for control prior to crabgrass germination. Control insect pests if necessary.
 - b. Use only a licensed Pest Control Operator to apply herbicides and sprays and to maintain a log for applications indicating material, timing, and rate.
4. Pre-scheduled On-site Meetings: Hold regularly-scheduled (monthly or bimonthly as determined by the Landscape Architect) on-site meetings with the Landscape Architect, Project Inspector and Owner's Representative. Dates and times will be jointly agreed upon.
5. Request, forty-eight hours (48 hrs.) in advance, on-site visits by the Landscape Architect to determine the end of the Landscape Maintenance Period.

END OF SECTION

PART 1 - GENERAL

1.1 INCLUSION OF OTHER CONTRACT DOCUMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01.5000, Construction Facilities and Controls.
- B. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- C. Section 01.8113, Sustainable Design Requirements.
- D. Section 31.2333, Trenching and Backfilling.
- E. Section 32 1200, Asphalt Concrete Paving.
- F. Section 32,1600, Site Concrete

1.3 QUALITY ASSURANCE

- A. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- C. The representatives of the Owner's testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner's testing lab representatives nor the testing by the Owner's testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.
- D. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction are the responsibility of the contractor.

1.4 SUBMITTALS

- A. Refer to Section 01 3300.
- B. Manufacturer's Data: Submit list and complete descriptive data of all products proposed for use. Include manufacturer's specifications, published warranty or guarantee, installation instructions, and maintenance instructions.
- C. CAL-GREEN Submittals:

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1. Product Data – VOC Limits: For adhesives, sealants, fillers and primers, documentation including printed statement of VOC contents, comply with limits specified in Section 01 6116.

1.5 GUARANTEE

- A. Refer to General Conditions and Section 01 3300.

1.6 REFERENCES AND STANDARDS

- A. California Green Building Standards Code, edition as noted on the drawings, as adopted by the California Division of the State Architect (DSA).
- B. ANSI/ASTM D698-00 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- B. ANSI/ASTM D1556-00 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- C. ANSI/ASTM D1557-02 - 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.
- D. ANSI/ASTM D 3017-05 Test Methods for Moisture Content of Soils and Soil-Aggregate Mixture by Nuclear Methods (Shallow Depth).
- E. ANSI/ASTM D 422-63 Test Method for Particle Size Analysis of Soil.
- F. ANSI/ASTM D 4318-05 Test Method for Liquid Limit, Plastic Limit, and Plasticity Limit.
- G. CALTRANS Standard Specifications.
- H. CAL-OSHA, Title 8, Section 1590 (e).
- I. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.
- J. California Plumbing Code current edition.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Transport, store and handle in strict accord with the local jurisdiction.
- B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

1.8 PROJECT CONDITIONS

- A. Existing civil, mechanical and electrical improvements are shown on respective site plans to the extent known. Should the Contractor encounter any deviation between actual

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conditions and those shown, he is to immediately notify the Architect before continuing work.

1.9 EXISTING SITE CONDITIONS

- A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

1.10 PROTECTION

- A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.
- B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.
- C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.
- D. Provide shoring, sheeting, sheet piles and/or bracing to prevent caving, erosion or gullyng of sides of excavation.
- E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to provide pumps and all equipment necessary to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.
- F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.
- G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.
- H. Trees: Carefully protect existing trees that are to remain.

1.11 SEASONAL LIMITS

- A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.

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1.12 TESTING

- A. General: Refer to Section 01 4523 – TESTING AND INSPECTION SERVICES AND STRUCTURAL TESTS AND INSPECTIONS LIST, DSA-103.
- B. Geotechnical Engineer: Owner is retaining a Geotechnical Engineer to determine compliance of fill with Specifications, and to direct adjustments in fill operations. Costs of Geotechnical Engineer will be borne by Owner; except those costs incurred for re-tests or re-inspection will be paid by Owner and backcharged to Contractor.

1.13 RECORD DRAWINGS

- A. Keep a daily record of all pipe placed in ground, verified by Project Inspector.
- B. Upon completion of this Contract, furnish one tracing showing all outside utility lines, piping, etc., installed under this Contract. Locate and dimension all work with reference to permanent landmarks.
- C. All symbols and designations used in preparing "RECORD" drawings shall match those used in Contract drawings.
- D. Properly identify all stubs for future connections, as to location and use, by setting of concrete marker at finished grade in the manner suitable to Architect.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC Limits for adhesives, sealants, fillers, coatings and primers. Comply with limits specified in related Section.
- B. Provide products conforming to local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product exceeds current requirement, provide conforming product at no additional cost. Provide written confirmation to Architect describing reason for revision and demonstrate compliance of replacement product with specified requirements.

