



CITY OF LAKEPORT
PUBLIC WORKS DEPARTMENT
LAKEPORT, CALIFORNIA

TECHNICAL SPECIFICATIONS

FOR

LAKE FRONT PARK PROJECT
BID NO. 21-04
IN
LAKEPORT, CALIFORNIA

These technical specifications are being provided for reference only. Please follow the procedures in the Notice Inviting Sealed Bids to request the documents necessary to submit a bid.

****Note****

In order for the general contractor to be responsive to the bid solicitation, the City is requiring that contractors/subcontractors for the skate park and spray park be prequalified prior to bid submission. There is a list of prequalified contractors in **Section 01 10 00 Part 1.04** of these Technical Specifications. *If the general contractor is to subcontract with one of the listed firms, the pre-bid submittal is NOT required. If the prime contractor intends to construct, or subcontract these specialty items with a firm not on the list, the following pre-bid submittal IS required.* See Section C of the Bid Documents for the Pre-Qualification Information Submittal procedures.

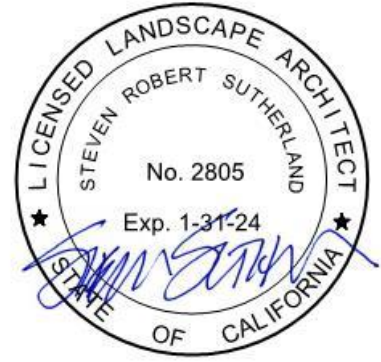
1.1 LANDSCAPE ARCHITECT

I hereby certify that the landscape architecture portions of this Project Specification were prepared by me or under my direct supervision and that I am a duly registered Professional Landscape Architect under the laws of the State of California.



Steven R. Sutherland, PLA # 2805
Expires 01-31-24

Date: May 4, 2022



**CITY OF LAKEPORT, CA
BID 21-04**

**LAKE FRONT PARK PROJECT
LAKEPORT, CA
PROJECT NO. 200009.00**

April 2022

PREPARED BY:

SSA LANDSCAPE ARCHITECTS, INC.
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Santa Cruz, California 95060
(831) 459-0455

TECHNICAL SPECIFICATIONS

SECTION 00 01 10 – TABLE OF CONTENTS

DIVISION 01	GENERAL REQUIREMENTS
01 10 00	SUMMARY OF THE WORK
01 25 13	SUBSTITUTION PROCEDURES
01 31 00	PROJECT COORDINATION
01 33 00	SUBMITTAL PROCEDURES
01 40 00	QUALITY CONTROL
01 42 00	DEFINITIONS AND STANDARDS
01 57 23	TEMPORARY WATER POLLUTION CONTROL
01 71 13	MOBILIZATION
01 73 00	FIELD ENGINEERING
01 77 00	PROJECT CLOSEOUT
01 78 39	PROJECT RECORD DOCUMENTS
DIVISION 03	CONCRETE
03 10 00	CONCRETE FORMING AND ACCESSORIES
03 20 00	CONCRETE REINFORCEMENT
03 30 00	CAST-IN-PLACE CONCRETE
03 37 00	SKATE PARK SHOTCRETE
03 52 00	SKATE PARK STRUCTURE CONCRETE PAVING
DIVISION 05	METALS
05 12 00	STRUCTURAL STEEL
05 50 00	METAL FABRICATIONS
05 51 00	SKATE PARK METAL FABRICATION
DIVISION 06	WOOD, PLASTICS, AND COMPOSITES
06 10 00	ROUGH CARPENTRY
06 18 00	GLUED-LAMINATED STRUCTURAL UNITS
DIVISION 09	FINISHES
09 91 00	EXTERIOR PAINTING
09 93 00	SKTAE PARK CONCRETE STAIN
DIVISION 10	SPECIALTIES
10 73 00	PROTECTIVE COVERS
DIVISION 11	EQUIPMENT
11 68 00	SPORTS EQUIPMENT AND STRUCTURES
DIVISION 12	FURNISHINGS
12 93 00	SITE FURNISHINGS

DIVISION 13

13 34 23

SPECIAL CONSTRUCTION

PRE-FABRICATED RESTROOM STRUCTURES

DIVISION 26

26 05 00

26 05 19

26 05 26

26 05 33

26 05 42

26 05 43

26 05 44

26 24 13

26 24 16

26 27 26

26 28 16

26 51 00

ELECTRICAL

GENERAL ELECTRICAL REQUIREMENTS

LINE VOLTAGE WIRE AND CABLE

GROUNDING

OUTLET, JUNCTION AND PULL BOXES

CONDUITS, RACEWAYS AND FITTINGS

UNDERGROUND DUCTS

IN GRADE PULL BOXES

SWITCHBOARDS, 600 VOLTS AND BELOW

PANELBOARDS AND DISTRIBUTION PANELS

DEVICES WIRING

CIRCUIT BREAKERS

LIGHTING

DIVISION 31

31 10 00

31 20 00

31 23 00

31 23 16

31 63 00

31 68 00

EARTHWORK

SITE PREPARATION

EARTHWORK

STRUCTURAL EXCAVATION AND FILL

TRENCHING, BACKFILLING AND COMPACTION

DRILLED CONCRETE PIERS

FOUNDATION TIE-DOWN ANCHORS

DIVISION 32

32 11 23

32 12 16

32 12 23

32 13 13

32 16 00

32 17 26

32 18 16.13

32 18 23

32 31 13

32 84 00

32 90 00

32 91 13

32 93 00

EXTERIOR IMPROVEMENTS

AGGREGATE BASE COURSES

ASPHALT PAVING & BASE

PAVEMENT MARKINGS AND SIGNS

CONCRETE PAVING

CONCRETE SIDEWALKS AND CURBS

TACTILE WARNING SURFACES

PLAYGROUND PROTECTIVE SURFACING

ATHLETIC COURT SURFACING

CHAIN LINK FENCING AND GATES

IRRIGATION WORK

PLANTING

SOIL PREPARATION

PLANT MAINTENANCE

DIVISION 33

33 11 00

33 30 00

33 40 00

UTILITIES

WATER UTILITY DISTRIBUTION PIPING

SANITARY SEWERAGE UTILITIES

SITE DRAINAGE

**SECTION 01 10 00
SUMMARY OF THE WORK**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all Specification sections, apply to work of this section.

1.02 PROJECT/WORK IDENTIFICATION

- A. General: Name of project is: Lake Front Park Bid No. 21-04 as shown on Contract Documents prepared by SSA Landscape Architects, Inc., 303 Potrero St. STE 40-C, Santa Cruz, CA. 95060-2756.
- B. Contract Documents: Indicate the work of the Contract and related requirements and conditions that have an impact on the project. Related requirements and conditions that are indicated on the Contract Documents can include, but are not necessarily limited to the following:
 - 1. Existing site conditions and restrictions.**
 - 2. Alterations and coordination with existing work.**
 - 3. Work to be performed concurrently by separate contractors.**
 - 4. Work to be performed subsequent to work under this Contract.**
 - 5. Alternates.**
 - 6. Allowances.**
- C. Summary of References: Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, Specification Sections, Drawings, Addenda and modifications to the contract documents issued subsequent to the initial printing of this project manual and including but not necessarily limited to printed material referenced by any of these. It is recognized that work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including weather conditions and other forces outside the Contract Documents.
- D. Abbreviated Written Summary: Briefly and without force and effect upon the Contract Documents, the work of the Contract can be summarized as follows:
 - 1. The work includes construction of a park including but not limited to a skate park, splash pad, picnic areas, shade shelters, plazas, pathways, parking lot and basketball court.**
 - 2. The work includes installation of owner provided building, shade shelters, pavilion, and fitness equipment.**

3. The work also includes procurement and installation of site furnishings, electrical improvements, pathways, bioswales and other park elements as shown in the contract documents.

1.03 CONTRACTOR USE OF PREMISES

- A. General: The Contractor Shall have unlimited use of the site and shall be responsible for all site security.
- B. At locations where the work abuts existing improvements including the community center and the West American Bank building, the Contractor shall coordinate work to minimize disruption to these facilities. Keep public areas such as parking lots, stairs, plazas, etc. free from accumulation of waste materials, rubbish or construction debris at all times.

1.04 MISCELLANEOUS PROVISIONS

- A. Skate Park and Splash Pad sub-contractors must have been pre-qualified prior to bidding.
- B. The following list of sub-contractors have been pre-qualified for the Skate Park construction component of this project:

1. **California Skateparks**

Contact: Joseph M. Ciaglia Jr.
909.949.1601
joe@californiaskeateparks.com

2. **Frontier Skateparks**

Contact: Michael Greenwald
760.473.5481
info@frontierskateparks.com

3. **Grindline Skateparks**

Contact: James Klinedinst
206.932.6414
bids@grindline.com

- C. The following sub-contractor has been pre-qualified for the Splash Pad construction component of this project:

1. **Western Water Features, Inc.**

Contact: Kooper Parkes
916.939.1600 ext. 103
kooper@westernwaterfeatures.com

1.05 MECHANICAL/ELECTRICAL REQUIREMENTS OF GENERAL WORK

- A. General: Except as otherwise indicated, comply with applicable requirements of Division-15 sections for mechanical provisions within units of general (Division 2-14) Work. Except as otherwise indicated, comply with applicable requirements of Division-16 sections for electrical provisions within units of general (Division 2-14) Work.
- B. Service Connections: Refer to Division-15 and Division-16 sections for the characteristics of the mechanical and electrical services to be connected to units of general work. Provide units manufactured or fabricated for proper connection to and utilizations of available services, as indicated. Except as otherwise indicated, final connection of mechanical services to general work is defined as being mechanical work, and final connection of electrical services to general work is defined as electrical work.
- C. Electrical Requirements: Except as otherwise indicated, comply with applicable provisions of The National Electrical Code (NEC) and standards by National Electrical Manufacturer's Association (NEMA), for electrical components of general work. Provide Underwriters Laboratories listed and labeled products where applicable.

1.06 PERFORMANCE REQUIREMENTS FOR COMPLETED WORK

- A. General: The Contract Documents indicate the intended occupancy and utilization of the site and its individual systems and facilities. Compliance with governing regulations is intended and required for the work and for the Owner's occupancy and utilization. In addition to the requirement that every element of the work comply with applicable requirements of the Contract Documents, it is also required that the work as a whole comply with the following general building performance requirements:
 - 1. Prior to the time of final completion, inspect, test and adjust the performance of every element, system or facility of the work as necessary to insure that the overall performance is in compliance with the Contract Documents and any governing codes, regulations, or documents related to the project.**
 - 2. Instruct the Owner's operating personnel on specific operational requirements needed to maintain compliance. Report to the Owner the performances of completed-and-adjusted work that appear to be unable to comply with the above-mentioned requirements.**

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 10 00

SECTION 01 25 13
SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all Specification sections, apply to work of this section.

1.02 DESCRIPTION OF REQUIREMENTS

1.03 SUBMITTALS

- A. Request for Substitutions: Submit 3 copies of each request for substitution. In each request identify the product or fabrication or installation method to be replaced by the substitution; include related specification section and drawing numbers, and complete documentation showing compliance with the requirements for substitutions. Include the following information, as appropriate, with each request:
1. Provide complete cost information, including a proposal of the net change, if any in the Contract Sum.
 2. Provide complete product data, drawings and description of products, and fabrication and installation procedures.
 3. Provide samples where applicable or requested.
 4. Provide a detailed comparison of the significant qualities of the proposed substitution with those of the work originally specified. Significant qualities include elements such as size, weight, durability, performance and visual effect where applicable.
 5. Provide complete coordination information. Include all changes required in other elements of the work to accommodate the substitution, including work performed by the Owner and separate Contractors.
 6. Provide a statement indicating the effect the substitution will have on the work schedule in comparison to the schedule without approval of the proposed substitution. Include information regarding the effect of the proposed substitution on the Contract Time.
 7. Provide certification by the Contractor to the effect that, in the Contractor's opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal-to or better than the work required by the Contract documents, and that it will perform adequately in the application indicated.

- i. Include in this certification, the Contractor's waiver of rights to additional payment or time, which may subsequently be necessary because of the failure of the substitution to perform adequately.
- B. Change Order Form: Submit requests for substitutions in the form and in accordance with procedures required for change order proposals.
- C. Owner's Representative's Action: Within one week of receipt of the Contractor's request for substitution, the Owner's Representative will request additional information or documentation as may be needed for evaluation of the request. Within 2 weeks of receipt of the request, or within one week of receipt of the requested additional information or documentation, whichever is later, the Owner's Representative will notify the Contractor of either the acceptance or rejection of the proposed substitution.
 1. Acceptance will be in the form of a change order.
 2. Rejection will include a statement giving reasons for the rejection.

1.04 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work.
- B. Compatibility of Options: Compatibility of products is a basic requirement of product selection. When the Contractor is given the option of selecting between two or more products for use on the project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to the Contractor is not assured by the various requirements of the Contract documents, but must be provided by the Contractor.

1.05 DEFINITIONS

- A. Definitions used in this paragraph are not intended to negate the meaning of other terms used in the contract documents, including such terms as "specialties", "systems", "structure", "finished", "accessories", "furnishings", "special construction" and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.
- B. "Products" are items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the project or taken from the Contractor's previously purchased stock. The term "product" as used herein includes the terms "material", "equipment", "system" and other terms of similar intent.
- C. "Named Products" are products identified by use of the manufacturer's name for a product, including such items as a make or model designation, as recorded in

published product literature, of the latest issue as of the date of the contract documents.

- D. "Materials" are products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form units of work.
- E. "Equipment" is defined as a product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.

1.06 SUBSTITUTIONS

- A. The Contractor's requests for changes in the products, materials, equipment and methods of construction required by the contract documents are considered requests for "substitutions", and are subject to the requirements specified herein. The following are not considered as substitutions:
 - 1. Revisions to the contract documents, where requested by the Owner, or Owner's Representative are considered as "changes" not substitutions.
 - 2. Substitutions requested during the bidding period, which have been accepted prior to the Contract Date, are included in the contract documents and are not subject to the requirements for substitutions as herein specified.
- B. Specified Contractor options on products and construction methods included in the contract documents are choices available to the Contractor and are not subject to the requirements for substitutions as herein specified.
- C. Except as otherwise provided in the contract documents, the Contractor's determination of and compliance with governing regulations and orders as issued by governing authorities do not constitute "substitutions" and do not constitute a basis for change orders.
- D. Standards: Refer to Division-1 section "Definitions and Standards" for the applicability of industry standards to the products specified for the project, and for the acronyms used in the text of the specification sections.
 - 1. Where a proposed substitution involves the work of more than one prime contractor, each prime contractor involved shall cooperate and coordinate the work with each other prime contractor involved, so as to provide uniformity and consistency and to assure the compatibility of products.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent vandalism, damage, deterioration and loss, including theft. Control delivery schedules to minimize long-term storage at the site and to prevent overcrowding of construction spaces. In

particular coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other sources of loss.

PART 2 - PRODUCTS

2.01 GENERAL PRODUCT COMPLIANCE

- A. General: Requirements for individual products are indicated in the contract documents; compliance with these requirements is in itself a contract requirement. These requirements may be specified in any one of several different specifying methods, or in any combination of these methods. These methods include the following:
 - 1. Proprietary
 - 2. Descriptive
 - 3. Performance
 - 4. Compliance with Reference Standards
- B. Compliance with codes, compliance with graphic details, allowances, and similar provisions of the contract documents also have a bearing on the selection process.
- C. Procedures for Selecting Products: The Contractor's options in selecting products are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by the Contractor on previous construction projects. Required procedures include but are not limited to the following for the various indicated methods of specifying:
- D. Proprietary and Semi-Proprietary Specification Requirements:
 - 1. Single Product Name: Where only a single product or manufacturer is named, provide the product indicated, unless the specification indicates possible consideration of other products. Advise the Owner's Representative before proceeding, when it is discovered that the named product is not a reasonable or a feasible solution.
 - 2. Two or More Product Names: Where two or more products or manufacturers are named, provide one of the products named, at the Contractor's option. Exclude products that do not comply with specification requirements. Do not provide or offer to provide an unnamed product, unless the specification indicates possible consideration of other products. Advise the Owner's Representative before proceeding where none of the named products comply with specification requirements, or are feasible for use.
 - 3. Where products or manufacturers are specified by name, accompanied by the term "or-equal" or similar language, comply with the contract document provisions concerning "substitutions" to obtain approval from the Owner's

Representative for the use of an unnamed product. Refer to Section 02760-Site Furnishings for any special "or-equal" requirements.

- E. Compliance with Standards, Codes and Regulations: Where the specifications require only compliance with an imposed standard, code or regulation, the Contractor has the option of selecting a product that complies with specification requirements, including the standards, codes and regulations.
- F. Visual Matching: Where matching an established sample is required, the final judgment of whether a product proposed by the Contractor matches the sample satisfactorily will be determined by the Owner's Representative. Where there is no product available within the specified product category that matches the sample satisfactorily and also complies with other specified requirements, comply with the provisions of the Contract Documents concerning "substitutions" and "change orders" for the selection of a matching product in another product category, or for non-compliance with specified requirements.
- G. Visual Selection: Except as otherwise indicated, where specified product requirements include the phrase "...as selected from the manufacturer's standard colors, patterns, textures..." or similar phrases, the Contractor has the option of selecting the product and manufacturer, provided the selection complies with other specified requirements. The Owner's Representative is subsequently responsible for selecting the color, pattern and texture from the product line selected by the Contractor. Contractor is required to give minimum 72 hours notice to Owners Representative for color selection, etc.
- H. Allowances: Refer to individual sections of the specifications and "Allowances" provisions in Division-1 sections for an indication of product selections that are controlled by established allowances, and for the procedures required for processing such selections.

2.02 SUBSTITUTIONS

- A. Conditions: The Contractor's request for a substitution will be received and considered when extensive revisions to the Contract Documents are not required, when the proposed changes are in keeping with the general intent of the Contract Documents, when the requests are timely, fully documented and properly submitted, and when one or more of the following conditions is satisfied, all as judged by the Owner's Representative; otherwise the requests will be returned without action except to record non-compliance with these requirements.
 - 1. The Owner's Representative will consider a request for substitution where the request is directly related to an "or equal" clause or similar language in the Contract Documents.

2. The Owner's Representative will consider a request for substitution where the specified product or method cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 3. The Owner's Representative will consider a request for a substitution where a substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Owner's Representative for redesign and evaluation services, the increased cost of other work by the Owner or separate contractors, and similar considerations.
 4. The Owner's Representative will consider a request for substitution when the specified product or method cannot receive a warranty as required by the Contract Documents and where the contractor certifies that the proposed substitution receive the required warranty.
- B. Work-Related Submittals: The Contractor's submittal of and the Owner's Representative's acceptance of shop drawings, product data or samples which relate to work not complying with requirements of the Contract Documents, does not constitute an acceptable or valid request for a substitution, nor approval thereof.\

2.03 GENERAL PRODUCT REQUIREMENTS

- A. General: Provide products that comply with the requirements of the Contract Documents and that are undamaged and, unless otherwise indicated, unused at the time of installation. Provide products that are complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
- B. Standard Products: Where they are available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- C. Continued Availability: Where, because of the nature of its application, the Owner is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard, domestically produced products for which the manufacturer has published assurances that the products and its parts are likely to be available to the Owner at a later date.
- D. Nameplates: Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view either in occupied spaces or on the exterior of the completed project.
- E. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface which, in occupied spaces, is not conspicuous.

- F. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate the nameplate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data.
1. Name of manufacturer
 2. Name of product
 3. Model number
 4. Serial number
 5. Capacity
 6. Speed
 7. Ratings

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS

- A. General: Except as otherwise indicated in individual sections of these specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at any time period.

B. **SAMPLE WARRANTY- GUARANTEE**

Separate guarantees furnished for particular types of work as specified under the pertinent Sections of these Specifications shall be submitted on the Contractor's letterhead in the following form:

GUARANTEE - WARRANTY FOR _____

We hereby warrant and the Manufacturer guarantees that the

_____ which we have installed in the _____ has been done in accordance with the drawings and specifications and that the work as installed will fulfill the requirements of the guarantee-warranty included in the Specifications.

We agree to repair or replace any or all of our work together with any other adjacent work which may be displaced by so doing, that may prove to be defective in its workmanship or material within a period of __1__ year(s) from the date of final

acceptance of the above-named Work by the Owner, without any expense whatsoever to the Owner, ordinary wear and tear and unusual abuse or neglect excepted.

In the event of our failure to comply with the above-mentioned conditions within thirty (30) days after being notified in writing by the Owner, we collectively or separately do hereby authorize the Owner to proceed to have such defects repaired and made good at our expense, and we shall honor and pay the costs and charges therefor upon demand.

Signed _____
General Contractor

Countersigned _____
Manufacturer (if applicable)

END OF SECTION 01 25 13

SECTION 01 31 00
PROJECT COORDINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all Specification sections, apply to work of this section.
- B. Related work:
 - 1. SECTION 01 33 00 – SUBMITTAL PROCEDURES.

1.02 DESCRIPTION OF WORK

- A. Minimum administrative and supervisory requirements necessary for coordination of work on the project can include but are not necessarily limited to the following:
 - 1. Coordination and meetings.
 - 2. Administrative and supervisory personnel.
 - 3. Surveys and records or reports.
 - 4. Limitations for use of site.
 - 5. Special reports.
 - 6. General installation provisions.
 - 7. Cleaning and protection.
 - 8. Conservation and salvage.

1.03 COORDINATION AND MEETINGS

- A. General: The Contractor shall prepare a written memorandum on required coordination activities. Include such items as required notices, reports, and attendance at meetings. Distribute this memorandum to each entity performing work at the project site. Prepare similar memorandum for separate contractors where interfacing of their work is required.
- B. Coordination Drawings: The Contractor shall prepare coordination drawings where work by separate entities requires fabrication off-site of products and materials which must accurately interface. Coordination drawings shall indicate how work shown by separate shop drawings will interface and shall indicate sequence for installation. Comply with all requirements of SECTION 01 33 00 – SUBMITTAL PROCEDURES.

- C. Coordination Meetings: The Contractor shall hold general project coordination meetings at regularly scheduled times convenient for all parties involved. These meetings are in addition to specific meetings held for other purposes, such as regular project meetings and special pre-installation meetings. The Contractor shall require representation at each meeting by every party currently involved in coordination or planning for the work of the entire project. Contractor shall conduct meetings in a manner which will resolve coordination problems. Contractor shall record results of the meeting and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.04 ADMINISTRATIVE/SUPERVISORY PERSONNEL

- A. General: In addition to a General Superintendent and other administrative and supervisory personnel required for performance of the work, the Contractor shall provide specific coordinating personnel as specified herein.
- B. Project Coordinator: Contractor shall provide a full-time Project Coordinator or Crew Leader experienced in administration and supervision of landscape construction, including plumbing, carpentry, concrete, masonry and electrical work. This Project Coordinator is hereby authorized to act as general coordinator of interfaces between units of work. For the purpose of this provision, "interface" is defined to include scheduling and sequencing of work, sharing of access to work spaces, installations, protection of each other's work, cutting and patching, tolerances, cleaning, selections for compatibility, preparation of coordination drawings, inspections, tests, and temporary facilities and services.

1.05 SURVEYS AND RECORDS/REPORTS

- A. General: Working from lines and levels established by the property survey, the Contractor shall establish and maintain benchmarks and other dependable markers. Establish benchmarks and markers to set lines and levels for work at each stage of construction and elsewhere as needed to properly locate each element of the project. Calculate and measure required dimensions as shown within recognized tolerances. Drawings shall not be scaled to determine exact dimensions. If a written dimension is required, Contractor shall request the information in the form of a Request For Information (RFI) or a Request For Clarification (RFC) from the Owner's Representative. After requesting such information, Contractor shall continue work in other areas so as to not delay work. Contractor shall advise entities performing work, of marked lines and levels provided for their use.
- B. Surveyor: The Contractor shall engage a Land Surveyor or Professional Engineer experienced and specializing in land survey work, who is registered in the State where the project is located, to perform those services specified in this article.
- C. Survey Procedures: Before proceeding with the layout of actual work, the Contractor shall verify the layout information shown on the drawings, in relation to the property

survey and existing benchmarks. As work proceeds, the Contractor shall check every major element for line, level and plumb. Maintain a surveyor's log or record book of such checks; make this log or record book available for the Owner's Representative's reference. Record deviations from required lines and levels, and advise the Owners Representative promptly upon detection of deviations that exceed indicated or recognized tolerances. Record deviations which are accepted, and not corrected, on record drawings.

D. Post Construction Skate Park Documentation:

1. At completion of skate park, contractor to perform a conformance survey of the as-built skatepark for review by the Owners Representative for approval at the Contractor's expense.
2. Survey shall include all elevation points indicated on the skate park plans.
3. Any required corrections as determined by the Owners Representative shall be made at the Contractor's expense and resubmitted for review by the Owners Representative.

1.06 LIMITATIONS ON USE OF THE SITE

- A. General: Limitations on site usage, as well as, specific requirements that impact site utilization are indicated on the drawings and by other contract documents. In addition to these limitations and requirements, Contractor shall administer allocation of available space equitably among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the project. Contractor shall schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.
- B. Burial of Waste Materials: The Contractor shall not dispose of organic and/or hazardous materials on site, either by burial or by burning.

1.07 SPECIAL REPORTS

- A. General: Contractor shall submit special reports directly to the Owner within one day of an occurrence. Submit a copy of the report to the Owners Representative and other entities that are affected by the occurrence.
- B. Reporting Accidents: Contractor shall prepare and submit reports of significant accidents, at site and anywhere else work is in progress. Record and document data and actions. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.
- C. Refer to all Technical Specification sections for additional required reporting, testing, etc.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION PROVISIONS

- A. Pre-Installation Conferences: Contractor shall hold pre-installation meetings at the project site well before installation of each unit of work which requires coordination with other work. Installer and representatives of the manufacturers and fabricators who are involved in or affected by that unit of work, and with its coordination or integration with other work that has preceded or will follow shall attend this meeting. The Contractor shall advise the Owners Representative of scheduled meeting dates.
1. At each meeting, the Contractor shall review progress of other work and preparations for the particular work under consideration.
 2. The Contractor shall record significant discussions of each conference, including agreements and disagreements, along with the final plan of action. Distribute the record of meeting promptly to everyone concerned, including the Owner and Owners Representative.
 3. The Contractor shall not proceed with the work if the pre-installation conference cannot be successfully concluded. The Contractor shall immediately notify the Owners Representative if such a situation occurs and initiate whatever actions are necessary to resolve impediments to performance of the work and reconvene pre-installation conference at the earliest feasible date.
 4. Pre installation conferences shall include the following:
 - i. Grading and Drainage
 - ii. Splash Pad
 - iii. Skate Park
 - iv. Restroom-Concession Building
 - v. Irrigation
 - vi. Planting
 - vii. Paving
- B. Installer's Inspection of Conditions: The Contractor shall require the Installer of each major unit of work to inspect the substrate to receive work and conditions under which the work is to be performed. The Installer shall report all unsatisfactory conditions in writing to the Contractor. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to

the Installer, within the allowances and tolerances of the Contract Documents and the discretion of the Owner's Representative.

- C. **Manufacturer's Instructions:** Where installations include manufactured products, the Contractor shall comply with manufacturer's applicable instructions and recommendations for installation, to the extent that these instructions and recommendations are more explicit or more stringent than requirements indicated in the contract documents.

1. At a minimum, and not by way of limitation, the Contractor shall:

- i. Inspect each item of materials or equipment immediately prior to installation and reject damaged and/or defective items.
- ii. Provide attachment and connection devices and methods for securing work. Secure work true to line and level, and within recognized industry tolerances. Allow expansion and building movement. Provide uniform joint width in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable visual-effect choices to the Owners Representative for final decision.
- iii. Recheck measurements and dimensions of the work, as an integral step of starting each installation.
- iv. Install each unit-of-work during weather conditions and project status which will ensure the best possible results in coordination with the entire work. Isolate each unit of work from incompatible work as necessary to prevent deterioration.
- v. Coordinate enclosure of the work with required inspections and tests, so as to minimize the necessity of uncovering work for that purpose.

- D. **Mounting Heights:** Where mounting heights are not indicated, mount individual units of work at industry recognized standard mounting heights for the particular application indicated. Refer questionable mounting height choices to the Owners Representative for final decision.

3.02 CLEANING AND PROTECTION

- A. **General:** During handling and installation of work at the project site, the Contractor shall clean and protect work in progress and adjoining work on the basis of continuous maintenance. The Contractor shall apply protective coverings on or barricades around installed work where it is required for safety and/or to ensure freedom from damage or deterioration until final acceptance.
- B. The Contractor shall clean and perform maintenance on installed work as frequently as necessary through the contract period. The Contractor shall adjust and lubricate operable components to ensure operability without damaging effects or appearances.

- C. Limiting Exposures of Work: To the extent possible through reasonable control and protection methods, the Contractor shall supervise performance of the work in such a manner and by such means which will ensure that none of the work, whether completed or in progress, will be subjected to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period. Such exposures include, where applicable, but not by way of limitation the following:
1. Excessive static or dynamic loading
 2. Excessive internal or external pressure
 3. Excessively high or low temperatures
 4. Thermal shock
 5. Excessively high or low humidity
 6. Air contamination or pollution
 7. Water or ice
 8. Solvents
 9. Chemicals
 10. Light
 11. Radiation
 12. Puncture
 13. Abrasion
 14. Heavy traffic
 15. Soiling
 16. Bacteria
 17. Insect infestation
 18. Combustion
 19. Electrical current
 20. High speed operation, improper lubrication, unusual wear or other misuse
 21. Incompatible interface
 22. Destructive testing
 23. Misalignment
 24. Excessive weathering
 25. Unprotected storage
 26. Improper shipping or handling

27. Theft

28. Vandalism

3.03 CONSERVATION AND SALVAGE

- A. General: It is a requirement of the Contractor for supervision and administration of the work that construction operations be carried out with the maximum possible consideration given to conservation of energy, water and materials. In addition, maximum consideration shall be given to salvaging materials and equipment involved in performance of the work but not incorporated therein. Refer to other sections for required disposition of salvage materials which are the Owner's property.

END OF SECTION 01 31 00

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related Sections:
 - 1. Drawings, and the technical specifications apply to this section.
 - 2. SECTION 01 33 23 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
 - 3. SECTION SUBSTITUTION PROCEDURES

1.02 DESCRIPTION OF WORK

- A. Contractor shall prepare and transmit a submittal or shop drawing for every product to be furnished on the project. Minor components may be excluded per the discretion of the Owners Representative. Submit all items as specified herein and as may be noted elsewhere in the Contract Documents. All submittals shall be provided electronically in a .pdf format.

1.03 SCHEDULE OF SUBMITTALS

- A. Within ten (10) working days from date of Notice To Proceed, the Contractor shall submit to the Owner Representative a comprehensive list of all submittals (Submittal Schedule) and the Progress Schedule for review and acceptance.
- B. Upon acceptance by the Owners Representative, the list and Progress Schedule shall become part of the Contract Documents. All project submittals shall be submitted to the Owners Representative within twenty (20) working days from the date of the Notice To Proceed unless noted otherwise.
- C. Coordinate the Progress Schedule with all sub-contractors, material suppliers, etc. to ensure adherence to the schedule.
- D. Revise and update the Progress Schedule on a monthly basis to reflect on-going construction conditions and sequences.
- E. Submit one copy of the Progress Schedule monthly to the Owners Representative showing all revisions for review and comment. Coordinate this submittal with Progress Payment requests or as acceptable to the Owners Representative.

- F. Closeout Submittals: All submittals noted as Project Closeout submittals shall be furnished to the Owner's Representative for review and acceptance prior to issuance of the Project Acceptance.

1.04 IDENTIFICATION OF SUBMITTALS

- A. Identify each submittal with the following information:
1. Date and revision dates
 2. Project title and number
 3. The names of:
 - i. Sub-contractor
 - ii. Supplier
 - iii. Manufacturer
 4. Specification section
 5. Separate detailer when pertinent
 6. Identifications of product or material
 7. Applicable standards
 8. Identification of deviations from Contract Documents
 9. Contractor's stamp, initialed or signed, certifying review of submittal, verification of field measurements and compliance with the Contract Documents.

PART 2 – PRODUCTS

2.01 PRODUCT LITERATURE

- A. Submit one electronic copy of each submittal, including of the manufacturer's printed data and instructions to the Owners Representative for review.
- B. Clearly indicate, by colored highlight or colored stamp (USING A COLOR THAT WILL PHOTOCOPY), which portion of the literature is submitted to be reviewed for compliance with the Contract Documents.

2.02 SHOP DRAWINGS

- A. Shop drawings shall be drawn accurately to a scale sufficiently large to depict all aspect of the items and its methods of connection to the work. Submit shop drawings to the Owners Representative in the quantity specified in "PRODUCT LITERATURE" above.

- B. Review of the shop drawings by the Owners Representative shall not relieve the Contractor of the responsibility for errors and/or omissions in the design of adequate connections or satisfactory construction of the work or conformance to applicable codes etc.
- C. Clearly indicate, by colored highlight or colored stamp (USING A COLOR THAT WILL PHOTOCOPY), the desired deviations from the Drawings (as applicable).

2.03 SAMPLES

- A. Samples shall be of the actual article(s) to be furnished.
- B. Submit four (4) samples to the Owners Representative for review. Two (2) samples shall be returned to the Contractor and two (2) shall be retained by the Owners Representative.
- C. When specifically, acceptable to the Owners Representative the returned sample(s) may be used in the work as an installed item.
- D. Construct the work or re-submit in accordance with the Owners Representative's review.

2.04 COLORS AND PATTERNS

- A. As required in related sections of these Specifications, submit actual color chips of specified colors and patterns as applicable to the actual material proposed for use in the work. Submit quantity as noted in "SAMPLES" above.

2.05 MANUALS

- A. Submit four (4) hard copies of all required manuals and a .pdf electronic copy
- B. Unless specified elsewhere, all manuals shall be bound in identical plastic binders approximately 8.5" x 11" in size and shall contain at least the following:
 - 1. Label on the front cover and binding edge stating general nature of the manual
 - 2. Neatly typed table of contents
 - 3. Complete instructions regarding operation and maintenance of all equipment to be furnished as part of the work
 - 4. Complete list of replaceable parts with part numbers and name and address of nearest supplier
 - 5. Copies of all guarantees and warranties issued
 - 6. Copies of reviewed shop drawings
 - 7. Photographs of exposed work before final covering, if required by the Owners Representative

- C. When the manual includes manufacturer's catalog "cut-sheets", clearly indicate the actual items installed in the project.

PART 3 – EXECUTION

3.01 SUBMITTAL ORGANIZATION

- A. Contractor shall prepare and transmit a submittal or shop drawing for every product to be furnished on the project. Minor components may be excluded per the discretion of the Owners Representative. Submit all items as specified herein and as may be noted elsewhere in the Contract Documents.
- B. Unless otherwise directed by the Owners Representative, organize all submittals in categories by specification section number from which the submittal was requested and submit all related materials at one time.
- C. Owners Representative reserves the right to reject incomplete or partial submittals.
 - D. Each submittal shall be independently numbered for each product. Products shall not be combined such as fittings shall be submitted separately from pipe.

3.02 SUBMITTAL REVIEW

- A. Contractor shall sign or stamp all submittals as verification that the submittal complies with the Contract Documents.
- B. The Owners Representative shall review all submittals and respond with one of the following markings:
 - 1. No Exceptions Taken
 - 2. Exceptions Taken (See attached comments)
 - 3. Furnish as Corrected
 - 4. Revise and Resubmit
- C. The Owners Representative's review of submittals shall not relieve the Contractor from responsibility for deviations from the Constructions Documents unless the contractor has called the Owner Representative's attention to such deviations and secured written acceptance, nor shall it relieve the Contractor from the responsibility for errors and/or omissions in shop drawings or other data.

3.03 RESUBMITTAL REQUIREMENTS

- A. General
 - 1. The Contractor shall make all submittals in advance of scheduled dates of installation to provide ample time for Owners Representative's review, for

possible revision and re-submittal, placing orders, necessary delivery lead times and for delivery to project site.

2. In scheduling, the Contractor shall allow at least ten full working days for the Owner Representative's review following receipt of the submittal. If a submittal is time sensitive, the Contractor shall clearly indicate this on the submittal and the Owners Representative shall make all reasonable effort to review the submittal and respond by the time it is needed.
- B. Financial impact of delays due to Contractor's tardiness of submittals will be back-charged as necessary to the Contractor and shall not be at the temporal or financial expense of the Owner.

END OF SECTION 01 33 00

SECTION 01 40 00 QUALITY CONTROL

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all Specification sections, apply to work of this section.
- B. Related work:
 - 1. SECTION 01 33 00 - SUBMITTAL PROCEDURES
 - 2. SECTION 01 42 00 – DEFINITIONS AND STANDARDS
 - 3.

1.02 DESCRIPTION OF WORK

- A. Materials furnished and work performed under the Contract shall be subject to review by the Owners Representative. The Contractor shall be held strictly to the requirements of the Contract Documents with regard to quality of materials, workmanship and diligent execution of the Contract. Such review may include mill, plant, shop, or field review as deemed necessary.
- B. Scope of Work:

Work performed in the absence of any prescribed inspection or observation may be subject to removal and replacement. In such a case, the entire cost of removal and replacement shall be borne by the Contractor, regardless of whether the work removed is found to be defective or not.

Testing, inspection, or other related services shall be performed by an independent consultant, testing laboratory or services selected by the Contractor and approved by the Owner's Representative. Qualification for the proposed Testing Laboratory and Technicians shall be submitted for approval. Laboratories shall be qualified under the AMRL, CCRL and/or Caltrans approved laboratory and technician lists. Provide documentation of qualifications for each test and technician.

The submittal shall include a comprehensive list of tests and test frequencies to be performed by the Contractor as outlined in the various specification sections.

Furnish labor necessary to obtain and handle testing samples at the project site or at other locations.

- C. Related sections can include, but may not be limited to the following:
All applicable sections of these Specifications.

1.03 REFERENCES AND REGULATORY REQUIREMENTS

- A. Control of Work: Conform to Section 5 of the 2010 Caltrans Standard Specifications.
- B. Control of Materials: Conform to Section 6 of the 2010 Caltrans Standard Specifications.

Quality Control and Assurance: Conform to Section 11 of the 2010 Caltrans Standard Specifications

PART 2 – PRODUCTS

2.01 INSPECTION AND TESTS

- A. Inspections, observations and/or testing that may be required by the Contract Documents during progress of the work shall be made by a pre-qualified, independent testing agency selected and paid for by the Contractor. When tests indicate non-compliance, the Contractor shall pay all direct and indirect costs of subsequent re-testing until compliance is established.
- B. B. The Owner may, at their discretion, perform independent testing of workmanship or materials. When tests indicate non-compliance, the Contractor shall pay all direct and indirect costs of subsequent re-testing until compliance is established.
- C. Costs associated with testing, inspections and observations due to the following shall be the responsibility of the Contractor:

Re-testing due to failure of initial samples.

Unacceptable changes in sources, lots, or suppliers of materials after original testing established compliance.

Changes in methods or materials of construction by contractor that require testing, inspection or other related services in excess of that required by original design.

Failure to properly notify the Owner's Representative at critical stages of construction.

Requesting testing, inspection, and/or observation of work not ready.

2.02 TOLERANCES

- A. Tolerances not specifically identified shall meet the written standards and/or recognized commercial tolerances established for the specific materials or product. Refer to SECTION 01 42 00 – DEFINITIONS AND STANDARDS.

PART 3 – EXECUTION

3.01 EXAMINATION OF CONDITIONS

- A. Prior to installing any portion of the work, the Contractor shall examine the site and verify that site conditions are acceptable to begin work of each section.
- B. Verify that work specified elsewhere has been completed to an appropriate stage to begin work of each section.
- C. Materials or products requiring installation under the supervision or inspection of a specific materials manufacturer or manufacturer's representative shall be examined and/or tested and accepted in writing, by such representative(s) prior to installation of work.
- D. Notify the Owners Representative immediately in writing of any irregularities or unacceptable conditions and re-direct work to avoid delay.
- E. Start of work by Contractor shall indicate Contractor's acceptance of site conditions.

END OF SECTION 01 40 00

SECTION 01 42 00
DEFINITIONS AND STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. General: This section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the Work. These requirements include the obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with regulations, codes and standards.
- B. The term, "Regulations," is defined to include laws, statutes, ordinances and lawful orders issued by governing authorities, as well as those rules, conventions and agreements within the construction industry which effectively control the performance of the work regardless of whether they are lawfully imposed by governing authority or not.
- C. Governing Regulations: Refer to General and Supplementary Conditions for requirements related to compliance with governing regulations.

1.03 DEFINITIONS

- A. General Explanation: A substantial amount of specification language consists of definitions of terms found in other contract documents, including drawings. (Drawings are recognized as being diagrammatic in nature and not completely descriptive of requirements indicated thereon). Certain terms used in contract documents are defined in this article. Definitions and explanations contained in this section are not necessarily either complete or exclusive, but are general for the Work to the extent that they are not stated more explicitly in another element of the contract documents.
- B. General Requirements: The provisions or requirements of other Division-1 sections apply to entire work of the Contract and, where so indicated, to other elements which are included in the project.
- C. Indicated: The term, "indicated", is a cross-reference to graphic representations, notes or schedules on the drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in contract documents. Where terms such as "shown", "noted", "scheduled", and "specified" are

used in lieu of "indicated", it is for the purpose of helping the reader locate the cross-reference, and no limitation of location is intended except as specifically noted.

- D. Directed, Requested, etc.: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "required", "accepted", and "permitted" mean "directed by Owners Representative", "requested by Owners Representative", and similar phrases. However, no such implied meaning will be interpreted to extend the Owner's Representatives' responsibility into Contractor's area of construction supervision.
- E. Accept: Where used in conjunction with the Owner's Representative's response to submittals, requests, applications, inquiries, reports and claims by the Contractor, the meaning of term "accepted" will be held to limitations of the Owner's Representative's responsibilities and duties as specified in General Notes and Conditions. In no case will the Owner's Representative's acceptance be interpreted as a release of the Contractor from responsibilities to fulfill requirements of contract documents.
- F. Project Site: The term "project site" is defined as the space available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing other work as part of the project. The extent of the project site is shown on the drawings, and may or may not be identical with the description of the land upon which the project is to be built.
- G. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations as applicable in each instance.
- H. Install: Except as otherwise defined in greater detail, the term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing protecting, cleaning and similar operations," as applicable in each instance.
- I. Provide: Except as otherwise defined in greater detail, the term "provide" means "to furnish and install, complete and ready for intended use", as applicable in each instance.
- J. Installer: The term "installer" is defined as "the entity" (person or firm) engaged by Contractor or its subcontractor or sub-subcontractor for performance of a particular unit of work at the project site, including installation, erection, application, and similar required operations. It is a requirement that installers are experienced in operations they are engaged to perform.
- K. Testing Laboratory: The term "testing laboratory" is defined as an independent entity engaged to perform specific inspections or tests of the work, either at project site or elsewhere; and to report, and (if required) interpret results of those inspections or tests.

1.04 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. General: This article is provided to help the user of these specifications more readily understand the format, language, implied requirements, and similar conventions of content. None of the following explanations shall be interpreted to modify the substance of the contract requirements.
1. Production Methods: Portions of these specifications have been produced by the Owner's Representative's standard method of editing master specifications; they may contain minor deviations from traditional writing formats. Such deviations are a natural result of this production technique, and no other meaning shall be implied.
 2. Specification Format: These specifications are organized based upon the Construction Specifications Institute's format. The organization of these specifications conforms generally to recognized industry practice.
 3. Divisions are groupings of related or similar sections. The divisions are recognized as the construction industry consensus method of uniform specification organization.
 4. Sections: For convenience, "Sections" are considered as the basic units of work. The section title is descriptive only and is not intended to limit the meaning or content of a section or to be completely descriptive of requirements specified therein.
 - i. Section Numbering is used to facilitate cross-references in the contract documents. Sections are placed in the Project Manual in numeric sequence; however, the numeric sequence is not complete and the listing of the sections in the "Table of Contents" at the beginning of the Project Manual must be consulted to determine the numbers and names of specification sections in the contract documents.
 5. Project Identification: The project and number and the date of the last revision of the specification are recorded at the top of each page of the specifications.
 6. Line Numbering: Line numbers are provided on each page to facilitate subsequent references to specific text, for addenda, purchasing, subcontracting, modifications, change orders and similar references.
 7. Page Numbering: Pages are numbered independently for each section, and are recorded in the listing of sections (Table of Contents) at the beginning of the Specification Book. The section number is shown together with the page number at the bottom of each page to facilitate the location of text.
 - i. Underscoring is used strictly to assist the reader of specification text in scanning the text of key works. No emphasis on or relative importance is intended for text where underscoring is used.

- B. **Specification Content:** This project specification has been produced employing certain conventions in the use of language as well as conventions regarding the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
1. **Methods of Specifying:** The techniques or methods of specifying requirements varies throughout the text. The method used for specifying one element of the Work has no bearing on requirements for another element of the Work. The methods of specifying may include the following, or any combination of the following:
 - i. Prescriptive
 - ii. Open generic-descriptive
 - iii. Performance
 - iv. Proprietary
 - v. Compliance with reference standards
 2. **Assignments of Specialists:** In certain circumstances, the specification text requires or implies that specific elements of the Work are to be assigned to specialists who must be engaged to perform that element of the Work. Such assignments are special requirements over which the Contractor has no choice or option. Such assignments are intended to establish which party or entity involved in a specific element of the Work is considered as being sufficiently experienced in the indicated construction processes or operations to be recognized as "expert" in those processes or operations. Nevertheless, the ultimate responsibility for fulfilling all contract requirements remains with the Contractor.
 3. **Trades:** The use of certain titles such as "carpentry" in the specification text, is not intended to imply that the Work must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also is not intended to imply that the requirements specified apply exclusively to work by tradespersons of that corresponding generic name.

1.05 DRAWING SYMBOLS

- A. **General:** Except as otherwise indicated, graphic symbols used on the drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., seventh edition.
- B. **Mechanical/Electrical Drawings:** Graphic symbols used on mechanical/ electrical drawings are generally aligned with symbols recommended by ASHRAE. Where appropriate, these symbols are supplemented by more specific symbols as recommended by other technical associations including ASME, ASPE, IEEE and

similar organizations. Refer instances of uncertainty to the Owners Representative for clarification before proceeding.