2.2 MATERIALS

- A. Pipe: Use one of the following, unless noted on the Drawings otherwise.
 - 1. Polyvinyl Chloride Pipe (PVC): SDR35 conforming to ASTM D3034 with elastomeric joints conforming to ASTM D3212 for pipe to 12". Sun damaged pipe will be rejected.
 - 2. High density polyethylene pipe (HDPE): The pipe shall be corrugated exterior/smooth interior pipe. 12" to 60" maximum diameter shall conform to AASHTO M294, water tight per ASTM D3212 with water tight gasket fittings.
- B. Perforated Pipe (for subdrains): Shall be ADS N12 pipe, 3 hole, ASTM F 405, AASHTO M 252; PCV ASTM D3034 SDR-35 storm drain pipe

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- C. Manhole: Shall be as shown on the drawing details.
- D. Drop Inlet: Shall be as shown on the drawing details.
- E. Curb Inlet: Shall be as shown on the drawing details.
- F. Mortar: For pipe connections to concrete drainage structures, conform to ASTM C270 type N mortar. Place within one half hour after adding water.
- G. Crushed Rock: Imported washed crushed rock. Minimum 100% passing 3/4 inch sieve.
- H. Trench drain: Polycast, Polydrain or equal and as shown on drawings.
- I. Area Drains: Shall be as shown on the drawing details.
- J. Floor Drains: Shall be as shown on the drawing details.
- K. Clean-outs: Shall be as shown on the drawing details.
- L. Planter drains: Shall be as detailed on the drawing details.
- M. Filter Fabric: Mirafi 140N.

PART 3 - EXECUTION

3.1 INSPECTION LAYOUT AND PREPARATION

- A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point where this installation may properly commence
- B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. Layout and staking shall be done by a licensed Land Surveyor or Professional Civil Engineer.
- C. Verify that specified items may be installed in accordance with the approved design.
- D. In event of discrepancy, immediately notify Owner and the Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.2 INSTALLATION

- A. General: Installation shall be in strict conformance with referenced standards, the manufacturer's written directions, as shown on the drawings and as herein specified.
- B. Verify invert elevations at points of connection to existing systems prior to any excavation. If invert elevations differ from that shown on drawings, notify Architect immediately.

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C. Excavation and Bedding:

1. General: Trench straight and true to line and grade with bottom smooth and free of irregularities or rock points. Trench width in accordance with pipe manufacturer's recommendations and as per the drawings. Follow manufacturer's recommendations for use of each kind and type of pipe.
2. Bedding: Provide bedding as detailed on plans for the full length of the pipe. Bedding shall have a minimum thickness beneath the pipe of 4" or 1/8 the outside diameter of the pipe, which ever is greater. Provide bell holes and depressions for pipe joints only of size required to properly make joint.
3. If the trenches for the site drainage fall within areas to be lime treated, the piping shall be installed prior to any lime treatment operations.
 - a. If additional piping is added to previously lime treated areas, the contractor shall backfill the trench with class 2 aggregate base and compact to 95%.

D. Laying of Pipe:

1. General: Inspect pipe prior to placing. Set aside any defective or damaged material. Do not place pipe in water nor place pipe when trenches or weather are unsuitable. Lay pipe upgrade, true to line and grade.
2. Bell and Spigot Joints: Lubricate inside of bells and outside of spigots with soap solution or as recommended by manufacture. Wedge joints tight. Bell of bell and spigot pipe to be pointed upgrade.
3. Pipe shall be bedded uniformly throughout its length.
4. Pipe elevation shall be within 0.02 feet of design elevation as shown on plans.
5. Off Site Work: All work beyond the property lines shall be done in strict conformance with the requirements of the governing agency.

E. Backfilling:

1. General: Do not start backfill operations until required testing has been accomplished.
2. Trenches and Excavations: Backfill with material as detailed on plans, filling both sides of the pipe at the same time, carefully tamping to hold pipe in place without movement. Refer to Section 31 2333 – TRENCHING AND BACKFILLING for fill above this layer.

F. Grouting of Pipes: Grout pipes smooth and water tight at drop inlet, manholes, and curb inlets. Grout back side of hood at curb inlets all grouting shall be smooth and consistent.

G. Off Site Work: All work beyond the property lines shall be done in strict conformance with the requirements of the local agency.

H. Cutting and Patching: Remove and replace existing surface features per applicable specification section (i.e. asphaltic concrete or concrete paving) where pipe is installed in areas of existing improvements.

3.3 TOLERANCES

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A. Storm Drain structure grates

1. In landscape and lawn areas $\pm 0.05'$.
2. In sidewalk and asphalt pavement $\pm 0.025'$.
3. In curb and gutter application $\pm 0.0125'$.

B. Cleanout Boxes and Lids

1. In landscape areas; 0.10 higher than surrounding finish grade, $\pm 0.05'$.
2. In sidewalks and asphalt pavement; Flush with surrounding finish grade, $\pm 0.025'$.

3.4 DEWATERING

- A. Contractor to provide trench dewatering as necessary, no matter what the source is, at no additional cost to the owner.

3.5 FLUSHING

- A. The Contractor shall thoroughly ball and flush the storm drain system to remove all dirt and debris. Discharge water to an approved location.

3.6 CLEANING

- A. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.
- B. Clean the dirt, rocks, and debris from the drop inlets and storm drain manholes.

END OF SECTION