1.06 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where more explicit or stringent requirements are written into the contract documents, applicable construction industry standards have the same force and effect as if bound in to or copied directly into the contract documents. Such industry standards are made a part of the contract documents by reference. Individual specification sections indicate which codes and standards the Contractor must keep available at the project site for reference.
- B. Referenced standards: Standards referenced directly in the contract documents take precedence over non-referenced standards that are recognized in the industry for applicability to the Work.
- C. Non-referenced standards: are defined as not being applicable to the Work, except as a general requirement of whether the Work complies with recognized construction industry standards.
- D. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of contract documents.
- E. Conflicting Requirements: Where compliance with two or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the contract documents specifically indicate a less stringent requirement. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Owners Representative for a decision before proceeding, and immediately re-direct construction efforts elsewhere to avoid delay.
- F. Copies of Standards: The contract documents require that each entity performing work be experienced in that part of the work being performed. Each entity is also required to be familiar with industry standards applicable to that part of the Work. Copies of applicable standards are not bound with the contract documents.
 - 1. Where copies of standards are needed for proper performance of the Work, the Contractor is required to obtain such copies directly from the publication source.
- G. Abbreviation and Names: Trade association names and titles of general standards are frequently abbreviated. Where acronyms or abbreviations are used in the specifications or other contract documents they are defined to mean the recognized name of the trade association, standards generating organization, governing authority or other entity applicable to context of text provision. Refer to the

"Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

AAN	American Association of Nurserymen 1250 Eye Street, NW, Suite 500 Washington, DC 20005 (202) 789-2900
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, Suite 225 Washington, DC 20001 (202) 624-5800
ACI	American Concrete Institute P.O. Box 19150 Detroit, MI 48219 (313) 532-2600
AI	Asphalt Institute Asphalt Inst. Bldg. College Park, MD 20740 (301) 227-4258
AIA	American Institute of Architects 1735 New York Ave. NW Washington, DC 20006 (202) 626-7300
ANSI	American National Standards Institute 655 Fifteenth Street, NW, Suite 300 Washington, DC 20015 (202) 639-4090
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329 (404) 636-8400
ASME	American Society of Mechanical Engineers 345 East 47th St. New York, NY 10017 (212) 705-7722
ASPE	American Society of Plumbing Engineers 15233 Ventura Blvd., Suite 811 Sherman Oaks, CA 91403 (213) 783-4845
ASTM	American Society for Testing and Materials 1916 Race St.

	Philadelphia, PA 19103 (215) 299-5400
BIA	Brick Institute of America 11490 Commerce Park Drive, Suite 300 Reston, VA 22091 (703) 620-0010
CCR	California Code of Regulations
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195 (312) 490-1700
IEEE	Institute of Electrical and Electronic Engineers 345 E. 47th Street New York, NY 10017 (212) 705-7926
IES	Illuminating Engineering Society of North America 345 E. 47th Street New York, NY 10017 (212) 705-7926
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180 (703) 281-6613
NBGQA	National Building Granite Quarries Association c/o H.E. Fletcher Co. West Chelmsford, MA 01863
NCMA	National Cement Masonry Association P.O. Box 781 Herndon, VA 22070 (703) 435-4900
NEC	National Electrical Code (by NFPA)
NECA	National Electrical Contractors Association 7315 Wisconsin Ave. Bethesda, MD 20814 (301) 657-3110
NEMA	National Electrical Manufacturers Association 2101 L Street, NW; Suite 300 Washington, DC 20037 (202) 457-8400
N.F.P.A.	National Forest Products Association

1619 Massachusetts Ave., NW
Washington, DC 20036 (202) 797-5800

NHLA	National Hardwood Lumber Association P.O. Box 34518 Memphis, TN 38104 (901) 377-1#8
NPCA	National Paint and Coating Association 1500 Rhode Island Avenue, N.W. Washington, DC 20005 (202) 462-6272
NSF	National Sanitation Foundation P.O. Box 1468; 3475 Plymouth Road Ann Arbor, MI 48106 (313) 769-8010
NSSEA	National School Supply and Equipment Association 1500 Wilson Blvd. Arlington, VA 22209 (703) 524-8819
NWMA	National Woodwork Manufacturers Association (Now NWWDA)
OLA	Office of Local Assistance 501 "J" Street, Suite 350 Sacramento, CA. 95814
OSA	Office of State Architect 301 Howard Street, Suite 400 San Francisco, CA. 94105
PDI	Plumbing and Drainage Institute (c/o Austin O. Roche, Jr.) 5342 Boulevard Pl. Indianapolis, IN 46208 (317) 251-5298
RIS	Redwood Inspection Service 591 Redwood Highway; Suite 3100 Mill Valley, CA 94941 (415) 381-1304
SHLMA	Southern Hardwood Lumber Manufacturers Association (Now HMA)
SJI	Steel Joist Institute 1205 48th Street, North; Suite A

Myrtle Beach, SC 29577 (803) 449-0487

SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway Pensacola, FL 32504 (904) 434-2611
SSA	SSA Landscape Architects, Inc. 303 Potrero Street, Suite 40-C Santa Cruz, CA 95060 (831) 459-0455 Fax (831) 459-0484
UBC	Uniform Building Code
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
UL	Underwriters Laboratories 333 Pfingsten Road Northbrook, IL 60062 (312) 272-8800
WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97223 (503) 639-0651
WIC	Woodwork Institute of California P.O. Box 11428 Fresno, CA 93773 (209) 233-9035
WRI	Wire Reinforcement Institute 8361 A Greensboro Drive McLean, VA 22102 (703) 790-9790
WSC	Water Systems Council 221 North LaSalle Street Chicago, IL 60601 (312) 346-1600
WWPA	Western Wood Products Association 1500 Yeon Building Portland, OR 97204 (503) 224-3930
W.W.P.A.	Woven Wire Products Association 2515 N. Nordica Ave. Chicago IL 60635 (312) 637-1359

1.07 SUBMITTALS

A. Permits, Licenses and Certificates

1. For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 42 00

SECTION 01 57 23
TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related Sections
 - 1. SECTION 02 41 19 – SELECTIVE DEMOLITION
 - 2. SECTION 31 10 00 – SITE CLEARING
 - 3. SECTION 31 20 00 – EARTH MOVING
 - 4. SECTION 32 91 13 – SOIL PREPARATION

1.02 SUMMARY

- A. This section includes:
 - 1. Training employees and subcontractors in stormwater Best Management Practices (BMPs)
 - 2. Implementation of BMPs, including erosion and sediment control
 - 3. Maintenance of BMPs
 - 4. Inspecting BMPs
 - 5. Removing BMPs when no longer needed

1.03 RELATED REQUIREMENTS

- A. Project Storm Water Pollution Prevention Plan
- B. Construction General Permit: “Storm Water Discharges Associated with Construction and Land Disturbance Activities,” SWRCB Order No. 2009-0009-DWQ, NPDES General Permit No. CAS000002, with amendments 2010-0014-DWQ and 2012-0006-DWQ

1.04 REFERENCES

- A. Standard Specifications (DTSS), State of California, Department of Transportation (Caltrans), 2018 edition
- B. Standard Plans, State of California, Department of Transportation (Caltrans), 2018 edition

- C. Construction Site Best Management Practices Manual (BMP Manual), State of California, Department of Transportation (Caltrans), latest edition.
- D. All standards shall include the latest additions and amendments as of the date of advertisement for bids

1.05 SUBMITTALS

- A. Material certifications for all BMP materials (silt fence, fiber roll, jute netting, etc.).
- B. Temporary Water Pollution Control Plan outlining products, maintenance, inspections, and removal protocols.

1.06 QUALITY ASSURANCE

- A. The City will provide a Qualified SWPPP Developer/Practitioner (QSD/QSP) to oversee Permit compliance.
- B. Contractor shall provide a Water Pollution Control Manager (WPCM) who will be responsible for performing BMP inspections and overseeing the implementation of water pollution control practices.
- C. The WPCM shall educate, direct and enforce compliance with the requirements of this Section by all subcontractors.
- D. All contractor employees, subcontractors, and heavy equipment operators shall attend a pre-construction water pollution control training session, and additional trainings as required.

1.07 PERFORMANCE REQUIREMENTS

- A. All storm water and non-storm water discharges shall be in compliance with all applicable federal, state, and local requirements.
- B. This SECTION outlines the contract minimum requirements that Contractor and all subcontractors shall abide by, and does not relieve Contractor of his responsibilities for protection of water quality in accordance with federal, state, and local requirements.
- C. Additional BMPs shall be required if the BMPs which are utilized are not adequately protecting water quality.
- D. Contractor shall revise and update the Water Pollution Control Plan, based on Contractor's operations, equipment used, sequence of work and other aspects of the project.
- E. Contractor and all subcontractors shall be thoroughly familiar with all of the requirements of this SECTION. Contractor shall be responsible for the performance

of subcontractors. Contractor shall inspect and monitor all subcontractors' work and storage areas for compliance with this SECTION.

1.08 FINES AND PENALTIES

- A. Contractor shall pay any fines and be liable for any other penalties that may imposed by any federal, state, or local regulatory agency for non-compliance with any water quality requirement during the course of work. In cases of violations, Contractor shall be responsible to complete any and all corrective measures, at his own expense, as may be directed by the regulatory agency.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Provide all temporary and permanent water pollution control measures, equipment and materials as required by this SECTION and Drawings.
- B. Materials shall conform to the Standard Specifications and Standard Plans.

PART 3 – EXECUTION

3.01 MONITORING AND INSPECTIONS

- A. Contractor's WPCM shall monitor the National Weather Service (NWS) forecast daily.
- B. Contractor's WPCM shall conduct inspections:
 - 1. Before a forecasted storm event
 - 2. After a qualifying rain event that produces site runoff
 - 3. At 24-hour intervals during extended storm events
 - 4. On a predetermined schedule of at least once a week
- C. Contractor's WPCM shall conduct daily inspections of storage areas and vehicle and equipment areas.
- D. Deficiencies shall be corrected immediately, unless a later date is authorized.

3.02 BEST MANAGEMENT PRACTICES

- A. BMP work shall comply with the following Standard Specifications sections:
 - 1. 13-4 Job Site Management
 - 2. 13-5 Erosion Control
 - 3. 13-6 Sediment Control

4. 13-7 Temporary Tracking Control
 5. 13-8 Temporary Active Treatment System
 6. 13-9 Temporary Concrete Washout
 7. 13-10 Temporary Linear Sediment Barriers
 8. 14-9 Air Quality
 9. 14-10 Solid Waste Disposal and Recycling
 10. 14-11 Hazardous Waste and Contamination
- B. Best Management Practices shall be implemented concurrent with the commencement of construction, shall be maintained throughout construction, and shall be removed when no longer required.

3.03 REPORTING

- A. Contractor's WPCM shall prepare and submit inspection reports to the City's QSD/QSP:
1. Weekly BMP inspections
 2. Quarterly non-storm water inspections
 3. Spill reports (if any)
- B. The following inspections will be performed by the City's QSD/QSP:
1. Pre-rain event inspection
 2. During-rain event inspection
 3. Post-rain event inspection
- C. A Rain Event Action Plan (REAP) will be provided by the City's QSD/QSP for each predicted rain event, if the project is Risk Level 2 or 3. Contractor's WPCM shall implement the REAP prior to the predicted rain event.
- D. Annual Report: Provide the City's QSD/QSP with Contractor's Annual Stormwater Certification, in a format acceptable to the City.
- E. Contractor's WPCM shall forward an electronic copy of each report to the City's QSD/QSP within one week of performing the inspection.
- F. Contractor shall notify the City's QSD/QSP of site visits by or correspondence received from any federal, state, or local agency that are related to activities under this SECTION.

END OF SECTION 01 57 23

SECTION 01 71 13 MOBILIZATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all Specification sections, apply to work of this section.
- B. Mobilization shall conform to the applicable provisions in Section 11, Mobilization of the State Standard Specifications.

1.02 DESCRIPTION OF WORK

- A. Mobilization shall include, but not be limited to the following items:
 - 1. All construction staging shall take place on site. Moving on to the site all of Contractor's equipment required for first month operations.
 - 2. Having all OSHA required notices and establishment of safety programs.
 - 3. Having the Contractor's superintendent at the job site full time.
 - 4. Walking the project sites with the Engineer prior to the start of construction and taking sufficient preconstruction digital photos or DVDs to document existing improvements and provide same to the City. At a minimum, one photograph must be obtained for each 100 feet of construction area with special attention given to environmentally critical areas and areas outside of the public right-of-way. Additional photographs shall be taken as necessary to adequately document the condition of existing improvements to remain. Photographs shall be labeled by station so that upon completion of the construction, or during construction, if necessary, subsequent photographs can be taken from the same control points.
 - 5. Conducting a site inspection and construction survey staking prior to construction to check that the proposed manhole locations and elevations conform to the Contract Drawings and to become familiar with all site conditions, and identify potential obstructions caused by other underground utilities. This also includes locating existing utilities by calling Underground Service Alert at 811 or 800-227-2600. Mobilization shall not exceed five (5%) percent of the contract total compensation amount for all open cut, pipe bursting, and civil improvements as defined in the Contract Documents.

1.03 SUBMITTALS

- A. General: Contractor shall prepare submittals per General Provisions 4.19.

- B. Mobilization submittal shall include plan view location of Construction Staging Area, including access points and haul routes to the construction site, along with a narrative on operational management.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 71 13

**SECTION 01 73 00
FIELD ENGINEERING**

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide survey control for clearing limits and all lines and grades required for the construction of this Project from the established reference points and data furnished on Drawings.
- B. The Contractor shall provide survey control for all lines and grades required for the construction of this Project from the established reference points and data furnished on Drawings.
 - 1. Job Conditions
 - i. Accuracy of Data: Site data given herein and on Drawings are as exact as could be secured, but their absolute accuracy cannot be guaranteed. Exact locations, distances, elevations, etc., shall finally be governed by field conditions and the Owners Representative's instructions.
 - ii. Conflicts with Existing Conditions: In the event there is any conflict between actual conditions and Drawings, notify the Engineer immediately and do not proceed with the work until directed by the Owners Representative.
 - iii. In the event that the construction staking reveals a design inconsistency or error, Contractor shall notify the Engineer immediately and shall not proceed with the work until directed by the Engineer.
 - 2. Protection of Existing Features
 - i. Preservation of Markers: All survey control points and project bench marks, which have been or may be established in any part of the site, shall be carefully preserved and respected by Contractor and shall be restored at Contractor's expense if lost or destroyed as a result of Contractor's operations.
- C. Minimum Staking Requirements: The following survey control shall be provided by Contractor for use in constructing the improvements as shown on the Contract Documents.
 - 1. Rough Grade Staking for parking areas and park improvement areas.
 - 2. Finish Grade Staking for parking area, curbs, walls, gutters, valley gutters, slabs, and sidewalk areas as shown on Drawings.
 - 3. Underground Utilities

- i. Storm Drain – Provide one set of two (2) stakes per storm drainage structure greater than 8-inches in diameter and one (1) stake every 100-feet for line and grade between these structures.
- D. Post Construction Skate Park Documentation: Refer to SECTION 01 31 00 PROJECT COORDINATION, part 1.05 D for requirements.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION 01 73 00

**SECTION 01 77 00
PROJECT CLOSEOUT**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all Specification sections, apply to work of this section.

1.02 SUMMARY

- A. Scope of work: This section specifies administrative and procedural requirements for project closeout that may include but are not necessarily limited to:
 - 1. Inspection and/or observation procedures
 - 2. Project record document submittal
 - 3. Operating and maintenance manual submittal
 - 4. Warranty submittal
 - 5. Final cleaning
- B. Related sections can include, but may not be limited to the following:
 - 1. All pertinent Sections of the Specifications

1.03 DESCRIPTION OF REQUIREMENTS

- A. Definitions: Project closeout is the term used to describe certain collective project requirements, indicating completion of the work that are to be fulfilled near the end of the contract time in preparation for final payment to the Contractor and the normal termination of the Contract.
- B. Specific requirements for site work completion are included in the appropriate sections in Divisions 2 through 16.
- C. Time of closeout is directly related to "Pre-Maintenance Punchlist "completion. This shall be applicable to the other provisions of this section. Contractor is required to fulfill all construction work requirements to the satisfaction of the Owners Representative, that may be described in the Contract Documents prior to requesting the "Pre-Maintenance" inspection.

1.04 PREREQUISITES TO FINAL COMPLETION

- A. General: Complete the following before requesting the Owner's Representative's "Pre-Maintenance" inspection for certification of final completion. List known exceptions to completed work in the request.

- B. In the progress payment request that coincides with, or is the first request following, the date final completion is claimed, provide correspondence indicating either 100% completion of the Work, or provide a list of incomplete portions, the estimated value of incomplete portions, and reasons for the portions being incomplete.
- C. Include supporting documentation for completion as indicated elsewhere in these Contract Documents.
- D. Advise Owner of pending insurance change-over requirements.
- E. Deliver tools, spare parts, extra stock of material and similar physical items to the Owner.
- F. Make the final change-over of locks and transmit the keys to the Owner. Advise the Owner's personnel of the change-over in security provisions.
- G. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities and services from the project site, along with construction tools and facilities, mock-ups and similar elements.
- H. Complete final cleaning up requirements, including touch-up painting of marred surfaces.
- I. Submit full size drafts of all Record Drawings.
- J. Inspection Procedure: Upon receipt of the Contractor's request for "Pre-Maintenance" inspection, the Owner's Representative will either proceed with inspection or advise the Contractor of unfilled prerequisites.
 - 1. Following the "Pre-Maintenance" inspection, the Owner's Representative will advise the Contractor of work which must be performed before Final Acceptance will be issued.
 - 2. Results of the completed "Pre-Maintenance" inspection will form the "Pre-Maintenance Punchlist" for Final Acceptance.

1.05 PREREQUISITES TO FINAL ACCEPTANCE

- A. General: Complete the following before requesting the Owner's Representative's certification of Final Acceptance. List known exceptions, if any, in the request.
 - 1. Submit all outstanding lien releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - 2. Submit a certified copy of the Owner's Representative's "Pre-Maintenance Punchlist" of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.
 - 3. Submit consent of surety.

4. Submit a final liquidated damages settlement statement, acceptable to the Owner (as applicable).
 5. Submit evidence of final, continuing insurance coverage complying with applicable insurance requirements.
 6. Submit final, completed Record Drawings.
- B. Re-inspection Procedure: The Owner's Representative will re-inspect the Work upon receipt of the Contractor's notice that the Work, including the "Pre-Maintenance Punchlist", has been completed, except for those items whose completion has been delayed because of circumstances that are beyond the Contractor's control and are acceptable to the Owner's Representative.
1. Upon completion of re-inspection, the Owner's Representative will either prepare notice of Final Acceptance, or will advise the Contractor of work that is incomplete or of obligations that have not been fulfilled, but are required for Final Acceptance by re-issuing a revised "Pre-Maintenance Punchlist".
 2. If additional and/or still incomplete portions of the Work are discovered and the "Pre-Maintenance Punchlist" is re-issued, the Contractor will be back-charged for the cost of the re-inspection. i.e.: The Contractor is allowed two inspections at closeout. One "Pre-Maintenance" inspection to establish the initial "Pre-Maintenance Punch-list" and one inspection to verify completion of the "Pre-Maintenance Punchlist". Refer to irrigation and planting sections for information relating to final observations associated with maintenance periods.

1.06 PROJECT COMPLETION AND PROJECT ACCEPTANCE

- A. Refer to the General and Supplemental Conditions (as applicable) and SECTION 01 42 00 -REFERENCES, for procedures required to establish Project Acceptance as may be applicable.
1. Final, regular Certificate for Payment (progress payment) shall be issued after all requirements of achieving Project Acceptance are met. Final retention payment shall be made after conclusion of any specified Landscape Maintenance Periods (subject to the discretion of the Owners Representative) and Project Final Acceptance by the City of Lakeport City Council.
- B. Inspection Procedures: Upon receipt of a request for inspection or observation, the Owners Representative shall either proceed or advise the Contractor of unfilled requirements. The Owners Representative may declare Project Acceptance following review of the work or advise the Contractor of what must be completed or corrected by issuance of a "punch-list". Upon receipt of the "punch-list", the Contractor shall complete all work described in a timely manner subject to the discretion of the Owner's Representative.

1. The Owners Representative shall repeat inspection and/or observation when requested provided the Contractor has made the request within the specified lead-time and given written assurance that the "punch-list" work has been completed.
2. Results of the completed inspection and/or observation shall help form the basis of requirements for Project Acceptance (as may be applicable) and if work is found acceptable, may signal the beginning of the specified Landscape Maintenance Period.

1.07 UNCORRECTABLE WORK

- A. Should the Owners Representative determine it is not practical or possible for the Contractor to correct work that is damaged or improperly executed, an equitable deduction from the Contract sum may be made at the sole discretion of the Owners Representative.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 CLOSEOUT PROCEDURES

- A. General Operating and Maintenance Instructions: The Contractor shall arrange for each installer of operating equipment and other work that requires regular or continuing maintenance, to meet at the site with the Owner's personnel to provide necessary basic instruction in the proper operation and maintenance of the entire Work. Where installers are not experienced in the required procedures, the Contractor shall include instruction by the manufacturer's representatives.
- B. As part of this instruction provide a detailed review of the following items:
 1. Maintenance manuals
 2. Record documents
 3. Spare parts and materials
 4. Tools
 5. Lubricants
 6. Fuels
 7. Identification systems
 8. Control sequences
 9. Hazards
 10. Cleaning

11. Warranties, bonds, maintenance agreements and similar continuing commitments.
- C. As part of this instruction for operating equipment the Contractor shall demonstrate the following procedures:
1. Start-up
 2. Shut-down
 3. Emergency operations
 4. Noise and vibration adjustments
 5. Safety procedures
 6. Economy and efficiency adjustments
 7. Effective energy utilization

3.02 CLOSE-OUT SUBMITTALS

- A. Submit two (2) copies of the following, where applicable, in accordance with applicable Contract Documents:
1. Project record documents (as-constructed)
 2. Operation and maintenance manuals
 3. Warranties, guaranties, and bonds
 4. Keys and keying schedule
 5. Spare parts and extra materials
 6. Other items required by the Specifications
- B. Specified number of copies of above close-out submittals shall be received and accepted by the Owners Representative before Project Acceptance shall be given (subject to the discretion of the Owners Representative).
- C. In addition to those items previously mentioned in this section, the Contractor shall submit to the Owners Representative the following items before Final Acceptance:
1. Up-to-date sub-contractor list with names, addresses and telephone numbers.
- D. Final Adjustment of Account:
1. Submit a final statement of accounting to the Owners Representative showing all adjustments to the Contract sum that have not been addressed by Change Order.

3.03 MAINTENANCE MANUALS

- A. All maintenance manuals shall be received and accepted by the Owners Representative before Project Acceptance shall be given (subject to the discretion of the Owners Representative).
- B. Organize operating and maintenance data into properly indexed heavy-duty 2-inch, 3-ring vinyl covered binders. Mark appropriate identification on front and spine of each binder. Manuals can include but are not limited to the following types of information:
 - 1. Emergency instructions
 - 2. Spare parts list
 - 3. Copies of warranties or actual warranty cards
 - 4. Wiring diagrams
 - 5. Recommended "turn around" cycles
 - 6. Inspection procedures
 - 7. Shop drawings and product data
 - 8. Fixture lamping schedule

3.04 DEMONSTRATION

- A. Prior to Project Acceptance, the Contractor shall fully instruct Owners Representative's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems installed.
 - 1. Provide services of factory trained instructors from the manufacturers of each major item of equipment or system, if necessary or requested by the Owners Representative.
 - 2. Operation and maintenance manual(s) shall be fully described at this instruction meeting.
 - 3. Review contents of manual(s) with personnel in full detail to explain all aspects of operations and maintenance such as:
 - i. Maintenance manuals
 - ii. Record documents
 - iii. Spare parts and materials
 - iv. Tools
 - v. Fuels
 - vi. Identification systems
 - vii. Control sequences

- viii. Hazards
 - ix. Cleaning
 - x. Warranties and bonds
 - xi. Maintenance agreements and similar continuing commitments.
- 4. As part of instruction for operating equipment, demonstrate the following procedures:
 - i. Start-up
 - ii. Shutdown
 - iii. Emergency operations
 - iv. Noise and vibration adjustment
 - v. Safety procedures
 - vi. Economy and efficiency adjustments
 - vii. Effective energy utilization

3.05 PROJECT RECORD DRAWINGS AND SPECIFICATIONS (AS-CONSTRUCTED)

- A. Provide in accordance with SECTION 017839 - PROJECT RECORD DRAWINGS.

3.06 WARRANTY/GUARANTY FORMAT

- A. Provide written warranties, guaranties (except manufacturers' standard printed warranties and/or guaranties), addressed to the Owners Representative.

3.07 REMOVAL OF TEMPORARY FACILITIES

- A. Prior to final inspection, the Contractor shall remove tools, materials, sheds, temporary power poles, temporary tree protection and all other articles/materials from the project site. Should the Contractor fail to take prompt action, the Owners Representative may, given 30 days written notice, treat them as abandoned property.

3.08 FINAL CLEANING

- A. General: Special cleaning requirements for specific units of Work are included in the appropriate sections of Divisions 2 through 16. General Cleaning during the regular progress of the Work is required by the General Conditions and is included under SECTION 01 55 00 – TEMPORARY FACILTIES AND CONTROLS.
- B. Cleaning: Provide final cleaning of the Work at the time indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of work to the condition expected from a normal, commercial building

cleaning and maintenance program. Comply with the manufacturer's instructions for operations.

- C. Complete the following cleaning operations before requesting the Owner's Representative's "Pre-Maintenance" inspection.
1. At the completion of the work, thoroughly clean the project area, including fixtures, equipment, walls, floors, and hardware.
 2. Thoroughly clean accumulated debris from sills, ledges, horizontal projections, steps, rails or other surfaces. Plumbing fixtures and natural metals shall be cleaned and polished.
 3. Use only those cleaning materials and methods recommended by manufacturer of the materials to be cleaned, and by the cleaning material manufacturer.
 4. Cleaning materials which will create hazards to health or property, or which will damage surfaces shall not be used.
 5. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from all exposed interior and exterior surfaces.
 6. Remove dust from all horizontal surfaces not exposed to view including light fixtures, ledges, and plumbing fixtures.
 7. Remove labels which are not required as permanent labels.
 8. Clean transparent materials, including mirrors and glass in doors and windows, to a polished condition. Remove putty and other substances which are noticeable as vision- obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 9. Clean exposed exterior and interim hard-surfaced finishes to a dust-free condition, free of dust, stains, films and similar noticeable distracting substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 10. Wipe surfaces of mechanical and electrical equipment clean. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 11. Clean the project site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas to a broom clean condition; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even- textured surface.
 12. Broom clean exterior paved surfaces and adjacent public streets. Utilize appropriate cleaning methods to remove spills, stains, tire tracks, etc. from all paved surfaces. Rake clean other surfaces of the site.

- 13. Hose down and scrub walls and paving surfaces dirtied or stained as a result of the construction work, and as directed by the Owners Representative.
- 14. Remove from the site construction waste, unused materials, excess earth, and debris resulting from the work.
- D. Pest Control: Engage an experienced exterminator to make a final inspection of the project, and to rid the project of rodents, insects and other pests.
- E. Removal of Protection: Except as otherwise indicated or requested by the Owner's Representative, remove temporary protection devices and facilities which were installed during the course of the work to protect previously completed work during the remainder of the construction period.
- F. Compliance: Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at the site. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile or other harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

END OF SECTION 01 77 00

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

- A. Scope of work:
 - 1. Prepare Project Record Drawings of “as-constructed” conditions as required by various sections of these Specifications and whenever work is installed differently than as shown in the Construction Documents “as bid”.
 - 2. Maintain a continually updated Job Set of as-constructed Contract Documents at the job site for review by the Owners Representative at all times.

1.03 REFERENCES AND REGULATORY REQUIREMENTS

- A. State of California Department of Transportation Standard Specifications, current edition.

1.04 RECORD DOCUMENT SUBMITTALS

- A. Submit full Job set to Owners Representative for review and acceptance prior to preparation of final Project Record Drawings.
- B. After acceptance, prepare and submit final Project Record Drawings to Owners Representative at Contract CloseOut. Final Record Drawings shall be received prior to Project Acceptance (subject to the discretion of the Owners Representative).
- C. General: Specific requirements for record documents are indicated in the individual sections of these specifications. Other requirements are indicated in the General Conditions.
- D. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire- resistive location; provide access to record documents for the Owner’s Representative’s reference during normal working hours.
- E. Record Drawings: Maintain a record set of blueprints of contract drawings and shop drawings in a clean, undamaged condition. Mark-up the set of blueprints to show the actual installation where the installed work varies from the work as originally shown. Mark whichever drawing is most capable of showing the actual "field" condition fully and accurately; however, where shop drawings are used for mark-up, record a cross-reference at the corresponding location on the working drawings.

Give particular attention to concealed work that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil and where feasible, use other colors to distinguish between variations in separate categories of work.
 2. Mark-up new information which is known to be important to the Owner, but for some reason was not shown on either contract drawings or shop drawings.
 3. At the completion of project, Contractor shall submit to the Owner's Representative on reproducible sepias furnished by the Owner, all deviations from original drawings clearly indicated. Contractor shall affix an "AS-BUILT" stamp on each sheet and include their company name stamp with signatures on each sheet of "AS-BUILT" reproducible sepias. Submit completed sepias to Owner's Representative for review and approval.
 4. Note related change-order numbers where applicable.
 5. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
- F. Record Specifications: Maintain one complete copy of the specifications, including addenda, and one copy of other written construction documents such as change orders and similar modifications issued in printed form during construction. Mark these documents to show variations in the actual work performed in comparison with the text of the specifications and modifications as issued. Give particular attention to substitutions, selection of options and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data, where applicable.
1. Upon completion of the Work, submit record drawings and specifications to the Owner's Representative for the Owner's records.
- G. Record Product Data: Maintain one copy of each product data submittal. Mark these documents to show significant variations in the actual Work performed in comparison with the submitted information. Include both variations in the products as delivered to the site, and variations from the manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned at a later date by direct observation. Note related change orders and mark-up of record drawings and specifications.
1. Upon completion of mark-up, submit complete set of record product data to the Owner's Representative for the Owner's records.
- H. Record Sample Submitted: Prior to the date of Final Completion, the Contractor shall meet at the site with the Owner's Representative and the Owner's personnel, to determine which, if any, of the submitted samples that have been maintained by the

Contractor during progress of the Work, are to be transmitted to the Owner for record purposes. The Contractor shall comply with delivery to the Owner's sample storage area.

- I. Miscellaneous Record Submittals: Refer to other sections of these specifications for requirements of miscellaneous record- keeping and submittals in connection with the actual performance of the Work. Prior to the date of Final Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Owner's Representative for the Owner's records.
- J. Maintenance Manuals: Organize operating and maintenance data (as applicable) into suitable sets of manageable size. Bind data into individual binders properly identified and indexed. Bind each set of data in a heavy-duty 2-inch, 3-ring vinyl-covered binder, with pocket folders for folded sheet information. Mark the appropriate identification on both front and spine of each binder.
 - 1. Include the following types of information in operation and maintenance manuals:
 - i. Emergency instructions
 - ii. Spare parts listing
 - iii. Copies of warranties
 - iv. Wiring diagrams
 - v. Recommended "turn-around" cycles
 - vi. Inspection procedures
 - vii. Shop drawings and product data

1.05 QUALITY ASSURANCE

- A. Job Set maintenance shall be delegated to one person on Contractor's staff who will be present at all meetings.
- B. Final Record Drawings shall be clearly drafted by a competent draftsman on full-size bond sheets.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store Job Set separate from Construction Document sets in a safe fire-resistant location.
- B. Protect Job Set and completed final Record Drawings from damage at all times.
- C. Maintain all documents in a neat, legible condition.

PART 2 - PRODUCTS – NOT USED

PART 3 – EXECUTION

3.01 MAINTENANCE OF JOB SET

- A. Clearly mark the designated Contract Documents as "Job Set."
- B. Record all deviations from the “as-bid” Contract Documents onto Job Set daily prior to covering of all work that has deviated.
- C. Convert schematic layouts to portray precise physical layout (including depths) of all exposed and concealed work.
- D. Clearly identify deviations by drawing a "cloud" around affected area and make sufficient notations to describe the change.
- E. Contractor shall solely bear any cost of uncovering, recording and re-covering work not recorded on Job Set.

3.02 FINAL RECORD DOCUMENTS

- A. Submit Job Set for review and acceptance by the Owners Representative prior to preparing final Record Drawings.
- B. After acceptance by Owners Representative, the Contractor shall cleanly and clearly draft, on the non-erasable side of the sheet, all information contained in the accepted Job Set. The final Record Drawing sheet material shall be as specified above in 1.05 - Quality Assurance. One set of reproducible Drawings shall be provided for the Contractor by the Owners Representative at no cost.
- C. Deliver the Job Set and final Record Drawings to the Owners Representative prior to Project Acceptance for review and acceptance (subject to the discretion of the Owners Representative).

END OF SECTION 01 78 39

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Formwork for cast in place concrete constructed under Section 03 30 00, with shoring, bracing and anchorage openings for other work, form accessories.
 - 2. Form stripping for cast in place concrete constructed under Section 03 30 00.
- B. Related Sections include the following:
 - 1. Section 03 20 00 - Concrete Reinforcement
 - 2. Section 03 30 00 - Cast-in-Place Concrete
 - 3. Section 05 12 00 - Structural Steel
 - 4. Supply of mechanical items for placement by this Section.
 - 5. Supply of electrical items for placement by this Section.

1.3 REFERENCES

- A. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301- Structural Concrete for Buildings.
- C. ACI 318 - Building Code Requirements for Reinforced Concrete.
- D. ACI 347 - Guide to Formwork for Concrete.
- E. PS 1 - Construction and Industrial Plywood.

1.4 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to Code requirements; resultant concrete to conform to required shape, line and dimension.
- B. Form, shoring and reshoring design shall be the sole responsibility of the Contractor, including metal decking acting as forms. All forms and shoring shall be designed by a Civil or Structural Engineer licensed in the State of California.

1.5 SUBMITTALS FOR REVIEW

- A. Submit under the provisions of the General Conditions- Submittals.
- B. Submit Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints, reveals, chamfers, textures, plugs, tie holes, embedded items, and any item which will be exposed to view in the finished pour..
- C. Review of shop drawings is of a general nature only, and responsibility for conformance with intent of drawings shall remain with the Contractor. Review does not imply or state that fabricator has correctly interpreted the construction drawings.

1.6 QUALITY ASSURANCE

- A. Formwork Standards: Unless otherwise indicated, design, construct, erect, maintain, and remove forms and related structures for concrete work in accordance with applicable requirements of ACI 301, ACI 318, and ACI 347.
- B. Design shoring under direct supervision of the Owner's Representative responsible for the design.
- C. Formwork Surface Materials: Provide material and work quality, which will produce clean and uniform finished surfaces within the allowable tolerances specified and which will conform with the following requirements.
 - 1. Concrete Exposed to View: Provide material and work quality that will produce clean, smooth, and uniform concrete surfaces.
 - 2. Concrete Concealed from View: Provide material and work quality that will produce aligned concrete surfaces free of fins, honeycombs, and stains.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Form Materials: Shall be at the discretion of the Contractor. Forms shall impart a smooth uniform appearance to the concrete without mottles and color variations caused by non-uniform absorption of moisture of chemical reaction. Use only one type of form throughout project for specific element (walls, decks, etc.
- B. For exposed surfaces, use only form panels in good condition and free of defects such as scars, dents, or delaminations.

2.2 FORMWORK ACCESSORIES

- A. Form Ties: Shall be removable or snap-off type with cones. When forms are removed, all metal shall be not less than 1-1/2 inches from the surface and shall not impart fractures, spalls, or other surface defects. Holes from cones shall be patched.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb

moisture, impair surface finish, bonding or coating.

- C. Corners: Provide 3/4 inch chamfers at all external corners, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.
- B. Verify that work from other trades has been completed to the point where formwork installation may properly commence.
- C. Verify that the reinforcing steel has been inspected prior to concealing with formwork.

3.2 EARTH FORMS

- A. Earth forms are permitted where adequate tolerances can be achieved.
- B. Remove loose soil and debris at the bottom of the excavation prior to placing concrete.

3.3 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners.
- G. Vertical form joints are to be plumb and horizontal joints level.
- H. Form ties shall be aligned vertically and horizontally
- I. Special Formwork Sections: Provide openings, offsets, sinkages, keyways, recesses, moldings, rustication strips, chamfers, blocking, screeds, bulkheads, anchorages, embedded items, and other features. Select materials and provide workmanship that will ensure indicated finishes.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate, set in place, and adequately secure items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Do not run conduits, wires or pipes in concrete unless approved by the Owner's Representative. Pipe sleeves shall be provided for thermal expansion.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Provide openings as required for vibrators and concrete placing.
- H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.7 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 117 unless noted otherwise.
- B. Tolerances for class of surface for formed surfaces exposed to view in the completed

structure shall conform to Class A as defined in table 3.1 of ACI 347

- C. Tolerances for class of surface for formed surfaces that will be permanently concealed in the completed structure shall conform to Class C as defined in table 3.1 of ACI 347.
- D. Forms shall have sufficient rigidity so as not to deflect more than 1/8 inch between supports after the concrete has been placed. Maximum deflection of facing materials reflected on concrete surfaces exposed to view shall be 1/240 of the span between structural members of the formwork.
- E. Stop using forms or forming systems that produce excessive undulations until modifications satisfactory to the Owner's Representative are made. The Owner's Representative may reject portions of structures with excessive undulations.

Table 3.1 - ACI 347

Class of Surface Maximum	Abrupt or Gradual Irregularity
A	1/8 inch
B	1/4 inch
C	1/2 inch
D	1 inch

3.8 FORM REMOVAL

- A. Time of form removal shall depend on the strength of the concrete and the curing. The following time periods shall be considered a minimum and may be extended by the Owner's Representative:
 - 1. Forms and shoring in formwork used to support the weight of concrete beams or columns shall remain in place until the concrete has reached the minimum concrete strength specified or 21 days minimum.
 - 2. Side forms of slab on grade shall remain in place for 7 days
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Form removal shall be done at uniform time periods for each type of work throughout the job to ensure uniform color and finish.
- D. All forms below ground surface, with all shores and braces, shall be removed before backfilling.

RE-USE OF FORMS

- A. Re-use of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtained if all forms were new, nor shall quality, appearance, or performance of the final structure be reduced.

END OF SECTION 03 10 00

SECTION 03 20 00
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.

1.2 SUMMARY

- A. This Section Includes the following:
 - 1. Reinforcing steel bars and accessories for cast-in-place concrete constructed under Section 03 30 00.
- B. Related Sections include the following:
 - 1. Section 03 10 00, Concrete Formwork.
 - 2. Section 03 30 00, Cast-in-Place Concrete
 - 3. Section 31 63 00, Drilled Concrete Piers

1.3 REFERENCES

- A. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 - Structural Concrete for Buildings.
- C. ACI 315 – Details and Detailing of Concrete Reinforcing.
- D. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- E. ASTM A706 – Low Alloy Steel Deformed Bars for Concrete Reinforcement
- F. AWS D1.4 - Structural Welding Code for Reinforcing Steel.

1.4 SUBMITTALS

- A. Submit under the provisions of the General Conditions- Submittals.
- A. Shop Drawings: Shall be completely detailed, including bending schedules and bending diagrams, and submitted for review. Shop drawings shall show placing details, size and location of reinforcing steel, and any welding to be done. Shop

drawings shall clearly specify locations of bars. On elevations of beams and columns locate sleeves that conflict with typical details or reinforcing. Shop drawings shall not be copies of Construction Drawings.

- B. Contract documents shall be reviewed for location for anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete. Provisions shall be made so that reinforcing steel will not interfere with the placement of such embedded items.
- C. Reinforcing steel shall not be fabricated or placed before the shop drawings have been reviewed by the Engineer.
- D. Review of shop drawings is of a general nature only, and responsibility for conformance with intent of drawings shall remain with the Contractor. Review does not imply or state that fabricator has correctly interpreted the construction drawings.
- E. Mill Test Reports: Certified mill test reports (tensile and bending strength) for each heat or melt of reinforcing steel shall be submitted before delivery of any material to the site. All sizes of reinforcing for the project shall have a test report. Where reinforcing is to be welded, mill test reports shall verify the weldability of the steel.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Maintain one copy of latest construction documents on site, including design drawings, approved shop drawings and permit drawings.
- C. Special inspections, as required by Section 1705.3 of the California Building Code, shall be provided during construction.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel:
 - 1. ASTM A615, Grade 60, deformed bar, unless noted otherwise.
 - 2. ASTM A706, deformed bars where reinforcement is to be welded.
 - 3. Spiral Reinforcement: ASTM A615 Grade 60, deformed bar.
 - 4. Shall be new, free from rust, scale, oil, and dirt.

2.2 ACCESSORIES

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Plastic, sized and shaped for strength and support of reinforcement during concrete placement conditions.
- C. Where supports bear on earth, use concrete blocks. For surfaces exposed to view, stainless steel support chairs, spacers, or bolsters shall be used.
- D. The use of wood or organic supports or spacers inside the forms is not permitted.
- E. Mechanical Splices: Lenton Standard Coupler (A2), capable of providing a Type 2 splice per ACI 318, as manufactured by Erico or equal with prior approval.
- F. Headed Reinforcement: Lenton Terminator (D6), capable of providing the equivalent of a hooked bar development, as manufactured by Erico or equal with prior approval.

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 301.
- B. Weld reinforcement in accordance with AWS D1.4. As a minimum, use E70 electrodes.
- C. Reinforcing splices not indicated on drawings shall be located at points of minimum stress and approved by the Engineer prior to placement.
- D. In case of fabrication errors do not rebend reinforcement in a manner that will damage or weaken the material.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Reinforcing steel shall be placed in accordance with the Construction Drawings, the reviewed shop drawings, and the requirements of the references. Place, support and secure reinforcement against displacement due to workmen and the placement of concrete. Do not deviate from required position.
- B. Maintain concrete cover around reinforcing as follows unless noted otherwise:

Item	Coverage
Formed, Exposed to Weather	1-1/2 inches
Formed, Exposed to Earth or Weather	1-1/2 inches
Concrete Formed Against Earth	3 inches

- C. Obstructions: Where conduits, piping, inserts, sleeves, etc., interfere with placing of reinforcing steel, obtain acceptance from the Owner's Representative for resolution before placing concrete.

- D. Accommodate placement of formed openings.
- E. Tying: Push in tie wire so that concrete placement will not force the wire ends to the surface of exposed concrete.
- F. Splicing: Locate splices as specified in the Construction Drawings. Stagger splices in adjacent bars wherever possible.
- G. Field Bending: All reinforcing shall be bent cold. Assure that minimum bend radiuses are maintained. Do not rebend reinforcement within 6 inches of previously bent areas without approval from the Owner's Representative. Reinforcing partially embedded in concrete shall not be field bent.

3.2 FIELD QUALITY CONTROL

- A. Schedule inspections with special inspectors and Owner's Representative a minimum of 48 hours prior to placing concrete.
- B. Provide free access to Work and cooperate with Owner's Representative.

END OF SECTION 03 20 00

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Cast-in-place concrete required for this Work as indicated on the drawings and includes, but not necessarily limited to:
 - a. Drilled concrete piers for Arbor, Pergola, Chain Link fence posts, Light Poles and Basketball Goal Posts
 - b. Tie-beams interconnecting drilled concrete piers
 - c. Plinth for steel columns supporting Pergola
- B. Related Sections include the following:
 - 1. Section 03 10 00 - Concrete Formwork.
 - 2. Section 03 20 00 - Concrete Reinforcement.
 - 3. Section 05 12 00 - Structural Steel.
 - 4. Section 31 63 00 – Drilled Concrete Piers

1.3 REFERENCES

- A. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 - Structural Concrete for Buildings.
- C. ACI 302 - Guide for Concrete Floor and Slab Construction.
- D. ACI 308 - Standard Practice for Curing Concrete.
- E. ACI 309 - Guide for Consolidation of Concrete.
- F. ASTM C33 - Concrete Aggregates.
- G. ASTM C94 - Ready-Mixed Concrete.

- H. ASTM C150 - Portland Cement.
- I. ASTM C309 - Liquid Membrane-Forming Compounds.
- J. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

1.4 SUBMITTALS FOR REVIEW

- A. Submit under the provisions of the General Conditions- Submittals.
- B. Submit to the Owner's Representative, the proposed concrete mix designs stamped by a structural or civil engineer currently licensed in the State of California. The submittal should include a history of uses and test reports and product data sheets. All materials, source of materials, admixtures and their proportions. Shrinkage limits of mix design. Whether mix is appropriate for pumping and pump or hose size required to deliver concrete.
- C. Submit curing method for review by the Owner's Representative.
- D. Submit schedule of concrete placement operations before commencing work. Show on one or more plans and/or elevations, locations of construction, contraction and expansion joints.
- E. Submit coordination drawings, indicating all embedded items, penetrations, openings, and other coordination items related to the finished concrete work.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Accurately record actual locations of embedded items, utilities, and components which are concealed from view. Submit to the owner at project closeout.
- B. All test and inspection reports. All transit mix delivery slips.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Maintain one copy of latest construction documents on site, including design drawings, approved shop drawings and permit drawings.
- C. Acquire cement and aggregate from same source for all work.
- D. Special Inspections: The following special inspections, as required by Section 1705.3 of the California Building Code, shall be provided during construction.

1. Concrete, per Section 1705.3; Inspection of concrete placement and compression tests.
2. Reinforcing Steel, per Section 1705.3, during placement of reinforcing.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type II, and shall be provided by one manufacturer.
- B. Pozzolan: ASTM C618, Class F Fly Ash
- C. Aggregates:
 1. Coarse shall conform to ASTM C33 size 57 or 67, or 7.
 2. Fine shall conform to ASTM C33.
 3. Pea Gravel or smooth aggregate shall not be used.
- D. Water: Clean, potable, and not detrimental to concrete.

2.2 ADMIXTURES

1. No admixtures shall be allowed without written acceptance by the Owner's Representative. Admixtures that have a negative impact on concrete finish shall not be used. When more than one admixture is used, admixtures shall be compatible. Provide letter from admixture manufacturer that it is appropriate for proposed mix design.
2. Air Entrainment: ASTM C260; "Daravair", "Micro-Air", manufactured by W.R. Grace, Master Builders or equal.
3. Shrinkage reducing admixture manufactured by W.R. Grace, Master Builders or equal.
4. Superplasticizer admixture may be used to assist placing in concrete moment frame elements such as Daracem 100 manufactured by W.R. Grace, Master Builders or equal.
5. A calcium nitrite based corrosion inhibitor shall be added to the mix at a minimum dosage of two gallons per cubic yard.

2.3 ACCESSORIES

- A. Intentionally Blank

2.4 CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94.

- B. Addition of water to the mix after leaving the plant is not permitted.
- C. Provide concrete to the following criteria:
 - 1. Compressive Strength (28 day): 3,000 psi.
 - 2. Normal Weight Aggregate.
 - 3. Water/Cementitious Material Ratio (maximum): 40 percent by weight.
 - 4. 20% of total cementitious material shall be Fly-Ash (class F).
 - 5. Aggregate Size (maximum): $\frac{3}{4}$ inch.
 - 6. Slump: 4 inches.
 - 7. Drying Shrinkage Limit: 0.04 percent. Drying shrinkage limit is percentage of change in length after 21 days of drying when tested per ASTM C157.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify that anchors, seats, plates, water stops, sleeves, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

- A. Prepare joints in previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Notify Owner's Representative and Special Inspector minimum 48 hours prior to commencement of operations. Do not place concrete until forms and reinforcement as well as other required inspections have occurred and the Special Inspector is present to perform observations and testing during placement.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.

- D. Separate slabs on grade from vertical surfaces as noted on plans or details. Place joint filler to required elevations. Secure to resist movement by wet concrete.
- E. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.
- F. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- G. Place concrete continuously between predetermined contraction joints.
- H. Do not interrupt successive placement; do not permit cold joints to occur.

3.4 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with a smooth-form finish in accordance with ACI 301, unless noted otherwise. Coordinate with Architect.
- B. Provide formed concrete surfaces to be permanently concealed from view with a rough-form finish in accordance with ACI 301, unless noted otherwise.
- C. Provide a 3/4" chamfer on all exposed concrete edges, unless noted otherwise.

3.5 CURING AND PROTECTION

- A. Curing of concrete shall comply with applicable requirements of ACI 301 and ACI 308, except that the curing duration shall be a minimum period of seven days. Curing with earth, sand, sawdust, straw, and hay will not be permitted.
- B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.6 FIELD QUALITY CONTROL

- A. Provide free access to Work and cooperate with Owner's Representative.
- B. Submit proposed mix design of each class of concrete to special inspection and testing firm for review prior to commencement of Work.
- C. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- D. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.

- E. At a minimum one slump test will be taken for each set of test cylinders taken.

3.7 PATCHING

- A. Allow Owner's Representative to inspect concrete surfaces immediately upon removal of forms if defects are present.
- B. Excessive honeycomb, cracking or embedded debris in concrete is not acceptable. Notify Owner's Representative upon discovery. Owner's Representative shall determine if concrete is defective.
- C. Patch imperfections in accordance with ACI 301 or as directed by Owner's Representative.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, quality standards, details, dimensions, tolerances, crack widths greater than 0.015", excessive voids or honeycombs or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Owner's Representative.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect or Owner's Representative for each individual area.
- D. Methods of placing of concrete, pour sequence, and locations of construction joints shall be at the discretion of the contractor unless noted otherwise. Any surface cracks 0.015" or greater in the cured concrete will be repaired by the Contractor using pressure epoxy injection methods in strict conformance with the epoxy manufacturer's recommendations. The repairs will be performed to the satisfaction of the Owner's Representative and at no additional cost to the Owner.
- E. No additional compensation will be allowed for repair of defective concrete.

END OF SECTION 03 30 00

03 37 00
SKATE PARK SHOTCRETE

PART 1 – GENERAL

1.01 SUMMARY

Work included: Provide sprayed-on concrete (concrete conveyed into place by air pressure through a flexible tube or gun with controlled nozzle) referred to herein as shotcrete, complete as shown and as specified for skate park radius and transition work only as shown on the plans.

RELATED WORK:

SECTION 03 52 00 – SKATE PARK STRUCTURE CONCRETE PAVING

SECTION 31 20 00 – EARTHWORK

1.02 QUALITY ASSURANCE

Skate Park Contractor Qualification

1. The skate park structure improvements including finish grading, rebar work, fabricated metal work, concrete work, and shotcrete work require qualification as described herein.
2. Contractors bidding the skate park structure shall have satisfactorily completed the installation of three (3 minimum number) similar skate park projects in accordance with the project plans and written specifications. The qualification can be met by either the prime bidding contractor or a subcontractor bidding to the prime. Qualifying projects must include concrete skate park structures of comparable size, finishes, bowl depths, coping types and features built within the last five (5) years. Qualifying projects by either the prime contractor or the skate park subcontractor must be listed in the bid proposal documents under the section CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS.
3. If Contractor intends to use an ACI certified Nozzleman for Shotcrete installation other than the Nozzleman who performed work for the required qualifying projects, the Contractor must submit three (3) qualifying projects that the ACI Certified Nozzleman has performed. Qualifying project shall be of the same requirement as described herein.
4. Only the Nozzleman referenced with the bid shall be permitted to perform shotcrete work for the said project. Should the Contractor want to substitute the qualifying Nozzleman of record with another Nozzleman, the Contractor shall make an application to the Owner providing all qualifying records of the proposed substitute Nozzleman at least five (5) days in advance of said work.

The Owner shall reserve the right to reject any substitute Nozzleman not meeting the qualifying requirements.

5. The Skate Park Contractor (either prime or subcontractor) shall provide reference for three (3) qualifying reference projects and proposed Nozzleman including location of qualifying projects, size, owner, and owner's contact information in the CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS.

Standards: Comply with the requirements of the current edition of the following codes and standards, except as herein modified:

6. Current UBC "Uniform Building Code".
7. American Concrete Institute (ACI): 506, Chapter 13, Wet Method; Chapter 5, Shotcrete Crew.
8. American Concrete Institute (ACI) "Manual of Standard Practice" Concrete Reinforcing.
9. Steel Institute (CRSI) "Manual of Standard Practice".
10. American Society for Testing Materials (ASTM).
 - i. Concrete Testing: Prepare test specimens by each application crew using the equipment materials and mix proportions proposed for the Project. Owner's Representative shall observe preparation of test panels noting placement of shotcrete by applications crew.
 - ii. Maintain and protect sample transition during construction and test for compliance with Specifications.
 - iii. Test strength of the shotcrete as work progresses as follows: Provide test panels and test in accordance with ASTM42. Test panels shall be taken not less than once each shift or less than one for each 50-cubic yards of shotcrete placed through the nozzle.
 - iv. Shotcrete core grade-2 required.

Acceptance: Final acceptance of the shotcrete will be based upon the results obtained from testing.

Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

Shotcrete Nozzleman shall be certified in accordance with ACI 5063.R. Shotcrete operations shall not be permitted without certified Nozzleman present.

Do not install concrete work over wet, saturated, muddy or frozen subgrade.

No trucks shall be allowed within the areas that have been graded.

1.03 SUBMITTALS

Manufacturer's Data: Current printed specifications with application and installation instruction for proprietary materials including concrete admixtures such as finishing agents/hardener, steel edging primer/paint, and integral concrete color(s) or stain if applicable.

Shop Drawings: shop drawings for all fabricated steel edging and steel accessories.

Mix Design: Submit to Owner's Representative; concrete mix design and letters from material suppliers certifying that materials comply with the standards referenced herein.

Pour Schedule: Contractor to indicate on plans locations to be shot within a day's work and sequence of pours for review by Owner's Representative.

PART 2 – PRODUCTS

2.01 CONCRETE MATERIALS

Portland Cement: ASTM C150, Types I or II, one brand only.

Fly Ash: ASTM C618

Normal Weight Aggregates: ASTM C33 and herein specified. Aggregate shall comply with gradation No. 2 as shown in ACI 506R Table 2.1 if the contractor can show satisfactory performance of an alternate grading under similar conditions of use, the engineer may waive the requirement for gradation No. 2.

1. Combined gradation of coarse and fine aggregate as follows:

Sieve Size U.S. Standard Square Mesh	Percent by Weight Passing Individual Sieves
3/8 in	90-100
No. 4	70-85
No. 8	50-70
No. 16	35-55
No. 30	20-35
No. 50	8-20
No. 100	2-10

2. Batch fine coarse aggregates separately to avoid segregation.
3. Aggregates shall be free from clay, mud, loam, or other deleterious substances.
4. Dune sand, bank run sand, and manufactured sand are not acceptable for fine aggregate. Use one source of sand only for entire project.

5. Coarse aggregate shall be clean, un-coated, heavy media processed aggregate of crushed stone or river washed aggregate.

2.02 ACCESSORIES

Water: Fresh, clean, potable, and free of deleterious acids, mixing, and curing water, as available from Owner's Representative. Transport as required. Water shall not be used to finish, see admixtures.

Admixtures: Use only accepted admixtures meeting the following requirements:

1. Chemical Admixtures: ASTM C494.
2. Evaporation Retardant and Finishing Aid: Burke Film Concentrate – Available from Whitecap Inc. Burk Film Concentrate shall be used in accordance with the manufacture recommendations. All finishing of concrete surfaces must be completed with this product, finishing with water is not allowed.
3. Air-entraining Admixtures: ASTM C1141. Air entraining prior to shooting shall be 1.5-percent to 3.0-percent with a plus-or-minus 1-percent tolerance.
4. Contractor shall submit cut sheets for all proposed admixtures with the concrete mix design.

2.03 PROPORTIONING AND DESIGN OF CONCRETE MIXES

Mix: Prepare design mix to achieve an in-place 28-day compressive strength of 4,000-pounds per square inch and an air content of 4-percent at 28-days. Maximum aggregate size shall not exceed 3/8-inch. Unit weight of in-place shotcrete shall be 494-pounds per cubic yard. Contractor will test the proposed mix designs at his/her expense.

Test Data: Submit for acceptance proportioning and test data from prior experience if available. If data from prior experience are not available or accepted, make, and have tested specimens from three or more different mix proportions in accordance with pre-construction testing requirements of this Specification.

Strength: Selected mix proportions on the basis of compressive strength tests of specimens shall be cut from the shotcrete sample transition not earlier than 5-days after shotcreting. For mix acceptance purposed, average core strengths shall be at least equal to f'_c for cores with L/D of 2.0. For cores with L/D between 1.0 and 2.0, use correction factors given in ASTM C42.

Review: Mix design shall be reviewed for acceptance by Owner's Representative.

See skate park structure legend in plans for shotcrete requirements.

2.04 CONCRETE APPLICATION EQUIPMENT

For Wet Mix Shotcrete:

1. Mixing Equipment: capable of thoroughly mixing aggregate, cement and water in sufficient quantity to maintain continuous placement.
2. Air Supply: Clean air adequate for maintaining sufficient nozzle velocity for parts of work, and for simultaneous operation of blow pipe for cleaning away rebound.
3. Delivery Equipment: capable of discharging aggregate-cement-water mixture accurately, uniformly, and continuously through delivery hose.

2.05 FORMS

Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for horizontal curves of a radius 100-feet or less.

Form-Release Agent: Commercially formulated form-release agent with a maximum of 350 mg/L volatile organic compounds (VOCS) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24-hours after concrete placement. Forms shall provide a continuous straight, smooth surface. Forms shall be of sufficient thickness to withstand pressure of newly placed concrete without bowing or deflecting.

Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

Check completed formwork and screeds for grade and alignment to the following Tolerances:

2. Top of Forms: Not more than 1/8-inch in ten feet.
3. Vertical Face on Longitudinal Axis: Not more than 1/8-inch in 10-feet.

Moisten wood forms immediately prior to placing concrete.

2.06 STEEL REINFORCEMENT MATERIALS

Reinforcement Bars shall be Number 4, Grade 40, deformed or per the plans.

General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement.

Clean reinforcement of loose rust, oil and mill scale, earth, ice, or other bond-reducing materials.

2.07 REQUIRED CURING AND FINISHING MATERIALS

Non-permeable Burleen TM curing blankets or approved equal; ASTM C 171. The concrete should be hard enough to prevent surface damage when covering with concrete blankets.

Water: Potable.

PART 3 – EXECUTION

3.01 INSPECTION

Examination: Owner's Representative shall examine concrete formwork and verify that it is true to line and dimension, adequately braced against vibration, and constructed to permit escape of air and rebound but to prevent leakage during shotcreting.

Inspection: Owner's Representative shall inspect reinforcement steel and items to be embedded in concrete. Correct any deviations from the accepted shop drawings.

Notification: Notify other trades involved in ample time to permit the proper installation of their work.

Existing Surfaces: Examine existing concrete surfaces for unsound material. Correct deficiencies.

3.02 STEEL REINFORCEMENT

General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement.

Clean reinforcement of loose rust, oil and mill scale, earth, ice, or other bond-reducing materials.

Deformed steel bars shall be located at 12-inches on center, both directions, continuous throughout the entire structure and as indicted on the plans. Steel rebar shall extend out from the features for 24-inches, 2-inches above base rock. (Rebar for the flat work shall tie onto the rebar extending for 24-inches from the features.) Lap rebar 24-inches and tie. Stagger joints. Do not heat to bend.

Provide dobie supports for rebar at 36-inches on center. Supports must keep the rebar at 2-inches min. above base rock and 2-inches below finish surfaces of concrete. Rebar shall be 2-inches away from outside surfaces of concrete in all locations. Rebar shall be free of rust, oil and other deleterious conditions.

3.03 PREPARATION FOR INSTALLATION OF CONCRETE

Forms: Use a form-release agent on removable forms to prevent absorption of moisture and to prevent bond with shotcrete.

3.04 CONCRETE BATCHING AND MIXING

Proportions: Mix proportions shall be controlled by weight batching. Owner's Testing Laboratory shall maintain quality control records during shotcrete production.

3.05 CONCRETE PLACEMENT

Placement: Use suitable delivery equipment and procedures that will result in shotcrete in place meeting the requirement of the Specification. Determine operation procedures for placement in extended distances, and around any obstructions where placement velocities and mix consistency must be adjusted. Shotcrete thickness 6" minimum.

Placement Techniques: Do not place shotcrete if drying or stiffening of the mix takes place at any time prior to delivery to the nozzle.

1. Control thickness, method of support, air pressure, and/or water content of shotcrete to preclude sagging or sloughing off. Discontinue shotcreting or provide suitable means to screen the nozzle stream if wind or air currents cause separation of the nozzle stream during placement.
2. Hold nozzle as perpendicular to surface as work will permit, to secure maximum compaction with minimum rebound.
3. In shotcreting walls, begin application at bottom. Ensure work does not sag.
4. Layering:
 - i. Build up layers by making several passes of nozzle over work area.
 - ii. Broom or scarify the surface of freshly placed shotcrete to which, after hardening additional layers of shotcrete are to be bonded. Dampen surface just prior to application of succeeding layers.
 - iii. Allow each layer of shotcrete to take initial set before applying succeeding layers.
 - iv. Use templates fabricated to the specified finish surfaces to ensure exact radii from flat bottom of Skate Park to top of transition. Templates shall be fabricated from steel or ¾-inch Plywood. Check every horizontal foot when applying shotcrete for conformance of intended wall radii. Brace template and place levels at arc to tangent connections to ensure no kinks will be formed. Kinks at the bottom of bowls will not be acceptable. Slumping of the shotcrete causing coping setback will not be acceptable. See Shotcrete Template detail.
5. Placement around Reinforcement:
 - i. Hold the nozzle at such distance and angle to place materials behind reinforcement before any material can accumulate on its face.

- ii. Test to ascertain if any void or sand pockets have developed around or behind reinforcement by probing with an awl or other pointed tool after the shotcrete has achieved its initial set, by removal of randomly selected bars, or coring of other suitable standards.

Finishing: Shotcrete installation crews must have appropriate scaffolding and radial ladders or equal to ensure access for application and finishing of shotcrete.

3.06 REMOVAL OF SURFACE DEFECTS IN CONCRETE

General: Remove and replace shotcrete that lacks uniformity, exhibits segregation honeycombing, or lamination. Or which contains any dry patches, slugs, voids, or pockets. Remove defective areas.

Sounding: Sound work with hammer for voids. Remove and replace damaged in-place shotcrete.

3.07 CONCRETE FINISH

Finish-General: Smooth hard trowel finish that is uniform and free of kinks and irregularities.

Transitions: Floated finish on radial face of wall shall consist of a smooth, hard, uniform surface of smooth trowel. Level the transition to a tolerance of 1/8-inch in 10-feet when vertical with a radial template using the appropriate radii. If horizontal, use a straight edge. Grinding the surfaces will not be an acceptable means of achieving the intended radii.

All horizontal and vertical edges of concrete shall have 1/2-inch radii unless noted otherwise. No Chamfered edges.

All connections between pours must be flush and smooth.

Grinding finished concrete to achieve the specified finishes will not be accepted.

3.08 CONCRETE JOINTS

Cold Joints: Construct true to line with faces perpendicular to surface planes of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated. See Cold Joint Detail.

Sawcut Joints: Form weakened-plane contraction joints, sectioning concrete into areas of approximately 100-square feet. See Jointing Plan for locations. Construct Sawcut joints to a depth of 1-1/2-inches and as follows:

1. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades within 48-hours of any said pour. Cut 3/16-inch-wide joints into concrete when cutting action will not tear, abrade,

or otherwise damage surface and before developing random contraction cracks. See Sawcut Detail.

Expansion Joints:

2. Fill all expansion joints flush with polyurethane elastomeric sealant Sikaflex-2C or approved equal. See Expansion Joint detail in plans. See Jointing Plan for locations.

3.09 CONCRETE PROTECTION AND CURING

General: Protect freshly placed shotcrete from premature drying and excessive cold or hot temperatures.

Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

Evaporation Retarder: Apply evaporation retarder to concrete surfaces according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing. Do not apply to areas to receive concrete stain. See plans for locations.

Apply curing blankets 2-hours after finishing concrete. Overlap blankets 2-feet on all sides. The concrete should be hard enough to prevent surface damage when covering with concrete blankets.

Maintain ongoing moisture of concrete by drip irrigation lines located under curing blankets. Provide ongoing moisture for a minimum of 14-days per finished area of concrete.

Concrete shall be protected from any traffic for 30-days.

The Contractor shall take necessary actions to protect the concrete from any vandalism or damage that may occur as a result of trespassing.

Remove and replace concrete pavement that is broken, under strength, spalling, damaged, or defective, or does not meet requirements in this section.

Drill test cores as directed by Testing Agency when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material.

The Contractor shall remove the curing blankets and the temporary drip irrigation system, as well as hose and sweep concrete pavement not more than 2- days before date scheduled for Substantial Completion inspections.

Grinding concrete to achieve specified finishes will not be allowed.

3.10 PAVEMENT TOLERANCES

Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/8-inch.
2. Thickness: minus 1/4-inch.
3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4-inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1-inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4-inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2-inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge.
8. Length of dowel 1/4-inch per 12-inches.
9. Contraction Joint Depth: Plus 1/4-inch, no minus.
10. Sawcut Joint Width: Plus 3/16-inch, no minus.
11. Plan Dimension 1-inch.
12. Vertical Radii: 1/8-inch over length of transition as checked with true template.

3.11 FIELD QUALITY CONTROL

Independent Testing Agency: The Owner's Independent Testing Agency shall sample materials, perform tests, and submit test reports during concrete placement according to requirements specified.

Testing Services: Testing will be performed according to the following requirements:

1. The CONTRACTOR shall be responsible for all testing requirements noted below. Fees for testing shall be paid for by the CONTRACTOR. The testing lab must be ACI certified for concrete testing. The proposed lab's credentials shall be submitted for approval by the City. If samples are casts, the City requires the lab to cast one for testing and one for the City. If the City chooses to, the City will independently test materials if desired.
2. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C172, except modified for slump to comply with ASTM C94.

3. Slump: AASHTO T119; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
4. Air Content: ASTM C173 or AASHTO T152, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
5. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40-degrees Fahrenheit and below and when 80-degrees Fahrenheit and above, and one test for each set of compressive- strength specimens.
6. Compression Test Specimens: ASTM C31; 1 set of 4-standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
7. Compressive-Strength Tests: ASTM C39; one set for each day's pour of each concrete class exceeding 5-cubic yards, but less than 25-cubic yards, plus 1-set for each additional 50-cubic yard. 1-specimen shall be tested at 7-days and 2-specimens at 28-days; one specimen shall be retained in reserve for later testing if required.

Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Owner's Representative but will not be used as the sole basis for approval or rejection.

Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Owner's Representative. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with AASHTO 501.24(b), or by other methods as directed.

END OF SECTION 03 37 00

SECTION 03 52 00
SKATE PARK STRUCTURE CONCRETE PAVING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes exterior concrete pavement for the following at the Skate Park:
 - 1. Vertical walls, ledges, and footings.
 - 2. Flatwork

1.02 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.03 SUBMITTALS

- A. Submit to Owner's Representative; concrete mix design and letters from material suppliers certifying that materials comply with the standards referenced herein.
- B. Submit to Owner's Representative, shop drawings for all fabricated steel edging and steel accessories.
- C. Submit to Owner's Representative: Cut sheets for finishing aid, steel edging paint, and concrete stain.

1.04 QUALITY ASSURANCE

- A. Skate Park Contractor Qualification
 - 1. The skate park structure improvements including finish grading, rebar work, fabricated metal work, concrete work, and shotcrete work require qualification as described herein.
 - 2. Contractors bidding the skate park structure shall have satisfactorily completed the installation of three (3 minimum number) similar skate park projects in accordance with the project plans and written specifications. The qualification can be met by either the prime bidding contractor or a subcontractor bidding to the prime. Qualifying projects must include concrete skate park structures of comparable size, finishes, transition depths, coping types and features built within the last five (5) years. Qualifying projects by either the prime contractor or the skate park subcontractor must be listed in

the bid proposal documents under the section CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS.

3. If Contractor intends to use an ACI certified Nozzleman for Shotcrete installation other than the Nozzleman who performed work for the required qualifying projects, the Contractor must submit three (3) qualifying projects that the ACI Certified Nozzleman has performed. Qualifying project shall be of the same requirement as described herein.
 4. Only the Nozzleman referenced with the bid shall be permitted to perform shotcrete work for the said project. Should the Contractor want to substitute the qualifying Nozzleman of record with another Nozzleman, the Contractor shall make an application to the Owner providing all qualifying records of the proposed substitute Nozzleman at least five (5) days in advance of said work. The Owner shall reserve the right to reject any substitute Nozzleman not meeting the qualifying requirements.
 5. The Skate Park Contractor (either prime or subcontractor) shall provide reference for three (3) qualifying reference projects and proposed Nozzleman including location of qualifying projects, size, owner, and owner's contact information in the CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS.
- B. Comply with provisions of the following standards, except where more stringent requirements are indicated.
1. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice".
 2. American Concrete Institute (ACI) "Manual of Standard Practice".
- C. Installer Qualifications: The Contractor or an experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Contract.
- D. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- E. Concrete Testing: The Owner's Independent Testing Agency shall perform material evaluation tests.

1.05 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Do not install concrete work over saturated, muddy or frozen subgrade.

1.06 QUALITY INSURANCE

- A. Perform all work in accordance with all rules and standards as required by the Owner's Representative.

PART 2 – PRODUCTS

2.01 EDGE FORMS AND SCREED CONSTRUCTION

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 - 1. Use flexible or curved forms for horizontal curves of a radius 100-feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent with a maximum of 350 mg/L volatile organic compounds (VOCS) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- C. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24-hours after concrete placement. Forms shall provide a continuous straight, smooth surface. Forms shall be of sufficient thickness to withstand pressure of newly placed concrete without bowing or deflecting.
- D. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.
- E. Check completed formwork and screeds for grade and alignment to the following Tolerances:
 - 1. Top of Forms: Not more than 1/8-inch in ten feet.
 - 2. Vertical Face on Longitudinal Axis: Not more than 1/8-inch in 10-feet.
- F. Moisten wood forms immediately prior to placing concrete.

2.02 STEEL REINFORCEMENT MATERIALS

- A. Reinforcement Bars shall be Number 4, Grade 40, deformed or per the plan details.
- B. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement.
- C. Clean reinforcement of loose rust, oil and mill scale, earth, ice, or other bond-reducing materials.
- D. Deformed steel bars shall be located at 12-inches on center, both directions, continuous throughout the entire structure and as indicated on the plan details. Steel rebars shall extend out from the features for 24-inches, 2-inches above base rock. (Rebars for the flat work shall tie onto the rebars extending for 24-inches from the features.) Lap rebars 24-inches and tie. Stagger joints. Do not heat to bend.
- E. Provide dobie supports for rebars at 36-inches on center. Supports must keep the rebars at 2-inches above base rock and 2-inches below finish surfaces of concrete.

Rebars shall be 2-inches away from outside surfaces of concrete in all locations.
Rebars shall be free of rust, oil and other deleterious conditions.

2.03 FABRICATED STEEL EDGING AND COPING

- A. All edging and coping shall be per the plan details with all connections welded and ground smooth.

2.04 CONCRETE MATERIALS

- A. Portland Type II (or V) Cement.
- B. Fly Ash: ASTM C 618, Class F or C.
- C. Aggregate: ASTM C 33, Class 4, from a single source, with coarse aggregate as follows: Aggregate Size: ¾-inch min.; 1-1/2-inches max. nominal. Do not use fine of coarse aggregates containing substances that cause spalling.
- D. Water: Fresh, clean, potable water free of foreign materials.

2.05 REQUIRED CURING AND FINISHING MATERIALS

- A. Water: Potable.
- B. Non-permeable Burleen TM curing blankets or approved equal; ASTM C 171. The concrete should be hard enough to prevent surface damage when covering with concrete blankets.

2.06 CONCRETE MIXES

- A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
- B. Proportion mixes to provide concrete with the following properties:
 - 1. Compressive Strength (28-Days): 4000-psi (6.5 sac min.)
 - 2. Slump Limit: no less than 2-inch and no more than 4-inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content as follows within a tolerance of plus or minus 1.5-4.0 percent.
- D. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
- E. When air temperature is between 85-degrees Fahrenheit and 90-degrees Fahrenheit, reduce mixing and delivery time from 1-1/2-hours to 75-minutes; when air temperature is above 90-degrees Fahrenheit, reduce mixing and delivery time to 60-

minutes. Do not use concrete that has been in transport or pump hoses for more than 90-minutes from time of initial mix.

- F. Concrete mix design shall be submitted to Owner's Representative for review and approval.

2.07 CONCRETE STAMP

- A. Submit proposed stamp to Landscape Architect for approval prior to concrete and stamp placement.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Refer to Geotechnical Report for Site Preparation and Grading requirements. Prepare subbase as required in the Geotechnical report and per the drawings.
- B. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Crushed rock base shall be ¾-inch: Class II Aggregate Base placed at a minimum depth of 6-inches in all locations to receive concrete or as noted otherwise. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement and sample pour has been approved.
- C. Remove loose material from compacted subbase surface immediately before placing concrete.
- D. The Contractor shall keep the project area as clean as possible during construction. The Contractor shall be responsible to clean up and remove all spillage, overpour, discarded forming material, rejected work or material and all refuse or debris resulting from the installation work.

3.02 JOINTS

- A. Cold Joints: Construct true to line with faces perpendicular to surface planes of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Sawcut Joints: Form weakened-plane contraction joints, sectioning concrete into areas of approximately 100-square feet. See Joint Plan for locations. Construct Sawcut joints to a depth of 1-1/2-inches and as follows:
 - 1. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades within 48-hours of any said pour. Cut 3/16-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks. See sawcut detail.

2. Fill joints with flexible epoxy control joint sealer/ adhesive, Sikaflex-2c, ns/sl or approved equal.
- C. Expansion Joints:
1. Fill all expansion joints flush with polyurethane elastomeric sealant Sikaflex-2C or approved equal. See Expansion Joint detail in plans. See Jointing Plan for locations.

3.03 CONCRETE PLACEMENT

- A. Inspection: Before placing any transitional concrete, the Owner's Representative will inspect the completed formwork installation, screed forms, templates, reinforcement steel, and any other items to be embedded or cast in place.
- B. Remove snow, ice, frost or standing water from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Deposit and spread concrete in a continuous operation between transverse joints. When concrete placing is interrupted more than two hours, place a cold joint.
- E. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
- F. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels and joint devices.
- G. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations.
- H. Concrete paving shall be a minimum of five 5-inches thick in all locations or as indicated per the plan details.
- I. Place concrete stamp where indicated per stamp manufacturer's instructions.

3.04 CONCRETE FINISHING

- A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.
- B. Finish: The finished surface of all concrete shall be a hard troweled, smooth finish.

- C. All horizontal and vertical edges of concrete shall have 1/2-inch radii. (unless noted otherwise on plans.)
- D. All connections between pours must be absolutely flush and smooth.
- E. Grinding finished concrete to achieve the specified finishes will not be accepted.

3.05 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.
- C. Apply curing blankets 2-hours after finishing concrete. Overlap blankets two 2-feet all sides.
- D. Maintain ongoing moisture of concrete by drip irrigation lines located under curing blankets. Provide ongoing moisture for a minimum of 14-days per finished area of concrete.
- E. Concrete shall be protected from any traffic for 30-days.
- F. The Contractor shall take necessary actions to protect the concrete from any vandalism or damage that may occur as a result of trespassing.

3.06 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
 - 1. Elevation: 1/8-inch.
 - 2. Thickness: minus 1/4-inch.
 - 3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4-inch.
 - 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1-inch.
 - 5. Vertical Alignment of Tie Bars and Dowels: 1/4-inch.
 - 6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2-inch.
 - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge.
 - 8. Length of dowel 1/4-inch per 12-inches.
 - 9. Joint Spacing: 3-inches.
 - 10. Contraction Joint Depth: Plus 1/4-inch, no minus.
 - 11. Joint Width: Plus 1/8-inch, no minus.

12. Plan Dimension 1-inch.

13. Vertical Radii: 1/4-inch over length of transition as checked with true template.

3.07 FIELD QUALITY CONTROL

- A. The CONTRACTOR shall be responsible for all testing requirements noted below. Fees for testing shall be paid for by the CONTRACTOR. The testing lab must be ACI certified for concrete testing. The proposed lab's credentials shall be submitted for approval by the City. If samples are casts, the City requires the lab to cast one for testing and one for the City. If the City chooses to, the City will independently test materials if desired
- B. Testing Services: Testing will be performed according to the following requirements:
 - 1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C172, except modified for slump to comply with ASTM C94.
 - 2. Slump: AASHTO T119; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 - 3. Air Content: ASTM C173 or AASHTO T152, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air- entrained concrete.
 - 4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40-degrees Fahrenheit and below and when 80-degrees Fahrenheit and above, and one test for each set of compressive- strength specimens.
 - 5. Compression Test Specimens: ASTM C31; 1 set of 4-standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
 - 6. Compressive-Strength Tests: ASTM C39; one set for each day's pour of each concrete class exceeding 5-cubic yards, but less than 25-cubic yards, plus 1-set for each additional 50-cubic yard. 1-specimen shall be tested at 7-days and 2-specimens at 28-days; one specimen shall be retained in reserve for later testing if required.
- C. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Owner's Representative but will not be used as the sole basis for approval or rejection.
- D. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Owner's Representative. Testing agency may

conduct tests to determine adequacy of concrete by cored cylinders complying with AASHTO 501.24(b), or by other methods as directed.

3.08 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, under strength, spalling, damaged, or defective, or does not meet requirements in this Section.
- B. Protect concrete from damage. Exclude traffic from pavement for at least 14-days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material.
- D. The Contractor shall remove the curing blankets and the temporary drip irrigation system, as well as hose and sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.
- E. Grinding concrete to achieve specified finishes will not be allowed.

END OF SECTION 03 52 00

SECTION 05 12 00 STRUCTURAL STEEL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hot-dip Galvanized Structural steel members for arbor construction
 - 2. Hot-dip Galvanized Structural steel members for pergola construction
- B. Related Sections include the following:
 - 1. Section 03 30 00 – Cast-In-Place Concrete
 - 2. Section 06 20 00 – Rough Carpentry
 - 3. Section 31 63 00 – Drilled Concrete Piers
 - 4. Section 09 91 00 – Exterior Painting

1.3 REFERENCES

- A. AISC 360 – Specification for Structural Steel Buildings
- B. ASTM A36 – Structural Steel
- C. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- E. ASTM A307 – Carbon Steel Externally Threaded Standard Fasteners.
- F. ASTM A500 – Cold Form Welded and Seamless Carbon Steel Structural Tubing
- G. AWS D1.1 – Structural Welding Code.
- H. SSPC – Painting Manual

1.4 SUBMITTALS FOR REVIEW

- A. Submit under the provisions of the General Conditions- Submittals.
- B. Submit to the Structural Owner's Representative detailed shop drawings. Shop drawings shall be drawn to scale. Changes to the Construction drawings shall be noted. Structural steel shall not be fabricated or erected before the Owner's Representative has reviewed the shop drawings.
- C. Submit to the Owner's Representative detailed shop drawing showing anchor bolt template layout plan and setting details. Delivery of concrete shall not be scheduled before the Owner's Representative has reviewed the anchor boltshop drawings.
- D. Certified material test reports (mill test) for all structural steel.
- E. Manufacturer's Certifications and product data sheets for all welding filler metal (electrodes).

1.5 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Steel fabricators shall be registered and pre-approved by the Building Official.
- C. Qualification of Welders:
 - 1. All welding shall be performed by operators who are qualified for the types of welds used. Each operator shall have been qualified as prescribed by AWS.
 - 2. Each welder working on the project shall be qualified for each process and position as a result of having performed a weld qualification test using the consumables and procedures to be used on this project.
- D. Visual inspection of welding shall be the primary method to confirm that the procedures, materials, and workmanship incorporated in construction are those that have been specified and approved for the project. Visual inspection shall be conducted by qualified personnel, in accordance with a written practice. Nondestructive testing of welds in conformance with AWS D1.1 shall serve as a backup, but shall not serve to replace visual inspection. All complete and partial penetration welds shall be tested using approved nondestructive methods conforming to AWS D1.1.

- E. The following special inspections, as required by Section 1705.2 of the California Building Code, shall be provided during construction:

Structural Steel Welding:

1. The special inspector shall:
 - a. Ascertain that all fabrication and erection by welding is performed in accordance with the requirements of the approved plans, specifications, the building code and AWS standards.
 - b. Verify that only materials and procedures conforming to the requirements of AWS, AISC, or ASTM, and specified on approved plans are used.
 - c. All field welding.
 - d. Visual inspection of shop welding performed by approved Fabricator using certified Welders with appropriate documentation.
 - e. All welding inspectors shall be trained and thoroughly experienced in inspecting welding operations, and qualified in accordance with AWS D1.1.
2. The Special Inspector shall provide continuous inspection. Continuous inspection includes 3/8 inch and larger fillet welds, multi-pass welds, groove welds, where specifically indicated on drawings, and other welds not listed in Section 3 below. All moment frames designated on plans are special moment frames.
3. Periodic inspections are permitted during welding of the following items, provided visual inspection is conducted prior to completion and/or shipment of shop welds.
 - a. Single-pass fillet welds not exceeding 5/16 in. (7.9mm)
 - b. Floor and roof deck welding.
 - c. Welded studs in structural diaphragm or composite systems.
 - d. Cold-formed studs and joists.
 - e. Stair and Railing Systems.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Plates and bars: ASTM A 36.
- B. Pipe: ASTM A53 Grade B, type E or S.
- C. Steel Tubing: ASTM A500 Grade B.

- D. Mild steel threaded fasteners: ASTM A307.
- E. Welding: AWS D1.1, AISC 341
- F. Welding Electrodes:
 - 1. As required by AISC “specification for structural steel buildings” and AWS code. Electrode selection shall be based on actual properties of connected metals.
 - 2. As a minimum use E70XX electrodes.
 - 3. Use low hydrogen electrodes unless noted otherwise.
- G. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days. SIKAGrout 212 or approved equal.

2.2 CONNECTORS

- A. Intentionally Blank

2.3 PROTECTIVE COATINGS

- A. Structural steel shall be hot dipped galvanized in accordance with the following:
 - 1. ASTM A153 for galvanizing iron and steel hardware.
 - 2. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299” thick and heavier.
- B. Hot-dipped Galvanized structural steel shall be painted where noted on the Landscape Plans. Paint shall be in accordance with the painted coating requirements of Section 09 91 00, “Exterior Painting”.
- C. Touch-Up Primer for Galvanized Surfaces: (2) coats zinc rich primer, ZRC Cold Galvanizing Compound by ZRC Worldwide at 1.5 - 2 mils DFT per coat.

2.4 FABRICATION

- A. General
 - 1. Fabrication will be performed in accordance with Chapter M of AISC “Specification for Structural Steel Buildings” and the Drawings and Specifications.
 - 2. To assure the proper amperage and voltage of the welding process, the use of a hand held calibrated amp and voltmeter shall be used. The fabricator, erector and the inspectors shall use this equipment. Amperage and voltage

shall be measured at the arc with this equipment. Travel speed and electrode stick out shall be verified to be in compliance with the electrode manufacturer's recommendations.

3. Provide holes and accessories required for securing other Work to the Structural steel.
4. Where thickness of plate exceeds 1 inch or the diameter of hole, drill or ream holes after punching. Flame cut holes for fasteners are not acceptable.
5. Fabricate beams and girders with natural camber upward, unless otherwise shown or indicated on the Drawings.
6. When minimum AISC fillet weld thickness requirement exceeds welds shown on details, provide minimum AISC weld
7. After fabrication, all steel shall be cleaned free of rust, loose mill, scale and oil.
8. The Contractor shall be responsible for the control of all erection procedures and sequences including but not limited to temperature differentials and weld shrinkage.
9. Structural elements having fabrication or erection errors or which do not satisfy tolerance limits shall be repaired at no additional expense to owner. Submit drawings showing reasons for, and details of, proposed corrective work for approval by the Owner's Representative prior to performing corrective work.
10. There shall be no field cutting of structural steel members with out prior approval of the Owner's Representative.

B. Architecturally Exposed Steel:

1. Fabricate with special care using materials selected for best appearance. Store materials off ground and keep clean. Cut, fit and assemble work with surfaces smooth, square and with complete contact at joints. Set cambers up. Weld all work continuously; grind smooth and flush to make seams invisible after priming.
2. Welds exposed to view shall be uniformly made and ground smooth. Weld splatter shall be removed.

C. Bolts, General

1. Bolts shall be of a length that will extend entirely through but not more than 1/4-inch beyond the nuts unless otherwise shown on the Drawings.
2. Washers shall be used on Bolts. Use beveled washers where bolts bear on sloping surface.
3. Bolts shall be installed such that no threads occur in the shear plane.
4. Manufacturers symbol and grade markings shall appear on all bolts and nuts.

5. Product containers must be marked so that correspondence with mill reports can be established.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with AISC codes and specifications, and with AWS D1.1.
- B. Secure field measurements required for proper and adequate fabrication and installation of the work. Assume responsibility for exact measurements.
- C. Prior to commencing with the erection of structural steel, the job site shall be inspected to verify that the structural steel may be erected in accordance with the Drawings and Specifications.
- D. Discrepancies:
 1. In the event of discrepancy, immediately notify the Owner's Representative in writing.
 2. Do not proceed with construction in the region of the discrepancy until all such discrepancies have been resolved.
- E. Preparation:
 1. Furnish templates for exact locations of items to be embedded in concrete and masonry, and any setting instructions required for installation.
- F. Erection, General:
 1. Structural steel shall be erected in accordance with Chapter M of AISC Specifications and the Drawings and Specifications.
 2. Care shall be taken to protect work already installed from damages resulting from structural steel erection.
 3. Steel erection may be allowed prior to supporting concrete reaching specified strengths if the contractor provides technical justification and the Owner's Representative concurs.
 4. Erection of architecturally exposed structural steel shall be in accordance with Section 10.4 of AISC Code of Standard Practice.
- G. Temporary Shoring and Bracing:
 1. Provide temporary bracing and shoring adequate to protect the structure against damage due to construction loads and other loads such as wind and seismic forces.
 2. Provide temporary works as necessary to erect the structure.

3. Items installed before concrete is placed shall be properly braced to prevent distortion by pressure of concrete. Watch and maintain bracing during concrete operations.
4. Contractor is responsible for identifying need for temporary construction.

H. Field Assembly:

1. Set structural members to the lines and elevations indicated. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
2. Before assembly clean bearing surfaces and other surfaces which will be in permanent contact after assembly.
3. Splice members only where indicated on Structural Drawings or where accepted by the Owner's Representative.
4. Do not enlarge unfair holes in members by burning or by the use of drift pins. Ream holes that need to be enlarged to admit bolts. Where a hole is required to be enlarged by more than 3/32-inch ream to and use next larger bolt size.
5. Do not use gas cutting torches in the field for correcting fabricating errors in the structural framing unless accepted by the Owner's Representative. Finish gas cut sections equal to a sheared appearance when permitted.
6. The quality of field welds or bolting shall be the same as that performed in the shop.
7. Erection bolts and other erection aids shall be removed from the completed structure.

END OF SECTION 05 12 00

SECTION 05 50 00
METAL FABRICATIONS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Shop fabricated steel items.
- B. Structural members required for arbor construction.

1.03 REFERENCE STANDARDS

- A. All references shall be latest edition.
 - 1. ANSI A14.3 - American National Standard for Ladders -- Fixed – Safety Requirements.
 - 2. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.
 - 3. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 4. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 6. ASTM A 283/A 283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
 - 7. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - 8. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 9. ASTM A 325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric).
 - 10. ASTM A 500/A 500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 11. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 12. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2007.
 - 13. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
 - 14. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

15. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.04 SUBMITTALS

A. Shop Drawings

1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

B. Welders' Certificates

1. Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

PART 2 – PRODUCTS

2.01 MATERIALS – STEEL

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500, Grade B cold-formed structural tubing.
- C. Plates: ASTM A 283.
- D. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.
- E. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 STEEL

- A. Prime paint all steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete or masonry
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: Two coats rust resistant primer.

2.04 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation from Plane: 1/16 inch in 48 inches.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.02 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per 10 feet, non-cumulative.
- B. Maximum Offset from True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 05 50 00

SECTION 05 51 00
SKATE PARK METAL FABRICATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related sections:
 - 1. SECTION 03 52 00 – SKATE PARK STRUCTURE CONCRETE PAVING
 - 2. SECTION 03 37 00 – SKATE PARK SHOTCRETE

1.02 SCOPE

- A. Provide labor, material, and equipment for the installation of the site metal work as shown on the drawings and as specified.

1.03 QUALITY ASSURANCE

- A. Qualification of Fabricators: Experienced in fabrication of miscellaneous metals.
- B. Qualifications of Welders: Welding shall be done only by certified welding operators currently qualified, according to AWS D1.1.
- C. Qualifications of Workmen: Provide at least one person who shall be present at all times during execution of this portion of the work, and who shall be thoroughly familiar with the type of materials being installed, the referenced standards, the requirements of the work, and who shall direct all work performed under this section. Welds indicated may be made in shop or field with approval.
- D. Reference Standards:
 - 1. Steel: Meet requirements of AISC “Specifications of Architecturally Exposed Structural Steel,” latest edition.
 - 2. Welding: Meet requirements of AWS “Structural Welding Code,” D1.1, latest edition.

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit shop drawings for all custom fabricated items under this section to Owners Representative. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories. Indicate welded connections using standard AWS welding symbols.
 - 2. Verification: Verify all measurements at the job. Show dimension, sizes, thickness, gauges, finishes, joining, attachments, and relationship of work to

adjoining construction. Where items must fit and coordinate with finished surfaces and/or constructed spaces, take measurements at site and not from drawings.

3. Coordination: Coordinate with work of SECTION 03 52 00 SKATE PARK STRUCTURE CONCETE PAVING and SECTION 03 37 00 SKATE PARK SHOTCRETE SECTION

- B. Submit steel primer and paint color(s) and product to Owners Representative for review and approval. See Skate Park Jointing and Material Plan.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Storage of Materials: Materials which are stored at the project site shall be above ground on platforms, skids, or other supports. Protect steel form corrosion. Store other material in a weather-tight and dry place until ready for use.
- B. Protection:
 - 1. Use all means necessary to protect miscellaneous metal before, during and after installation and to protect the installed work and materials of all other trades.
 - 2. Protect any adjacent materials or areas below from damage due to weld splatter of sparks during field welding.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

1.06 JOB CONDITIONS

- A. Examine existing conditions in which the work is to be installed. Notify Owner's Representative if conditions are unacceptable to begin work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

1.07 COORDINATION

- A. Templates and Built-ins: Furnish all anchors, fastenings, sleeves, setting templates and layouts affecting or installed in the work of other trades.
- B. Delivery: Where items must be incorporated or built into adjacent work, deliver to trade responsible for such work in sufficient time that progress of work is not delayed. Be responsible for proper location of such items.
- C. Approved sample(s) shall be used as the standard of workmanship and shall remain on site until work has been completed and approved by the Owner's Representative.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. See plan details.
- B. WELDING RODS: E-70 series low hydrogen unless otherwise noted.

2.02 GROUT

- A. Non-shrinking MasterFlow 885, Conrad Sovig's "Metal-Mxs Grout", Sonneborn's "Ferrolith G Redi-Mixed Grout" or approved equal.

2.03 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation for miscellaneous metals, shall be new, first quality of their respective kinds and subject to the approval of the Owner's Representative.

PART 3 EXECUTION

3.01 EXISTING CONDITIONS

- A. Inspection: Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- B. Discrepancies: In the event of discrepancy, immediately notify the Owner's Representative.

3.02 COORDINATION

- A. General: Install metal fabrications in strict accordance with the Drawings, the approved Shop Drawings, and all pertinent codes, regulations and standards.
- B. Delivery: Ensure timely delivery of all metal fabrications that must be installed in other work so as not to delay that work.

3.03 INSTALLATION

- A. General:
 - 1. Install metal fabrications in strict accordance with the drawings, the approved Shop Drawings, and all pertinent codes, regulations and standards.
 - 2. Obtain Owner's Representative review prior to site cutting or making adjustments which are not part of scheduled work.
 - 3. Install items square and level, accurately fitted and free from distortion or defects.
 - 4. Align all metal fabrications as shown on the Drawings, and where vertical or horizontal members are shown, align them straight, plumb and level within a tolerance of 1 in 500.

5. Make provisions for erection stresses by temporary bracing. Keep work in alignment.
6. Replace items damaged in course of installation.
7. Perform field welding in accordance with AWS D1.1
8. After installation, grind and touch-up field welds.

3.04 WORKMANSHIP

- A. Layout: Set all work plumb, true, rigid, and neatly trimmed out. Miter corners and angles of exposed molding and frames unless otherwise noted.
- B. Fitting: Fit exposed connections accurately together to form tight hairline joints.
- C. Labor: Employ only workmen specifically skilled in such work.

3.05 FABRICATION

- A. Shop assemble in largest practicable dimensions, making members true to length so assembling may be done without fillers.
- B. Provide all surfaces free of file marks, dents, hammer marks, wire edges or any unsightly surface defects.
- C. STEEL PIPE COPING: Roll pipe to conform to top radius curve of skate park feature as shown on drawings. Refer to drawings for relational tolerance to concrete surface and other steel.

3.06 ATTACHMENTS AND REINFORCEMENTS

- A. Do all cutting, shearing, drilling, punching, threading, tapping, etc., required for site metalwork or for attachment of adjacent work. If applicable, drill or punch holes; do not use cutting torch.

3.07 OTHER CONNECTORS

- A. Make all permanent connections in ferrous metal surfaces using welds where at all possible; do not use bolts or screws.

3.08 WELDING

- A. Preparation: Remove all rust, paint, scale and other foreign matter. Wire-brush all flame-cut edges. Clamp members as required and alternate welds, all as necessary to prevent warping or misalignment.
- B. Exposed Welds: Uniformly grind smooth (no tolerance) all welds normally exposed to view and feel in the finished work.
- C. Faulty and Defective Welding: Chip out and replace all welding showing cracks, slag inclusion, lack of fusion, bad undercut or other defects ascertained by visual or other means of inspection. Replace and re-weld at no cost to Owner.

D. Field Welding:

1. Procedure: Comply with AWS code of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work. Cold Spray Galvanize on galvanized features when complete.
2. Protection: Protect all adjacent surfaces from damage due to weld sparks, spatter, or tramp metal.

3.09 SURFACE TREATMENT AND PROTECTIVE COATINGS

A. Cleaning:

1. Thoroughly clean all mill scale, rust, dirt, grease, and other foreign matter from ferrous metal prior to priming and painting.
2. Conditions that are too severe to be removed by hand cleaning, shall be cleaned using appropriate methods for solvent cleaning, power tool cleaning and brush-off blast cleaning.

B. Exterior Ferrous Metal:

1. Grind smooth all welds, burrs, and rough surfaces. Clean all coping from grease.
2. Shop coat iron metal items; using anti-rust primer per the Skate Park Material Plan.
3. All welds to be painted with primer after appropriate connections and grinding has taken place. Touch-up all scratched primer prior to shotcrete application.

C. STEEL EDGING PAINTING

1. See Skate Park Jointing and Material Plan for steel edging paint and primer requirements.

3.10 CLEAN-UP

- A. Keep all areas of work clean, neat and orderly at all times. Keep paved areas clean during installation.
- B. Clean up and remove all debris from the entire work area prior to Final Acceptance to satisfaction of Owner's Representative.

END OF SECTION 05 51 00

**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related sections:
 - 1. SECTION 05 12 00 – STRUCTURAL STEEL
 - 2. SECTION 06 18 00 – GLUE LAMINATED STRUCTURAL UNITS

1.01 SECTION INCLUDES

- A. Framing with dimension lumber at arbor and pergola structure.

1.02 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.
- B. Exposed Framing: Dimension lumber not concealed by other construction and indicated to receive a stained or natural finish.

1.03 SUBMITTALS

- A. Product Data for the following products:
 - 1. Non-Glulam framing member. Refer to SECTION 06 18 00 GLUE LAMINATED STRUCTURAL UNITS for additional submittals
 - 2. Metal framing anchors.
 - 3. Wood stain and sealer.
- B. Research or evaluation reports of ICC that evidence the following products' compliance with building code in effect for Project.
 - 1. Metal framing anchors.
 - 2. Power-driven fasteners.

1.04 QUALITY ASSURANCE

- A. Comply with the applicable provisions of the California Code of Regulations (CCR) Title 24, Part 2, California Building Code, current edition.

PART 2 – PRODUCTS

2.01 LUMBER, GENERAL

- A. Lumber Standards: Comply with 2019 CBC Section 2302.1.1 based on DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC Board of Review.
- B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. WCLIB - West Coast Lumber Inspection Bureau.
 - 2. WWPA - Western Wood Products Association.
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
 - 1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.
- D. Framing members for arbor and pergola structure to be Alaskan Yellow Cedar. Grade to be A & Better Clear.
- E. Where nominal sizes are indicated, provide actual sizes required by 2019 CBC section 2303 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.02 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, flat washers.

2.03 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install framing and anchors in accordance with 2019 CBC. See Notes on the Drawings.
- B. Set carpentry work accurately to required levels and lines with members plumb and true.
- C. Fit carpentry work to other work. Scribe and cope as required for accurate fit.
- D. Provide nailers and blocking where required.
- E. Shim with metal or slate for bearing on concrete substrates. Where indicated, grout with 1:3 Portland Cement-Sand grout for full-bearing.
- F. Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards.
- G. Provide washers under bolt heads and nuts in contact with wood.
- H. Countersink nail heads on exposed carpentry work and fill holes.
- I. Fasteners: Use common wire nails, except as otherwise shown or specified herein. Use finishing nails for exposed work. Do not wax or lubricate fasteners that depend on friction for holding power. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required. Do not drive threaded friction type fasteners; turn into place. Tighten bolts and lag screws at installation and retighten as required for tight connections prior to closing in or at completion of work
- J. Install manufactured materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with other work.
- K. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.
- L. Restore damaged components. Protect work from damage.
- M. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate the work with a minimum of joints or the optimum jointing arrangement.

END OF SECTION 06 10 00

SECTION 06 18 00
GLUED-LAMINATED STRUCTURAL UNITS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Section includes glued-laminated timber beams and purlins as indicated on the drawings and includes, but not necessarily limited to:
 - a. Glue-laminated units for the Arbor and Pergola.
- B. Related Sections include the following:
 - 1. Section 05 12 00 - Structural Steel.
 - 2. Section 06 10 00 – Rough Carpentry

1.3 REFERENCES

- A. American Institute of Timber Construction:
 - 1. AITC Timber Construction Manual.
- B. American Nation Standards Institute:
 - 1. ANSI 117 - Standard Specification for Structural Glued Laminated Timber of Softwood Species
 - 2. ANSI A190.1 - Standard for Wood Products - Structural Glued Laminated Timber
- C. American Wood-Preservers' Association:
 - 1. AWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
- D. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard Grading Rules for West Coast Lumber.
- E. Western Wood Products Association:
 - 1. WWPA G-5 - Western Lumber Grading Rules.

1.4 SUBMITTALS FOR REVIEW

- A. Submit under the provisions of the General Conditions- Submittals.

- B. Provide a written warranty against defects in material and workmanship for a period of five (5) years.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Furnish an AITC or American Wood Systems (APA-EWS) Certificate of Conformance stating that the glue-laminated units conform to the specifications to the Structural Engineer.

1.6 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products by acceptable manufacturers that have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Manufacturer of Glue-laminated Products: AITC-licensed, qualified to apply the AITC "Quality Inspected" mark.
- C. Maintain one copy of latest construction documents on site, including design drawings, approved shop drawings and permit drawings.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Glue-laminated units shall be provided with protected during shipment. Refer to section "Source Quality Control" for additional information.
- B. Maintain factory-applied, protective covering until building enclosure is complete and final finishing work is ready to proceed, or provide alternative acceptable to Owner.
- C. Store glue-laminated units on blocks well off ground with individual members separated for air circulation. Cover with water-proof tarpaulins.

PART 2 PRODUCTS

2.1 GLUE-LAMINATED STRUCTURAL UNITS

- A. Lumber Species: Alaskan Yellow Cedar.
- B. Layup combination: 20F-V13 AC/AC.
- C. Appearance Classification: ARCH (Architectural Appearance).

- D. Laminating Adhesive: Adhesive shall be water-proof glue suitable for use under exterior (wet use) exposure conditions.
- E. Camber: Furnish beams with standard camber.
- F. Wood Sealers: Manufacturer's standard colorless, transparent, product to seal ends and cross-grain; compatible with required final finish treatment.

2.2 MATERIALS

- A. Lumber: ANSI/AITC A190.1 and applicable lumber association standards cited therein as necessary for compliance with Project requirements.

2.3 FABRICATION

- A. Verify dimensions and site conditions prior to fabrication.
- B. Shop Assembly: ANSI/AITC A190.1 shop fabricate laminated members to the greatest extent possible; provide member size and configuration indicated; where dimensions are not indicated provide manufacturer's standard size and shapes required to fulfill indicated performances.
- C. Shop-fabricate for connections, and hardware to greatest extent possible, including drilling of bolt holes.
- D. Factory Sealer: Immediately after fabrication, sanding, and end trimming, apply a heavy saturation coat of penetrating sealer on ends and other surfaces of each unit.
- E. Field Finishing of Members: Apply penetrating sealer to glue-laminated units in accordance with Landscape Architect's Drawings. Ensure compatibility between factory applied sealer and required field finish.

2.4 SOURCE QUALITY CONTROL

- A. Factory mark laminated structural units with AITC Quality Inspected mark on timber surfaces which will not be exposed to view in completed work.
- B. Prior to shipping, individually wrap laminated units with manufacturer's standard, opaque, durable, water-resistant, plastic-coated paper covering, with water-resistant seams.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify supports are ready to receive units.
- B. Verify dimensions and site conditions prior installation. Coordinate with Work of other sections.
- C. Comply with recommendations of ANSI/AITC A190.1 Structural Glued Laminated Timber.

3.2 ERECTION

- A. Lift members using protective straps to prevent visible damage.
- B. Set structural members level and plumb, in correct positions or sloped where indicated.
- C. Provide temporary bracing and anchorage to hold members in place until permanently secured.
- D. Fit members together accurately without trimming, cutting, or other unauthorized modification.
- E. Swab and seal interior wood surfaces of field drilled holes in members with primer.
- F. Install Work plumb, true, and properly aligned; locate Work accurately in positions and configurations indicated. Secure members in-place with metal connectors, fasteners, and accessories.
- G. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Fit members together accurately without trimming, cutting, or other unauthorized modification. Do not splice or join members in locations other than those indicated without permission.
- H. Where field cutting and drilling are acceptable, seal cut surface(s).
- I. Prevent damage to members during installation; brace and shore members in place until permanent connections and supporting structure is in place.
- J. Prevent damage and deterioration of installed work. Maintain factory protection on individual members until structure is enclosed and finish work is complete or until protection is no longer necessary.

K. Restore damaged components and finishes or replace damaged members as directed where damage is beyond acceptable repair.

L. Clean and protect work from damage.

3.3 TOLERANCES

A. Framing Members: 1/2 inch maximum from indicated position.

3.4 FIELD QUALITY CONTROL

A. Provide free access to Work and cooperate with Owner's Representative.

END OF SECTION 06 18 00

**SECTION 09 91 00
EXTERIOR PAINTING**

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1.02 DESCRIPTION OF WORK

- A. Primer, paint and finish of HSS columns for pergola and arbor structures, using the combination of materials listed on Painting Schedule in Part 2 of the Section, as specified herein, and as needed for a complete and proper installation.
- B. Related work specified elsewhere includes, but is not limited to, the following:
 - 1. SECTION 05 50 00 – METAL FABRICATION

1.03 SUBMITTALS

- A. General: Contractor shall prepare submittals per Section 01 33 00 SUBMITTAL PROCEDURES.
- B. Product data and MSDS sheets
- C. Brush out samples
 - 1. Provide three Samples of color as specified in Site Schedule for HSS columns, prepared on galvanized substrate for approval by the Landscape Architect.
 - 2. Except as otherwise directed by the Landscape Architect, make sample approximately 8" x 10" in size.
- D. Revise and resubmit each Sample as requested until the required color, and texture is achieved. Such Samples, when approved, will become standards of color and finish for accepting or rejecting the work of this Section.
- E. Do not commence finish painting until approved Samples are on file at the job site.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Paint Coordination
 - 1. Provide finish coats which are compatible with the prime coats actually used.
 - 2. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as required.

3. Notify the Landscape Architect in writing of anticipated problems in using the specified coating systems.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Listed products are Dunn-Edwards or approved equal unless otherwise noted and are used to indicate type of product, quality and performance standards required.
- B. Colors
 1. Use factory mixed colors as selected by Landscape Architect except where job mix is required and directed by Landscape Architect.
 2. Apply sample areas of finish colors to surfaces designated to receive scheduled colors. Sample areas shall be of sufficient size to permit adequate review of the work.

1.06 JOB CONDITIONS

- A. Employ protective coverings, drop cloths, or other suitable means to properly protect any items or surfaces not to be painted. Exercise care to prevent paint being spattered onto prefinished surfaces.

1.07 EXTRA STOCK

- A. Deliver to the owner for use in future modifications an extra stock of a minimum of 2 gallons of each primer and paint color installed under this section. Provide in unopened new containers.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Paint Finishes: Conform to required finish types and systems given below. Schedule is based on products of the Dunn-Edwards Paint Company.
 1. Acceptable paint manufacturers: Sherwin Williams, Sinclair, Benjamin Moore, Fuller O'Brien, Glidden.
- B. Color: Per drawings
- C. Metal Primer
 1. For galvanized metal: Zinc Dust Zinc Oxide Primer.
 2. For ferrous metal: Zinc Chromate Primer.

2.02 EXTERIOR PAINTING SYSTEMS

- A. Metal Work: Primed metal and other metal work except aluminum and prefinished items:
 - 1. One (2) Prime Coat Galvanized Metal Primer (omit if shop primed).
 - Or
 - 2. One (2) Prime Coat – Corrobar 43-5 (omit if shop primed).
 - 3. Two (2) Coats – Rust-Oleum High Performance 7400 System Alkyd Enamels

PART 3 – EXECUTION

3.01 PREPARATION OF SURFACES

- A. Surfaces must be clean and dry, smooth and free from any but minor blemishes which can be readily remedied by surface preparation and painting as given hereunder. Any conditions which will adversely affect this work are to be reported for correction before beginning work.
- B. Metal: shall be free of dust, oil and grease before priming. Clean with mineral spirits or other suitable cleaner.
- C. Remove rust, mill scale and other foreign matter from ferrous metals by sandblasting, wire brushing or other acceptable method.
- D. Carefully examine previously primed metal delivered to job site and spot coat unpainted and damage areas with the appropriate metal primer.
- E. Wash down exposed surfaces of galvanized metal to be painted with pre-treatment wash primer in accordance with manufacturer's instruction. Omit treatment where galvanized metal is shop primed.
- F. Surfaces to receive paint shall be proven dry before painting by using a standard moisture meter if necessary.

3.02 APPLICATION

- A. Spread a drop cloth on the ground around painting item. Tape off the ground or other surfaces surrounding the item.
- B. Apply paint according to manufacturer's directions. Finished work shall be free of runs, sags, brushmarks and other blemishes.
- C. Each coat shall be thoroughly dry and carefully sanded before next coat is applied. Sand sharp corners to a slight radius.
- D. Do not apply paint in damp or rainy weather or to any surface not completely dry.
- E. Do not paint prefinished surfaces or manufacturer's finished items.

END OF SECTION 09 91 00

SECTION 09 93 00
SKATE PARK CONCRETE STAIN

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specifications sections, may apply to work of this section.
- B. Related Sections
 - 1. SECTION 03 52 00 – SKATE PARK STRUCTURE CONCRETE PAVING
 - 2. SECTION 03 37 00 – SKATE PARK SHOTCRETE SECTION

1.02 DESCRIPTION OF WORK

- A. Stain 1: Stain all concrete flatwork with 2-coats of Lithochrome Chemstain Classic by Scofield or approved equal. Color: CS-15 ‘Antique Amber’
Stain 2: Stain all shotcrete and (3) Ledges show on skate park material plan with 2-coats of Lithochrome Chemstain Classic by Scofield or approved equal. Color: CS-13 ‘Copper Patina’.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, including surface preparation and application instructions.
- B. Color Samples: Submit manufacturer's standard color chart for review and approval by Owners Representative.
- C. Applicator's Project References: Submit list of successfully completed projects, including project name and location, name of architect, and type and quantity of concrete floor stain applied. Maintenance Instructions: Submit manufacturer's maintenance and cleaning instructions.

1.04 QUALITY ASSURANCE

- A. Applicator's Qualifications:
 - 1. Successful experience in application of similar concrete floor stains.
 - 2. Employ persons trained for application of concrete floor stains.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying manufacturer, product name, and color.

B. Storage:

1. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
2. Keep containers sealed until ready for use.
3. Concrete Cleaner: Keep from freezing.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Apply concrete floor stain when air and surface temperatures are between 40 degrees Fahrenheit and 90 degrees Fahrenheit during application and a minimum of 48 hours after application.
- B. Exterior Surfaces: Do not apply materials in wet weather.

1.07 SEQUENCING

- A. Prepare surface and apply concrete floor stain after skate park concrete has been installed.

PART 2 – PRODUCTS

2.01 MANUFACTURER

- A. LM Scofield CO or approved equal.

2.02 CONCRETE FLOOR STAIN

- A. Concrete Floor Stain: LM Scofield CO. or approved equal.
1. Description: Ready-to-use, penetrating, acid base stain that chemically reacts with cement on surface to permanently stain concrete to create transparent appearance. Color: See Add Alternate Plan. Final color selection and locations to be confirmed with Owners Representative.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive concrete floor stain. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.02 SURFACE PREPARATION

- A. Protection: Protect walls, adjacent surfaces, surrounding areas, and vegetation from overspray, runoff, and contact with concrete floor stain.
- B. Prepare concrete floor surface in accordance with manufacturer's instructions.
- C. New Concrete:
 - 1. Concrete shall be as specified. Do not apply curing compounds, sealers, or water repellents.
 - 2. Remove excess release agents.
 - 3. Allow concrete to cure a minimum of [30] days.
- D. Ensure concrete surface is clean, dry, structurally sound, and free from dirt, dust, debris, oil, grease, tar, tire marks, adhesive, paint, curing compounds, sealers, wax, and other surface coatings
- E. Pre-Cleaning Concrete: Do not use acid to pre-clean concrete.

3.03 APPLICATION

- A. Apply concrete floor stain in accordance with manufacturer's instructions at locations herein and in coordination with Construction Inspector.
- B. Keep material containers closed when not in use to avoid contamination.
- C. Apply 2-coats of undiluted stain.
- D. Dilute stain with clear stain reducer if colors are too strong per the direction of the Owners Representative.
- E. Allow first coat of stain to dry before applying second coat.
- F. Allow second coat of stain to dry overnight before neutralizing and washing surface to remove stain residue.

3.04 FIELD QUALITY CONTROL

- A. Test inconspicuous area of concrete for color and reactivity of concrete floor stain for approval by Owners Representative.
- B. Test concrete surface after surface preparation and before application.

3.05 PROTECTION

- A. Protect stained concrete floor from damage during construction.
- B. Protect concrete surfaces from foot traffic for a minimum of 24 hours after application of concrete floor sealer.

END OF SECTION 09 93 00

**SECTION 10 73 00
PROTECTIVE COVERS**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related Sections:
 - 1. SECTION 31 20 00 – EARTHWORK
 - 2. SECTION 03 30 00 - CAST-IN-PLACE CONCRETE
- C. DESCRIPTION OF WORK
 - 1. Installation of Owner Provided metal protective covers for use as shade shelters.

PART 2 – PRODUCTS

2.01 SHELTER SYSTEM AND MATERIALS

- A. MANUFACTURER- Basis of Design:
 - 1. Poligon, 4240 136th Ave, Holland, MI 49424 or approved equal
Contact: All About Play Contact: Dan Baxter (916)-923-2180
Dan@playgroundpros.com
- B. MATERIAL- Per Site Schedule and Reference Drawings

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install each shade structure and hardware item in compliance with the manufacturers' engineered drawings, instructions, and recommendations.
- B. Install shade structures in a timely manner and coordinate with the work of other trades.
- C. Securely fasten all parts to be attached. Make sure all parts interact freely and smoothly without binding, sticking or excessive clearance.

3.02 PROTECTION AND MAINTENANCE

- A. The contractor reserves the right to repair or replace any item covered by the warranty.

- B. Shade structures located in areas where they may be subject to damage during construction by handling, cleaning, etc. (i.e. painting, cleaning of concrete block) shall be protected and or removed from the location until the hazardous condition is terminated.
- C. Shade shelters must be inspected, and maintenance done at least once a year. Refer to the maintenance book supplied.

END OF SECTION 10 73 00

SECTION 11 68 00
SPORTS EQUIPMENT AND STRUCTURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related Drawings:
 - 1. SECTION 03 30 00 – CAST-IN-PLACE CONCRETE
 - 2. SECTION 32 11 23 – AGGREGATE BASE COURSES
 - 3. SECTION 32 18 16.13 – PLAYGROUND PROTECTIVE SURFACING
 - 4. SECTION 32 18 23 – ATHLETIC SURFACING

1.02 DESCRIPTION OF WORK

- A. Provide all necessary materials, labor, tools and equipment to perform the work included in the section for the installation of freestanding and composite sport and fitness equipment.
 - 1. Fitness equipment has been purchased by the City. Contractor to install. Contractor to coordinate and provide delivery from City staging area to project site.
 - 2. Additional sports equipment to be purchased and installed by Contractor unless noted otherwise in project plans.

1.03 SUBMITTALS

- A. General: Submit under the General and Special Provisions section of the Project Specifications provided by the City.
- B. Product Data: Submit manufacturer's "cut-sheets," technical data, installation instructions, warranties, and finish/color samples for all equipment listed, in compliance with SECTION 01 33 00 SUBMITTAL PROCEDURES.
- C. Qualification Data: For the qualified installer and Equipment to be IPEMA certification.
- D. Product Certificates: For each type of sports equipment purchased by the contractor, from the manufacturer.
- E. Warranty: Sample product warranty.
- F. Material Certificates: For the following items, from the manufacturer:
 - 1. Shop finishes.

1.04 JOB CONDITIONS

- A. Contractor is solely responsible to protect all equipment from any damage or vandalism until acceptance of project, or written acceptance of individual equipment.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Installation must be completed by a manufacturer approved installer.
- B. Safety Standards: Provide fitness equipment complying with or exceeding the requirements in ASTM F 1487-17.
- C. Manufacturer Qualifications: A firm whose fitness equipment components have been certified by IPEMA's third-party product certification service.

1.06 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fitness equipment that fails in materials or workmanship within the specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - i. Structural failures.
 - ii. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Warranty period: Five years from date of contract acceptance.

PART 2 - PRODUCTS

2.01 SPORTS EQUIPMENT

- A. Basis of Design Manufacturers:
 - 1. Landscape Structures Inc. Contact: Jon Bawden, Ross Recreation. Phone (707) 736-6890 or jonb@rossrec.com (City purchased, for included for reference)
 - 2. LA Steelcraft. Contact: LA Steelcraft.com
 - 3. Or Approved Equal.
- B. Colors: As shown on the drawings

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, site surface and subgrade drainage, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading required for placing protective surfacing is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Verify locations of perimeter curb and pathways. Verify that layout and equipment locations comply with requirements for each type and component of equipment.

3.03 EQUIPMENT INSTALLATION

- A. All equipment to be installed per the manufacturer's specifications.
- B. To guide installation, each structure shall be accompanied by bills of materials, written instructions, an erection plan view drawing, and a footing plan location drawing to be furnished prior to or with the delivery of the structure. To facilitate assembly, each part shall be indelibly stenciled with an easily-read identification number keyed to the bills of materials and erection drawings. All components shall be shipped unitized, protectively wrapped, banded for mechanical handling and ready for assembly.
 - 1. Maximum Equipment Height: Coordinate installed heights of equipment and components with finished elevations of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that fitness equipment elevations comply with requirements for each type and component of equipment.
- C. Install all fitness equipment per manufacturer's instructions in conjunction with all Contract Documents. Immediately notify Owners Representative of any conflicting information or discrepancies.
- D. Immediately after installation of adjacent paving, plantings, or other fixtures, contractor shall completely wash down fitness equipment contained within the area until clean and free of debris.
- E. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.

- F. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.
- G. Post Set with Concrete Footing: Comply with ACI 301 for measuring, batching, mixing, transporting, forming, and placing concrete.
 - 1. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.
 - i. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
 - 2. Embedded Items: Use setting drawings and manufacturer's written instructions to ensure correct installation of anchorages for equipment.
 - 3. Concrete Footings: Install per SECTION 03 30 00 – Cast-In-Place Concrete. Smooth top, and shape to shed water.

3.04 QUALITY CONTROL

- A. Upon completion of the installation of fitness equipment products/parts, the fitness area shall be inspected and certified compliant by:
 - 1. A qualified inspector to assess conformity with the requirements given in ASTM F3101-21a and adherence to the recommendations set forth by the manufacturer.
- B. Notify the Owner's representative 48 hours in advance of date and time of final inspection.
- C. Provide certification to the City that equipment conforms to the above requirements.

3.05 MAINTENANCE

- A. Contractor shall maintain all equipment in a first-class, new condition until project final acceptance, or written acceptance of individual equipment.

END OF SECTION 11 68 00

SECTION 12 93 00
SITE FURNISHINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.

1.02 SECTION INCLUDES

- A. This section includes specifications for (some items are owner furnished / contractor installed):
 - 1. Benches
 - 2. Bike Racks
 - 3. Trash and Recycling Receptacles
 - 4. Picnic Tables
 - 5. Bollards

1.03 DESCRIPTION OF WORK

- A. Refer to drawings and construction details for location and further description of site furnishings.
- B. Types of furnishings required are listed in the Site Schedule located on the Site Plan, sheet L-3.0
- C. Acceptable manufacturers are listed in the Site Schedule; or approved equal.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed installation of site furnishings similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing site furnishings similar to those required for this project and with a record of successful in-service performance.
- C. Source Limitations: Obtain each color, finish, shape and type of site furnishing from a single source with resources to provide components of consistent quality in appearance and physical properties.
- D. Product Options: Drawings indicate size, shape and dimensional requirements of site

furnishings and are based on the specific system indicated.

1.05 SUBMITTALS

- A. Product Data: For products to be purchase by the contractor, submit manufacturer's "cut-sheets," technical data, installation instructions, warranties, and finish samples for all site furnishings listed, in compliance with General and Special Provisions Section "Submittal Procedures" and SECTION 01 33 00 SUBMITTAL PROCEDURES.
- B. Manufacturer's warranties, as applicable.
- C. Maintenance Data: For each site furnishing
 - 1. Include recommended methods for repairing damage to the finish.

1.06 JOB CONDITIONS

- A. Contractor is solely responsible to protect all site furnishings from any damage or vandalism until acceptance of project, or written acceptance of individual site furnishings.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area in accordance with manufacturer's instructions. Keep materials in manufacturer's original, unopened containers and packaging until installation.
- C. Handling: Protect materials and furniture during handling and installation to prevent damage.

1.08 WARRANTY

- A. Manufacturer's Warranty Information:
 - 1. Products will be free from defects in material and/or workmanship for a period of three years from the date of invoice.
 - 2. The warranty does not apply to damage resulting from accident, alteration, misuse, tampering, negligence, or abuse.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Site Furnishings shall be as specified on plans and details, or equal, as approved by

Owner's Representative. If so desired, the Contractor may submit "or equal" site furnishings to the Owner's Representative a minimum of three (3) working days prior to bid date.

- B. When requesting a substitution, it is the Contractor's responsibility to provide the Owner's Representative with a "side by side" comparison of the specified item and the proposed "or equal" to demonstrate equality of size, style, finish, quality and strength. Requests for "or equal" substitutions must be approved in writing by the Owner's Representative prior to bid date.
- C. All furnishings shall be designed and constructed specifically for commercial outdoor use. All furnishings shall be heavy-duty and designed for stability.
- D. All pre-cast concrete to be factory finished with anti-graffiti coating, and free of manufacturing defects such as scratched surfaces, gouges, and honeycombing.
- E. All metal furniture to be powder coated, factory finished or stainless, as appropriate.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until site is properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install all site furnishings per respective manufacturer's instructions in conjunction with all Contract Documents. Immediately notify Owners Representative of any conflicting information or discrepancies. As applicable, install all in-ground site furnishings with their concrete footings sufficiently below finish grade to allow for installation of specified finish materials above unless noted otherwise.
- B. Immediately after installation of adjacent paving, plantings, or other fixtures, contractor shall completely wash down site furnishings contained within the area until clean and free of debris. Do not use harsh cleaning materials or methods that could damage finish.
- C. Component Damage: Remove and replace damaged components that cannot be successfully repaired as determined by Owner's representative.

- D. Protect installed furniture to ensure that, except for normal weathering, it will be without damage or deterioration at time of Substantial Completion.

3.04 CLEAN-UP AND PROTECTION

- A. Protect installed product until completion of project.
- B. Touch up, repair or replace damaged products.

3.05 MAINTENANCE

- A. Contractor shall maintain all site furnishings in a first-class, new condition until project final acceptance, or written acceptance of individual site furnishings.

END OF SECTION 12 93 00

SECTION 13 34 23
PRE-FABRICATED RESTROOM STRUCTURE

A. General, Specifications and Clarification of Prefabricated Building and Site Installation

1. This portion of the bid specifications does not follow the CSI standard format as the prefabricated structure in this bid is an offsite constructed “product” and not “typical” general construction.
2. The installation of the product on site is general construction, which must be coordinated between the general contractor and the building manufacturer. Specifications for the building foundation/pad shall be provided herein by the specified design/build subcontractor. Due to the responsibility of the specified building manufacturer for architecture, engineering and a five-year warranty, the site pad/foundation must meet the building manufacturer’s design so the pad and building can be considered from a single source for warranty purposes. The building manufacturer must accept the pad and compactions tests before they take responsibility for the entire system under their warranty.

B. General Contractor Coordination with Design/Build Manufacturer

1. The specified prefabricated building requires coordination between the General Contractor (who prepares the site pad and delivery access for the prefabricated building) and the prefabricated restroom building manufacturer (who completes the architectural design, engineering, off-site building construction, delivery and installation on site). The General Contractor shall allow for coordination with the building manufacturer in their project bid.

C. General Contractor, General Scope of Work

1. The general contractor for this project is responsible for the site survey and staking the building locations, finished slab survey elevations and marking on site, construction and compaction of the required building pads; access to the site for a large crane and tractor trailers delivering the prefabricated building; providing water, sewer, and power at a point of connection (POC) within 6 feet of the building and at the depth required by the building manufacturer and local code; and the installation of any sidewalks or hardscape outside the building footprint.
2. The general contractor is responsible for verification to the building manufacturer design/build firm that there are no unanticipated site delivery issues such as overhead wires, trees, tree roots, or existing grade changes and that prevent a clear path of travel between a roadway and the final site exists for a tractor trailer and crane to expedite delivery. The design/build building manufacturer requires that the general contractor certify that the required delivery crane must be able to set the building modules within 35’ distance from the center of the building to the center of the crane hoist.

D. Site Scope of Work by General Contractor

The general contractor shall prepare the building subgrade to receive the prefabricated building in accordance with the bid subgrade preparation drawings or foundation plan.

1. The building subgrade/footings shall be constructed per the bid drawings
2. The General Contractor shall provide water point of service at 30" below finished building slabs; sewer at 24" below the finished building slabs; and electrical at 36" below the finished building slabs or other per bid plans.
3. General Contractor shall coordinate with subcontractor to provide full site delivery access for a 70' tractor-trailer and hydro crane to the final building sites.
4. If the final site access is over existing sidewalks, utilities, or landscaping, the General Contractor shall be responsible for plating and or tree trimming, utility line removal, or other to protect any existing conditions.
5. The hydro crane must be able to locate no greater than 35' from the center point of the building to the center point of the crane.
6. The utilities shall be furnished per bid site plans at specified points of connection (POC) nominally 6' from the building lines.
7. General contractor shall furnish and install final grading, landscaping and sidewalks/hardscape.

E. Connection to Utilities

1. The restroom subcontractor will stub-out: Electrical, Water, and Sewer at the proper POINT OF CONNECTION AND AT THE PROPER ELEVATION BELOW GRADE, for this project. Restroom subcontractor shall provide final hook up of the water from building to POC; sewer hookup to POC; and electrical sleeve from building panels to POC only. Final utility connections shall be by General Contractor or others. General contractor shall flush the water lines thoroughly before making final water connection to the building. **Thoroughly flushing the water lines for AT LEAST 30 MINUTES is critical to ensure that the new code required low-flow fixtures and flush valves that are extremely sensitive to particulate matter in the water will not malfunction.**

F. Shipping Protection

The building, while traveling over roads to the destination may encounter inclement weather or road grime that could require substantial cleaning when it arrives on site. The building shall be shrink-wrapped before transportation and sufficiently strong to arrive at the owner site intact for exterior finish protection. Materials removed on site shall be disposed of and recycled by restroom building install staff.

G. Certifications

Building shall be certified in compliance with the plan approval by the State of California, Department of Housing and Community Development. The building shall be delivered with an applied insignia; in compliance with all State regulations. The local building authority shall provide site inspections for the underground mechanical piping and final connections, footings, and access issues outside the restroom footprint.

END OF SECTION 13 34 23

SECTION 26 05 00
GENERAL ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.01 Description of Work:

- A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations that are shown on the Drawings, included in these specifications, or otherwise needed for a complete and fully operating facility.
- B. Furnish and install all required in-place equipment, conduits, conductors, cables and any miscellaneous materials for the satisfactory interconnection and operation of all associated electrical systems.

1.02 Related Work:

- A. This Section provides the basic Electrical Requirements which supplement the General Requirements of Division 01 and apply to all Sections of Division 26.

1.03 Submittals:

- A. As specified in Division 01. Submit to the Architect shop drawings, manufacturer's data and certificates for equipment, materials and finish, and pertinent details for each system specified. Information to be submitted includes manufacturer's descriptive literature of cataloged products, equipment, drawings, diagrams, performance and characteristic curves as applicable, test data and catalog cuts. Obtain written approval before procurement, fabrication, or delivery of the items to the job site. Partial submittals are not acceptable and will be returned without review. Furnish manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Industry and Technical Society Publication References, and years of satisfactory service of each item required to establish contract compliance. Photographs of existing installations and data submitted in lieu of catalog data are not acceptable and will be returned without approval.
- B. Organize submittals for equipment and items related to each specification section together as a package.
- C. Proposed substitutions of products will not be reviewed or approved prior to awarding of the Contract.

- D. Substitutions shall be proven to the Architect or Engineer to be equal or superior to the specified product. Architect's decision is final. The Contractor shall pay all costs incurred by the Architect and Engineer in reviewing and processing any proposed substitutions whether or not a proposed substitution is accepted.
- E. If a proposed substitution is rejected, the contractor shall furnish the specified product at no increase in contract price.
- F. If a proposed substitution is accepted, the contractor shall be completely responsible for all dimensional changes, electrical changes, or changes to other work which are a result of the substitution. The accepted substitution shall be made at no additional cost to the owner or design consultants.

1.04 Quality Assurance:

- A. Codes: All electrical equipment and materials, including installation and testing, shall conform to the latest editions following applicable codes:
 - 1. California Electrical Code (CEC).
 - 2. Occupational Safety and Health Act (OSHA) standards.
 - 3. All applicable local codes, rules and regulations.
 - 4. Electrical Contractor shall possess a C-10 license and all other licenses as may be required. Licenses shall be in effect at start of this contract and be maintained throughout the duration of this contract.
- B. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply.
- C. Standards: Equipment shall conform to applicable standards of American National Standards Institute (ANSI), Electronics Industries Association (EIA), Institute of Electrical and Electronics Engineers (IEEE), and National Electrical Manufacturers Association (NEMA).
- D. Underwriter Laboratories (UL) listing is required for all equipment and materials where such listing is offered by the Underwriters Laboratories. Provide service entrance labels for all equipment required by the NEC to have such labels.
- E. The electrical contractor shall guarantee all work and materials installed under this contract for a period of one (1) year from date of acceptance by owner.

- F. All work and materials covered by this specification shall be subject to inspection at any and all times by representatives of the owner. Work shall not be closed in or covered before inspection and approval by the owner or his representative. Any material found not conforming with these specifications shall, within 3 days after being notified by the owner, be removed from premises; if said material has been installed, entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the contractor.

1.05 Contract Documents:

A. Drawings and Specifications:

1. In the case of conflict between the drawings and specifications, the specifications shall take precedence.
2. Drawings and specifications are intended to comply with all law, ordinances, rules and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, said laws, ordinance, rules and regulations shall be considered as a part of said Contract Documents within the limits specified. The Contractor shall bear all expenses of correcting work done contrary to said laws, ordinance, rules and regulations if the Contractor knew or should have known that the work as performed is contrary to said laws, ordinances, rules and regulations and if the Contractor performed same (1) without first consulting the Architect for further instructions regarding said work and/or (2) disregarded the Architect's instructions regarding said work.

B. Drawings: The Electrical Drawings shall govern the general layout of the completed construction.

1. Locations of equipment, panels, pullboxes, conduits, stub-ups, ground connections are approximate unless dimensioned; verify locations with the Architect prior to installation.
2. Review the Drawings and Specification Divisions of other trades and perform the electrical work that will be required for those installations.
3. Should there be a need to deviate from the Electrical Drawings and Specifications, submit written details and reasons for all changes to the Architect for approval.
4. The general arrangement and location of existing conduits, piping, apparatus, etc., is approximate. The drawings and specifications are for the assistance and guidance of the contractor, exact locations, distances and elevations are governed by actual field conditions. Accuracy of data given herein and on the drawings is not

guaranteed. Minor changes may be necessary to accommodate work. The contractor is responsible for verifying existing conditions. Should it be necessary to deviate from the design due to interference with existing conditions or work in progress, claims for additional compensation shall be limited to those for work required by unforeseen conditions as determined by the Architect.

5. All drawings and divisions of these specifications shall be considered as whole. The contractor shall report any apparent discrepancies to the Architect prior to submitting bids.
6. The contractor shall be held responsible to have examined the site and compared it with the specifications and plans and to have satisfied himself as to the conditions under which the work is to be performed. He shall be held responsible for knowledge of all existing conditions whether or not accurately described. No subsequent allowance shall be made for any extra expense due to failure to make such examination.

1.06 Closeout Submittals:

- A. Manuals: Furnish manuals for equipment where manuals are specified in the equipment specifications or are specified in Division 01.

1.07 Coordination:

- A. Coordinate the electrical work with the other trades, code authorities, utilities and the Architect.
- B. Provide and install all trenching, backfilling, conduit, pull boxes, splice boxes, etc. for all Utility Company services to the locations indicated on the Drawings. All materials and construction shall be in accordance with the requirements for all the Utility Companies. Prior to performing any work, the Electrical Contractor shall coordinate with the various Utility Companies and obtain utility company engineering drawings. Verify that all such work and materials shown on the Drawings are of sufficient sizes and correctly located to provide services on the site. The Electrical Contractor shall verify with all the Utility Companies that additional contractor furnished and installed work is not required. If additional work, materials, or changes are required by any of the Utility Companies, the Electrical Contractor shall advise the Architect of such changes and no further work shall then be performed until instructed to do so by the Architect. The Electrical Contractor shall coordinate with the various Utility Companies to schedule inspections and to obtain service connections.

- C. The Electrical Contractor shall schedule all utility work necessary for utility inspections, connections, cable installation, etc. for the new electrical service to meet the construction schedule.
- D. Utility Company charges shall be paid by the Owner.
- E. Contractor shall pay all inspection and other applicable fees and procure all permits necessary for the completion of this work.
- F. Where connections must be made to existing installations, properly schedule all the required work, including the power shutdown periods.
- G. When two trades join together in an area, make certain that no electrical work is omitted.

1.08 Job Conditions:

- A. Operations: Perform all work in compliance with Division 01.
 - 1. Keep the number and duration of power shutdown periods to a minimum.
 - 2. Show all proposed shutdowns and their expected duration on the construction schedule. Schedule and carry out shutdowns so as to cause the least disruption to operation of the Owner's facilities.
 - 3. Carry out shutdown only after the schedule has been approved, in writing, by the owner. Submit power interruption schedule 15 days prior to date of interruption.
- B. Construction Power: Unless otherwise noted in Division 01 of these specifications, contractor shall make all arrangements and provide all necessary facilities for temporary construction power [from the owner's on site source. Energy costs shall be paid for by the Owner.] [to the site. Energy costs shall be paid by the General Contractor.]
- C. Storage: Provide adequate storage for all equipment and materials which will become part of the completed facility so that it is protected from weather, dust, water, or construction operations.

1.09 Damaged Products:

- A. Notify the Architect in writing in the event that any equipment or material is damaged. Obtain approval from the Architect before making repairs to damaged products.

1.10 Locations:

- A. General: Use equipment, materials and wiring methods suitable for the types of locations in which they are located.
- B. Dry Locations: All those indoor areas which do not fall within the definition below for Wet Locations and which are not otherwise designated on the Drawings.
- C. Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the Drawings.

1.11 Safety and Indemnity:

- A. The Contractor is solely and completely responsible for conditions of the job site including safety of all persons and property during performance of the work. This requirement will apply continually and not be limited to normal working hours. The contractor shall provide and maintain throughout the work site proper safeguards including, but not limited to, enclosures, barriers, warning signs, lights, etc. to prevent accidental injury to people or damage to property.
- B. No act, service, drawing review or construction review by the Owner, the Engineer or their Consultants is intended to include reviews of the adequacy of the Contractors safety measures in or near the construction site.
- C. The Contractor performing work under this Division of the Specifications shall hold harmless, indemnify, and defend the Owner, the Engineer, their consultants, and each of their officers, agents and employees from any and all liability claims, losses, or damage arising out of or alleged to arise from bodily injury, sickness, or death of a person or persons and for all damages arising out of injury to or destruction of property arising directly or indirectly out of or in connection with the performance of the work under this Division of the Specifications, and from the Contractor's negligence in the performance of the work described in the construction contract documents, but not including liability that may be due to the sole negligence of the Owner, the Engineer, their Consultants or their officers, agents and employees.
- D. If a work area is encountered that contains hazardous materials, the contractor is advised to coordinate with the owner and it's abatement consultant for abatement of hazardous material by the Owner's Representative. "Hazardous materials" means any toxic substance regulated or controlled by OSHA, EPA, State of California or local rules, regulations and laws. Nothing herein shall be construed to create a liability for Aurum Consulting Engineers regarding hazardous materials abatement measures, or discovery of hazardous materials.

1.12 Access Doors:

- A. The contractor shall install access panels as required where floors, walls or ceilings must be penetrated for access to electrical, control, fire alarm or other specified electrical devices. The minimum size panel shall be 14" x 14" in usable opening. Where access by a service person is required, minimum usable opening shall be 18" x 24".
- B. All access doors installed lower than 7'-0" above finished floor and exposed to public access shall have keyed locks.
- C. Where specific information or details relating to access panels differ from Division 26 paragraph 1.12 of these specifications, or shown on the electrical drawings and details or under other Divisions of work, those requirements shall supersede these specifications.

1.13 Arc Flash:

- A. The contractor shall install a clearly visible arc flash warning to the inside door of all panelboards and industrial control panels, as well as to the front of all switchboards and motor control centers that are a part of this project.
- B. The warning shall have the following wording: line 1 "WARNING" (in large letters), line 2 "Potential Arc Flash Hazard" (in medium letters), line 3 & 4 "Appropriate Personal Protective Equipment and Tools required when working on this equipment".

1.14 Emergency Boxes:

- A. All boxes and enclosures for emergency circuits shall be permanently marked with a readily visible red spray painted mark.

PART 2 - PRODUCTS

2.01 Standard of Quality:

- A. Products that are specified by manufacturer, trade name or catalog number establish a standard of quality and do not prohibit the use of equal products of other manufacturers provided they are established to be equal to the specified product and approved by the Architect prior to installation.
- B. Material and Equipment: Provide materials and equipment that are new and are current products of manufacturers regularly engaged in the production of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period includes use of equipment and materials of similar size under similar circumstances. For uniformity, only one manufacturer will be accepted for each type of product.

- C. Service Support: Submit a certified list of qualified permanent service organizations including their addresses and qualification for support of the equipment. These service organizations shall be convenient to the equipment installation and able to render service to the equipment on a regular and emergency basis during the warranty period of the contract.
- D. Manufacturer's Recommendations: Where installation procedures are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendation shall be cause for rejection of the equipment or material.

2.02 Nameplates:

- A. For each piece of electrical equipment, provide a manufacturer's nameplate showing his name, location, the pertinent ratings, the model designation, and shop order number.
- B. Identify each piece of equipment and related controls with a rigid laminated engraved plastic nameplate. Unless otherwise noted, nameplates shall be melamine plastic 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 0.5 by 2.5 inches unless otherwise noted. Where not otherwise specified, lettering shall be a minimum of 0.25 inch high normal block style. Engrave nameplates with the inscriptions indicated on the Drawings and, if not so indicated, with the equipment name. Securely fasten nameplates in place using two stainless steel or brass screws.

2.03 Fasteners:

- A. Fasteners for securing equipment to walls, floors and the like shall be either hot-dip galvanized after fabrication or stainless steel.

2.04 Finish requirements:

- A. Equipment: Refer to each electrical equipment section of these Specifications for painting requirements of equipment enclosures. Repair any final paint finish which has been damaged or is otherwise unsatisfactory, to the satisfaction of the Architect.
- B. Wiring System: In finished areas, paint all exposed conduits, boxes and fittings to match the color of the surface to which they are affixed.

PART 3 - EXECUTION

3.01 Workmanship:

- A. Ensure that all equipment and materials fit properly in their installation.
- B. Perform any required work to correct improperly fit installation at no additional expense to the owner.
- C. All electrical equipment and materials shall be installed in a neat and workmanship manner in accordance with the “NECA-1 Standard Practices for Good Workmanship in Electrical Contracting”. Workmanship of the entire job shall be first class in every respect.

3.02 Equipment Installations:

- A. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.
- B. Do all the cutting and patching necessary for the proper installation of work and repair any damage done.
- C. Earthquake restraints: all electrical equipment, including conduits over 2 inches in diameter, shall be braced or anchored to resist a horizontal force acting in any direction as per CBC Section 1616A Title 24, part 2 and ASCE7-10, Sections 13.3 and 13.6 and Table 13.6-1.
- D. Structural work: All core drilling, bolt anchor insertion, or cutting of existing structural concrete shall be approved by a California registered structural consulting engineer prior to the execution of any construction. At all floor slabs and structural concrete walls to be drilled, cut or bolt anchors inserted, the contractor shall find and mark all reinforcing in both faces located by means of x-ray, pach-ometer, or prof-ometer. Submit sketch showing location of rebar and proposed cuts, cores, or bolt anchor locations for approval.

3.03 Field Test:

- A. Test shall be in accordance with Acceptance testing specifications issued by the National Electrical Testing Association (NETA).
- B. Perform equipment field tests and adjustments. Properly calibrate, adjust and operationally check all circuits and components, and demonstrate as ready for service. Make additional calibration and adjustments if it is determined later that the initial adjustments are not satisfactory for proper performance. Perform equipment field test

for equipment where equipment field tests are specified in the equipment Specifications. Give sufficient notice to the Architect prior to any test so that the tests may be witnessed.

- C. Provide instruments, other equipment and material required for the tests. These shall be of the type designed for the type of tests to be performed. Test instrument shall be calibrated by a recognized testing laboratory within three months prior to performing tests.
- D. Operational Tests: Operationally test all circuits to demonstrate that the circuits and equipment have been properly installed and adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, including alarm conditions.
- E. Re-testing will be required for all unsatisfactory tests after the equipment or system has been repaired. Re-test all related equipment and systems if required by the Architect. Repair and re-test equipment and systems which have been satisfactorily tested but later fail, until satisfactory performance is obtained.
- F. Maintain records of each test and submit five copies to the Architect when testing is complete. All tests shall be witnessed by the Architect. These records shall include:
 - 1. Name of equipment tested.
 - 2. Date of report.
 - 3. Date of test.
 - 4. Description of test setup.
 - 5. Identification and rating of test equipment.
 - 6. Test results and data.
 - 7. Name of person performing test.
 - 8. Owner or Architect's initials.
- G. Items requiring testing shall be as noted in the additional electrical sections of these specifications.

3.04 Cleaning Equipment:

- A. Thoroughly clean all soiled surfaces of installed equipment and materials.

3.05 Painting of Equipment:

- A. Factory Applied: Electrical equipment shall have factory applied painting system which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical section.
- B. Field Applied: Paint electrical equipment as required to match finish of adjacent surfaces.

3.06 Records:

- A. Maintain one copy of the contract Drawing Sheets on the site of the work for recording the "as built" condition. After completion of the work, the Contractor shall carefully mark the work as actually constructed, revising, deleting and adding to the Drawing Sheets as required. The following requirements shall be complied with:
 - 1. Cable Size and Type: Provide the size and type of each cable installed on project.
 - 2. Substructure: Where the location of all underground conduits, pull boxes, stub ups and etc. where are found to be different than shown, carefully mark the correct location on the Drawings. Work shall be dimensioned from existing improvements.
 - 3. Size of all conduit runs.
 - 4. Routes of concealed conduit runs and conduit runs below grade.
 - 5. Homerun points of all branch circuit.
 - 6. Location of all switchgear, panels, MCC, lighting control panels, pullcans, etc.
 - 7. Changes made as a result of all approved change orders, addendums, or field authorized revisions.
 - 8. As Built: At the completion of the Work the Contractor shall review, certify, correct and turn over the marked up Drawings to the Architect for his use in preparing "as built" plans.
 - 9. As built Drawings shall be delivered to the Architect within ten (10) days of completion of construction.

3.07 Clean Up:

- A. Upon completion of electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean, and acceptable to the Architect.

3.08 Mechanical and Plumbing Electrical Work:

- A. The requirements for electrical power and/or devices for all mechanical and plumbing equipment supplied and/or installed under this Contract shall be coordinated and verified with the following:
 - 1. Mechanical and Plumbing Drawings.
 - 2. Mechanical and Plumbing sections of these Specifications.
 - 3. Manufacturers of the Mechanical and Plumbing equipment supplied.
- B. The coordination and verification shall include the voltage, ampacity, phase, location and type of disconnect, control, and connection required. Any changes that are required as a result of this coordination and verification shall be a part of this Contract.
- C. The Electrical Contractor shall furnish and install the following for all mechanical and plumbing equipment:
 - 1. Line voltage conduit and wiring.
 - 2. Disconnect switches.
 - 3. Manual line motor starters.
- D. Automatic line voltage controls and magnetic starters shall be furnished by the Mechanical and/or Plumbing Contractor and installed and connected by the Electrical Contractor. When subcontracted for by the Mechanical and/or Plumbing Contractor, all line voltage control wiring installed by the Electrical Contractor shall be done per directions from the Mechanical and/or Plumbing Contractor.
- E. All low voltage control wiring for Mechanical and Plumbing equipment shall be installed in conduit. Furnishing, installation and connection of all low voltage conduit, boxes, wiring and controls shall be by the Mechanical and/or Plumbing Contractor.
- F. Disconnects (Motor And Circuit)
 - 1. Disconnect switches shall be provided and located at all motors.
 - 2. Switches for three-phase motors shall be heavy-duty, horsepower rated three-pole, and surface mounted except as noted on drawings.
 - 3. Switches containing more than three poles shall be as specified on the drawings.
 - 4. Switches for single-phase, fractional horsepower motors shall be heavy-duty, horsepower rated.

5. Disconnect switches shall be as manufactured by ITE- Siemens, General Electric or Square D.

G. Disconnects (Motor: Fused):

1. Disconnect switches shall be provided and located at all motors.
 2. Switches for three-phase motors shall be heavy-duty, horsepower rated three-pole, and surface mounted except as noted on drawings.
 3. Switches containing more than three poles shall be as specified on the drawings.
 4. Switches for single-phase, fractional horsepower motors shall be heavy-duty, horsepower rated.
 5. Disconnect switches shall be as manufactured by ITE- Siemens, General Electric or Square D.
- H. Manual motor starters, where required, shall have toggle type operators with pilot light and melting alloy type overload relays, SQUARE D COMPANY, Class 2510, Type FG-1P (surface) or Type FS-1P (flush) or ITE, WESTINGHOUSE or GENERAL ELECTRIC equal.

END OF SECTION

SECTION 26 05 19
LINE VOLTAGE WIRE AND CABLE

PART 1 - GENERAL

1.01 Description of Work:

- A. The work of this Section consists of providing all wire and cable rated 600 volts or less, including splices and terminations, as shown on the Drawings and as described herein.

1.02 Related Work:

- A. See the following Specification Section for work related to the work in this Section:
 - 1. 260542 Conduits, Raceways and Fittings.
 - 2. 260533 Junction and Pull Boxes.

1.03 Quality Assurance

- A. Field tests shall be performed as specified in paragraph 3.04 of this Section.

PART 2 - PRODUCTS

2.01 Conductors:

- A. Conductors shall be copper, type THHN/THWN/MTW oil and gasoline resistant, 90°C, 600 volt rated insulation.
- B. Conductors shall be stranded copper.
- C. Minimum power and control wire size shall be No. 12 AWG unless otherwise noted.
- D. All conductors used on this Project shall be of the same type and conductor material.

2.02 Cables:

- A. All individual conductors shall be copper with type THHN/THWN, 90°C, 600 volt rated insulation.
- B. Insulation Marking - All insulated conductors shall be identified with printing colored to contrast with the insulation color.

- C. Color Coding - As specified in paragraph 3.03.
- D. Special Wiring - Where special wiring is proposed by an equipment manufacturer, submit the special wiring requirements to the Owner's Representative and, if approved, provide same. Special wire shall be the type required by the equipment manufacturer.
- E. Other Wiring - Wire or cable not specifically shown on the Drawings or specified, but required, shall be of the type and size required for the application and as approved by the Owner's Representative.
- F. Manufacturer - Acceptable manufacturers including Cablec, Southwire, or equal.

2.03 Terminations:

- A. Manufacturer - Terminals as manufactured by T&B, Burndy or equal.
- B. Wire Terminations – Stranded conductors shall be terminated in clamping type terminations which serve to contain all the strands of the conductor. Curling of a stranded conductor around a screw type terminal is not allowed. For screw type terminations, use a fork type stake-on termination on the stranded conductor. Use only a stake-on tool approved for the fork terminals selected.
- C. End Seals - Heat shrink plastic caps of proper size for the wire on which used.

2.04 Tape:

- A. Tape used for terminations and cable marking shall be compatible with the insulation and jacket of the cable and shall be of plastic material.

PART 3 - EXECUTION

3.01 Cable Installation:

- A. Clean Raceways - Clean all raceways prior to installation of cables as specified in Section 260542 - Conduits Raceway and Fittings.
- B. All line voltage wiring shall be installed in conduit.
- C. All feeder conductors shall be continuous from equipment to equipment. Splices in feeders are not permitted unless specifically noted or approved by the Electrical Engineer.

- D. All branch circuit wiring shall be run concealed in ceiling spaces, walls, below floors or in crawl spaces unless noted otherwise.
- E. Cable Pulling - Exercise care in pulling wires and cables into conduit or wireways so as to avoid kinking, putting undue stress on the cables or otherwise abrading them. No grease will be permitted in pulling cables. Only soapstone, talc, or UL listed pulling compound will be permitted. The raceway construction shall be complete and protected from the weather before cable is pulled into it. Swab conduits before installing cables and exercise care in pulling, to avoid damage to conductors.
- F. Bending Radius - Cable bending radius shall be per applicable code. Install feeder cables in one continuous length.
- G. Equipment Grounding Conductors - Provide an equipment grounding conductor, whether or not it is shown on the Drawings, in all conduits or all raceways.
- H. Panelboard Wiring - In panels, bundle incoming wire and cables which are No. 6 AWG and smaller, lace at intervals not greater than 6 inches, neatly spread into trees and connect to their respective terminals. Allow sufficient slack in cables for alterations in terminal connections. Perform lacing with plastic cable ties or linen lacing twine. Where plastic panel wiring duct is provided for cable runs, lacing is not necessary when the cable is properly installed in the duct.

3.02 Cable Terminations and Splices:

- A. Splices - UL Listed wirenuts.
- B. Terminations - Shall comply with the following:
 - 1. Make up and form cable and orient terminals to minimize cable strain and stress on device being terminated on.
 - 2. Burnish oxide from conductor prior to inserting in oxide breaking compound filled terminal.

3.03 Circuit and Conductor Identification:

- A. Color Coding - Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. Conductor colors shall be as follows:

<u>VOLTAGE</u>	<u>208/120V</u>	<u>480/277V</u>
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Grey
Ground	Green	Green

- B. Color coding shall be in the conductor insulation for all conductors #10 AWG and smaller; for larger conductors, color shall be either in the insulation or in colored plastic tape applied at every location where the conductor is readily accessible.
- C. Circuit Identification - All underground distribution and service circuits shall be provided with plastic identification tags in each secondary box and at each termination. Tags shall identify the source transformer of the circuit and the building number(s) serviced by the circuit.

3.04 Field Tests:

- A. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and ground of not less than the requirements of the CEC. All circuits shall be tested for proper neutral connections.
- B. Insulation Resistance Tests: Perform insulation resistance tests on circuits with #2 AWG and larger conductors to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests before all equipment has been connected. Test the insulation with a 500Vdc insulation resistance tester with a scale reading 100 megohms. The insulation resistance shall be 2 megohms or more. Submit results for review.

END OF SECTION

SECTION 26 05 26 GROUNDING

PART 1 GENERAL

1.1 Section Includes:

- A. Conduits, wires, ground rods and other materials for the electrical grounding system.

1.2 Related Sections:

- A. Section 26 05 00 - Electrical General Requirements.

PART 2 PRODUCTS

2.1 Ground Rod:

- A. "Copperweld" ground rod conforming to or exceeding requirements of U.L. Specification No. 467 (ANSI C-33.8). Rod shall be 3/4" diameter and 10' in length, unless otherwise noted on the Drawings.

2.2 Below Grade Connections:

- A. Compression fittings, Thomas & Betts, Series 52000, 53000 or 54000 or approved equal.

2.3 Hardware:

- A. Bolts, nuts and washers shall be bronze, cadmium plated steel or other non-corrosive materials, approved for the purpose.

2.4 Waterproof Sealant:

- A. Use Kearney "Aqua Seal" mastic sealant on all below grade clamp or compression type connections.

PART 3 EXECUTION

3.1 Grounding and Bonding:

- A. Grounding and bonding shall be as required by codes and local authorities.
- B. All electrical equipment shall be grounded, including, but not limited to, panel boards, terminal cabinets and outlet boxes.

- C. The ground pole of receptacles shall be connected to their outlet boxes by means of a copper ground wire connecting to a screw in the back of the box.
- D. A green insulated copper ground wire, sized to comply with codes, shall be installed in all conduit runs.
- E. All metal parts of pull boxes shall be grounded per code requirements.
- F. All ground conductors shall be green insulated copper.
- G. The ground system electrodes shall be tested for resistance before the equipment ground conductors are connected. Maximum ground system resistance shall be 25 ohms. Install up to two additional ground rods to meet the 25 ohm requirement. Multiple ground rods shall not be less than 10 feet apart.
- H. Grounding of the panels, and buildings shall be completed as indicated on the Drawings.

END OF SECTION

SECTION 26 05 33
OUTLET, JUNCTION AND PULL BOXES

PART 1 - GENERAL

1.01 Description of Work:

- A. The work of this Section consists of providing all required labor, supervision, materials and equipment to satisfactorily complete all electrical installations shown on the drawings, included in these Specification, or otherwise needed for a complete and fully operating facility. The work shall include but not be limited to the following:
- B. Furnish and install all required material, supports and miscellaneous material for the satisfactory interconnection of all associated electrical systems.

1.02 Related Work:

- A. See the following specification sections for work related to the work of this section.
 - 1. 260500 General Electrical Requirements.
 - 2. 260542 Conduits, Raceway and Fittings.
 - 3. 260519 Line Voltage Wire and Cable.

PART 2 - PRODUCTS

2.01 Outlet boxes, Junction and Pull boxes

- A. Standard Outlet Boxes: Galvanized, steel, knock-out type of size and configuration best suited to the application indicated on the Drawings. Minimum box size shall be 4 inches square (octagon for most light fixtures) by 1-1/2 inches deep with mud rings as required.
- B. Switch boxes: Minimum box size shall be 4 inches square by 1-1/2 inches deep with mud rings as required. Install multiple switches in standard gang boxes with raised device covers suitable for the application indicated.
- C. Conduit bodies: Cadmium plated, cast iron alloy. Conduit bodies with threaded conduit hubs and neoprene gasketed, cast iron covers. Bodies shall be used to facilitate pulling of conductors or to make changes in conduit direction only. Splices are not permitted in conduit bodies. Crouse-Hinds Form 8 Condulets, Appleton Form 35 Unilets or equal.

- D. Sheet Metal Boxes: Use standard outlet or concrete ring boxes wherever possible; otherwise use a minimum 16 gauge galvanized sheet metal, NEMA I box sized to Code requirements with covers secured by cadmium plated machine screws located six inches on centers. Circle AW Products, Hoffman Engineering Company or equal.
- E. Flush Mounted Pull boxes and Junction boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

PART 3 - EXECUTION

3.01 Outlet Boxes

A. General:

1. All outlet boxes shall finish flush with building walls, ceilings and floors except in mechanical and electrical rooms above accessible ceiling or where exposed work is called for on the Drawings.
2. Install raised device covers (plaster rings) on all switch and receptacle outlet boxes installed in masonry or stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.
3. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

B. Box Layout:

1. Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.
2. Locate switch outlet boxes on the latch side of doorways.
3. Outlet boxes shall not be installed back to back nor shall through-wall boxes be permitted. Outlet boxes on opposite sides of a common wall shall be separated horizontally by at least one stud or vertical structural member.
4. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.
5. On fire rated walls, the total face area of the outlet boxes shall not exceed 100 square inches per 100 square feet of wall area.

C. Supports:

1. Outlet Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.
2. Fixture outlet boxes installed in suspended ceiling of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.
3. Fixture outlet boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above where pendant mounted lighting fixture are to be installed on the box.
4. Fixture Boxes above tile ceilings having exposed suspension systems shall be supported directly from the structure above.
5. Outlet and / or junction boxes shall not be supported by grid or fixture hanger wires at any locations.

3.02 Junction And Pull Boxes

A. General:

1. Install junction or pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.
2. Locate pull boxes and junction boxes in concealed locations above accessible ceilings or exposed in electrical rooms, utility rooms or storage areas.
3. Install raised covers (plaster rings) on boxes in stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.
4. Leave no unused openings in any box. Install close-up plugs as required to seal openings.
5. Identify circuit numbers and panel on cover of junction box with black marker pen.

B. Box Layouts:

1. Boxes above hung ceilings having concealed suspension systems shall be located adjacent to openings for removable recessed lighting fixtures.

C. Supports:

1. Boxes installed in metal stud walls shall be equipped with brackets designed for attaching directly to the studs or shall be mounted on specified box supports.
2. Boxes installed in suspended ceilings of gypsum board or lath and plaster construction shall be mounted to 16 gauge metal channel bars attached to main ceiling runners.
3. Boxes installed in suspended ceilings supporting acoustical tiles or panels shall be supported directly from the structure above.
4. Boxes mounted above suspended acoustical tile ceilings having exposed suspension systems shall be supported directly from the structure above.

END OF SECTION

SECTION 26 05 42
CONDUITS, RACEWAYS AND FITTINGS

PART 1 - GENERAL

1.01 Description of Work:

- A. The work of this section consists of furnishing and installing conduits, raceways and fittings as shown on the Drawings and as described herein.

1.02 Related Work:

- A. See the following specification sections for work related to the work in this section:
 - 1. 260543 Underground Ducts
 - 2. 260544 In Grade Pull Boxes
 - 3. 260519 Line Voltage Wire and Cable
 - 4. 260533 Junction and Pull Boxes

PART 2 - PRODUCTS

2.01 Conduits, Raceways:

- A. Electrical Metallic Tubing (EMT) shall be hot-dip galvanized after fabrication. Couplings shall be compression or set-screw type.
- B. Flexible Conduit: Flexible metal conduit shall be galvanized steel.
- C. Galvanized Rigid Steel Conduit (GRS) shall be hot-dip galvanized after fabrication. Couplings shall be threaded type.
- D. Rigid Non-metallic Conduit: Rigid non-metallic conduit shall be PVC Schedule 40 (PVC-40 or NEMA Type EPC-40) conduit approved for underground use and for use with 90° C wires.

2.02 Conduit Supports:

- A. Supports for individual conduits shall be galvanized malleable iron one-hole type with conduit back spacer.
- B. Supports for multiple conduits shall be hot-dipped galvanized Unistrut or Superstrut channels, or approved equal. All associated hardware shall be hot-dip galvanized.

- C. Supports for EMT conduits shall be galvanized pressed steel single hole straps.
- D. Clamp fasteners shall be by wedge anchors. Shot in anchors shall not be allowed.

2.03 Fittings:

- A. Provide threaded-type couplings and connectors for rigid steel conduits; provide steel compression (watertight), or steel set-screw type for EMT, (die-cast zinc or malleable iron type fittings are not allowed). Provide threaded couplings and Meyers hubs for rigid steel conduit exposed to weather.
- B. Fittings for flexible conduit shall be Appleton, Chicago, IL, Type ST, O-Z Gedney Series 4Q by General Signal Corp., Terryville, CT, T & B 5300 series, or approved equal.
- C. Fittings for use with rigid steel shall be galvanized steel or galvanized cast ferrous metal; access fittings shall have gasketed cast covers and be Crouse Hinds Condulets, Syracuse, NY, Appleton Unilets, Chicago, IL, or approved equal. Provide threaded-type couplings and connectors; set-screw type and compression-type are not acceptable.
- D. Fittings for use with rigid non-metallic conduit shall be PVC and have solvent-weld-type conduit connections.
- E. Union couplings for conduits shall be the Erickson type and shall be Appleton, Chicago, IL, Type EC, O-Z Gedney 3-piece Series 4 by General Signal Corp., Terryville, CT, or approved equal. Threadless coupling shall not be used.
- F. Bushings:
 - 1. Bushings shall be the insulated type.
 - 2. Bushings for rigid steel shall be insulated grounding type, O-Z Gedney Type HBLG, Appleton Type GIB, or approved equal.
- G. Conduit Sealants:
 - 1. Fire Retardant Types: Fire stop material shall be reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL Classification 35L4 or as specified on the Drawings.

PART 3 - EXECUTION

3.01 Conduit, Raceway and Fitting Installation:

- A. For conduit runs exposed to weather provide rigid metal (GRS).

- B. For conduit run underground, in concrete or masonry block wall and under concrete slabs, install minimum $\frac{3}{4}$ " size nonmetallic (PVC) with PVC elbows. Where conduits transition from underground or under slab to above grade install wrapped rigid metal (GRS) elbows and risers.
- C. For conduit runs concealed in steel or wood framed walls or in ceiling spaces or exposed in interior spaces above six feet over the finished floor, install EMT.
- D. Flexible metal conduit shall be used only for the connection of recessed lighting fixtures and motor connections unless otherwise noted on the Drawings. Liquid-tight steel flexible conduit shall be used for motor connections.
- E. The minimum size raceway shall be 1/2-inch unless indicated otherwise on the Drawings.
- F. Installation shall comply with the CEC.
- G. From pull point to pull point, the sum of the angles of all of the bends and offset shall not exceed 360 degrees.
- H. Conduit Supports: Properly support all conduits as required by the NEC. Run all conduits concealed except where otherwise shown on the drawings.
 - 1. Exposed Conduits: Support exposed conduits within three feet of any equipment or device and at intervals not exceeding NEC requirements; wherever possible, group conduits together and support on common supports. Support exposed conduits fastened to the surface of the concrete structure by one-hole clamps, or with channels. Use conduit spacers with one-hole clamps.
 - a. Conduits attached to walls or columns shall be as unobtrusive as possible and shall avoid windows. Run all exposed conduits parallel or at right angles to building lines.
 - b. Group exposed conduits together. Arrange such conduits uniformly and neatly.
 - 2. Support all conduits within three feet of any junction box, coupling, bend or fixture.
 - 3. Support conduit risers in shafts with Unistrut Superstrut, or approved equal, channels and straps.
- I. Moisture Seals: Provide in accordance with NEC paragraphs 230-8 and 300-5(g).
- J. Where PVC conduit transitions from underground to above grade, provide rigid steel 90's with risers. Rigid steel shall be half-lap wrapped with 20 mil tape and extend minimum 12" above grade.

- K. Provide a nylon pull cord in each empty raceway.
- L. Provide galvanized rigid steel factory fittings for galvanized rigid steel conduit.
- M. Slope all underground raceways to provide drainage; for example, slope conduit from equipment located inside a building to the pull box or manhole located outside the building.
- N. Conduits shall be blown out and swabbed prior to pulling wires, or installation of pull cord in empty conduits.

END OF SECTION

SECTION 26 05 43
UNDERGROUND DUCTS

PART 1 - GENERAL

1.01 Description of Work:

- A. The work of this section consists of furnishing and installing raceways, and raceway spacers with necessary excavation.

1.02 Related Work:

- A. See the following specification sections for work related to the work of this section.
 - 1. 312300 Excavation and Backfill
 - 2. 260542 Conduit Raceway and Fittings

1.03 Standards and Codes:

- A. Work and material shall be in compliance with and according to the requirements of the latest revision of the following standards and codes.
 - 1. National Electrical Code (NEC) (Latest Revision)
 - 2. California Electrical Code (CEC).
 - 3. Underground Installations CEC - Article 300.5
 - 4. Rigid NonMetallic Conduit CEC - Article 347

PART 2 - PRODUCTS

2.01 Raceways:

- A. As specified in Section 260542 Conduits, Raceways and Fittings.

PART 3 - EXECUTION

3.01 Excavation:

- A. As specified in Section 312300, Excavation and Backfill and as required for the work shown on the Drawings.

3.02 Install raceways as indicated on drawings.

3.03 Sand Encasement:

A. As specified in Section 312300 - Excavation and Backfill.

3.04 Backfill:

A. As specified in Section 312300 - Excavation and Backfill.

END OF SECTION

**SECTION 26 05 44
IN GRADE PULL BOXES**

PART 1 - GENERAL

1.01 Description of Work:

- A. The work of this section consists of providing all labor, supervision, tools, materials, and performing all work necessary to furnish and install pre-cast concrete vaults, and pull boxes with necessary excavation.

1.02 Related Work:

- A. See the following specification sections for work related to the work of this section.
 - 1. 02200 Excavation and Backfill.
 - 2. 260543 Underground Ducts.

1.03 Submittals:

- A. As specified in Section 260500 and Division 01.
 - 1. Catalog Data: Provide manufacturer's descriptive literature - Pre-cast Vaults, Pull Boxes and Accessories.

PART 2 - PRODUCTS

2.01 Materials and Equipment:

- A. General Requirements:
 - 1. Pull boxes for electrical power, controls and other communication circuits shall consist of pre-cast reinforced concrete boxes, extensions' bases, and covers as specified herein and as indicated on the Drawings. Pre-cast units shall be the product of a manufacturer regularly engaged in the manufacture of pre-cast vaults and pull boxes. Acceptable manufacturers are Christy, Utility Vault, Brooks, Associated Concrete or equal.
- B. Construction:
 - 1. Pre-cast concrete vaults and pull boxes for electrical power distribution and communication circuits with associated risers and tops shall conform to ASTM C478

and ACI 318. Pull boxes shall be the type noted on the Drawings and shall be constructed in accordance with the applicable details as shown. Tops and walls shall consist of reinforced concrete. Walls and bottom shall be of monolithic concrete construction. Duct entrances and windows shall be located near the corners of structures to facilitate cable racking.

C. Covers:

1. The word "ELECTRICAL" shall be cast in the top face of all electrical cable boxes. The word "Signal" or "Fire Alarm" shall be cast in the top of the boxes utilized for these systems.

PART 3 - EXECUTION

3.01 Installation:

- A. Install pull boxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not shown on the Drawings.
- B. Pre-cast pull boxes shall be installed approximately where indicated on the Drawings. The exact location of each pull box shall be determined after careful consideration has been given to the location of other utilities, grading, and paving. All cable boxes and secondary pull boxes shall be installed with a minimum of 6-inch thick crushed rock or sand bedding.
- C. Paved areas - Vaults and pull boxes located in areas to be paved shall be installed such that the top of the cover shall be flush with the finished surface of the paving.
- D. Unpaved Areas - In unpaved areas, the top of vaults and pull box covers shall be approximately 2 inches above finished grade.
- E. Joint Seals - Section joints of pre-cast vaults and pull boxes shall be sealed with compound as recommended by the manufacturer.
- F. Trenching, Backfilling, and Compaction - Trenching, backfilling and compaction shall be as specified in Section 02200 - Excavation and Backfill.

END OF SECTION

SECTION 26 24 13
SWITCHBOARDS, 600 VOLTS AND BELOW

PART 1 GENERAL

1.01 Description of Work: The work of this Section consists of providing switchboards, as shown on the Drawings and as described herein.

1.02 Related Work:

A. See the following Specification Sections for work related to the work in this Section.

1. 26 05 19 Line Voltage Wire and Cable
2. 26 22 00 Transformers
3. 26 28 16 Circuit Breakers

1.03 Submittals:

A. Shop Drawings - As specified in Section 26 05 00 and Division 01. For each switchboard furnished under this Contract, submit manufacturer's name, catalog data, and the following information:

1. Switchboard type.
2. Main bus and terminal connection sizes.
3. Location of line connections.
4. Section dimensions.
5. Gutter space.
6. Gauge of boxes and fronts.
7. Finish data.
8. Voltage rating.
9. Breaker manufacturer, types, trip ratings, and interrupting ratings.

- B. Before construction of the main (service) switchboard, the contractor shall deliver two or more copies of the switchboard submittal to P.G.&E. for their approval. The contractor shall deliver one P.G.&E. approved copy of the submittal to the Electrical Engineer for record.
- C. Submit operation and maintenance data for switchboards, and circuit breakers including nameplate data, parts lists, manufacturer's circuit breaker time current coordination curves, factory and field test reports, recommended maintenance procedures and typewritten as-built panel and switchboard schedules. Submit in accordance with Division 01.

1.04 Warranty

- A. Manufacturer shall warrant equipment to be free from defects in materials and workmanship for the lesser of one (1) year from date of installation or eighteen (18) months from date of purchase

PART 2 – PRODUCTS

2.01 Switchboards:

- A. General: Switchboards shall be designed, built and tested in accordance with applicable portions of the latest NEMA, EUSERC, and Underwriter Laboratories standards and the latest requirements of the California Electrical Code. All sections and devices shall be UL listed and labeled.
 - 1. Switchboards shall be dead front, completely self-supporting structure of the required number of vertical sections bolted together to form one metal, totally enclosed, switchboard. Sides, top, and rear covers shall be code gauge steel, bolted to the switchboard structure.
 - 2. The switchboard shall be furnished with phase and neutral busses of the amps, volts and phase shown on the Drawings. The bus shall extend the full length of the switchboard. Tapered bus is not acceptable. The switchboard sections, when called for on the plans, shall be as follows:
 - a. Metering Section and landing lugs; Fully Pacific Gas & Electric Company compatible.
 - b. All sections shall include full capacity busing between sections.
 - c. All sections shall be front aligned and shall have front-connected devices.

3. All buses shall be silver plated copper, supported with high impact, non-tracking insulating material, braced to withstand the mechanical forces exerted during short circuit conditions. The current density of the bus shall not exceed 1000 amperes per square inch of cross section area or the switchboard bussing shall be of sufficient cross-sectional area to meet UL standard 891 for temperature rise. Provisions shall be provided for future splicing of additional sections from either end. The neutral bus shall be 100% rated.
4. A ground bus shall be furnished secured to each vertical section structure, and shall extend the entire length of the switchboard. The ground bus shall be sized per UL standard 891 and be of the same material as the through bus.
5. The neutral bus in the feeder sections shall be not further than 20 inches from the front of the switchboard.
6. Vertical main bus bars shall be furnished full height to accommodate future branch devices.
7. The switchboard shall be furnished and installed complete with all underground pull sections, utility sections, main device and feeder sections as indicated on the Drawings. Underground pull sections, utility cable termination, transformer and metering sections shall be in accordance with Pacific Gas and Electric Company requirements.
8. The main device, where indicated to be individually mounted, shall be completely isolated from the utility and the feeder sections of the switchboard, both in the device section and the cable section of the switchboard cubicle. The cable section shall also be isolated from the main horizontal bus. The main device cubicle shall have UL service equipment label.
9. Feeder devices shall be group-mounted and be front accessible, furnished with vertical wiring gutter on the front of the distribution sections. Wiring gutters shall be furnished with hinged, code gauge steel formed covers. Unused device space shall be covered with blank code gauge steel covers.
10. All vertical sections comprising the switchboard shall be aligned front and rear.
11. Switchboards for outdoor installation shall be furnished in [stainless steel] NEMA 3R non-walk-in enclosures provided with thermostatically controlled space heaters in each vertical section. Space heaters shall be powered from a circuit breaker protected circuit originating within the switchboard and shall be sized adequately to prevent the formation of condensation. Space heater shall be suitable for operation at 120V AC.

12. All steel surfaces are to be chemically cleaned and treated, providing a bond between paint and metal surfaces to help prevent the entrance of moisture and formation of rust under the paint finish. Switchboard exterior shall be furnished with a grey enamel finish color over a rust inhibiting primer, unless otherwise noted.

B. Circuit Breakers

1. Circuit breakers, unless otherwise indicated, shall be the molded case type with ratings as indicated on the Drawings. Circuit breakers shall meet the requirements specified under Section 26 28 16- Circuit Breaker.
2. Main circuit breakers, where indicated to be Molded case type, shall be 80 [100] percent rated, with the frame size and trip plug ratings shown.
3. Circuit breakers equipped with Ground-Fault Equipment Protection shall be capable of the following types of ground-fault protection: residual, source ground return, and modified differential.
 - a. Ground-fault settings for circuit breaker sensor sizes 1200 A or below shall be adjustable from 0.2 to 1.0 times In in 0.1 In increments. The ground-fault settings for circuit breakers above 1200 A shall be adjustable from 500 to 1200 A.
4. Circuit breakers with an arc Energy-Reducing Maintenance Switch (ERMS) setting shall be equipped with a separate trip curve to reduce incident energy.
 - a. The ERMS trip curve shall be selected through physical selector. Trip unit [remote indicator light] shall indicate when trip unit is operating in ERMS mode.
 - b. Trip unit shall operate in Fast Instantaneous trip mode, 25 to 30 mS, when ERMS trip curve is active.
 - c. Engaging/disengaging the ERMS mode or making settings changes to the ERMS settings shall be restricted to authorized personnel by limiting access to such features by padlocks or passwords to ensure safety of the personnel working with the equipment.

C. Customer Metering

1. Instrument Transformers
 - a. Current transformers shall be window type conforming to, one per phase, Square D Company Class 4210, General Electric JAG-O or equal.

- b. Potential transformers shall be fixed mounted, type Square D Company Class 4210, General Electric JVM, or equal.

2. Power Monitors and Meters

- a. The Customer Metering equipment shall be manufactured by Square D Company, General Electric or equal.
- b. Substitutions: substitutions shall be made only after proper verification
- c. The switchboard shall be metered using:
 - i. [Square D Type PM 650] [Square D Type CM 2350]
 - ii. [Square D Type PM 650]
 - (A). Digital Power Meter with 0.25% accuracy with the following features:
 - (B). A, V, kW, kVAR, kVA, PF, F, kWh, kVARh, kVAh, KYZ, RS-485 communications, THD, Demand, kWd, kVARd, kVAd, date/time stamping,
 - (C). predicted power demand, onboard alarms, min/max. readings, data log, event log
 - iii. [Square D Type CM 2350]
 - (A). Digital Circuit Monitor with 0.2% accuracy with the following features:
 - (B). A, V, kW, kVAR, kVA, PF, F, THD, K-Factor, kWh, kVARd, kVAd, kVARh, kVAh, KYZ output, RS-485 communication port, kWd, kVARd, kVAd, date/time stamping, predicted power demand, onboard alarms, min/max. readings, data log, event log, extend memory (100k), wave form capture, and disturbance monitoring

D. Manufacturer

- a. The switchboard shall be Square D, Siemens, [I.E.M], [General Electric], [or] [Eaton Cutler Hammer].

PART 3 – EXECUTION

3.01 Installation:

- A. Switchboards shall be installed where indicated on the Drawings, and in accordance with the manufacturer's instructions.
- B. A 1" conduit shall be installed for new PG& E services from the PG& E Metering Section to the Main Telephone Terminal Board.
- C. At switchboards located indoors, a 2" conduit and pull tape shall be installed from outside the switchboard meter cabinet to a location on the exterior of the building. The installation shall meet PG&E Green Book requirements.
- D. Circuit breakers for solidly grounded Wye Electrical Systems of more than 150V to Ground and 1000A or larger shall be equipped with Ground-Fault Equipment Protection.
- E. Circuit breakers 1200A and larger shall be equipped with a separate trip curve for an arc Energy-Reducing Maintenance Switch (ERMS) setting to reduce incident energy.

3.02 Mounting:

- A. Switchboards shall be mounted on a concrete pad, as indicated on the drawings. Reinforcing shall be as shown on the Drawings. The top surface of the pad shall be 2 inches above the surrounding surface.
- B. The switchboard shall be bolted to the pad with ½ inch diameter bolts minimum at each corner of each section unless otherwise noted.
- C. The switchboard shall be seismically qualified to withstand potential seismic forces up to UBC Seismic Zone 4.

3.03 Padlocks:

- A. Exterior switchboard shall be provided with padlocks keyed as directed by the Owner's Representative. Padlocks shall be supplied by the contractor.

3.04 Field Tests:

- A. Insulation resistance Tests: Perform insulation resistance tests on circuits to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests after all equipment has been connected, except that equipment which may be damaged by the test voltage

shall not be connected. Test the insulation with 500V dc insulation resistance tester with a scale reading 100 megohms. The insulation resistance shall be 2 megohm or more. Submit results for review.

- B. Grounding: Grounding shall conform to Section 26 05 26.
- C. Continuity: Switchboard circuits shall be tested for continuity prior to energizing. continuity tests shall be conducted using a dc device with a bell or buzzer.

END OF SECTION

SECTION 26 24 16
PANELBOARDS AND DISTRIBUTION PANELS

PART 1 – GENERAL

1.01 Description of Work:

- A. The work of this Section consists of providing panelboards and circuit breakers as shown on the Drawings and as described herein.

1.02 Related Work:

- A. See the following specification sections for work related to the work in this Section.
 - 1. 260519 Line Voltage Wire and Cable
 - 2. 260526 Grounding
 - 3. 262816 Circuit Breakers

1.03 Submittals:

- A. Shop Drawings - As specified in Division 01 and Section 26 05 00. For each panelboard and distribution panel furnished under this Contract, submit manufacturer's name, catalog data, and the following information:
 - 1. Panelboard / distribution panel type.
 - 2. Main bus and terminal connection sizes.
 - 3. Location of line connections.
 - 4. Cabinet dimension.
 - 5. Gutter space.
 - 6. Gauge of boxes and fronts.
 - 7. Finish data.
 - 8. Voltage rating.
 - 9. Breaker manufacturer, types, trip rating, and interrupting ratings.

10. When information is available on the Drawings, show breaker circuit numbers and locations along with trip ratings on a panelboard layout.
- B. Single Submittal - A single complete submittal is required for all products covered by this Section.
- C. Closeout Submittals: Submit operation and maintenance data for panelboards and circuit breakers including nameplate data, parts lists, factory and field test reports, recommended maintenance procedures and typewritten as-built panel schedules. Submit in accordance with Division 01.

PART 2 – PRODUCTS

2.01 Panelboards:

- A. General: Lighting and Receptacle Panelboards shall be the automatic circuit breaker type. The number and arrangement of circuits, trip ratings, spares and blank spaces for future circuit breakers shall be as shown on the Drawings or, if not shown, 42 circuits. All circuit breakers shall be quick-make, quick-break, thermal-magnetic, bolt-on type (unless otherwise noted on drawings), with 1, 2 or 3 poles as shown, each with a single operating handle. Tandem or piggy-back breakers shall not be used.
- B. Nameplates:
 1. Each panelboard shall have a field mounted identifying, rigid, plastic nameplate giving the panel identification as shown on the Drawings.
 2. Each panelboard shall have a manufacturer's nameplate showing the voltage, bus rating, number of phases, frequency and number of wires.
- C. Construction:
 1. Door and trim shall be finished to match finish type and color of surrounding wall. Box shall be hot-dip galvanized, and field finished to match the front.
 2. Panelboards and enclosures shall conform to requirements of all relevant codes. Panelboards shall be suitable for use as service equipment.
 3. Panelboards shall be furnished with hinged trim fronts with key latch and a typed directory card and holder. Panelboard circuits shall be arranged with odd numbers on the left and even numbers on the right. Provide weatherproof, NEMA type 3R enclosures for outdoor installation.

- D. Busbars: Panelboard busbars shall be phase sequence type suitable for bolt-on circuit breakers. All busbars shall be copper.
- E. Circuit Breakers: Circuit breakers shall be the molded case type with trip and interrupting ratings as shown on the Drawings.
- F. Manufacturer:
 - 1. Panelboard manufacturer shall be Square D, Siemens, [I.E.M], [General Electric], [or] [Eaton Cutler Hammer]. Panelboards shall be of the same manufacturer as the switchboard.

2.02 Distribution Panels:

- A. General: Distribution panels shall be the automatic circuit breaker type. The number and arrangement of circuits, trip ratings, spares and blank spaces for future circuit breakers shall be as shown on the Drawings. All circuit breakers shall be quick-make, quick-break, thermal-magnetic bolt-on type, with 1, 2 or 3 poles as shown, each with a single operating handle. Tandem or piggy-back breakers shall not be used.
- B. Nameplates:
 - 1. Each distribution panel shall have a field mounted, identifying, rigid, plastic nameplate giving the panel identification as shown on the Drawings.
 - 2. Each distribution panel shall have a manufacturer's nameplate showing the voltage, bus rating, number of phases, frequency and number of wires.
- C. Construction:
 - 1. Door and trim shall be finished to match color of surrounding wall. Box shall be hot-dip galvanized, field finished to match the front.
 - 2. Distribution panels and enclosures shall conform to requirements of all relevant codes. Distribution panels shall be suitable for use as service.
 - 3. Distribution panels shall have a front door with key latch and a typed directory card and permanently attached holder. Adhesive backed holders are not acceptable. Distribution panels circuits shall be arranged with odd numbers on the left and even numbers on the right. Provide weatherproof, NEMA type 3R enclosures for outdoor installation.

D. Busbars: Distribution panels busbars shall be phase sequence type suitable for bolt-on circuit breakers. All busbars shall be copper, sized for a maximum current density of 1000A psi.

E. Circuit Breakers:

1. Circuit breakers shall be the molded case type with trip and interrupting ratings as shown on the Drawings.
2. Circuit breakers equipped with Ground-Fault Equipment Protection shall be capable of the following types of ground-fault protection: residual, source ground return, and modified differential.
 - a. Ground-fault settings for circuit breaker sensor sizes 1200 A or below shall be adjustable from 0.2 to 1.0 times In in 0.1 In increments. The ground-fault settings for circuit breakers above 1200 A shall be adjustable from 500 to 1200 A.
3. Circuit breakers with an arc Energy-Reducing Maintenance Switch (ERMS) setting shall be equipped with a separate trip curve to reduce incident energy.
 - a. The ERMS trip curve shall be selected through physical selector. Trip unit [remote indicator light] shall indicate when trip unit is operating in ERMS mode.
 - b. Trip unit shall operate in Fast Instantaneous trip mode, 25 to 30 mS, when ERMS trip curve is active.
 - c. Engaging/disengaging the ERMS mode or making settings changes to the ERMS settings shall be restricted to authorized personnel by limiting access to such features by padlocks or passwords to ensure safety of the personnel working with the equipment.

F. Manufacturer:

4. Distribution panel manufacturer shall be Square D, Siemens, [I.E.M], [General Electric], [or] [Eaton Cutler Hammer]. [Distribution panels shall be of the same manufacturer as the switchboard.]

PART 3 – EXECUTION

3.01 Installation: Panelboards and Distribution Panels shall be installed where indicated on the Drawings, and in accordance with the manufacturer's instructions.

3.02 Installation:

- A. Panelboards and Distribution Panels shall be installed where indicated on the Drawings, and in accordance with the manufacturer's instructions.
- B. Circuit breakers for solidly grounded Wye Electrical Systems of more than 150V to Ground and 1000A or larger shall be equipped with Ground-Fault Equipment Protection.
- C. Circuit breakers 1200A and larger shall be equipped with a separate trip curve for an arc Energy-Reducing Maintenance Switch (ERMS) setting to reduce incident energy.

3.03 Mounting:

- D. Panelboards and Distribution Panels shall be mounted with the top of the box 6'-6" above the floor. Panelboards and Distribution Panels shall be plumb within 1/8-inch. The highest breaker operating handle shall not be higher than 72 inches above the floor.

3.04 Field Tests:

- A. Insulation Resistance Tests: Perform insulation resistance tests on circuits with #2 AWG and larger conductors to be energized with a line-to-neutral voltage of 120 volts or more. Make these tests after all equipment has been connected, except that equipment which may be damaged by the test voltage shall not be connected. Test the insulation with a 500Vdc insulation resistance tester with a scale reading 100 megohms. The insulation resistance shall be 2 megohms or more. Submit results for review.
- B. Grounding: Grounding shall conform to Section 26 05 26.
- C. Continuity: Panelboard and Distribution Panel circuits shall be tested for continuity prior to energizing. Continuity tests shall be conducted using a dc device with a bell or buzzer.

END OF SECTION

SECTION 26 27 26 DEVICES WIRING

PART 1 – GENERAL

1.01 Description of Work

A. The work of this section consists of:

1. Furnishing, installing, and connecting all duplex receptacles complete with wall plates and/or covers, as shown on the Drawings.
2. Furnishing, installing and connecting all light switches complete with wall plates and or handle operators, as shown on the Drawings.

1.02 Related Work:

A. See the following specification sections for work related to the work of this section:

1. 26 05 42 Conduits, Raceways and Fittings.
2. 26 05 19 Line Voltage Wire and Cable.
3. 26 05 33 Junction and Pull Boxes.

1.03 Submittals: As specified in Section 26 05 00 and Division 01.

- A. Submit manufacturers published descriptive literature properly marked to identify the items to be supplied.
- B. A single complete submittal is required for all products covered by this Section.

PART 2 – PRODUCTS

2.01 Receptacles:

A. General - Receptacles shall be heavy duty, high abuse, grounding type.

B. Duplex Receptacles:

1. Receptacles shall be specification grade, rated 20 ampere, two-pole, 3-wire, 125 volt, NEMA 5-20 configuration, self-grounding with screw terminals. Color shall be as selected by the Architect.

2. Devices shall have a nylon face, back and side wired.
3. Manufacturer: Hubbell #DR20 Series, Leviton #16352 Series.

C. GFCI Receptacles:

1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volt, conforming to NEMA 5-20 configuration. Face shall be nylon composition. Unit shall have an LED type red indicator light, test and reset push buttons. Color shall be as selected by the Architect.
2. GFCI component shall meet UL 943 Class A standards with a tripping time of 1/40 second at 5 milliamperes current unbalance. Operating range shall extend from -31°F to 158°F. Unit shall have transient voltage protection and shall be ceramic encapsulated for protection against moisture.
3. Manufacturer: Hubbell #GF20__LA Series, Leviton #GFNT2 Series.

D. Weather Resistant GFCI Receptacles:

1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volt, conforming to NEMA 5-20 configuration, Face shall be nylon composition. Unit shall have a LED type red indicator light, test and reset push buttons. Color shall be as selected by the architect.
2. GFCI component shall meet UL 943 Class A standards with a tripping time of 1/40 second at 5 milliamperes current unbalance. Operating range shall extend from -31°F to 158°F. Unit shall have transient voltage protection and shall be ceramic encapsulated for protection against moisture.
3. Manufacturer: Hubbell #GFTR20__ Series, Leviton #GFWR2 Series.

E. Surge Suppression Receptacles:

1. Device shall be rated 20 ampere, 2-pole, 3-wire, 120 volt. Face shall be nylon composition. Unit shall have an LED type "Power-on" indication light and damage-alert audible alarm. Color shall be as selected by the Architect.
2. Surge suppression protection shall be listed to UL standard 1449 and shall instantly absorb a transient surge of 6,000 volts minimum. A minimum of four (4) Metal Oxide Varistors shall be utilized to absorb transients.
3. Manufacturer: Hubbell #HBL8362S Series, Leviton #8380 Series.

2.02 Switches:

- A. Switches shall be rated 20 amperes to 120/277 volts ac. Units shall be flush mounted, self-grounding, quiet operating rocker devices. Rocker color shall be as selected by the Architect.
 - 1. Manufacturer: Hubbell #DS_20__ Series, Leviton #5621 Series. See plans for single pole, three way and four way requirements.
- B. Timed switches: Shall be as designed by Paragon Electric Company # ET2000f or Watt Stopper TS-400 rated for the voltage specified on drawings. Time-out shall be adjustable from 5 minutes up to 12 hours. Unit shall be provided with warning alarm.
- C. Dimmer switches: Switch shall be as specified on drawings, color per architect. Heat fins shall not be removed, where dimmer switches are ganged together, care shall be taken to install correct size backbox to accommodate switches without removing fins.

2.03 Plates:

- A. General - Plates shall be of the style and color to match the wiring devices, and of the required number of gangs. Plates shall conform with NEMA WD 1, UL 514 and FS W-P-455A. Plates on finished walls shall be non-metallic or stainless steel. Plates on unfinished walls and on fittings shall be of zinc plated steel or case metal and shall have rounded corners and beveled edges.
- B. Non-Metallic: Plates shall be plain with beveled edges and shall be nylon or reinforced fiberglass.
- C. Stainless Steel: Plates shall be .040 inches thick with beveled edges and shall be manufactured from No. 430 alloy having a brushed or satin finish.
- D. Cast Metal: Plates shall be cast or malleable iron covers with gaskets so as to be moisture resistant or weatherproof.
- E. Blank Plates: Cover plates for future telephone outlets shall match adjacent device wall plates in appearance and construction.
- F. Weatherproof Plate: Cover plates in wet and damp locations shall have recessed in-use covers, Taymac or equal. Back box shall be suitable for the wall material where it is installed.

- G. Labeling: All switch and receptacle plates shall be labeled on the top portion of the plate with the panelboard and circuit number serving that device. Lettering shall be 3/16" minimum high, black color, on clear Mylar 3/8" tape. Manufactured by P-touch or equal.

PART 3 – EXECUTION

3.01 Installation of Wiring Devices:

- A. Interior Locations: In finished walls, install each device in a flush mounted box with washers as required to bring the device mounting strap level with the surface of the finished wall. On unfinished walls, surface mount boxes level and plumb.
- B. Mounting Heights: Adjust boxes so that the front edge of the box shall not be farther back from the finished wall plane than 1/4-inch. Adjust boxes so that they do not project beyond the finished wall. Height of device shall be as follows unless otherwise noted on the drawings:
 - 1. Receptacles 15 Inches from finished floor to bottom of box.
 - 2. Toggle Switches 48 Inches from finished floor to top of box.
- C. Receptacles:
 - 1. Ground each receptacle using a grounding conductor, not a yoke or screw contact.
 - 2. Install receptacles with connections spliced to the branch circuit wiring in such a way that removal of the receptacle will not disrupt neutral continuity and branch circuit power will not be lost to other receptacles in the same circuit.

3.02 Installation of Wall Plates:

- A. General - Plates shall match the style of the device and shall be plumb within 1/16-inch of the vertical or horizontal.
- B. Interior Locations, Finished Walls: Install non-metallic plates so that all four edges are in continuous contact with the finished wall surfaces. Plaster filling will not be permitted. Do not use oversized plates or sectional plates.
- C. Interior (not wet) Locations, Unfinished Walls: Install stainless steel or cast metal cover plates.

D. Wet Locations: Install cast metal plates with gaskets on wiring devices in such a manner as to provide a rain tight weatherproof installation. Cover shall be outdoor “in use” type.

E. Future Locations: Install blanking cover plates on all unused outlets.

3.03 Tests:

A. Receptacles:

1. After installation of receptacles, energize circuits and test each receptacle to detect lack of ground continuity, reversed polarity, and open neutral condition.

END OF SECTION

SECTION 26 28 16 CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 Description of Work:

- A. The work of this Section consists of providing circuit breakers as shown on the Drawings and as described herein.

1.02 Related Work: See the following Specification Sections for work related to the work in this Section.

- A. 26 05 00 General Electrical Requirements
- B. 26 24 13 Switchboards
- C. 26 24 16 Panelboards and Distribution Panels

1.03 Submittals:

- A. Shop Drawings - Submittals shall be in accordance with Section 260500 and Division 01. For each circuit breaker furnished under this Contract, submit manufacturer's name, catalog data, and the following information:
 - 1. Terminal connection sizes.
 - 2. Voltage rating.
 - 3. Breaker manufacturer, types, trip ratings and interrupting ratings.
- B. Single Submittal - A single complete submittal is required for all products covered by this Section.
- C. Closeout Submittals: Submit in accordance with and Section 260500, operation and maintenance data for circuit breakers including nameplate data, parts lists, manufacturer's circuit breaker timer, current, coordination curves, factory and field test reports and recommended maintenance procedures.

PART 2 - PRODUCTS

2.01 Circuit Breaker: Each circuit breaker shall consist of the following:

- A. A molded case breaker with an over center toggle-type mechanism, providing quick-make, quick-break action. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Multipole circuit breakers shall have variable magnetic trip elements which are set by a single adjustment to assure uniform tripping characteristics in each pole. Circuit breakers shall be of the bolt-on type unless otherwise noted.
- B. Breaker shall be calibrated for operation in an ambient temperature of 40°C.
- C. Each circuit breaker shall have trip indication by handle position and shall be trip-free.
- D. Three pole breakers shall be common trip.
- E. The circuit breakers shall be constructed to accommodate the supply connection at either end of the circuit breaker. Circuit breaker shall be suitable for mounting and operation in any position.
- F. Breakers shall be rated as shown on Drawings.
- G. Circuit breaker and/or Fuse/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations for use in the end use equipment in which it is installed. Any series rated combination used shall be marked on the end use equipment per CEC section 110-22.
- H. Breakers shall be UL listed. Circuit breakers shall have removable lugs.
- I. Lugs shall be UL listed for copper and aluminum conductors.
- J. Breakers shall be UL listed for installation of mechanical screw type lugs.
- K. Circuit breakers serving HACR rated loads shall be HACR type. Circuit breakers serving other motor loads shall be motor rated.

PART 3 - EXECUTION

3.01 Mounting:

- A. The highest breaker operating handle shall not be higher than 72 inches above the floor.

END OF SECTION

SECTION 26 51 00
LIGHTING

PART 1 – GENERAL

1.01 Description of Work:

- A. The work of this section consists of providing and installing a complete lighting system, including fixtures, LED light module, hangers, reflectors, glassware, lenses, auxiliary equipment, heat management components, LED driver (integral or remote), and housing.

1.02 Related Work:

- A. See the following specification sections for work related to the work of this section:

- 1. 26 05 00 General Electrical Requirements.
- 2. 26 05 42 Conduit, Raceway and Fittings.
- 3. 26 05 19 Line Voltage Wire and Cable.
- 4. 26 05 33 Junction and Pull Boxes.

1.03 Submittals: In accordance with Division 01.

- A. Submit descriptive data, photometric curves for each fixture configuration proposed.
- B. Submit shop drawings showing proposed methods for mounting lighting fixtures.
- C. Seismic Requirements: Submit:
 - 1. Sketch or description of the anchorage system if not provided on construction documents.
- D. Submit Operation and Maintenance Data per Division 01.

1.04 Warranty:

- A. LED light module, LED driver, [HID and Fluorescent lamps], [ballasts], batteries or other luminaire components which fail within the first year after final acceptance shall be replaced by the Contractor with the warranty clause of the General Provisions.
- B. Replacement components provided under warranty to be provided by contractor, not taken from project spare stock.

PART 2 – PRODUCTS

2.1 General

- A. Fixtures shall be of the types, wattages and voltages shown on the Drawings and be UL or equivalent classified and labeled for the intended use.
- B. Substitutions will not be considered unless the photometric distribution curve indicates the proposed fixture is equal to or exceeds the specified luminaire and the substitution is consistent with the design intent.
- C. Luminaire (factory or field installed) wire, and the current carrying capacity thereof shall be in accordance with the CEC.
- D. Luminaires and lighting equipment shall be delivered to the project site complete, with suspension accessories, aircraft cable, stems, hangers canopies, hickey, castings, sockets, holders, LED light engine, [lamps], [ballasts], diffusers, frames, and related items, including support and braces.

2.2 Light Emitting Diode (LED) Light Sources and Luminaires:

A. General (Non-Emergency):

- 1. Provide identical power supply and driver within each luminaire type. Provide power supplies and drivers that are suitable and UL-listed for the electrical characteristics of the supply circuits to which they are to be connected and which are suitable for operating LED or relevant light sources.
- 2. Unless otherwise specified, provide power supplies of same type and same manufacturer for ease of stocking and replacement.
- 3. Components shall be configured and installed in luminaire by the luminaire manufacturer.
- 4. Luminaire housing shall be constructed of painted metal with no sharp edges unless otherwise noted.
- 5. Provide only luminaires whose design, fabrication and assembly prevent overheating or cycling of light engines or drivers/power supplies under any condition of use.
- 6. Electronic ballasts shall meet the requirements of the Federal Communications Commission Rules and Regulations, Part 18, Part C (RF Lighting Devices) Non-

consumer equipment, regarding radio frequency interference (RFI) (radiated) and electromagnetic interference (EMI) (power line conducted).

7. Submit light fixture details with luminaire shop drawings.
- B. Emergency Lighting: Battery-backed emergency lighting luminaires shall consist of a normal LED luminaire with some or all of the LEDs connected to a battery and charger.
1. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of luminaire operation unless otherwise noted.
 2. The charger shall be solid-state and include overload, short circuit, brownout and low battery voltage protection.
 3. The battery and charger shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months.
 4. The luminaire shall include a test/monitor module with status indicating lights mounted so as to be visible to the public.
 5. The luminaire shall not contain an audible alarm.
 6. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- C: LED Performance and component manufacturer requirements.
1. All color characteristics, SPD (Special Power Distribution) CCT, CRI, CIE Chromaticity Coordinates shall be consistent across the entire dimming range.
 2. LEDs shall comply with ANSI/NEMA/ANSI C78.377-2008 – Specifications for the Chromaticity of Solid State Lighting Products. Color shall remain stable throughout the life of the source. The chromaticity of the installed product shall match IES LM-80 data showing that the LED's do not shift more than .005 DuV from submitted documentation.
 3. White LEDs shall have a minimum rated source life of 50,000 hours or as specified: Luminaire Schedule. Multicolor LEDs shall have a minimum rated source life of 100,000 hours. LED "rated source life" shall be determined per IES TM-21 - Projecting Long Term Lumen Maintenance of LED Light Sources based on LM-80 test data. Calculated lifetimes exceeding testing hours per TM-21 are not accepted.

4. Luminaire assembly shall include a method of dissipating heat so as to not degrade life of source, electronic equipment, or lenses. LED luminaire housing shall be designed to transfer heat from the LED board to the outside environment. Luminaire housing shall have no negative impact on life of components. Manufacturer shall provide Luminaire Efficacy (lm/W), total luminous flux (lumens), luminous intensity (candelas), chromaticity coordinates, CCT, CRI, optical performance, polar diagrams, and relevant luminance and illuminance photometric data. Provide data in IES file format in accordance with testing standards IES LM-79-08 and IES LM-82-12, based on test results from an independent Nationally Recognized Testing Laboratory or National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory.
5. Manufacturer will keep record of original chromaticity coordinates for each LED module and have replacement modules or luminaires from within three (3) MacAdam Ellipses/ steps of the same coordinates available for the duration of the warranty period.
6. Manufacturer's LED light engine or equivalent system will be available for ten (10) years: Manufacturer will provide exact replacement parts, complete replacement luminaires, or provide upgraded parts that are designed to fit into the original luminaire and provide equivalent distribution and lumen output to the original, without any negative consequences.
7. All LED sources used in the LED luminaire shall be of proven quality from established and reputable LED manufacturers and shall have been fabricated within 12 months before installation per the date code on the module. Acceptable LED component or module manufacturers unless otherwise noted are:
 - a. Cree, Inc.
 - b. Lumileds
 - c. Nichia Corporation
 - d. Norlux
 - e. Lextar
 - f. Osram Optronic Semiconductors
 - g. Xicato
 - h. Bridgelux
 - i. Epistar

- j. San'an
- k. Citizen Electronics
- l. General Electric Company
- m. Sora
- n. Samsung
- o. Seoul Semiconductor
- p. Lumenetix
- q. Ledengin

2.3 LED Power Supplies/ Drivers:

1. LED driver shall have a minimum 50,000 hour published life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
2. Driver shall be Sound Rated A+.
3. Driver shall be > 80% efficient at full load across all input voltages.
4. Driver shall include ability to turn off at low control input rather than holding at a minimum dimming level, and shall consume 0.5 Watts or less in standby/off mode. Control deadband at low control input shall be included to allow for voltage variation of incoming signal without causing noticeable variation in luminaire to luminaire output.
5. Drivers shall track evenly across multiple luminaires at all light levels, and shall have an input signal to output light level that allows smooth adjustment over the entire dimming range.
6. Control Input:
 - a. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers
 - (i) Must meet IEC 60929 Annex E for General White Lighting LED drivers.
 - (ii) Connect to devices compatible with 0 to 10V Analog Control Protocol, Class 2, capable of sinking 0.6 ma per driver at a low end of 0.3V.
 - (iii) Must meet ESTA E1.3 for RGBW LED drivers.

- b. Digital (DALI Low Voltage Controlled) Dimming Drivers
 - (i) Must meet IEC 62386.
- c. Digital Multiplex (DMX Low Voltage Controlled) Dimming Drivers
 - (i) Must meet DMX / RDM: USITT DMX512A and ANSI E1.20 (Explore & Address).
 - (ii) Must be capable of signal interpolation and smoothing of color and intensity transitions.
- 7. Power Factor: The luminaire shall have a power factor of 90% or greater at all standard operating voltages and full luminaire output.
- 8. THD: Total harmonic distortion (current and voltage) induced into an AC power line by luminaire shall not exceed 10 percent at any standard input voltage and meet ANSI C82.11 maximum allowable THD requirements at full output. THD shall at no point in the dimming curve allow imbalance current to exceed full output THD.
- 9. In Rush Current: Meet or exceed NEMA 410 driver inrush standard of 430 Amps per 10 Amps load with a maximum of 370 Amps 2 – seconds.
- 10. RF Interference: The luminaire and associated on-board circuitry must meet Class A emissions limits referred in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 Non-Consumer requirements for EMI/RFI emissions.
- 11. Light engines shall be 3500°K 80 CRI minimum, U.O.N. on drawings.
- 12. Drivers [and ballasts] shall be accessible for maintenance or replacement without removal of recessed light fixture and without destruction of the ceiling.

PART 3 – EXECUTION

3.01 Installation:

A. General:

1. All fixtures and luminaires shall be clean and lamps shall be operable at the time of acceptance.

2. Install luminaires in accordance with manufacturer's instructions, complete with lamps, ready for operation as indicated.
3. Align, mount, and level the luminaires uniformly.
4. Avoid interference with and provide clearance for equipment. Where an indicated position conflicts with equipment locations, change the location of the luminaire by the minimum distance necessary.
5. Recessed light fixtures in fire rated assemblies shall be installed per an approved UL rated fire rated penetration detail.

B. Mounting and Supports:

1. Mounting heights shall be as shown on the Architectural and Electrical Drawings. Unless otherwise shown, mounting height shall be measured to the centerline of the outlet box for wall mounted fixtures and to the bottom of the fixture for suspended fixtures and to the bottom of the fixture for all other types.
2. Luminaire supports shall be anchored to structural members.
3. Pendant stem mounted luminaires shall be provided with ball aligners to assure a plumb installation and shall have a minimum 45 degree clean swing from horizontal in all directions. Sway bracing shall be installed as required to limit the movement of the fixture. Fixtures shall be allowed to sway a maximum of 45° without striking any object.
4. Fixture supports shall be designed to resist earthquake forces of seismic zone 4.
5. Refer to fixture mounting details on drawings for installation requirements.
6. Pendant cable mounted luminaries shall be provided with fully adjustable stainless steel aircraft cable hangers unless otherwise noted on the Drawings.

END OF SECTION

SECTION 31 10 00 SITE PREPARATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Locate and mark existing utilities within the limits of work.
- B. Remove existing trees, including root ball, within the area of work, as indicated on plan.
- C. Remove existing surface improvements within the area of work as indicated on plan.
- D. Remove existing subsurface utilities, including appurtenances, within the area of work, as indicated on plan.
- E. Properly dispose of all excess and unsuitable material.
- F. Strip all areas within the limits of work as indicated on the plan.
- G. Deploy and subsequently remove temporary construction area and tree protection fencing at completion of construction.
- H. Install and maintain erosion control measures.

1.2 RELATED SECTIONS

- A. Earthwork - Section 312000
- B. Trenching, Backfilling and Compaction - Section 312316

1.3 REFERENCES

- A. Reference Data:
 - 1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the work is given.
- B. Caltrans Standard Plans and Specifications.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

- A. Install tree protective fencing around trees designated to be saved, prior to the start of demolition work. See Civil and Landscape Plans and Specifications. Install fencing as far from the trunk as possible to allow for construction of proposed improvements. Maintain fencing throughout duration of construction.
- B. The area above the natural ground surface shall be cleared of all vegetation such as trees not designated to be saved, roots, brush, grass, weeds, and all other objectionable material including buildings (footings, slabs, etc.), asphalt, concrete, curbs, mulch, headerboard, ramps, stairs, utility piping (including appurtenances), bike racks, fences/gates, site furniture, and similar materials, within the limits of construction.
- C. All concrete and asphalt pavements and other existing improvements within the areas to be developed should be removed during site demolition. At the Contractor's option, salvaged class 2 aggregate base material may be stockpiled for reuse.
- D. Existing building foundations should be entirely removed below final subgrade in the building pad areas, and to a depth of at least three feet in areas outside the building footprints. The excavations beneath the planned building area should be backfilled with engineered fill. See also Section 312000.
- E. The natural ground surface within the entire site, except within the tree protection zones, shall be grubbed to a depth necessary to remove all stumps, buried logs, roots over 2-inches in diameter, and all other unsuitable material. Stumps shall be removed to a depth of at least 24" below original grade.
- F. Existing utilities designated to be removed that do not conflict with proposed improvements may be abandoned in place. If they are abandoned in place, the utility shall be slurried and capped. Any portions of these utilities that conflict with the new improvements shall be removed.
- G. All unsuitable material shall be removed from the construction area and disposed of properly. Comply with hazardous material abatement regulations that may apply.

3.2 DEMOLITION SEQUENCING

- A. Permanent and/or temporary facilities may need to be installed prior to demolition to limit utility outages. Any planned and or necessary interruption of existing utilities shall be coordinated with the Construction Manager. A minimum of one week's notice

shall be provided before any such interruption.

3.3 STRIPPING

- A. The upper soils containing grass, small roots, and other vegetation, to a depth of 4+/- inches, shall be stripped from and removed from the site. Deeper stripping may be required in localized areas to remove roots or other concentrations of organic material.
- B. Dust control shall be performed by the contractor during all phases of the construction. Payment for the dust control work involved shall be considered included in the items of work and no additional allowance will be made therefor.
- C. The Geotechnical Engineer will observe the clearing and stripping operations and recommend the maximum depth of stripping required and any additional excavation necessary due to contamination of materials or concentrations of vegetation.
- D. All suitable stripped material in excess of those needed to backfill landscape and/or planter areas shall be removed from the project site and disposed of properly.

3.4 CLEARED MATERIAL

- A. The objectionable cleared material including buildings (footings, slabs, etc.), curbs, mulch, headerboard, ramps, utility piping (including appurtenances), bike racks, fences/gates, site furniture, etc., shall be removed from the project site and disposed of properly.

3.5 STRIPPED MATERIAL

- A. Excess and objectionable stripped material including asphalt and concrete pavements, grass/vegetation, etc. shall be removed from the project site and disposed of properly. Contractor is encouraged to recycle the existing aggregate base materials for use in hardscape areas only (non-building).

3.6 EROSION AND SEDIMENT CONTROL

- A. Install and maintain erosion control devices/measures, including, but not limited to drainage inlet protection, fiber rolls, silt fence, etc., until such time as all vegetative and hard surface improvements within their individual tributary areas are completed. Provide periodic maintenance of all such devices, and following completion of said improvements, remove and dispose of erosion control devices and repair surfaces to match final specified surface finishes.
- B. Any areas where ground has been disturbed, and where final landscaping has not been

installed by October 15, will require the installation and maintenance of erosion control devices by the Contractor, as generally noted in the Erosion Control Notes on the plans.

- C. Additionally, the Contractor shall implement and adhere to the requirements of the Water Pollution Control Plan (WPCP), including, but not limited to, rain event inspections, storm water discharge sampling and analysis, vehicle/equipment maintenance, and cleaning, etc..

3.7 SURFACE IMPROVEMENT AND UTILITY REMOVAL AND RELOCATION

- A. The Contractor shall have Underground Service Alert mark all existing public utilities as a first order of work. Additionally, the Contractor shall have a locating service mark all existing private utilities within the limits of work.
- B. The Contractor shall pothole each existing utility that will be extended or reused at its point of cut and removal to confirm the actual locations and depths as well as all proposed crossings as shown on the drawings. Notify Engineer of results via the RFI process.
- C. Existing water, sewer, storm drain, gas, electrical, communication (data) services and laterals to be abandoned or removed as indicated on the plans shall be provided with replacement facilities as to comply with construction sequencing requirements and limit utility/service outages as required by the Owner.
- D. See Mechanical, Electrical, and Civil plans for detailed removal/replacements requirements.

3.8 CLEAN UP

- A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 31 20 00
EARTHWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Description of suitable materials for earthwork operations.
- B. Definitions of terms.
- C. Description of the duties and responsibilities of the Geotechnical Engineer.
- D. Excavate earth, rock, and all material regardless of character and subsurface conditions.
- E. Requirements for excavation, overexcavation, and disposal of surplus and unsuitable material off the project site.
- F. Dewatering of excavations.
- G. Spread and compact engineered/import/select fill.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Division 01 Specification Section, apply to this Section.
- B. Related Sections include the following:
 - 1. Site Preparation - Section 311000
 - 2. Trenching, Backfilling and Compaction - Section 312316

1.3 REFERENCES

- A. Reference Data:
 - 1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual, or test designation in effect the date the Notice to Proceed with the Work is given.

1.4 EXISTING CONDITIONS

- A. All grading activities shall be in accordance with the project Geotechnical Investigation, prepared by LACO Associates, titled Geotechnical Evaluation and

Geohazard Report, and dated June 3, 2020.

- B. The project site is underlain by interbedded alluvial deposits variously composed of low to high plasticity, medium stiff to very stiff, silty to sandy clay and loose to medium dense silty and clayey sands and gravels.
- C. It is the Contractor's responsibility to achieve the finished grades shown on the plan, and to determine the quantity of and provide for soil import or export required to achieve plan grades.

1.5 GEOTECHNICAL ENGINEER

- A. The work covered by these specifications shall be performed under the observation of the Geotechnical Engineer, who shall be retained and paid by the Owner. The Geotechnical Engineer will be present at the site intermittently during the conduct of work to observe the work, and to perform field and laboratory tests to evaluate material quality and compaction. The Contractor shall cooperate with the Geotechnical Engineer in performing the observations and tests. The Geotechnical Engineer shall notify the Contractor of failing test results. The Contractor shall rework these areas until the specified degree of compaction is obtained. At the completion of his work, the Geotechnical Engineer shall submit a report to the Owner, including a tabulation of all tests performed. The Geotechnical Engineer's costs for observing and testing the repair of unsatisfactory work performed by the Contractor shall be billed to the Owner. The Owner shall pay them and then shall deduct the amount from monies due the Contractor.

1.6 SUBMITTALS

- A. Submit test reports and compaction curve analysis for engineered fill required in accordance with Section 013300.

1.7 DEFINITIONS

- A. Standard Specifications
 - 1. Where referred to in these specifications, "Standard Specifications" shall mean the State of California Standard Specifications, latest edition. All work shall be carried out in conformance with the Standard Specification, unless otherwise specified herein.
 - 2. Where referred to in these specifications, "City " shall mean the latest edition of the standard plans and drawings for the City of Lakeport. All work shall be carried out in conformance with the standards.
 - 3. Where referred to in these specifications, "City" shall mean the latest edition of the standard plans and drawings of the City of Lakeport. All work shall be carried out in conformance with the referenced standard.
 - 4. Site Grading shall comply with the applicable sections of Title 24 and of Appendix J of the California Building Code, latest adopted edition.
- B. Percent Compaction -- As referred to in these specifications, percent compaction is the required in-place dry density of the material, expressed as a percentage of the maximum dry density of the same material determined by the ASTM D 1557 test procedure.
- C. Optimum Moisture Content -- As referred to in these specifications, optimum moisture content is the moisture content, percent (by dry weight), corresponding to the

maximum dry density of the same material as determined by the ASTM D 1557 test procedure.

- D. Soil Subgrade – Where used in these specifications, soil subgrade shall mean within exterior slab areas, the surface on which aggregate base material is placed, and within building areas, the surface on which footings bear and/or on which floor slab structural section is placed.

PART 2 - PRODUCTS

2.1 IMPORT FILL

- A. Import fill shall be material consisting of soil and rock mixtures that: 1) are free of organic material. 2) have a Liquid Limit less than 40 and a Plasticity Limit of less than 20, and 3) have a maximum particle size of 6 inches.
- B. In general, the onsite soils, to the extent that they may be available, will be suitable for use as fill, provided they are prepared as described below.
- C. General engineered fill shall be approved by the Soils Engineer prior to fill placement.

PART 3 - EXECUTION

3.1 SPILLAGE, DUST AND EROSION CONTROL

- A. The Contractor shall prevent spillage when hauling on or adjacent to any public streets or highways. In the event that such occurs, the Contractor shall remove all spillage and sweep, wash or otherwise clean such streets or highways as required by local City and County authorities and/or the State of California.
- B. The Contractor shall take all precautions needed to prevent a dust nuisance to adjacent public or private properties and to prevent erosion and transportation of soil to downstream adjacent properties. Any damage so caused shall be corrected or repaired by the Contractor at no cost to the Owner.

3.2 EXCAVATION

- A. Following clearing and stripping, overexcavate existing subgrade materials in non-building areas to planned subgrade. The overexcavations should extend three feet beyond the edges of exterior hardscape edges, as required. The overexcavated materials may be stockpiled and reused as properly placed compacted/engineered fill. The excess and unsuitable excavated material shall be disposed of properly, offsite.
- B. The upper 8" of all exposed exterior hardscape subgrade soils shall be scarified, thoroughly moisture- conditioned to at least 3% above optimum moisture content, and compacted to at least 90% relative compaction. The upper 6" of subgrade in asphalt pavement areas shall be compacted to at least 95% relative compaction.
- C. Once compacted, the subgrade materials should be maintained at least 3 percentage points above optimum moisture content prior to placement of additional fill or aggregate base material. This is likely to require periodic sprinkling during the dry season. Should drying of the soils occur, they should again be scarified, moisture-conditioned to the proper moisture content and recompact.
- D. Recompact subgrade shall have a firm and unyielding surface under the observation of the Geotechnical Engineer or their designated representative. If excessive pumping or instability is observed, overexcavation and the placement of a stabilizing fabric and a 12" to 18" thick layer of class 2 aggregate base may be required by the project Geotechnical Engineer.
- E. Final surfaces exposed by the completed excavations (cutting) shall be finished true to line and grade. Depressions shall be filled and compacted, and loose material shall be removed.

- F. Temporary construction slopes shall not exceed requirements set forth in Cal-OSHA Industrial Safety Orders, or ratio suggested in the field by the Geotechnical Engineer.
- G. It is the Contractor's responsibility to achieve the finished grades shown on the plan, and to determine the quantity of and provide for soil import or export required to achieve plan grades
- H. Refer to the Geotechnical Investigation Report for further requirements.

3.3 FIELD QUALITY CONTROL

- A. The Geotechnical Engineer will observe the excavation, soil removal, moisture-conditioning and recompaction operations. After the completion of these operations and before placement of fill, the Contractor shall obtain the Geotechnical Engineer's approval of the site preparation in each area.

3.4 DEWATERING

- A. During excavation activities, groundwater may be encountered. The contractor is responsible for accounting in their bid the necessary equipment required to remove groundwater from excavations to allow for the proper placement of fill per the Geotechnical Report.

- B. Groundwater shall be discharged through a silt-sack type device at the outlet end of the discharge pipe to allow for filtration.
- C. Silty water shall not be discharged to any storm drain.

3.5 PLACEMENT MOISTURE CONDITIONING AND COMPACTION

- A. Exposed subgrade materials shall be ripped, moisture-conditioned, and compacted as noted in Paragraph 3.02B. above. Onsite fill materials to be used in exterior hardscape areas should subsequently be placed in loose, horizontal lifts of 8 inches thick or less, moisture-conditioned to within 2% of optimum moisture content or as directed in the field by the project Geotechnical Engineer, and uniformly compacted to at least 90% relative compaction. The upper 6" of subgrade in asphalt pavement areas shall be compacted to at least 95% relative compaction
- B. All site preparation and fill placement should be observed by a representative of the Geotechnical Engineer.
- C. Where field density tests indicate that required compaction and/or moisture content has not been attained, the fill shall be reconditioned as necessary and recompacted to the required density and/or moisture content prior to placing additional material. The Contractor shall be responsible for placing, moisture conditioning and compacting approved material in accordance with these specifications.
- D. Sufficient testing and inspection should be performed to assure compliance with the recommended compaction standards. Samples of proposed native or imported fill should be submitted to the Geotechnical Engineer material testing laboratory for assessment at least 48 hours prior to placement or importing to the site (whichever is soonest).

3.6 FINISH

- A. Fill slopes shall be compacted by slope rolling and trimming or shall be overfilled and trimmed back to planned grade. The completed fill shall be finished true to line and grade. Depressions shall be filled and compacted and all loose material shall be removed.
- B. After completion of compaction and finish grading operations, fill slopes, horizontal surfaces disturbed by construction operations, and cut slopes shall be moisture conditioned and 'trackwalked' to provide a firm and uniformly roughened surface free of loose material.

- C. See also requirements in landscape specifications for slope and landscaped area requirements.

3.7 CLEAN UP

- A. Remove all debris and stains resulting from the work of this section, including any and all excess material, which shall be removed from the project site.

END OF SECTION

SECTION 31 23 00
STRUCTURAL EXCAVATION AND FILL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Available Information: “Geotechnical Evaluation and GeoHazard Report” prepared by LACO Associates and dated June 3, 2020, is available in accordance with “Information Available to Bidders”.

1.2 SUMMARY

- A. This Section Includes:
 - 1. Excavation for foundations and pits.
 - 2. Backfilling structural excavations as required.
 - 3. Fill over concrete mat foundations.
- B. Related Sections:
 - 1. Division 03 Section “Concrete Formwork” for formwork for footings.
 - 2. Division 31 Section “Earthwork” for mass excavation and/or fill for building pad.

1.3 REFERENCES

- A. ASTM: Standards of the American Society for Testing and Materials (ASTM) apply where cited in this Section.
- B. American Concrete Institute (ACI):
 - 1. ACI 301 - Specifications for Structural Concrete for Buildings, 2010.
 - 2. ACI 229R – Controlled Low Strength Materials, 2013.
- C. California Department of Transportation’s (Caltrans):
 - 1. CSS - Standard Specifications, 2010.

1.4 SITE CONDITIONS

- A. Notify Owner’s Representative when site conditions differ from findings of Geotechnical Investigation Report.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Concrete: Concrete materials and proportions shall be in accordance with ACI 301 to produce concrete with minimum compressive strength of 2500 psi at 28 days.
- B. Structural Fill: CSS Section 26, Class 2 Aggregate Base rock, 3/4” size.
- C. Controlled Low Strength Material: Machine mixed, self-compacting, low-strength fill consisting of fine aggregate, cementitious materials, entrained air and water. Mix and mixing shall conform to recommendations of ACI 229 to achieve the following properties:
 - 1. Slump: 8 to 10 inches.
 - 2. Compressive Strength:
 - a. For backfill: Minimum 150 psi to maximum 300 psi at 30 days.
 - b. For fill beneath footings: Minimum 300 psi at 30 days.

3. Fresh Density: 115 to 145 pounds per cubic.
 4. Subsidence: Minimal; a maximum of 1/16" per foot of thickness.
- D. Pea Gravel: ASTM C 33, Size No 7.
1. Fill material (over mat foundation): Crushed rock of uniform gradation, 100% passing 3/4 inch sieve.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Take measures to prevent surface water from entering excavations.
- B. Notify Geotechnical Engineer at least 48 hours prior to commencing and upon completion of excavations.

3.2 EXCAVATION

- A. Accurately cut foundation excavations to dimensions and elevations shown on Drawings to tolerances of ACI 301.
- B. Where sides are unstable or excavations are not accurately cut, over-excavate to permit placement and removal of formwork.
- C. Shore and brace excavations as required to prevent caving and danger to persons and structures. Comply with applicable safety regulations.
- D. Prepare bottoms of footing excavations to produce conditions acceptable to Owner's Representative, based on professional opinion of Geotechnical Engineer.
 1. The bottoms of excavations shall be firm, undisturbed earth, clean and free from loose material, debris and foreign matter.
 2. Remove or recompact disturbed material.
 3. Remove soft or unstable material to a depth satisfactory to Geotechnical Engineer.
 4. Fill over-depth excavations with concrete, flowable fill, or structural fill compacted to minimum 95% relative compaction.
- E. Maintain footing conditions approved by Geotechnical Engineer until concrete work is complete.
 1. In periods of wet weather, over-excavate footings and place 2-inches minimum concrete mud-slab as soon as practical after completing excavation.
- F. Keep excavations free of water at all times until foundation concrete is cast.
- G. Stockpile or remove excavated material from site in accordance with Division 31 Section

“Earthwork”.

3.3 BACKFILLING

- A. Place and compact fill in accordance with Division 31 Section, “Earthwork”.
 - 1. Use pea gravel or controlled density material for backfill against sides of footings and pits, where adequate compaction of structural fill cannot be achieved.
- B. Backfill footings after formwork is removed. Do not backfill pits until concrete has cured a minimum of 7 days.

3.4 FILL OVER CONCRETE MAT FOUNDATIONS

- A. Preparation:
 - 1. Verify piping is securely supported against vertical and lateral displacement.
 - 2. Where area is not enclosed prior to placement of fill, make provision for removal of water.
- B. Placement: Fill may be placed to the full specified thickness without compaction.
 - 1. Pipes: Bed pipes in fill up to grade of underside of pipe, taking care not to place material atop pipe. Shovel slice material under and beside the pipe up to the spring line without moving the pipe.

- C. Consolidation: Immediately prior to placement of vapor retarder, consolidate surface with a minimum of 3 passes of a vibratory plate. Achieve specified grade to plus 0 inch to minus 1-1/2 inch tolerance.

3.5 FIELD QUALITY CONTROL

- A. The Geotechnical Engineer will observe footing excavations prior to placement of reinforcement; and again, immediately prior to casting of concrete.
- B. The Geotechnical Engineer will observe the placement of fill and backfill material.

END OF SECTION

SECTION 31 23 16

TRENCHING, BACKFILLING AND COMPACTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Locate and mark existing utilities within the limits of work.
- B. Trenching and other excavation needed for the installation of pipe (storm drain, water, sanitary sewer and gas) and appurtenances.
- C. Provide and install bedding material as specified for each type of utility.
- D. Backfill and compact trenches and excavations with suitable material, as specified.
- E. Provide and install subbedding material as required.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Division 01 Specification Sections apply to this Section.
- B. Related Sections include the following:
 - 1. Site Drainage – Section 334000
 - 2. Water Utility Distribution Piping – Section 331100
 - 3. Sanitary Sewerage Utilities – Section 333000

1.3 SUBMITTALS

- A. In accordance with Section 013300, Submittal Requirements:
 - 1. Sand equivalent and gradation analysis of bedding and backfill materials.

1.4 REFERENCES

- A. Standard Specifications
 - 1. Where referred to in these specifications, "Standard Specifications" shall mean the State of California Department of Transportation Standard Specifications, latest edition. All work shall be carried out in conformance with the Standard Specifications unless otherwise specified herein.

1.5 EXISTING SITE CONDITIONS

- A. The Contractor shall have Underground Service Alert mark all existing public utilities as a first order of work. Additionally, the Contractor shall have a locating service mark all existing private utilities within the limits of work.
- B. The Contractor shall pothole each existing utility that will be extended or reused at its point of cut and removal to confirm the actual locations and depths, as well as all proposed crossings as shown on the drawings. Notify Engineer of results via the RFI process.
- C. Existing water, sewer, storm drain, gas, electrical, communication (data), etc. services and laterals to be abandoned or removed as indicated on the plans shall be provided with replacement facilities as to comply with construction sequencing requirements and limit utility/service outages as required by the Owner. See Mechanical, Electrical, and Civil plans for detailed removal/replacements requirements.

- D. The Contractor shall acquaint himself with all site conditions. If unknown/unmarked active utilities are encountered during the work, the Engineer shall be promptly notified for instruction via the RFI process. Failure to notify will make the Contractor liable for damage to these utilities arising from Contractor's operations subsequent to his discovery of such unknown/unmarked utilities.
- E. The Contractor shall review the Soils Investigation and plan their work accordingly.

1.6 QUALITY ASSURANCE

- A. Testing Agency: The project Geotechnical Engineer representative (Inspector) shall verify the adequacy of sub-bedding conditions and monitor bedding, backfilling, and compaction operations.
- B. Unsatisfactory Conditions: The Inspector will advise the Contractor immediately if unsatisfactory conditions or test results are observed. The area where compaction is unsatisfactory shall be reworked until the required density has been attained. The Inspector shall have the authority to reject structural bedding or backfill until unsuitable material has been replaced and/or rework, as needed, has taken place. It shall be the sole responsibility of the Contractor to achieve the specified degree of compaction.

1.7 PROTECTION FROM CAVING

- A. Construction Safety Orders
 - 1. Nothing in this section shall be deemed to allow the use of a shoring, sloping, or protective system less effective than that required by the Construction Safety Orders. The Contractor shall take all necessary measures to protect the workmen and adjacent areas and structures from the hazards of the trenching or excavation operations. Sheet piling and other sheeting shall be withdrawn in such a manner as to prevent caving at the walls of excavation or damage to piping or other structures. Except as may be hereinafter modified, no sheeting shall be left in the trench and no backfill shall be made against the sheeting before it is removed. Any sheeting extending below the invert of the pipe shall be left in place by cutting off in a manner satisfactory to the Inspector.
- B. Liability
 - 1. Nothing in this section shall be construed to impose tort liability on the Architect or the Design Engineer.

PART 2 - PRODUCTS

2.1 TRENCH STABILIZATION SUBBEDDING

- A. Drain rock for trench stabilization subbedding shall be of the nominal sizes designated as 3/4" x 1/4".

2.2 BEDDING MATERIAL (STORM DRAIN, WATER AND SANITARY SEWER)

- A. Bedding material shall be well graded sand free from vegetable matter and refuse.
- B. The minimum sand equivalent value shall be 30.
- C. The grading shall conform to the following:

Sieve	Percentage Passing	
	Minimum	Maximum
1"	100	100
3/4"	100	100
3/8"	100	100
No. 4	90	100
No. 200	0	5

2.3 BEDDING MATERIAL (GAS)

- A. Bedding material for gas line installation shall be backfill sand meeting the requirements of the PG&E Green Book.

2.4 BACKFILL

- A. In non-hardscape areas (as shown on the Increment 3 set of plans), backfill material may be native excavated material free of vegetable matter, refuse and other unsatisfactory material.
- B. The backfill material shall be free of stone and lumps exceeding 4 inches in greatest dimension.
- C. Backfill material shall have minimum Plastic Index (PI) value of 15. Liquid limit (LL) value shall be no more than 40.
- D. Granular trench backfill material may be used in lieu of native material at the Contractor's option.

2.5 GRANULAR BACKFILL MATERIAL

- A. Within paved and other hardscape areas, the upper 12" of backfill for trenches shall be Caltrans Class 2 aggregate base.
- B. Granular backfill material, above bedding material, and below class 2 aggregate base, shall be gravel, sand or rock material free from deleterious materials, shall be used in hardscape areas.
- C. Minimum sand equivalent value shall be 25.
- D. Granular backfill material shall conform to the following:

Sieve Size	Percentage Passing
3"	100
3/4"	-
3/8"	-
No. 4	40 - 100
No. 30	10-100
No. 200	-

PART 3 - EXECUTION

3.1 EXCAVATION

- A. The Contractor shall make all necessary excavations to construct the work shown on the Drawings and in accordance with trench detail appropriate to the utility being installed and the City Standards.
- B. The Contractor shall perform all excavations of every description and all substances encountered to the depth indicated on the drawings. During excavation, that material suitable for backfilling shall be deposited in an orderly manner, a sufficient distance from the banks for the trench to avoid overloading and to prevent slides or cave-ins. All excavated material not required or suitable for backfill shall be removed and properly disposed of offsite.
- C. Excavation shall include the removal of all materials or surface obstructions of any nature that would interfere with the execution of the work, and such items shall be returned to their equivalent preconstruction condition after installation of utilities.
- D. All trench excavation work shall conform to the Division of Industrial Safety Construction Safety Orders, which are currently in use.

3.2 TRENCH WIDTH AND DEPTH

- A. The maximum allowable width of trench measured at the top of the pipe shall be the outside diameter of the pipe exclusive of bells and collars, plus twenty-four (24) inches, and such maximum width shall be inclusive of all trench sheeting. Minimum width of trench for pipes 18" diameter and less shall be pipe diameter plus 6". Maximum width of trench for pipes 18" diameter and less shall be pipe diameter plus 9". Minimum width of trench for pipes 18" diameter and greater shall be pipe diameter plus 9". Maximum width of trench for pipes 18" diameter and greater shall be pipe diameter plus 12". Whenever the maximum allowable trench width is exceeded for any reason, the Contractor shall, at his expense, embed or cradle the pipe in concrete in a manner satisfactory to the Engineer.
- B. The trench shall be excavated to the dimensions and depth shown on the Drawings and in a manner, which will produce a firm foundation for supporting the entire length of each section of pipe. Bell holes shall be provided so that the load is carried on the pipe barrel.
- C. Minimum cover for domestic and recycled/reclaimed water lines shall be 24".
- D. Minimum cover for fire water lines shall be 42".
- E. Minimum cover for gas lines shall be 30".

3.3 CONTROL OF WATER

- A. The Contractor, at his own expense, shall provide sufficient pumping equipment, and the operation thereof, to remove ground water from the excavation.
- B. Water shall be disposed of in such a manner as to cause no injury to public or private property, nor be a menace to the public health. Discharges directly to storm drainage systems, ditches, and creeks shall not be allowed.
- C. Dewatering shall be performed under a Contractor obtained permit from either the City of Lakeport (if discharge is to the sewer system) or the Regional Water Quality Control Board (if discharge is to the storm drain system). The Contractor is advised that both of these agencies may require testing of the proposed dewatering discharge for contaminants. It shall be the sole responsibility of the Contractor to apply for and obtain the necessary permits, obtain and pay for any required water quality tests, design shoring and dewatering systems, and pay any fees associated with discharging the water to the sanitary sewer system if that option is selected. Permits must be obtained prior to any discharge occurring.

3.4 UNSUITABLE SUB-BEDDING

- A. Where soft, wet, spongy, or unsuitable trench foundation is encountered, sub-bedding material shall be placed under the pipe to facilitate construction. The cost of furnishing and placing sub-bedding material shall be included in the price bid for the job.

3.5 BRACING EXCAVATIONS

- A. Excavations shall be so braced and supported that they will be safe, and the ground alongside the excavation will not slide or settle, and all existing improvements of any kind, either on public or private property will be fully protected from damage.
- B. If any damage does result to such improvements, the Contractor shall make the necessary repairs or reconstruction at his own expense.

3.6 PIPE BEDDING (STORM DRAIN, WATER AND SANITARY SEWER)

- A. Bedding material shall be placed under the pipe before the pipe joints have been completed and inspected.

- B. Bedding material shall be placed carefully around and under the pipe in horizontal layers 4 inches thick after compaction.
- C. The bedding material shall be brought up uniformly on each side of the pipe.
- D. Bedding material shall have the proper moisture content to assure maximum compaction by using hand or pneumatic tampers.
- E. Bedding shall be accomplished in a manner which will not disturb the pipe but will secure a relative compaction of 90 percent.
- F. Bedding shall be installed up to 4 inches below and 12" over the top of the pipe.

3.7 PIPE BEDDING (GAS)

- A. Bedding material shall be placed under the pipe before the pipe joints have been completed and inspected.
- B. Bedding material shall be placed carefully around and to the sides of the pipe in horizontal layers 4 inches thick after compaction.
- C. No compaction is allowed directly above the pipe until there is at least 12" of cover.
- D. The bedding material shall be brought up uniformly on each side of the pipe.
- E. Bedding material shall have the proper moisture content to assure maximum compaction by using hand or pneumatic tampers.
- F. Bedding shall be accomplished in a manner which will not disturb the pipe but will secure a relative compaction of 90 percent.
- G. Bedding shall be installed at least 2 inches below and 12" over the top of the pipe.

3.8 TRENCH BACKFILL

- A. Backfill material shall be placed after the pipe and bedding have been inspected by the Inspector. Native backfill may be used, at the contractor's option, outside of exterior slab and pavement areas. All other areas shall use Caltrans Class 2 aggregate base in the upper 12 inches of the trench backfill. All trenches shall be backfilled to pavement or exterior slab structural section subgrade, or to finished grade in unpaved areas.

- B. Backfill and compaction of utility trenches in and immediately adjacent to building pads, driveways, parking, and other flatwork areas should be such that no settlement will occur.
- C. Where trenches closely parallel a footing and the trench bottom is within a 2 horizontal to 1 (one) vertical plane, projected outward and downward from any structural element, grout slurry should be utilized to backfill that portion of the trench below this plane. The use of slurry backfill is not required where a narrow trench crosses a footing at or near a right angle.
- D. Granular Backfill (Non-native)
 - 1. The backfill material shall be placed in layers not exceeding 6" in uncompacted thickness.
 - 2. Compaction may be accomplished by adding sufficient water to the material as it is placed in the trench to achieve 90 percent relative compaction.
 - 3. Supplemental compactive effort using vibratory means shall be employed if necessary to obtain specified degree of compaction.
 - 4. Ponding or the use of excessive amounts of water will not be allowed.
 - 5. Vibratory or other compaction equipment shall be used whenever necessary to obtain the required compaction, and must be used within 12 inches of pavement subgrade in paved areas, where compaction is required to be 95% R.C.

E. Native Backfill

1. Native backfill material shall be placed in layers not exceeding 6" in uncompacted thickness.
2. Compaction may be accomplished by adding sufficient water to the material as it is placed in the trench to achieve 90 percent relative compaction.
3. Supplemental compactive effort using vibratory means shall be employed if necessary to obtain specified degree of compaction.
4. Ponding or the use of excessive amounts of water will not be allowed.
5. Vibratory or other compaction equipment shall be used whenever necessary to obtain the required compaction.

3.9 CLEAN UP

- A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 31 63 00
DRILLED CONCRETE PIERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.

1.2 SUMMARY

- A. This Section Includes the following:
 - 1. Drilled concrete piers suitable for structural support of designated site improvements including: Arbor, Pergola and Chain link fence posts, Light Poles and Basketball Goal Posts
 - 2. Groundwater was encountered in the Geotechnical Investigation at depths ranging from 6 feet below ground surface to 10.5 feet below ground surface, however mottling of soil, which is indicative of seasonal groundwater, was observed as shallow as 2.5 feet below ground surface. The contractor shall anticipate ground water will be encountered during construction of drilled concrete piers.
 - 3. Where groundwater is encountered the contractor shall dewater the holes and/or place concrete via tremmie.
- B. Related Sections include the following:
 - 1. Section 31 20 00 - Earthwork
 - 2. Section 03 20 00 - Concrete Reinforcement
 - 3. Section 03 30 00 - Cast-in-Place Concrete
 - 4. Section 05 12 00 - Structural Steel
 - 5. Section 32 31 13 – Chain Link Fencing
 - 6. Supply of electrical items for placement by this Section.

1.3 REFERENCES

- A. Geotechnical Investigation Report By LACO entitled, “Technical Memorandum, Geotechnical Exploration, Lake Front Park Design, 800 North Main Street, Lakeport, California, Assessor’s Parcel Numbers 025-601-070 and -08”, dated August 3, 2020. LACO Project Number 9611.00.

1.4 QUALITY ASSURANCE

- A. Geotechnical engineer shall be contacted 48 hours prior to all pier drilling operations. All provisions contained within the Geotechnical Investigation shall be observed.
- B. Comply with governing codes and regulations.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Concrete - Section 03 30 00
- B. Reinforcement - Section 03 20 00

PART 3 EXECUTION

3.1 INSTALLATION

- A. The methods used to place concrete shall prevent segregation. The flow of concrete shall be directed into the center of the hole and concrete shall not strike reinforcement, reinforcement bracing or other objects in the hole.
- B. Concrete must not be allowed to fall from a height greater than 8 feet without the use of adjustable length pipes or tubes.
- C. Construct drilled holes for concrete piers only after earthwork operations in immediate area are completed.
- D. Concrete filling for cast in place concrete piers shall be as specified in section 03 30 00 "CAST-IN-PLACE CONCRETE". The concrete filling for cast in place concrete piles shall be dense and homogeneous. Concrete placed in drilled holes shall be placed against undisturbed material. Concrete shall be vibrated in the upper 15 feet of the pier.
- E. Where groundwater is encountered, drilled holes shall be dewatered prior to placing concrete backfill and/or concrete shall be placed via tremmie method. Tip of the tremmie shall be embedded a minimum of two feet into fresh concrete at all times during placement of concrete backfill. Drilled piers which are constructed without properly dewatering holes shall be considered defective. Drilled piers constructed by the tremmie method shall be considered defective if the tip of the tremmie is not embedded in fresh concrete at all times. Defective drilled piers shall be rejected and reconstructed at the contractor's sole expense.

- F. The contractor is to notify the project Geotechnical Engineer four working days prior to commencement of drilling operations.
- G. All holes for concrete piers cast in drilled holes shall be, at a minimum, drilled to the diameters shown on the plan and to the depths shown on the plans and may be increased as determined by the project geotechnical engineer.
- H. All holes shall be examined for straightness and any hole showing an out of plumb tolerance in excess of 2% of the total hole depth shall be rejected. If the tolerances noted herein are exceeded, the contractor shall furnish and pay for any corrective design and construction that may be required. Suitable casings shall be furnished and placed when necessary to control water or to prevent caving of the hole.
- I. All loose material existing at the bottom of the hole after drilling operations have been completed shall be removed before placing reinforcing steel or concrete in the hole. Surface water shall not be permitted to enter the hole and all water which may have infiltrated into the hole shall be removed prior to placing concrete therein.
- J. Casing, if used in drilling operations, shall be removed from the hole as concrete is placed therein. The bottom of the casing shall be maintained not more than five feet nor less than one foot below the top of the concrete during withdrawal and placing operations. Separation of the concrete by hammering or otherwise vibrating the casing during withdrawal operations shall be avoided.

END OF SECTION 31 63 00

SECTION 31 68 00
FOUNDATION TIEDOWN ANCHORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Geotechnical Report: "Geotechnical Evaluation and GeoHazard Report" prepared by LACO Associates and dated June 3, 2020, is available in accordance with "Information Available to Bidders".

1.2 SUMMARY

- A. This Section includes:
 - 1. Permanent tiedown anchors used to provide resistance to seismic uplift forces, including drilling, grouting, stressing, load testing and lock-off.

1.3 SYSTEM REQUIREMENTS

- A. Contractor design responsibility: Contractor shall determine the bond length, borehole diameter and grouting method to achieve the performance requirements, subject to the minimum requirements of the Contract Documents.
- B. Performance requirements:
 - 1. Each tiedown anchor shall be capable of sustaining an Ultimate Load (UL) as designated on Drawings, when performance tested in accordance with Part 3 of this Section.
- C. Minimum requirements:
 - 1. Contractor shall not be permitted to adjust the location and number of tiedown anchors or change the anchor bar size or type from that designated in the Contract Documents.
 - 2. Minimum borehole diameter shall be as designated on Drawings.
 - 3. Free-stressing length designated on Drawings is a minimum requirement. Free-stressing length shall not exceed specified minimum by more than five feet unless approved by Owner's Representative, considering effect on anchor elongation.
 - 4. Minimum length of bonded zone shall be as designated on Drawings.
 - 5. Provide the minimum total anchor length designated on Drawings to achieve the required load capacity of anchor groups, where indicated.

D. Performance Verification: All tiedown anchors shall be tested in accordance with Part 3 of this Section.

1. Contractor shall complete the initial performance testing program prior to installation of additional anchors.

1.4 REFERENCES

- A. Standards listed below apply where designation is cited in this Section. Where the applicable year of adoption or revision is not listed below, the latest edition applies.
- B. ASTM: Standards of the American Society for Testing and Materials (ASTM) apply where cited in this Section.
- C. PTI: Post-Tensioning Institute's "Recommendations for Prestressed Rock and Soil Anchors", 2014 (PTI DC35.1-14)

1.5 DEFINITIONS

- A. Alignment Load (AL): A nominal load applied to an anchor during testing to keep the testing equipment positioned correctly.
- B. Design Load (DL): As designated on Drawings. The Design Load is the maximum anchor load determined using allowable stress load combinations.

- C. Free-stressing length: The length of the anchor bar that is not bonded to the surrounding ground or grout during stressing, measured from the bearing plate.
- D. Lock-off load: The prestressing force after transferring the load from the jack to the foundation, as specified on the Drawings.
- E. Ultimate Load (UL): The maximum load to which performance test anchors are subjected, equal to the maximum load determined based on load combinations for strength design using overstrength factors. Anchors designated for performance testing shall be subjected to UL equal to 240% of DL.
- F. Proof Load (PL): The maximum load to which production anchors are subjected, equal to 160% of DL.
- G. Tiedown: A system used to transfer tensile loads to soil or rock that includes the anchor bar, anchorage, corrosion protection, sheathings, centralizers, and grout.

1.6 SUBMITTALS

- A. Submittal procedures and administrative provisions are established by Division 01 Section "Submittals".
- B. Qualifications: Project lists for the Anchor Installer.
- C. Design calculations: Generate calculations showing test load, nominal borehole diameter, bond length and free-stressing length for each tiedown. Indicate basis for determination of bond length. Identify minimum and maximum anchor deformation under Proof Load.
 - 1. Calculations shall bear the seal and signature of a Civil Engineer registered in the State of California.
- D. Fabrication drawings: Indicate bar size and material. Provide detailed drawing of factory installed corrosion protection and sheath systems, including end terminations. Provide detailed drawing of anchor zone, including all anchorage components. Indicate location and type of centering devices. If utilized, specify location of anchor bar splice.
- E. Installation and monitoring procedures: Provide detailed written procedure to be followed for installing anchors, including description of equipment and methods to be used. Describe procedures for monitoring grout quality, volume of grout, and grouting pressure during installation. Include form proposed for preparation of standard daily log.
- F. Load testing procedures: Describe procedures to be employed for load testing.
 - 1. Submit certified calibration charts for each test jack, pressure gauge, master gauge, and load cell to be used.
- G. Mill test reports: Submit test reports certifying compliance with specified standards to Testing Agency for record purposes.

1. Anchor bars. Include stress-strain curves and creep tests per Section 4.2.2 of PTI document.
 2. Cement.
- H. Mix design for grout.
- I. Anchor bar coupler: If utilized, submit code approval report.

1.7 QUALITY ASSURANCE

- A. Installer qualifications: Not less than 5 successfully completed projects within the preceding 5 years with similar site conditions, shaft sizes, and anchor test loads.
- B. Preinstallation conference: Conduct conference at project site to comply with requirements in Division 01 Section "Project Management and Coordination."
1. Schedule: Three weeks minimum prior to installation of tiedown anchors.
 2. Attendees: For the Contractor, include representatives of the Anchor Installer and their Professional Engineer. For the Owner, include representatives of the Geotechnical Engineer, Structural Engineer, and Testing Agency.
 3. Agenda: General Contractor shall review status of submittals and discuss outstanding items and proposed schedule for work. Anchor Installer shall present procedures for installation, testing, and monitoring. Roles and responsibilities for testing, inspection and monitoring by Contractor, Geotechnical Engineer, and Testing Agency will be reviewed and coordinated. Process for response to field conditions that require modification to approved drawings will be reviewed.

- C. Each anchor shall be load tested by the Contractor, with observation by the Geotechnical Engineer and Owner's Testing Agency in accordance with "Load Testing" provisions of this Section.
 - 1. Jacks shall be calibrated, and load versus gauge pressure/load cell reading curves provided for each pressure gauge, for 25 percent and 75 percent of the minimum jack extension for two cycles of loading, over the full range of expected load usage. At least six (6) load increments shall be applied, and all measured points shall be shown on the calibrations.
 - 2. Provide means to measure load application within an accuracy of plus or minus five percent (5%).

1.8 PRODUCT HANDLING AND STORAGE

- A. Handle anchor bars in such a manner to ensure that bars are not bent and that corrugated PVC sheathing is not damaged. Repair damage to sheathing in accordance with the manufacturer's recommendations.
- B. Maintain anchors free of soil. Do not drag on ground. Store off ground on suitable supports.

PART 2 - PRODUCTS

2.1 TIEDOWNS

- A. General: Factory fabricate tiedown anchor assemblies as one continuous unit to achieve 100-year certified PTI Class I (Double Corrosion Protection) in the completed installation.
- B. Acceptable products: Dywidag Threadbar® Anchors with Double Corrosion Protection, SAS Stressteel Inc. threadbars with DCP, or Williams Threadbar with Multiple Corrosion Protection III (No substitutions).
- C. Anchor bar: Alloy steel threaded bars fabricated from steel conforming to ASTM A722, with a minimum tensile strength of 150,000 psi, and manufacturer's standard threaded deformations.
- D. Factory corrosion protection: Anchor bars shall be encapsulated in a corrugated plastic sheath over the full length of the anchor. The annular space between the bar and the sheath shall be completely filled with encapsulation grout. Encase corrugated sheathing in a smooth plastic sheath over the free-stressing length and tape ends.
 - 1. Plastic sheaths: High density polyethylene (HDPE) according to ASTM D1248, Type III, or polyvinyl chloride (PVC) according to ASTM D1784, Class 13464-B.
 - a. Corrugated sheath: Sheath shall have a minimum wall thickness of 1.5

- mils. Inside diameter shall be 1/2-inch minimum larger than the anchor bar diameter, measured from the outside of anchor bar deformations. Outside diameter shall be 1/2-inch minimum larger than inside diameter.
- b. Smooth sheath: Tube or pipe with a minimum wall thickness of 0.10 inches. Inside diameter shall not be more than 0.25 inches larger than outside diameter of corrugated sheath. Outside diameter shall not exceed 4 inches.
 - c. The materials for accessories such as end caps, grouting caps, grout tubes and sealing caps shall have properties equal to the plastic sheath.
- 2. Encapsulation grout: A combination of Type I or II Portland cement and potable water. Chemical admixtures that retard set or reduce bleeding may be used. Other admixtures shall be allowed only with approval of Owner's Representative.
 - 3. Tape: 20 mil thick by minimum 2 inch wide polyethelene tape. Same as 3M Scotchrap TM All- Weather Corrosion Protection Tape 51, or approved equal.
- E. Accessories: Furnish manufacturer's standard accessories as necessary for complete installation.
- 1. Couplers: Shall be as specified by the supplier of the anchor and shall develop at least 100% of the guaranteed minimum ultimate strength of the bar.
 - 2. Anchor nuts and washers: Shall be as specified by the supplier of the anchor and shall develop at least 100% of the guaranteed minimum ultimate strength of the bar. Capable of accommodating variations in angle.
 - 3. Bearing plates: ASTM A36 or ASTM A572, Grade 50 steel.
 - 4. Trumpet: Fabricate from steel pipe according to ASTM A53 with a minimum wall thickness of 0.20 inches. Trumpet shall have an inside diameter larger than the outside diameter of the smooth sheath.
 - a. Trumpet shall be long enough to accommodate movements of the structure and the anchor bar during stressing and testing, but not less than 18 inches. The trumpet shall overlap the

- smooth sheath by at least 6 inches and the fully encapsulated anchor bar by at least 12 inches.
 - b. Where shown on Drawings, trumpet shall extend full length to bottom of footing to receive waterproofing. Grind inside and outside edges to form minimum 1/16 chamfer and epoxy coat bottom 8 inches for corrosion protection.
 - c. The joint between trumpet and bearing plate shall be made watertight by seal welding.
 - d. A seal to retain corrosion inhibiting compound or grout within trumpet shall be provided between the outside of the smooth sheath and inside face of trumpet. A description of the seal shall be provided to the Owner's Representative for approval. Install seal within 3 inches of bottom of trumpet.
 - 5. Centralizers: PVC devices that will position the anchor bar assembly at the center of the shaft and will hold it securely in place during grout placement. The centering devices shall not interfere with grout placement. Place at 10-foot intervals along bond length.
 - 6. Covers: Steel or plastic cover that forms a permanent watertight enclosure for the anchor head. Cover shall provide minimum 1 inch vertical clearance over top of anchor bar. Cover shall positively and securely fasten to bearing plate. Cover shall have provision for filling with corrosion inhibiting compound.
- F. Fabrication:
- 1. Shop fabricate anchor bar assemblies. Field splice only as necessary and with approval of Owner's Representative. Splices are not allowed in the free stressing length of the tie down.
 - 2. Anchor bars shall be cut with an abrasive saw.
 - 3. All of the bond length shall be free of dirt, lubricants, or other deleterious substances that may significantly affect bond or the service life of the anchor.
 - 4. Encapsulation grouting shall be done on an inclined frame or bed by injecting the grout from the low end of the anchor.
 - 5. Joints in the plastic sheath shall be made watertight.

2.2 GROUT

- A. A pumpable mixture of Types I or II Portland cement, water, and admixtures. Chemical additives which can control bleed or retard set may be used. Expansive additives will not be allowed. Additives, if used, shall be mixed in accordance with the manufacturer's recommendations.
- 1. The grout shall achieve a minimum compressive strength of 2,500 psi at 7 days and 3,500 psi at 28 days. Minimum concrete compressive stress at time of stress is 3,500 psi.
 - 2. The grout shall bleed less than 2 percent when allowed to stand for 1 hour.
 - 3. Subject to compliance with requirements, fine aggregate (sand) and/ or fly ash may be added to grout mix.

2.3 MISCELLANEOUS

- A. Corrosion-inhibiting compound: Grease or wax with appropriate moisture-displacing, corrosion-inhibiting additives, and self-healing properties. The compound shall permanently stay viscous and be chemically stable and non-reactive with the prestressing steel, the sheathing material, and the anchor grout. Conform with Table 4-1 of PTI "Recommendations for Prestressed Rock and Soil Anchors."

2.4 SOURCE QUALITY CONTROL

- A. Inspection and testing will be performed under provisions of Division 01 Section, "Quality".
- B. Testing Agency will:
 - 1. Review manufacturer's test reports for compliance with specified requirements.
 - 2. Verify material identification.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform field engineering and layout work including furnishing necessary centerlines, offsets, and grade stakes.

- B. Notify the Geotechnical Engineer at least four working days in advance of the beginning of work or on resumption of work after stoppage. Any hole drilled or cast without continuous observation of the Geotechnical Engineer will be rejected.

3.2 INSTALLATION

- A. Install tiedown anchors in accordance with approved layout drawings and installation and monitoring procedures.
- B. Tolerances:
 - 1. Plan location: Plus or minus 3 inches.
 - 2. Vertical alignment: Shafts out of plumb, or differing from prescribed angle, not more than 1.5 percent of length.
 - 3. Where specified tolerances are exceeded, provide corrective construction to compensate for eccentricity as determined by Owner's Representative and DSA.
- C. Minimum formwork: Case top 2 feet of anchor shaft with leave-in place metal, plastic or fiber tube. Formwork may remain in place. Backfill around form with clean sand upon completion of anchor.
- D. Grouting equipment shall be sized to enable anchor shaft to be grouted in one continuous operation.
 - 1. Mixer shall be capable of producing a grout free of lumps and undispersed cement. Mixer shall continuously agitate the grout.
 - 2. Neat cement grouts shall be screened to remove lumps. The maximum size of the screen openings shall be 0.25 inches (6.4 mm).
 - 3. Grout pump shall be equipped with a pressure gauge to monitor grout pressures.
- E. Grouting:
 - 1. Tremie grout from the bottom of the hole. As drill casing is withdrawn pump grout under sufficient pressure to create the bond zone.
 - 2. Record the quantity of the grout and the grout pressures along the height of the shaft.
 - 3. Fill the entire anchor shaft with grout in one continuous operation.
 - 4. Upon completion of grouting, the filled grout tube may remain in the hole.
- F. Post-grouting: The number of phases of post-grouting shall be determined by Installer and proven in Preproduction and Performance Test anchors. Production anchors shall be grouted using the methods and target pressures that were used for installation of acceptable test anchors. Grouting pressures shall be incrementally increased until a refusal is reached or an acceptable amount of grout is pumped.

3.3 LOAD TESTING

- A. Test installed tiedowns in accordance with the procedures herein prior to installation of foundations.
- B. Load testing shall be performed by Contractor, under the observation of Geotechnical

Engineer.

- C. Testing shall be performed in accordance with provisions of PTI “Recommendations for Prestressed Rock and Soil Anchors”, except as modified herein.
- D. Testing apparatus: Apparatus for applying loads shall be in accordance with ASTM D3689.
 - 1. Maintain 8 feet clear distance between test anchor and cribbing.
- E. Test the first 2 production anchors plus 2% of the remaining anchors using Performance Test procedures.
 - 1. Contractor shall propose locations for test anchors. Geotechnical Engineer shall review and approve locations as representative of site conditions.
 - 2. Do not install other anchors until tests are completed and accepted by Geotechnical Engineer.
- F. Performance test procedures:
 - 1. Test anchors using the Performance Test procedures and loading schedule (Table 8.1) of PTI “Recommendations for Prestressed Rock and Soil Anchors” except as modified herein. Add two additional loading steps to Table 8.1 as follows.
 - a. Loading step 7. Apply load according to the following increments: AL, 0.25 DL, 0.50 DL, 0.75 DL, 1.00 DL, 1.20 DL, 1.33 DL, 1.60 DL.
 - b. Loading step 8. Apply load according to the following increments: AL, 0.25 DL, 0.50 DL, 0.75 DL, 1.00 DL, 1.20 DL, 1.33 DL, 1.60 DL, 2.00 UL.
 - c. Loading step 9. Apply load according to the following increments: AL, 0.25 DL, 0.50 DL, 0.75 DL, 1.00 DL, 1.20 DL, 1.33 DL, 1.60 DL, 2.00 DL, 2.40 DL (UL).

2. In the performance test, the anchor is incrementally loaded and unloaded. At each increment, the movement of the anchor bar is recorded. The loading at each increment is held just long enough to obtain movement readings, but not longer than 1 minute. The maximum load is held for a minimum of 10 minutes, with movement readings taken at 1, 2, 3, 4, 6 and 10 minutes.
 3. If the total movement between the 1 and 10 minute readings exceeds 0.04 inches, hold the load for 50 additional minutes. The movement shall then be recorded at 15, 20, 25, 30, 45, and 60 minutes.
- G. During performance testing, the movement of the stressing end of the anchor shall be monitored to the nearest 0.001 inches using a free-standing dial gauge. Measurements shall be recorded at each increment of loading and at 1- and 10- minutes.
1. Plot a graph of total anchor movement at each load increment.
 2. Acceptance criteria:
 - a. The total elastic movement shall exceed 80% of the theoretical elastic movement of the anchor bar over the free-stressing length.
 - b. The total elastic movement shall not exceed the theoretical elastic movement of the anchor bar over the free-stressing length plus one half of the bonded length.
 - c. The total movement, measured during the final cycle of loading, shall not exceed the designated performance criteria.
 - d. The creep rate does not exceed 0.080 inches/log cycle during the final log cycle of the test.
- H. Proof tests: All remaining anchors shall be Proof Tested.
1. Test anchors using the Proof Test procedures of PTI "Recommendations for Prestressed Rock and Soil Anchors".
 2. The proof test measures the movement of the anchor during one cycle of incremental loading. The loading at each increment is held just long enough to obtain movement readings, but not longer than 1 minute. The maximum load is held for a minimum of 10 minutes, with movement readings taken at 1, 2, 3, 4, 6 and 10 minutes.
 3. Apply the Proof Load (PL) according to the following increments: AL, 0.25 DL, 0.50 DL, 0.75 DL, 1.00 DL, 1.20 DL, 1.33 DL, 1.6 DL (PL).
 4. Hold Proof Load for 10 minutes. If the total movement between the 1- and 10-minute readings exceeds 0.04 inches, hold the load for 50 additional minutes. The movement shall then be recorded at 15, 20, 25, 30, 45, and 60 minutes.
 5. Acceptance Criteria:
 - a. The total movement shall exceed 80% of the theoretical elastic movement of the anchor bar over free-stressing length, when measured between 0.50 DL and PL.
 - b. The creep rate does not exceed 0.080 inches/log cycle during the final log cycle of the test.

- I. When, in the professional opinion of the Geotechnical Engineer, the proof test results for an anchor show significant variation from the performance test results, the Contractor shall perform a performance test on that anchor at no additional cost to Owner.
 - 1. Allow for additional Performance Testing of 5 percent of the total number of anchors in Contract Price.
- J. Defective anchors:
 - 1. If an anchor fails to meet the above acceptance criteria for testing, then that anchor will be rejected. All rejected anchors shall be replaced or supplemented by anchors installed at locations approved by the Owner's Representative and DSA, as required to provide the total anchor capacity indicated on the Drawings.
 - 2. No extension of time or additional compensation will be provided for replacing or installing additional anchors.
- K. Records: The Contractor shall provide the Owner's Representative two (2) copies of test record for each anchor within five (5) days of each test. Test records shall include the information listed below.
 - 1. General: Project identification, anchor identification, bar size and type, bond length, free-stressing length.
 - 2. Grouting data: Date grouted, pressure and grout volume.
 - 3. Test results: Date tested, test type (performance or proof) and graphs of results. Note any adjustments made during test and unusual occurrences during test.

3.4 LOCK-OFF

- A. Preparation: Observe placement, sealing and securing of trumpet immediately prior to placement of foundation concrete. Verify that compressible material is installed over top of shaft.

- B. Upon completion of foundations, stress anchor bars to lock-off and anchor. Provide a method of anchorage which will limit the load loss to not more than five percent of the lock-off load in the transfer of loads from the jacks to the footing.
- C. Fill trumpet completely with corrosion preventative compound.
- D. Install and seal cover and fill completely with corrosion preventative compound.

3.5 FIELD QUALITY CONTROL

- A. Inspection and testing will be performed under provisions of Division 01 Section "Quality".
- B. Geotechnical Engineer will:
 - 1. Continuously observe drilling for anchors paying attention to the depths of soil and rock materials encountered. Notify Contractor and Owner's Representative when depth of materials encountered varies from expected conditions.
 - 2. Continuously observe tiedown anchor installation. Notify Contractor and Owner's Representative when grout volume or pressure deviates from observations of test program.
 - 3. Monitor load testing and recording of results.
 - 4. Perform final determination of the acceptability of installed tiedown anchors; assign reduced capacity to tiedown anchors that fail to comply with specified requirements.
 - 5. Compile records of each tiedown anchor from Contractor's log, Geotechnical Engineer's observations, load testing, and as-built locations provided by the Contractor.
 - 6. Prepare final report.
- C. Testing Agency will:
 - 1. Sample and test grout for compressive strength in accordance with ASTM C109.
 - 2. Observe final stressing, lock-off and installation of corrosion protection measures.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related sections:
 - 1. SECTION 32 13 13 – CONCRETE PAVING
 - 2. SECTION 32 18 16.13 – PLAYGROUND PROTECTIVE SURFACING

1.02 DESCRIPTION OF WORK

- A. The work to be performed under this specification includes all labor, equipment, materials and supplies necessary to install aggregate base course for:
 - 1. Concrete paving
 - 2. Playground protective surfacing

1.03 SUBMITTALS

- A. General: Submit under the General Conditions, Special Provisions and SECTION 01 33 00 SUBMITTAL PROCEDURES.
- B. Product Data: Submit source, gradation, R-value, sand equivalent, and durability for the proposed base material.
- C. Test Reports: Submit plant and field test reports as specified in Articles 2.02 and 3.05 herein.

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C136: Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - 2. ASTM D421: Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants
 - 3. ASTM D1241: Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses
 - 4. ASTM D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
 - 5. ASTM D2419: Test Method for Sand Equivalent Value of Soils and Fine Aggregate
 - 6. ASTM D2844: Test Method for Resistance R-Value and Expansion Pressure of Compacted Soils
 - 7. ASTM D2922: Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 - 8. ASTM D3017: Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

9. ASTM D3744: Test Method for Aggregate Durability Index
- B. State of California, Department of Transportation (Caltrans), Standard Specifications, current edition: Chapter 26 Aggregate Bases

PART 2 – PRODUCTS

2.01 MATERIAL

- A. Aggregate for base course at the time the base material is deposited on the prepared sub grade or sub base shall conform with ASTM D1241 and the following requirements:
 1. Class 2 Aggregate Base:
 - i. Class 2 aggregate base shall be free of vegetable matter, reclaimed asphalt, concrete, glass and other deleterious substances. Coarse aggregate, material contained on the No. 4 sieve, shall consist of material of which 25 percent by weight shall be crushed particles. ¾” Class 2 aggregate base shall conform to the following grading determined in accordance with ASTM C136:

Percentage Passing Sieves		
Sieve Sizes	1-1/2 inch Maximum	3/4-inch Maximum
2-inch	100	-----
1-1/2 inch	90-100	-----
1-inch	-----	100
3/4-inch	50-85	90-100
No. 4	25-45	35-55
No. 30	10-25	10-30
No. 200	2-9	3-9

- ii. Class 2 aggregate base shall conform to the following additional requirements:

ASTM Test		
Tests	Method	Requirements
Resistance (R-Value)	D2844	78 min.
Sand Equivalent	D2419	30 min.
Durability Index	D3744	35 min.

Where aggregate base is used as finish surfacing, it shall be virgin material.

2.02 SOURCE QUALITY CONTROL

- A. The Contractor shall perform sampling and tests of the aggregate base material in accordance with the ASTM Test Methods herein specified and provide copies of such tests to City, to determine compliance with specified requirements. Samples shall be taken from material as delivered to the site, and shall be prepared in accordance with ASTM D421, as applicable.

- B. Aggregate grading or sand equivalent test shall represent no more than 500 cubic yards of base material or one day's production, whichever is the greater amount.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. The Contractor shall call for an inspection by the Owner and obtain written acceptance of the prepared sub grade or sub base before proceeding with the placement of aggregate base course.
- B. The sub grade or sub base to receive aggregate base course, immediately prior to spreading, shall conform to the compaction and elevation tolerances indicated for the material involved and shall be free of standing water and loose or extraneous material in accordance 31 20 00- EARTHWORK.

3.02 INSTALLATION STANDARDS

- A. Aggregate base shall be applied over the prepared sub grade or sub base and compacted (95% relative compaction unless otherwise noted) in accordance with Section 26 of the Caltrans Standard Specifications.
- B. Aggregate base shall have minimum uniform thickness after compaction of dimensions indicated. Where not indicated, compacted thickness shall be 6 inches.
- C. All compaction expressed in percentages in this section refers to the maximum dry density as determined by ASTM D1557.
- D. Do not place fill on soft, muddy or frozen surfaces.
- E. Level and contour surfaces to elevations and gradients indicated.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.03 SPREADING OF MATERIAL

- A. Aggregate for base shall be delivered as uniform mixture of fine and coarse aggregate and shall be spread in layers without segregation.
- B. Aggregate base material shall be free from pockets of large and fine material. Segregated materials shall be remixed until uniform.
- C. Aggregate base material shall be moisture-conditioned to at least 2% over optimum moisture content in accordance with the applicable requirements of the Geotechnical Investigation (Appendix).
- D. Aggregate base 6 inches and less in thickness may be spread and compacted in one layer. For thickness greater than 6 inches, the base course aggregate shall be spread and

compacted in two or more layers of uniform thickness not greater than 6 inches each per Caltrans Standard Specification Section 26.

3.04 COMPACTING

- A. Relative compaction of each layer of compacted aggregate base material shall be not less than 95 percent as determined by ASTM D1557.
- B. The maximum compacted Density shall exceed 125 lb/ft³
- C. Thickness of finished base course shall not vary more than 3/4 inch from the indicated thickness at any point. Base that does not conform to this requirement shall be reshaped or reworked, watered, and recompact to achieve compliance with specified requirements.
- D. The surface of the finished aggregate base course at any point shall be no higher than design grades and no more than 1/2" below design grades and elevations.

3.05 FIELD QUALITY CONTROL

- A. The Owner may, for Owner's sole convenience, perform field tests to determine compliance with specified requirements for density and compaction of aggregate base material, and to determine moisture-content compliance of the installed base course.
- B. Testing frequency by Owner, if performed, is anticipated to be not less than one test for every 2,000 square feet of base course material, per layer or lift. Contractor shall accommodate and cooperate with such testing activity.

END OF SECTION 32 11 23

SECTION 32 12 16

ASPHALT PAVING AND BASE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide, spread, and compact aggregate base as shown on the Contract Documents and as specified herein.
- B. Provide, spread, and compact asphaltic concrete pavement.
- C. Adjust to finish grade: any, and all, new or existing utility cleanouts, drainage structures, valve boxes, etc., which are included in the limits of work.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Division 01 Specification Sections apply to this Section.
- B. Related Sections includes, but are not limited to the following:
 - 1. Earthwork - Section 312000
 - 2. Trenching, Backfilling and Compaction - Section 312316
 - 3. Concrete Sidewalk and Curbs - Section 321600

1.3 REFERENCES

- A. Reference Data:
 - 1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.
- B. Caltrans Standard Specifications.

1.4 QUALITY ASSURANCE

- A. Testing and inspection of the aggregate base, aggregate subbase and asphaltic concrete shall be done by a testing laboratory retained and paid for by the City. Any areas receiving failing tests shall be reworked by the Contractor to achieve the minimum specified degree of compaction. It shall be the sole responsibility of the Contractor to achieve satisfactory results.
- B. Test Methods: Unless otherwise indicated, tests shall be made in conformance with the following standard methods:
 - 1. Relative compaction shall be determined by Test Method No. California 216 and 231.
 - 2. Caltrans Standards and Specifications, most recent edition.

1.5 SUBMITTALS

- A. Submit certificate of compliance for aggregate base.
- B. Submit gradation and strength analysis of any recycled Class 2 aggregate base.
- C. Submit asphalt mix design parameters and certificates of compliance.
- D. Submittals shall conform to the requirements of Section 013300.

PART 2 - PRODUCTS

2.1 AGGREGATE BASE

- A. Aggregate for aggregate bases shall be clean and free of vegetable matter and other deleterious substances.
- B. Aggregate base shall be of such a nature that it can be compacted readily under watering and rolling to form a firm, stable base.
- C. Aggregate base shall be Class 2, and the combined aggregate shall conform to the 3/4 inch maximum grading specified in Section 26-1.02A "Class 2 Aggregate Base" of the Caltrans Standard Specifications.

- D. Recycled Class 2 Aggregate base materials meeting the gradation and strength requirements of virgin material is acceptable for use in hardscape areas only (non-building areas).

2.2 ASPHALT CONCRETE

- A. The asphalt concrete in pedestrian areas shall be Type A, ½ inch maximum, medium and shall conform to the applicable portions of Section 39 of the Caltrans Standard Specifications.
- B. The asphalt concrete in vehicular areas shall be Type A, ½ inch maximum, medium and shall conform to the applicable portions of Section 39 of the Caltrans Standard Specifications

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION FOR BASE MATERIAL

- A. Subgrade preparation shall conform to the requirements in Section 312000 - Earthwork, and shall not vary more than 0.05 foot above, or 0.05 foot below the grade established by the Plans.
- B. Prepared subgrade shall be inspected by the independent testing laboratory retained by the District prior to the placement of any aggregate base.
- C. As per Section 312000 - Earthwork.

3.2 SPREADING

- A. Aggregate base shall be delivered to the roadbed as uniform mixtures and shall be graded in layers or windrows. Segregation shall be avoided and the base/subbase shall be free from pockets of coarse or fine material.
- B. The aggregate base, after spreading as above specified, shall be shaped to such thickness that after watering and compacting the completed base will conform to the required grade and cross section, within the tolerances specified in Section 26-1.05 "Compacting" of the Caltrans Specifications.
- C. The base shall be spread, watered and compacted in layers not to exceed 6 inches in compacted thickness to achieve the specified thickness.

3.3 COMPACTION AND TOLERANCE

- A. The relative compaction of the base shall not be less than 95 percent.
- B. The finished surface of the aggregate base shall not vary more than 0.05 foot from the design grades.
- C. Aggregate base which fails to meet the specified tolerances shall be reshaped, dewatered, and recompacted at the Contractor's expense.

3.4 SUBGRADE PREPARATION FOR ASPHALT CONCRETE

- A. All construction beneath the subgrade shall be completed, including pipeline testing, prior to asphalt concrete placement.
- B. Subgrade shall not vary more than 0.05 foot above or below design grade.
- C. Any soft spots in the subgrade shall be repaired by the Contractor, regardless of cause, prior to paving.
- D. Minimum Class 2 aggregate base material under private walkways as shown on the Drawings shall be 6" in compacted thickness, unless otherwise noted.

3.5 TACK COAT

- A. Apply tack coat of RS-1 or CRS1 Emulsion to vertical surfaces of existing surfacing that will come into contact with asphalt concrete.

3.6 SPREADING AND COMPACTING ASPHALT CONCRETE

- A. Shall be in accordance with Section 39 of the Caltrans Standard Specifications.

3.7 STRUCTURE ADJUSTMENT

- A. The Contractor shall mark the location of all structures to be adjusted to grade and shall be responsible for their location after paving operations are completed.

- B. After surfacing or resurfacing is completed, the Contractor shall construct or reconstruct the structures to grade as shown on the plans.

3.8 FLOW TEST

- A. Finished pavement areas shall be flow tested in the presence of the Inspector of record to confirm that positive gradients, that facilitate proper and complete surface drainage, have been achieved in all paved areas.
- B. Any areas that fail the flow test, defined as any area where depth of ponding water exceeds 1/8 inch or where the surface of a ponding area exceeds 10 square feet, shall be repaved to achieve positive drainage.

3.9 CLEAN UP

- A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 12 23
PAVEMENT MARKINGS AND SIGNS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish materials and install painted parking stalls, pavement markings, crosswalk striping.
- B. Furnish and paint curbs.
- C. Furnish materials and install signs and posts.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Asphalt Concrete Paving and Base – Section 321216
 - 2. Concrete Sidewalk and Curbs – Section 321600

1.3 SUBMITTALS

- A. In accordance with Section 013300, Submittal Requirements:
 - 1. Paint product data.
 - 2. Sign product data.

1.4 REFERENCES

- A. California Manual of Uniform Traffic Control Devices (MUTCD), latest edition.
- B. California Code of Regulations, Title 24, Part 2 – California Building Code (CBC), latest edition.
- C. American with Disabilities Act (ADA), latest edition.

PART 2 - PRODUCTS

2.1 STRIPING PAINT

- A. The paint to be used on striping shall be commercial quality paint and be applied in two coats to achieve the designed coverage. Thinner shall not be mixed with paint.
- B. White paint shall be used on all parking stall, pavement markings and crosswalk striping.
- C. Blue paint shall be used on ADA parking stalls where indicated on the details.
- D. Red paint shall be used on curbs where indicated on the drawings.

- E. Refer to Architectural drawings for color(s) of playground striping.

2.2 SIGNS

- A. Accessible signs shall also comply with the applicable sections of California Title 24 regulations and the ADA.
- B. Signs shall be mounted at standard heights on 2" diameter steel posts set in concrete as detailed on the plans.

PART 3 - EXECUTION

3.1 STRIPING

- A. No striping shall be started until all paving work on the entire job has been completed, and the various finished surfaces are sufficiently cured to prevent undue tracking onto new striping.
- B. All stripes for parking spaces shall have a width of four inches. All widths shall be within 1/4-inch of the specified widths.

- C. All lines and other shapes shall be clean and sharp as to dimensions and shall be painted in the locations shown on the plans. Ragged ends of segments, fogginess along the sides, or objectionable dribbling along the unpainted portions of the stripe shall not be permitted.
- D. The finished product shall have an opaque, well painted appearance with no black or other discolorations showing through. Any smears shall be painted out with black paint to the satisfaction of the Owner's Representative.
- E. The Contractor shall take all reasonable precautions to protect the paint during drying time and may be required to paint out all objectionable tracking. Appropriate traffic control necessary to insure non-tracking as well as reasonable traffic flows shall be the Contractor's responsibility.
- F. Painted stripes shall receive two coats of paint to achieve the desired coverage.
- G. No work shall be done when the pavement is appreciably damp.

3.2 SIGNS

- A. Signs shall be installed in the locations shown on the plans and in accordance with the referenced standards for height, setbacks, and embedment.
- B. Signs for disabled accessibility shall be installed in accordance with the requirements of the California Building Code.

3.3 CLEAN UP

- A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related Sections:
 - 1. SECTION 03 20 00 - CAST-IN-PLACE CONCRETE
 - 2. SECTION 31 20 00 - EARTHWORK
 - 3. SECTION 32 11 23 - AGGREGATE BASE COURSES
 - 4. SECTION 32 17 26 – TACTILE WARNING SURFACE

1.02 DESCRIPTION OF WORK

- A. Provide all necessary materials, labor, tools and equipment to perform the work included in the section for the:
 - 1. Installation of forming for slabs-on-grade, walks, and paving.
 - 2. Seat walls
 - 3. Placing reinforcement.
 - 4. Placing and finishing concrete.
 - 5. Curing of concrete.

1.03 SUBMITTALS

- A. Comply with City Standard Specifications and ACI 301, ACI 302.1R, ACI 305 R, ACI 306 R, ACI 306 R, ACI 308, ACI 309 R, ACI 318 & ACI 347.
- B. SHOP DRAWINGS: for reinforcing showing layout, dimensions and materials.
- C. REPORTS/TESTS:
 - 1. Certificates or mill test reports indicating physical and chemical properties of reinforcing.
 - 2. Compressive strength test reports from previous applications for each class of concrete.
- D. PRODUCT DATA: Concrete design mix, Color admixtures, non-shrink grout, curing compound, absorptive mats, expansion joint filler, and bonding agent.
- E. Design Mixes: For each type of concrete.

- F. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.
- G. Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.
- H. MOCK-UPS: For a textured or colored concrete surface, construct a 48-by-48-inch test panel for each type of texture and color.
 - 1. Construct mockup using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. Mockup shall be produced by the individual workers who will perform the work for the Project. Record specific information pertinent to the installation.
 - 2. Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.
 - 3. Accepted mockup provides visual standard for work of Section.
 - 4. Mockup shall remain through completion of work for use as a quality standard for finished work, therefore install at a location suitable.
 - 5. Remove mockup when directed.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Maintain one copy of latest construction documents on site, including design drawings, approved shop drawings and permit drawings, and special inspection and testing agreement
- C. Acquire cement and aggregate from same source for all work.
- D. Tolerances: Tolerances for sub-grade, subbase and finished grade shall be as specified by the Standard Specifications except that Contractor shall install the aggregate base and concrete to the minimum thickness shown. No combination of high and low tolerances will be permitted.
- E. All concrete work installed that does not conform to the approved samples shall be removed and replaced by Contractor at Contractor's expense.

1.05 JOB CONDITIONS

- A. Weather Conditions: Construct concrete surface course only when atmospheric temperature is above 40 degrees F. and below 85 degrees F, when the underlying base is dry, and when weather is not rainy.
- B. Grade Control: Establish and maintain the required lines and grades, including cross-slope during construction operations.

C. Integrally Colored Concrete Environmental Requirements:

1. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
2. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.
3. Comply with professional practices described in ACI 305R and ACI 306R.

D. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.

1.06 PRE-JOB CONFERENCE

- A. One week prior to placement of concrete a meeting will be held to discuss the Project and application materials.
- B. It is suggested that the Architect, Landscape Architect, General Contractor, Subcontractor, Ready-Mix Concrete Representative, and a Manufacturer's Representative be present.

1.07 REFERENCES

- A. In addition to complying with all pertinent standards, codes and regulations, comply with all requirements of:
 1. ACI 308 - Standard Practice for Curing Concrete.
 2. ACI 309 - Guide for Consolidation of Concrete.
 3. ACI 303.1 "Standard Specification for Cast-In-Place Architectural Concrete."
 4. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete."
 5. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
 6. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."
 7. ASTM C33 - Concrete Aggregates.
 8. ASTM C94 - Ready-Mixed Concrete.
 9. ASTM C150 - Portland Cement.
 10. ASTM C309 - Liquid Membrane-Forming Compounds
 11. AASHTO M194 "Chemical Admixtures"

PART 2 – PRODUCTS

2.01 INTEGRAL COLORED CONCRETE

A. ACCEPTABLE MANUFACTURER

1. Basis of Design - Davis Colors as shown on the drawings
2. Scofield Colors
3. Or approved equal

2.02 MATERIALS

A. Forming Materials:

1. Formwork for seat walls to be smooth finish form boards.
 - i. MDO or HDO formboards
 - ii. Fiberglass ties to match color of concrete
2. Unless otherwise indicated, materials for formwork shall be wood, steel, fiber or reinforced plastic and of suitable quality to achieve required finishes. Contractor shall conform to considerations and recommendations in ACI-347, Chapter 3.
3. Unless otherwise indicated, contact surfaces in fabricated forms shall be smooth and uniform without warps, bends, dents, sags or irregular absorptive conditions and imperfections.
4. Form ties and spreaders shall leave a hole not larger than 7/8-inch nor less than 1/2-inch in diameter in the concrete surface. The portion of the tie remaining in the concrete shall be at least 1-inch back from the concrete surface that will be exposed to view, painted, damp proofed or waterproofed.
5. Radiused chamfer strips shall be milled from clear straight-grain lumber, surfaced on all sides. Other material of equal quality may be used only as authorized by Engineer's representative or Owner. Radii shall be as detailed in the Landscape drawings.
6. Form coatings and bond breaking materials shall be non-staining and completely compatible with finish materials and other surface treatment materials to be used.

B. Reinforcement:

1. Reinforcing Bars: Deformed, new billet-steel bars, conforming to ASTM Designation A 615, Grade 60 or ASTM A706 unless noted otherwise.
2. Concrete Reinforcing Fiber – SIKAFIBER 150 or equal.
3. Tie wires: ASTM A82
4. Reinforcement supports:
 - i. At reinforcing placed over sand or earth, use precast concrete cubes.

- ii. At reinforcing placed over forms, provide supports with legs which are hot dip galvanized, stainless steel or plastic protected.
- 5. Mechanical Bar Splice: Xtender by Headed Reinforcement Corp. or equal to develop a minimum of 125% of yield strength of bar.
- 6. Dowels: Deformed steel bars, ASTM A 615, Grade 60, unless otherwise shown.
- C. Colored Admixture for Integrally Colored Concrete:
 - 1. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and ultra-violet resistant.
 - 2. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494 and ASSHTO M194.
 - 3. For Euroblue concrete, use additional 1/3 colorant beyond manufacturer's recommendations.
- D. Curing Compound for Integrally Colored Concrete: Curing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.
 - 1. Exterior Integrally Colored Concrete: Use to cure exterior flatwork that will be allowed to cure naturally with only occasional maintenance.
- E. Portland Cement: ASTM C 150, Type II or V, gray. Cement shall be provided by one manufacturer. For blue color concrete, white cement is required.
- F. Normal-Weight Aggregates: ASTM C 33, uniformly graded, 3/4-inch max. Provide aggregates from a single source. Pee gravel or smooth aggregate shall not be used.
- G. Water: The water used in the concrete mix shall be clear and free from injurious amounts of oil, salts, acid, alkali, organic matter, or other deleterious substances.
- H. Air-Entraining Admixture: ASTM C 260. "Daravair", "Micro-Air", manufactured by W.R. Grace, Master Builders or equal.
- I. No admixtures shall be allowed without written acceptance by the Owner's Representative. Admixtures that have a negative impact on concrete finish shall not be used. When more than one admixture is used, admixtures shall be compatible. Provide letter from admixture manufacturer that it is appropriate for proposed mix design.
- J. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- K. Expansion- and Isolation-Joint Filler Strips: ASTM D 1752, cork or self-expanding cork; 3/8-inch thick asphalt impregnated fiberboard ASTM D 1571.

- L. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days. SIKAGROUT 212 or approved equal.
- M. Epoxy Grout: Two-part epoxy adhesive product that conforms to the requirements of Simpson SET-XP High Strength Epoxy (ICC ESR-2508) by Simpson Strong Tie or equal product with prior written approval of the Owner's Representative. Installation shall be in strict conformance with the manufacturer's recommendations.

2.03 CONCRETE MIXTURES

- A. Proportion normal-weight concrete mixes to provide the following properties:
 - 1. Compressive Strength: Minimum 3,000 psi at 28 days.
 - 2. Slump Limit: Minimum 2 inches, maximum 4 inches.
 - 3. Aggregate Size (maximum): 1-1/2 inch.
 - i. Aggregate Size for seat walls: 3/8" max.
 - 4. W/C Ratio: 0.50 maximum at point of placement.
 - 5. Air Content: 3 percent plus or minus 1.5 percent.
 - 6. Drying Shrinkage Limit: 0.04 percent. Drying shrinkage limit is percentage of change in length after 21 days of drying when tested per ASTM C157.
 - 7. All site concrete shall be mixed using gray or white Portland cement conforming to 2.02.E above.
 - 8. For Euro Blue Integrally Colored Concrete mix, incorporate polypropylene fibers at a rate of 1.5% of cement by volume of concrete. Polypropylene fibers shall be 12mm in length.
- B. Do not add calcium chloride to mix as it causes mottling and surface discoloration.
- C. Supplemental admixtures shall not be used unless approved by manufacturer.
- D. Do not add water to the mix in the field.
- E. Add colored admixture to concrete mix according to manufacturer's written instructions.
- F. Fly ash is not allowed.
- G. Mix design to be stamped and signed by engineer.
- H. Aggregate for site walls not to exceed 3/8" diam.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.
- C. Subgrade: Verify that subbase is properly compacted and at suitable grade and prepare as required in the Geotechnical Report, if available or per the drawings.
- D. Protection: Take all steps necessary not to discolor or damage existing improvements. If damage occurs, repair immediately and if repair cannot be made to the satisfaction of the Owner's Representative, remove and replace at no expense to the Owner.

3.02 PREPARATION

- A. Accurately position and support reinforcement, and secure against displacement.
- B. Locate and install contraction, construction, isolation, and expansion joints as indicated or required.

3.03 INSTALLATION

- A. Place concrete in accordance with ACI 301.
- B. Place concrete in a continuous operation within planned joints or sections. Do not add water to adjust slump.
- C. Do not interrupt successive placement; if interrupted for more than 1/2 hour, place a construction joint.
- D. Concrete shall be thoroughly consolidated during placement, and shall be worked around reinforcement and embedded fixtures.
- E. In depositing concrete in piers, or thin sections, provide openings in forms, elephant trunks, tremies or other recognized devices, to prevent segregation and accumulation of partially hydrated concrete on forms or metal reinforcement above level of concrete being placed. Such devices shall be installed so that concrete will be dropped vertically. Unconfined vertical drop of concrete from end of such devices to placement surface shall not exceed 6 feet.
- F. Joints: Construct expansion and construction joints true-to-line with face perpendicular to surface of the concrete, unless otherwise shown. Construct transverse joints at right angles to the centerline, unless otherwise noted.
 - 1. Tool edges to a radius of 1/2 inch.
 - 2. Tool joints to a radius of 1/4 inch , 1/4 depth of concrete thickness.

3. Saw-cut joints to be 3/16 inch, 1/4 depth of concrete thickness.
 4. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler. Place joint filler to required elevations. Secure to resist movement by wet concrete.
 5. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.
 6. Furnish joint fillers in one-piece lengths for the full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Form top edge of filler to conform to top profile of concrete.
 7. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- G. Where new curb, gutter, and sidewalk adjoins existing, dowel to existing curb, gutter, and sidewalk with two #3 dowels 12-inches long
- H. Begin curing after finishing concrete. Keep concrete continuously moist for at least seven days.
- I. Remove and replace concrete paving that is broken, damaged, or defective. Exclude traffic from paving for at least 14 days.
- J. Notify the Owner's Representative a minimum two working days prior to commencement of operations. Do not place concrete until forms and reinforcement as well as other required inspections have occurred and the Owner's Representative is present to perform observations and testing during placement.
- K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

3.04 CONCRETE FINISHES

- A. After striking-off and consolidating concrete, smooth the surface by screeding and floating. Use hand methods only where mechanical floating is not possible. After floating, test surface for trueness with a 10-foot straight-edge -- maximum 1/8-inch variation from any edge to concrete surface. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous, smooth finish. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2-inch radius, unless otherwise shown. Eliminate any tool marks on concrete surface. After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
1. Broom: Pull broom across freshly floated concrete to produce medium texture in straight lines perpendicular to main line of traffic. Do not dampen brooms.

2. Sandblast: Allow concrete to cure to sufficient strength so that it will not be damaged by blasting but not less than seven days and not more than 14 days. Use light sandblasting to remove cement mortar from surface and expose aggregate to match originally approved field sample.
LIGHT SANDBLAST: expose 1/8"-1/4"
MEDIUM SANDBLAST: expose 1/4" – 3/8"
HEAVY SANDBLAST: expose 3/8" – 1/2"
 3. Retardant: Apply retardant product as specified on the drawings, to achieve the sandblast-like finish described above. Apply per manufacturer's directions.
 4. Stamp: Texture while concrete is in the plastic stage. For textures that require concrete stamps, use stamp under manufacturer's recommendations. Stamp is provided by the owner.
- B. If textured concrete surface is grouted, place grout after initial curing of textured concrete. Remove curing seal and other deleterious substances before applying grout. Removal method must not stain or discolor area of textured concrete to remain exposed after grouting. Spread and consolidate grout over the textured concrete area under manufacturer recommendations. Remove excess grout from textured concrete area with a squeegee and damp burlap rags or other authorized method. Apply curing seal.

3.05 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.06 FIELD QUALITY CONTROL

- A. The City may employ a testing agency to sample concrete, perform tests, and submit test reports during concrete placement at the City's discretion.
- B. Provide free access to Work and cooperate with Owner's Representative, and Special Inspector.
- C. Testing and Inspections shall be performed in accordance with City requirements.
- D. One test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- E. At a minimum one slump test will be taken for each set of test cylinders taken.

3.07 PATCHING

- A. Allow Owner's Representative to inspect concrete surfaces immediately upon removal of forms.
- B. Honeycomb or embedded debris in concrete is not acceptable. Notify Owner's Representative upon discovery.
- C. Patch imperfections in accordance with ACI 301 and satisfaction of Owner's Representative.

3.08 COLOR TOLERANCES

- A. Minor variations in appearance of integrally colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable.
- B. Any sections of integrally colored concrete deemed unacceptable shall be removed and replaced at the Contractor's expense.

3.09 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Owner's Representative.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.
- D. No additional compensation will be allowed for repair of defective concrete.

END OF SECTION 32 13 13

SECTION 32 16 00
CONCRETE SIDEWALKS AND CURBS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Construct concrete curbs and sidewalks.
- B. Provide mockup of exterior concrete walk finish.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Division 01 Specification Sections apply to this Section.
- B. Related Sections include, but are not limited to, the following:
 - 1. Concrete Reinforcing – Section 032000
 - 2. Cast-in-Place Concrete – Section 033000
 - 3. Earthwork – Section 312000
 - 4. Asphalt Paving and Base – Section 321216

1.3 REFERENCES

- A. Reference Data:
 - 1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.
- B. Caltrans Standard Specifications, Sections 73 (Concrete Curbs and Sidewalks) and 90 (Concrete).

1.4 SUBMITTALS

- A. Submit concrete mix design to Engineer for review at least 21 days prior to concrete.
- B. Submit mockup of exterior concrete walk finish, including, but not limited to score pattern, color and texture to Architect for review prior to any concrete installation.

PART 2 - PRODUCTS

2.1 CONCRETE

- A. Concrete shall comply with the applicable provisions of Section 90 "Concrete" of the Caltrans Standard Specifications for Section 90-2. "Minor Concrete" and meet the following requirements listed below.
 - 1. Concrete shall have a minimum 28-day compressive strength of 3,000 psi.
 - 2. Concrete shall have a maximum slump of 4 inches.

3. Concrete must contain at least 505 pounds of cementitious material per cubic yard.
4. Cementitious material must be Type II or V Portland cement or a combination of Type II or V Portland cement and other approved Supplementary Cementitious Materials (SCM's). Typical SCM's are ground granulated blast furnace slag, fly ash, silica fume, rice hull ash and natural pozzolans such as calcined shale, calcined clay and metakaolin. The amount of SCM's in the concrete mix shall not exceed the requirements listed in section 90-1.02B of the Caltrans Standard Specifications.
5. The quantity of free water must not exceed 310 pounds per cubic yard of concrete plus 20 pounds of free water for each required 100 pounds of cementitious material in excess of 550 pounds of cementitious material per cubic yard of concrete.
6. The maximum coarse aggregate size must not be larger than 1-1/2" or smaller than 3/4" and meet the gradation requirements in section 90-1.02C(4)(b).
7. Fine Aggregate grading shall meet the gradation requirements in section 90-1.02C(4)(c).
8. Acceptable admixtures shall conform to Section 90-1.02E. Chemical admixtures must comply with ASTM C 494, Air-entraining admixtures must comply with ASTM C 260

PART 3 - EXECUTION

3.1 GENERAL

- A. Curbs and walkways shall conform to the details shown on the plans.
- B. Provide representative mockup of sidewalk including, but not limited to score pattern, color and finish for review and approval by Architect prior to construction.
- C. Concrete finishes along accessible routes of travel shall be at least as slip-resistant as that described as a medium salted finish for slopes of less than 6%, and slip-resistant at slopes of 6% or greater.
- D. Concrete finishes in non-accessible path of travel areas should be a medium broom finish.

3.2 SUBGRADE PREPARATION

- A. As per Section 312000, Earthwork.
- B. Minimum Class 2 aggregate base material under sidewalks as shown on the Drawings shall be at least 6 inches in compacted thickness, or otherwise noted.
- C. Subgrade and forms shall be wet immediately before concrete placement.
- D. Reinforcement shall be carefully placed and supported.
- E. Steel dowels, reinforcement steel and welded wire reinforcement must comply with Section 52 "Reinforcement" of the California Standard Specifications
- F. Apply soil sterilizer 6" each side of the edges of sidewalks/walkways to prevent growth of vegetation under sidewalks/walkways.
- G. Excavate for thickened edges where they occur.

3.3 EXISTING CURBS, GUTTERS AND WALKWALKS

- A. Joint shall be cut to a minimum depth of 1-1/2 inches with an abrasive type saw.
- B. Joint shall be at first scoring line at or beyond the planned joint location.

3.4 FORMS

- A. Smooth face against concrete, true smooth upper edge, and rigid enough to withstand pressure of fresh concrete without distortion.
- B. Clean and oil coated.
- C. Carefully set to alignment, grade and required dimensions.
- D. Adequately secured from movement by stakes, clamps, spreaders, and braces.

3.5 CURB AND WALKWAY CONSTRUCTION

- A. Dimensions as shown on Drawings.
- B. Weakened plane joints shall be constructed at intervals not exceeding 10 feet.
- C. Expansion joints, 1/2-inch-wide, shall be installed where the new walkway joins existing curbs, drainage structures, and other fixed objects and at intervals not exceeding 60'.
- D. Expansion joints shall contain 1/2-inch thick pre-molded joint fillers the full thickness of concrete. Preformed expansion joint filler must comply with ASTM D 1751. Once concrete has cured, expansion joints shall be caulked.
- E. The top and face of curbs, and non-decorative sidewalks, shall be finished with a steel trowel and be given a final fine brush finish.
- F. The top and face of curb shall be true and straight and not vary more than 0.01 foot above or below the staked grade.
- G. Concrete curing shall be as provided in Section 90-1.03B of the California Standard Specifications.

- H. Repairs shall be made by removing and replacing the entire unit between scoring lines or joints.

3.6 ADJUST UTILITY BOXES

- A. The Contractor shall adjust all existing and new utility boxes, and any other service castings falling within the limits of work to exact grade at the same time the concrete improvements are being constructed and shall maintain these appurtenances to true and exact grade until concrete is thoroughly set.

3.7 CURING

- A. Moist Curing: Cover with reinforced waterproof curing paper. Seal all joints and weights down edges. Maintain moist for 14 days.
- B. Liquid Curing Compound: Locations as approved by Architect. Apply a uniform coating within two hours of final troweling.

3.8 REPAIRS AND PROTECTIONS

- A. Repair or replace broken or defective concrete as directed by Architect.
- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

3.9 CLEAN UP

- A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 17 26
TACTILE WARNING SURFACE

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and all Specification sections, may apply to work of this section.
- B. Related sections:
 - 1. SECTION 32 13 13 – CONCRETE PAVING

1.02 DESCRIPTION OF WORK

- A. Provide all necessary materials, labor, tools and equipment to perform the work included in the section for the installation of:
 - 1. Cast in Place tactile warning tiles.

1.03 SUBMITALS

- A. Product Data: Material cut-sheet, installation procedures and maintenance instructions.
- B. Samples: Submit (1) sample 4"x4" of tactile warning surface material, in specified color. Samples shall be properly labeled with manufacturers' name, catalog number, and color.

1.04 QUALITY ASSURANCE

- A. Material shall be produced by a single manufacturer.
- B. Material shall meet the following:
 - 1. ASTM B117, C501, C1028, D543, D570, D638, D695, D790, G155, and E84.
 - 2. AASHTO-H20
 - 3. Americans with Disabilities Act (ADA) Title 49 CFR Transportation, Part 37.9 Standards for accessible transportation Facilities, Appendix A, Section 4.29.2 Tactile Warnings on Walking Surfaces.

1.05 JOB CONDITIONS

- A. Apply adhesive only when ambient temperature is above 50 deg F and when temperature has not been below 35 deg F for 12 hours immediately before application. Do not apply when substrate is wet or contains excessive moisture.

- B. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set unit pavers within 1 minute of spreading setting-bed mortar.

1.06 COORDINATION

- A. Coordinate work under provisions of SECTION 32 13 13 – CONCRETE PAVING.

1.07 WARRANTY

- A. Contractor agrees to repair or replace components of tactile warning surfaces that fail in materials within specified warranty period.
- B. Warranty Period: Five years from date of Substantial Completion.

PART 2 – PRODUCTS

2.01 MANUFACTURER

- 1. Armor Tile Brand
- 2. ADA Solutions
- 3. or Approved equal

2.02 TILES

- A. Tactile warning surfaces shall comply with Section 11B-705 of the California Building Code (CBC).
- B. Shall be glass/carbon composition (colorfast and UV stable), cast concrete or granite.
- C. The tactile warning texture shall have the following features:
 - 1. Durable, slip-resistant (min. static coefficient of friction of 0.80, wet and dry) material having a surface texture composed of raised, truncated domes with a diameter of nominal 0.9 inch at the base tapering to 0.45 inch at the top, a height of nominal 0.2 inch, and a center-to-center spacing of nominal 2.35 inches in compliance with CBC Figure 11B-23A.
- D. Surface applied tiles shall be 3/16" thick with a beveled edge with a maximum slope of 1:2 in order to minimize the potential for a pedestrian tripping hazard.
- E. Tile size shall be as indicated on plan
- F. Color to be:
 - 1. [Federal Yellow (Y) per Federal Standard 595B Table IV, Color No. 33538.]

2.03 SEALANT

- A. As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine receiving surfaces and verify that surfaces are proper for installation.
- B. Prior to cast-in-place installation, the concrete shall be finished, true and smooth and sloped per drawings.
- C. Do not start work until unsatisfactory pavement surface conditions have been corrected.

3.02 EXECUTION

- A. Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Tiles shall be oriented such that the rows of inline truncated domes are parallel with the direction of the ramp. When multiple tiles, regardless of the size are used, the truncated domes shall be aligned between the tactile warning surface tiles and throughout the entire tactile warning surface installation.
- C. Cutting of the tiles may be required to accommodate specific site conditions. All possible attempts shall be made by the Contractor to minimize cutting of tiles, however, if necessary, the minimum acceptable width of the cut tile shall be 9".
- D. Cast-In-Place tiles:
 - 1. Provide a 1/8" gap between successive tiles and as part of the concrete finishing, shall provide a 1/4" edge treatment around the perimeter of the tiles to facilitate future replacements if necessary. Contractor shall apply a urethane sealant to the edge for a watertight installation.
 - 2. A maximum of 30 feet may be installed in any single pour.
 - 3. Tiles shall be tamped or vibrated into the fresh concrete to ensure that there are no voids or air pockets, and the field level of the Cast in Place Tile is flush to the adjacent concrete surface or as the Drawings indicate to permit proper water drainage and eliminate tripping hazards between adjacent finishes.

3.03 PROTECTION

- A. Do not allow foot traffic on installed tiles until the perimeter edge sealant or concrete base has cured.
- B. Protect tiles during construction from damage from rolling loads by covering with plywood.

- C. Remove protective plastic sheeting from tile within 24 hrs of installation of the tile.

END OF SECTION 32 17 26

SECTION 32 18 16.13
PLAYGROUND PROTECTIVE SURFACING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Conditions and all Specification sections, may apply to work of this section.
- B. Related Sections:
 - 1. SECTION 11 68 00 – SPORTS EQUIPMENT AND STRUCTURES
 - 2. SECTION 31 20 00 – EARTHWORK
 - 3. SECTION 32 11 23 – AGGREGATE BASE COURSES

1.02 DESCRIPTION OF WORK

- A. Provide all necessary materials, labor, tools and equipment to perform the work included in the section for the installation of the poured-in-place resilient safety surfacing at the outdoor exercise equipment area.

1.03 SUBMITTALS

- A. Manufacturer's Product Literature and Specification Data.
- B. ASTM F1292-17 Impact Attenuation Test Certification for safety surface system to be installed in compliance with the Critical Fall Height as determined by the Playground Equipment to be installed.
- C. ASTM F2223 Playground Surfacing
- D. ASTM F1951-14 ADA Accessibility Test.
- E. ASTM D2859 Flammability Test.
- F. ASTM E303 Skid Resistant Test.
- G. ASTM D624 Tear Resistance Test.
- H. ASTM D412 Tensile Strength test.
- I. IPEMA Certification Letter.
- J. Statement of Warranty for a minimum five-year period with detailed Warranty Claim requirements of the owner and specific procedures to be followed by the manufacturer in terms of response and repair of warranty claims.
- K. Samples of Poured-in-place (1) of each color formed, not loose, until approved.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall have manufactured and installed playground poured-in-place surfacing systems for a minimum of 10 years.
- B. Material Performance requirement:
 - 1. Safety surfacing shall meet current ASTM Test Criteria identified in 1.03 Submittals.
 - 2. The safety surface must yield deceleration of no more than 200 G-Max and a Head Injury Criteria (HIC) value of no more than 1000 for a head-first fall from the highest accessible portion of play equipment installed.
- C. Installer qualifications: The installation of the poured-in-place product shall be completed by Manufacturer Certified Contractors or by direct employees of the Manufacturer's Installation Division.
- D. Manufacturer's detailed installation procedures shall be submitted to the Architect and made a part of the Bid Specifications.

PART 2 – PRODUCTS

2.01 POURED-IN-PLACE RESILIENT SAFETY SURFACING

- A. MANUFACTURER/INSTALLER
 - 1. Surface America/Ross Recreation
 - 2. PlayPour/Playgrounds Unlimited
 - 3. Tot Turf /Robertson's Industries
 - 4. Approved equal.
- B. MATERIAL
 - 1. Complying with ASTM F2479
 - 2. A dual durometer poured-in-place system with a wearing layer upper membrane and an underlying impact attenuation cushion layer. The finished surface shall be porous and capable of being installed at varying thickness to comply with Critical Fall Height requirements of playground equipment installed in conjunction with the surface.
 - 3. The POURED-IN-PLACE surface shall be manufactured from EPDM, TPV and/or SBR rubber compounds mixed with a 100% MDI based Polyurethane Resin. Polyurethane contained any TDI shall not be allowed due to environmental regulations. Note: Aliphatic binder shall be provided for bright green color.

4. Cushion Course shall be a mixture of shredded and SBR rubber particles of heterogeneous distribution bonded by a polyurethane binder applied to 100% of the rubber and installed to a designated thickness as required by the Consumer Product Safety's Commission's Guidelines and ASTM F1292-13 Test Criteria.
5. Wearing Surface shall be a mixture of black EPDM or colored EPDM 1-4 MM granules bonded by a polyurethane binder applied to 100% of the granules and applied to a minimum thickness of 3/8" over the cushion layer. Color choice and blend ratios to be of color selected by the owner.
6. Color and pattern per drawings.

2.02 GEOTEXTILE FABRIC

A. MANUFACTURER

1. Tencate or approved equal.

B. MATERIAL

1. Fabric to be non-woven geotextile fabric.
2. Color to be earth tone.
3. Black plastic is prohibited.

PART 3 EXECUTION

3.01 POURED IN PLACE RESILIENT SAFETY SURFACING

- A. Contractor shall comply with the instructions and recommendations of the playground surfacing manufacturer.
- B. Contractor to create a funnel with the surfacing around rope/surface interfaces to allow for rope movement.
- C. Sub Surface Preparation:
 1. Aggregate subbase- Refer to SECTION 32 11 23 - AGGREGATE BASE COURSE.
 2. Aggregate subbase- Aggregate base shall be minimum 4" – maximum 10". Ensure that the subbase is compacted in 2" lifts to 95% or greater and has a min. 2% uniformly sloped surface. Variations will be telegraphed through to the rubber surface. The aggregate shall be fully contained.
- D. Subbase Tolerance:
 1. Aggregate subbase shall be within 3/8" in 10'-0".

PART 4 TESTING AND INSPECTION

- A. Upon completion of the installation of safety surface material, the playground shall be inspected by:
 - 1. A Certified Playground Safety Inspector (CPSI) contracted by the CITY and paid for by the Contractor for playground safety compliance.

END OF SECTION 32 18 16.13

SECTION 32 18 23

ATHLETIC COURT SURFACING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Conditions and all Specification sections, may apply to work of this section.
- B. Related sections:
 - 1. SECTION 32 12 16 ASPHALT PAVING

1.02 DESCRIPTION OF WORK

- A. The work shall consist of construction and installation for the surfacing of the sport courts.
- B. Courts shall be cleaned using a stiff bristle broom and gas powered blower or water based pressure spray unit capable of generating 2500 psi at the nozzle tip, to remove all dirt and debris.
- C. The work to be performed under this specification includes all labor, equipment, materials and supplies necessary for the installation of the courts included in this contract.

1.03 SUBMITTALS

- A. Material samples and cut sheets.
- B. Installer's certificate.

1.04 SUBSTITUTIONS

- A. Submit substitutions in accordance with the Technical Specifications.
- B. Information must include a QUV test of at least 2000 hours illustrating the UV stability of the system. The color system shall have an ITF pace rating in Category 4. Under no circumstances will systems from multiple manufacturers be considered.

1.05 QUALITY ASSURANCE

Installer must be a certified Nova installer or certified installer of approved, substituted product.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store product in manufacturer's packaging until ready to install.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Nova Sports U.S.A.,
6 Industrial Rd., Bldg. #2.,
Milford, MA 01757
800-USA-NOVA
- B. DecoTurf
- C. Plexipave

2.02 MATERIALS

- A. COATINGS:
 - 1. NOVAPLAY SYSTEM for the basketball court.
 - 2. All coatings shall be pure acrylic, containing no asphaltic or tar emulsions, nor any vinyl, alkyd or non-acrylic resins. The color system shall be factory-mixed compounds requiring only the addition of water at the jobsite except for the addition of sand to top surface. All materials shall be delivered to the jobsite in sealed containers with the manufacturer's label affixed.
- B. LINE MARKINGS:
 - 1. Textured paint to be 'Novatex' by Nova Sports.
 - 2. Line primer to be 'Seal-A-Line' by Nova Sports.
 - 3. Color to be as shown on the drawings

PART 3 - EXECUTION

3.01 APPLICATION

- A. New asphalt pavement shall cure for 14 days prior to application of any surfacing materials.
- B. Contractors must notify the Owners Representative of all applications, 48 hours prior to installation.
- C. The surface to be coated shall be inspected and made sure to be free of grease, oil, dust, dirt and other foreign matter before starting work.
- D. The surface shall be flooded. Any ponding water remaining that is deep enough to cover the thickness of a five-cent piece shall be corrected using a patch mix per manufacturer's mix design and installation recommendations.

- E. Application shall proceed only if the surface is dry and clean and the temperature is at least fifty degrees (50°F) and rising, and the surface temperature is not in excess of one hundred forty degrees (140°F). Do not apply coatings when rain is imminent.
- F. Each coat must dry completely before next application. Between each coat, inspect entire surface. Any defects should be repaired. Scrape surface to remove any lumps, and broom or blow off all loose matter.
- G. Apply court surface per manufacturer's instructions.
- H. BASKETBALL COURT NOVAPLAY SYSTEM - Using a neoprene rubber squeegee, apply two (2) coats of Novaplay (colors to be per drawings). Allow each application to dry thoroughly. A small (not to exceed 8 fl. oz per gal.) quantity of water may be used in diluting these coatings, only if coatings are drying too rapidly. Permission of the owner shall be obtained before adding additional water.

3.02 LINE MARKINGS

- A. Upon completion and acceptance of the court surface, prepare and paint lines for the courts.
- B. Prime masked lines. Allow application to dry.
- C. Paint lines with textured line paint. Allow application to dry.
- D. Remove masking tape immediately after lines are dry.
- E. Protect adjacent areas and structures (fences, posts, sidewalks, buildings, etc.), which are not to be coated. In the event that coatings are applied to above, remove immediately before drying is complete

3.03 CLEAN-UP AND PROTECTION

- A. Upon completion, the contractor shall insure proper removal of all construction debris, surplus materials, empty containers and wash water, and shall leave the site in a condition acceptable to the owner. The court is to be left secure so as to prevent vandalism.

3.04 LIMITATIONS

- A. Apply coatings only when ambient temperature is fifty degrees (50°F) and rising, and the surface temperature is not in excess of one hundred forty degrees (140°F).
- B. All NOVACRYLIC coatings are waterborne and cannot cure in cold temperatures or when subject to moisture. Care should be taken not to apply coatings when rain is forecast or sudden drop of temperature is expected. Climatic conditions such as very cool evenings and high dew points dictate that work should be completed early in the day so the coatings can be exposed to enough warm sunlight to form a film before sunset. The opposite applies during times of high heat, low humidity and

drying breezes: under these conditions, work very early in the morning or very late in the day. If the product seems to be drying too fast in hot weather, mist the pavement with water to make the application easier. Care must be taken to allow each application to dry thoroughly prior to recoating.

END OF DOCUMENT 32 18 23

SECTION 32 31 13
CHAIN LINK FENCING AND GATES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including Special Provisions and all Specification sections, apply to the work of this section.

1.02 DESCRIPTION OF WORK

- A. Extent of chain link fences and gates is indicated on drawings.

1.03 QUALITY ASSURANCE

- A. Provide chain link fences and gates as complete units controlled by a single source including necessary erection accessories, fittings, and fastenings.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data, and installation instructions for metal fencing, fabric, gates and accessories.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Dimensions indicated for pipe, roll-formed, and H-sections are outside dimensions, exclusive of coatings.
- B. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - 1. Galvanized Steel Fencing and Fabric with a Powdercoat Color Finish
 - i. American Fence Corp., Perma Coat
 - ii. Anchor Fence, Inc.
 - iii. United States Steel

2.02 STEEL FABRIC

- A. Fabric: No. 9 ga. (0.148" + 0.005") size steel wires, 2" mesh, with top and bottom selvages knuckled.
- B. Furnish one-piece fabric widths for fencing up to 12' high.
- C. Fabric Finish: Galvanized, ASTM A 392, Class II, with not less than 2.0 oz. zinc per sq. ft. of surface.
- D. Fabric Finish: The coating color for the fence fabric shall be as shown on the drawings. Reference ASTM F668 and ASTM F934.

- E. Comply with ASTM F 668, Class 2, except provide fabric with diameter (gauge) of core wire equivalent to fabric diameter specified when measured prior to application of non-metallic coating.

2.03 FRAMING AND ACCESSORIES

- A. Steel Framework, General: Posts, rails, braces, and gate frames.
1. Type 1 Pipe: Hot-dipped galvanized steel pipe conforming to ASTM F1083, plain ends, standard weight (Schedule 40) with not less than 2.0 oz. zinc per sq. ft. of surface area coated.
 2. Type 11 Pipe: Manufactured from steel conforming to ASTM A569 of A446, grade D, cold formed, electric welded with minimum yield strength of 50,000 psi and triple coated with a minimum 0.9 oz zinc per sq. ft. after welding, a chromate conversion coating and a clear polymerf overcoat. Corrosion protection on inside surfaces shall protect the metal from corrosion when subjected to the salt spray test of ASTM B117 for 300 hours with the end point of 5 percent red rust.
- B. Fittings and Accessories: Galvanized, ASTM A 153, with zinc weights as per pipe and framework requirements.
- C. Steel Framework Finish: Galvanized, ASTM A 392, Class II, with not less than 2.0 oz. zinc per sq. ft. of surface. Provide framework, fittings and accessories in accordance with manufacturer's Powdercoat finish. Color to match chain link fabric.
- D. End, Corner, and Pull Posts: Minimum sizes and weights as follows:
1. Up to 6' fabric height, 2.375" OD steel pipe, 3.65 lbs. per lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per lin. ft.
 2. Over 6' fabric height, 2.875" OD steel pipe, 5.79 lbs. per lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per lin. ft.
- E. Line Posts: Space 10' o.c. maximum, unless otherwise indicated, of following minimum sizes and weights.
1. Up to 6' fabric height, 1.90" OD steel pipe, 2.70 lbs. per lin. ft. or 1.875" x 1.625" C-sections, 2.28 lbs. per lin. ft.
 2. 6' to 8' fabric height, 2.375" OD steel pipe, 3.65 lbs. per lin. ft. or 2.25" x 1.875" H-sections, 2.64 lbs. per lin. ft.
 3. Over 8' fabric height, 2.875" OD steel pipe, 5.79 lbs. per lin. ft. or 2.25" x 1.875" H-sections, 3.26 lbs. per lin. ft.
- F. Gate Posts
1. Furnish posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

Leaf Width	Gate Post	lbs./lin. ft.
Up to 6'	3.5" x 3.5" roll-formed section or	4.85

	2.875" OD pipe	5.79
Over 6' to 13'	4.000" OD pipe	9.11
Over 13' to 18'	6.625" OD pipe	18.97
Over 18'	8.625" OD pipe	28.55

- G. Top Rail: Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate corner, pull and end post.
1. 1.66" OD pipe, 2.27 lbs. per ft. or 1.625" x 1.25" roll-formed sections, 1.35 lbs. per ft.
- H. Tension Wire: 7 gage, coated coil spring wire, metal and finish to match fabric.
1. Locate at bottom of fabric.
 2. Locate at bottom and top of fabric.
- I. Wire Ties: 11 ga. galvanized steel.
- J. Post Brace Assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375" diameter rod and adjustable tightener.
- K. Post Tops: Provide weather tight closure cap with loop to receive tension wire or top rail; one cap for each post.
- L. Stretcher Bars: One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x 3/4". Provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into post.
- M. Stretcher Bar Bands: Space not over 15" o.c., to secure stretcher bars to end, corner, pull, and gate posts.

2.04 GATES

- A. Fabrication: Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal or breakage. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories. Space frame members maximum of 8' apart unless otherwise indicated.
- B. Provide same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate frame at not more than 15" o.c.
- C. Install diagonal cross-bracing consisting of 3/8" diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.
- D. Swing Gates: Fabricate perimeter frames of minimum 1.90" OD pipe.

- E. Gate Hardware: Provide hardware and accessories for each gate, galvanized per ASTM A 153, and in accordance with the following:
1. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180 deg gate opening. Provide 1-1/2 pair of hinges for each leaf over 6' nominal height.
 2. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
 3. Keeper: Provide keeper for vehicle gates, which automatically engages gate leaf and holds it in open position until manually released.
 4. Double Gates: Provide gate stops for double gates, consisting of mushroom type flush plate with anchors, set in concrete, and designed to engage center drop rod or plunger bar. Include locking device and padlock eyes as integral part of latch, permitting both gate leaves to be locked with single padlock.
 5. Sliding Gates: Provide manufacturer's standard heavy-duty inverted channel track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, hardware, and accessories as required.
 6. Concrete: Provide concrete consisting of portland cement, ASTM C 150, aggregates, ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi using at least 4 sacks of cement per cu. yd., 1" maximum size aggregate, maximum 3" slump, and 2% to 4% entrained air.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Do not begin installation and erection before final grading is completed, unless otherwise permitted.
- B. Excavation: Drill or hand excavate (using post hole digger) holes for posts to diameters and spacings shown, in firm, undisturbed or compacted soil.
- C. If not indicated on drawings, excavate holes for each post to minimum diameters as recommended by fence manufacturer, but not less than 4 times largest cross-section of post.
- D. Unless otherwise indicated, excavate hole depths approximately 3" lower than post bottom, with bottom of posts set not less than 36" below finish grade surface.
- E. Setting Posts: Center and align posts in holes 3" above bottom of excavation.
- F. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations.
- G. Unless otherwise indicated, extend concrete footings 2" above grade and trowel to a crown to shed water.

- H. Top Rails: Run rail continuously through post caps, bending to radius for curved runs. Provide expansion couplings as recommended by fencing manufacturer.
- I. Center Rails: Provide center rails where indicated. Install in one piece between posts and flush with post on fabric side, using special offset fittings where necessary.
- J. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.
- K. Tension Wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 ga. galvanized wire. Fasten fabric to tension wire using 11 ga. galvanized steel hog rings spaced 24" o.c.
- L. Fabric: Leave approximately 2" between finish grade and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.
- M. Stretcher Bars: Thread through or clamp to fabric 4" o.c., and secure to posts with metal bands spaced 15" o.c.
- N. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.
- O. Tie Wires: Use U-shaped wire, conforming to diameter of pipe to which attached, clasp pipe and fabric firmly with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing.
- P. Tie fabric to line posts, with wire ties spaced 12" o.c. Tie fabric to rails and braces, with wire ties spaced 24" o.c. Tie fabric to tension wires, with hog rings spaced 24" o.c.
- Q. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

END OF SECTION 32 31 13

SECTION 32 84 00
IRRIGATION WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related Sections:
 - 1. SECTION 31 20 00 – EARTHWORK
 - 2. SECTION 32 90 00 – PLANTING

1.02 SECTION INCLUDES

- A. Irrigation materials, execution and testing.
- B. As-built and project close specifications.

1.03 DESCRIPTION OF WORK

- A. Provide all necessary materials, labor, tools and equipment to perform the work included in the section for the:
 - 1. Location and identification of existing underground utilities.
 - 2. Boring under existing pavements for new mainlines.
 - 3. Saw cutting and patching through existing paving for new mainlines
 - 4. Hookup to point of connection.
 - 5. Installation of new mainline.
 - 6. Installation of sleeving where necessary.
 - 7. All excavation, trenching, backfilling, and restoration of surfaces altered by the work. Restore existing paving to original quality, texture, thickness, and color.
 - 8. Repair of any control or electrical wires and or conduits damaged during the course of construction.
 - 9. Repair of any lateral or mainline damaged during construction.
 - 10. Installation of low flow and over-head broadcast irrigation components.
 - 11. Installation of hose bibs, ball valves, remote control valves and valve boxes per plans.
 - 12. Installation of Controller per plans and manufacturers specifications

1.04 QUALITY ASSURANCE

- A. All work and materials shall be in full accordance with the latest rules and regulations of the National Electric Code, the Uniform Plumbing Code published by the Western Plumbing Officials Association, and other applicable State or local laws or regulations.
- B. All piping shall be inspected and approved by the Owner's Representative prior to backfilling as described in the EXECUTION portion of this Section.
- C. Irrigation system to be fully functional prior to planting, including controller wiring and power. City representative to review layout and coverage prior to planting.

1.05 SUBMITTALS

- A. Submit in accordance with General and Special Provisions and SECTION 01 33 00 SUBMITTAL PROCEDURES. Submit copies of descriptive literature of all proposed materials for review. All submittals shall be transmitted, in one bound package, with a cover sheet and table of contents.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. All materials provided shall be new and in a first class condition.
- B. Mainline Pressure Pipe – Pressure mains shall be SCH 40 PVC conforming to the requirements of ASTM Designation D1785 and shall be provided with solvent weld joints and fittings. Pipe shall be purple colored and continuously marked with the wording “RECYCLED WATER – DO NOT DRINK” on opposite sides of the pipe.
- C. Fittings for solvent weld joints: shall be SCH 40 PVC unless otherwise noted. Solvent weld joints shall be made using P-70 primer as manufactured by “Weld-On” or approved equal and “Weld-On” 710 joint cement or approved equal.
- D. Irrigation sleeving: shall be class 315 sized twice the size of pipe being sleeved unless otherwise noted.
- E. Remote & Manual Control Valves: shall be as specified on the drawings. All valves to have a isolation ball valve within their assembly per the details.
- F. Low flow and overhead broadcast emitters: shall be as specified on the drawings.
- G. Quick Coupler Valves: shall be as specified on the drawings.
- H. Valve Boxes: shall be manufactured by Brooks, Carson, Christy or approved equal.
- I. Backflow Prevention Device: shall be as specified on the drawings.
- J. Irrigation Controller: shall be as specified on the drawings.

- K. Flow Sensor: shall be as specified on the drawings.
- L. Flow Sensor Wire: Use shielded direct burial cable with at least one twisted pair of conductors. Use #20 AWG or larger solid copper wire conductors
- M. Appurtenances Identification: All recycled water appurtenances must be identified with tags or labels as belonging to the recycled water system. Recycled water tags or labels must have a purple background with black lettering stating “RECYCLED WATER – DO NOT DRINK” in both English and Spanish and “Do Not Drink” symbol.

PART 3 – EXECUTION

3.01 EXCAVATION

- A. Trenches may be excavated either by hand or machine, but shall not be wider than is necessary to lay the pipes. Any damages shall be repaired by Contractor at no additional cost to Owner.
 - i. Minimum depth of cover for irrigation pipelines shall be:
 - ii. Twenty four inches (24") for mainline pressure piping and eighteen inches (18") for lateral piping unless otherwise noted on the plans.
 - iii. Twenty four inches (24"), minimum cover, for any pipe, wire or sleeve under paving of any kind.
 - iv. Refer to drawings, details and legends for additional information.
 - v. Irrigation sleeving: Install where shown and as needed, extend sleeving min. 6" into planters.

3.02 PIPE JOINTS AND CONNECTIONS

- A. Jointing shall be performed by competent tradesmen, specially trained in the type of work required and using tools and equipment recommended by the manufacturers of the pipe fittings or equipment.
- B. Metal pipe threads shall be sound, clean cut, and cored to full inside diameter. Threaded joints shall be made up with best quality pure joint compound or lead paste carefully and smoothly placed on the male threads only throughout the system. All brass nipples and bronze fittings shall be factory threaded.
- C. All screwed joints shall be made tight with tongs and wrenches without the use of handle extensions. Use of thread cement or caulking to make joints water tight will not be permitted. All cut ends shall be remade to full bore before assembly.
- D. On Plastic to IPS (iron) Connections, the Contractor shall work the IPS (iron) side first. A non-hardening pipe dope such as Rectroseal #5 or equal, with the following exception: do not use paste products on black Cylolac plastic, use only Teflon tape. Tighten plastic to IPS joints with light pressure only. On PVC to

PVC threaded connections such as at valve or swing joint assemblies, use Teflon tape on threads.

- E. All pipe and fittings shall be joined using manufacturers recommended procedures.
- F. Use clean rag and wipe off all excess solvent from both pipe and fittings.
- G. Allow at least fifteen (15) minutes set-up time for each solvent-welded joint before moving pipe.
- H. Connections and controls shall be functionally as shown on the Drawings, but physically shall be the most direct and convenient method while imposing the least hydraulic friction.

3.03 HANDLING OF PIPE

- A. Handling and assembly of pipe, fittings, and accessories shall be by skilled tradesmen using approved methods and tools and exercising care to prevent damage to the materials or equipment. Interior of pipe, fittings, and accessories shall be kept clean at all times, and all openings in piping runs shall be closed at the end of each day's work or otherwise as necessary to prevent the entry of foreign materials. Bending of galvanized steel pipe will not be permitted.
- B. All plastic pipes to be installed shall be free from blisters, internal striations, dents, wrinkles, cracks, holes, foreign materials, and the interior wall shall be smooth and have a glass-like appearance. Plastic pipe shall be marked continuously and permanently with the following information: Manufacturer's name and quality control identification, National Sanitation Foundation's seal, class, or schedule of pipe, pressure rating of pipe, and pipe size. The pipe shall be turned with the markings up during installation so that they may be read when viewed from above while trenches are open.

3.04 INSTALLATION OF PIPING - GENERAL

- A. There shall be minimum 3" clear, horizontally and vertically around all piping in trenches. Plastic pipe shall always be installed so that there will be a small amount of excess length in the line to compensate for contraction and expansion of the soil around the pipe. This shall be accomplished by "snaking" the pipe, side to side in the trench during the time of installation. Refer to irrigation details for additional information

3.05 TESTING PIPING

- A. All testing shall be done in the presence of the Owner's Representative. All work herein shall be done by the Contractor. Center-load all pipelines with appropriate backfill material to resist hydraulic pressures, but leave all fittings exposed for inspection. Piping under paving shall be tested and approved before paving or re-paving. All glued fittings must be allowed to dry a minimum of 48 hours prior to

testing. Install a 0 to 160 P.S.I. water-filled pressure gauge on lines to be tested. All valves shown on Plans shall be in place, and shall be in the closed position. Gasketed supply lines shall be tested at 150 P.S.I., solvent weld supply lines shall be tested at 120 p.s.i., and laterals at 65 P.S.I. Fill pipelines with water slowly to avoid pipe damage, and bleed all air from lines as they are being filled. After closing valve at water source and bringing piping to specified pressure, supply lines shall hold specified pressure for six (6) hours with no pressure loss or leaks. Laterals are expected to have minor leakage at swing joint assemblies etc., subject to the discretion of the Owner's Representative. Major leaks are not acceptable. Laterals shall be tested for one (1) hour at 65 P.S.I. solely to reveal any piping or assembly flaws. The laterals are not expected to hold gauge pressure.

- B. For testing laterals, cap risers or turn adjusting screws on nozzles to the "off" position, as appropriate.
- C. Repair any flaws discovered in supply lines or laterals, then retest in same fashion as outlined in presence of the Owner's Representative, until all lines have been approved.

3.06 VALVE AND VALVE BOX INSTALLATION

- A. Valve boxes shall be grouped and located in shrub and ground cover areas wherever possible. Valves shall be installed no farther than twelve (12) inches from the mainline and no closer than twelve inches from walk edges, buildings or walls.
- B. Thoroughly flush main line before installation. Valves shall be installed as indicated on the details shown on the plans.
- C. All control valves shall be (3) inches minimum and (8) inches maximum below finish grade to the top of the flow control stem.
- D. Valve boxes shall be set one-half (1/2") inches above finish grade in lawn areas and one and one-half (1-1/2) inches above grade in shrub areas.

3.07 SPRINKLER HEAD INSTALLATION

- A. Lawn heads shall be located with a minimum on (1) inch, a maximum of three (3) inches, clear from adjacent paving or headers, and flush with them where a potential hazard may occur. Other lawn heads shall be installed as indicated on the details shown on the plans.
- B. Pop-up heads of approved design shall be installed at edges of landscaped areas adjoining paved areas as indicated on the details shown on the plans.
- C. Individual heads shall be adjusted as required to obtain uniform coverage without overthrow onto buildings, paving, main walks, or other structures to the extent feasible.

- D. Each section of lateral pipe shall be thoroughly flushed out prior to sprinkler head attachment.
- E. Sprinkler heads shall be located and installed as shown on the plans. Minor adjustments to head locations are acceptable to achieve adequate coverage or minimize overspray.

3.08 BACKFILL

- A. For all trench conditions refer to plans, and for all backfill specifications, refer to SECTION 31 20 00 – EARTHWORK.

3.09 RECORD DRAWINGS

- A. The Contractor shall provide and maintain in good order two (2) complete sets of prints of all sprinkler drawings which form a part of the Contract, showing all water supply lines, valves, and stub-outs. In the event any of the originally drawn elements are not installed as indicated on the drawings, all such deviations shall be drawn carefully and correctly on these prints, with dimensions shown. These prints shall be updated on a continual basis and be available for review on job site at any time by the Owner's Representative. At the completion of the work, prior to start of Maintenance Period, the Record Drawing prints shall be submitted to the Owner's Representative for review and comment. After comments are made, Record Drawings will be sent back to Contractor for modification or redrafting. When Record Drawings are acceptable to the Owners Representative, the Contractor shall affix the company seal and signature which shall serve as the Contractors guarantee of accuracy. First submittal of Record Drawing prints shall be made before punchlist inspection.

3.10 ADDITIONAL TURN-OVER MATERIALS

- A. Deliver to the Owner's Representative upon completion of work:
 - i. Two (2) laminated 11x17 color coded prints of valve sequencing plans.
 - ii. Additional sprayheads, rotors and drip emitters. Quantity equal to 5% of installed product.

3.11 PROTECTION

- A. The Contractor shall be responsible for any and all damages to any of their materials or work prior to final acceptance. This includes any damages incurred during specified maintenance period. Securely cover all openings and cover all apparatus, fixtures and appliances both before and after setting into place to prevent obstruction in the conduits and breakage or disfigurement of equipment. Should the equipment become damaged, restore it to its original condition and finish before final acceptance

3.12 MAINTENANCE

- A. Maintain all materials in prudent, workmanlike fashion after delivery to site and all work immediately after installation until final acceptance.
- B. Specifically, Contractor shall at minimum: Repair and/or replace any damaged equipment or site damages (including planting) resulting from defects in or vandalism to irrigation system components.
- C. The Contractor shall submit first draft of record drawings, all turn-over materials, and other items in accordance with General and Special Provisions "Project Closeout". Contractor is allowed (2) inspections, one, to establish the punchlist" and a second to verify completion of the punchlist. Any additional walk-throughs or observations required to obtain approval will be back-charged to the Contractor.

3.13 GUARANTEE

- A. The entire system shall be guaranteed by the Contractor in writing, to be free from defects in material and workmanship for a period of one (1) year from date of final acceptance of work. Guarantee shall include repair of any trench settlement occurring within the guarantee period, including related damage to paving, landscaping, or improvements of any kind. Written guarantee shall be submitted with any remaining turn-over materials before final acceptance will be issued.

END OF SECTION 32 84 00

**SECTION 32 90 00
PLANTING**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related sections:
 - 1. SECTION 01 56 39 – TEMPORARY TREE PROTECTION
 - 2. SECTION 31 10 00 – SITE CLEARING
 - 3. SECTION 31 20 00 – EARTHWORK
 - 4. SECTION 32 84 00 – IRRIGATION WORK
 - 5. SECTION 32 91 13 – SOIL PREPARATION

1.02 DESCRIPTION OF WORK

- A. Provide all necessary materials, labor, tools and equipment to perform the work included in the section for the:
 - 1. Method of Planting
 - 2. Planting of trees
 - 3. Staking of trees
 - 4. Planting of shrubs, groundcovers and grasses
 - 5. Planting of sod and hydroseeded areas
 - 6. Watering Basins
 - 7. Planting Accessories
 - 8. Extent of landscape development work as shown on drawings, details and on sheet legends.

1.03 DEFINITIONS

- A. **Caliper:** Trunk diameter measured 6 inches from the ground; if caliper is greater than 4 inches, the caliper measurement shall be taken at 12 inches from the ground.
- B. **Central leader:** A continuation of the main trunk located more or less in the center of the crown, beginning at the lowest main branch (scaffold) and extending to the top of the tree.

- C. **Circling roots:** One or more roots whose diameter is greater than 10% of the trunk caliper circling more than one-third of the trunk.
- D. **Finish Grade:** Elevation of finished surface of planting soil below mulch.
- E. **Kinked root:** A main mother root that is sharply bent.
- F. **Planting Soil:** Surface soil mixed with soil amendments.
- G. **Subgrade:** Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.
- H. **Wound:** A discontinuity resulting from the removal of the bark and cambium. Pruning cuts that are not closed over are not considered wounds.

1.04 SUBMITTALS

A. General:

Submit under the provisions of the General Conditions- Submittals.

B. Product data:

- 1. Submit product information or “cut-sheets” for all proposed products on all specified products to be used. Clearly indicate specific product to be used on each “cut-sheet”.
- 2. Copies of invoices or purchase orders for all plant materials confirming order and supplier.
- 3. Photographs of “tied-off” plant material (if by special request).
- 4. Proof of contract growing (if by special request).

C. Samples for verification:

- 1. Physical samples of soil amendment and mulch top dressing (one quart bag full minimum).

D. Product Certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:

- 1. Manufacturer’s certified analysis for standard products.
- 2. Submit certificates of inspection, as required by governmental authorities for transportation of plant materials across state lines. Submit manufacturer's or vendor's certified analysis for soil.

E. Design data:

- 1. Xerox reductions of drawings with graphic area take-offs of all planting areas stating quantities of all soil amendments, fertilizers and other soil additives to be used by volume per area.

1.05 SOURCE QUALITY CONTROL

A. General

1. Substitution in variety or size without approval will not be permitted. If specified plant material or seed is not obtainable, submit proof of non-availability to Owner's Representative, together with proposed equivalent materials for review at least two weeks prior to scheduled planting time. If a size of plant is not available, approval must be obtained from the Owner's Representative for any change. In no case will additional compensation be allowed to the Contractor for any substitution of size. If the next size larger is available in the species, the Contractor shall provide them at no additional cost to the Owner.

B. Analysis and Standards

1. Package standard products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

1.06 QUALITY ASSURANCE

A. Planting work shall be awarded to a single firm specializing in planting work.

B. Notify Owner's Representative at least 48 hours in advance of the following required observations:

1. Delivery of plants for inspection prior to planting
2. Review of irrigation system in place, fully functioning prior to planting.
3. Approval of turf beds prior to seeding and/or sodding
4. Approval of plant layout as described in Part 3.
5. "Pre-maintenance" observation and punch-list formation
6. "Pre-maintenance" punch-list completion verification
7. "Final acceptance" observation
8. Allow at least 3 business days for the Owner's representative's inspection.

C. SITE/MATERIAL INSPECTION: The Owner's Representative shall inspect all trees, shrubs, groundcover, sod and seed before planting for compliance with specified requirements for genus, species, variety, container size and quality.

1. The Contractor shall label at least one tree and one shrub of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name. Provide copies of all delivery tags

2. The Owner's Representative shall inspect trees and shrubs for plant size and for the condition of tree roots, trunks, stems branches or structure, buds, disease, oxalis infestation or other weeds, bound roots, latent defects and injuries. Etc., and reserves the right to reject unsatisfactory or defective material at any time during progress of work. Contractor shall remove all rejected trees or shrubs immediately from project site and replace with materials acceptable to Owner's Representative.
3. The Owner's Representative shall inspect the roots of container-grown trees and plants by removing earth/washing away substrate from the rootball of not less than 2 sample plants, nor more than 2 percent of the total number of plants of each species or variety. If container-grown plants are purchased from several sources, the Owner's Representative shall inspect the roots of not less than 2 of each plant species or variety from each source. The rootball of container grown plants must not show evidence of being underdeveloped, deformed, kinked or having been restricted. If the Owner's Representative finds noncompliant plants, the entire lot represented by the noncompliant sample plants will be rejected.

1.07 COORDINATION

- A. Coordinate work with that specified in other sections, such as soil preparation and fine grading, before start of installation. Any installation found to be in conflict with such work as a result of neglected coordination, shall be removed and reinstalled in new locations designated by the Owner's representative at no additional expense to the Owner.
- B. Proceed with, and complete landscape work after the irrigation system is fully installed, tested and functional.
- C. Proceed with installation of plant material working within seasonal limitations for each kind of landscape work required and discretion of Owner's Representative. Do not plant after heavy rains until soil is dried out. Do not plant if temperatures below 65 degrees or above 80 degrees are anticipated.
- D. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate as necessary. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
- E. Excavation: When underground conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Owner's Representative for recommendation prior to planting.
- F. Coordination with Turf: Plant trees, and shrubs after final grades are established and prior to planting of turf, unless otherwise acceptable to Owner's Representative. If planting of trees and shrubs occurs after turf work, protect turf areas and promptly repair damage to turf resulting from planting operations.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Plant material: Ship plant material and seed with certificates of inspection required by governing authorities. Comply with federal and state regulations applicable to plant materials requiring inspection for diseases and infestations. Inspection certificates required by law must accompany each shipment of plants.
- B. Packaged materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer.
- C. Protection of plants and cuttings from wind, sun and all other damage shall be adequately given by the Contractor. Such protection includes plants and cuttings in storage and those planted. On site plant material shall be irrigated daily. Plants are healed-in if B&B material is used.
- D. Protect materials from vandalism and deterioration during delivery, and while stored at site. The Owner's Representative may mark certain containers upon, or after, delivery. All marked containers shall be stored on site, empty or full until final acceptance of the project for review by Owner's Representative.
- E. Do not remove container grown stock from containers until planting time.
- F. Do not store shrub or groundcover material on site more than 7 days.
- G. The sod shall be delivered and installed within a period of 36 hours.
- H. Quality of plant material shall be maintained during transportation from the nursery and throughout the plating process.
- I. Always handle tree by the root ball using straps or powered equipment and do not lift using branches or the trunk.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. On days expected to be 90 degrees Fahrenheit or greater, the Contractor shall schedule planting in the morning only to avoid stressing plants during installation.
- B. Sodding shall be performed only during the time of day and during seasons when satisfactory results can be expected unless authorized in writing by the Owner's Representative.

1.10 PLANTING GUARANTEE

- A. Contractor shall guarantee, in writing, all planting work and plant material for a period of one year after date of start of maintenance period, against material and workmanship defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond Contractor's control. Planting Guarantee shall be submitted with Irrigation Guarantee (if applicable) and other turn-over materials

before final acceptance will be issued. A sample of the guarantee format is available from the Owners Representative.

- B. Contractor shall prudently remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during specified maintenance period and one-year guarantee period.
- C. An inspection will be conducted at end of 1-year guarantee period to determine acceptance or rejection of trees materials. Only one replacement (per tree, shrub or plant) will be required at end of guarantee period, except for losses or replacements due to failure of Contractor to comply with specified requirements.

1.11 REFERENCES

- A. *Guideline Specifications for Nursery Tree Quality*, Urban Tree Foundation 115 S. Dollner Avenue, Visalia, CA 93291. 2009
- B. *American Standards for Nursery Stock ANSI-Z60.1 & Container Guidelines*, American Nursery & Landscape Association, 1200 G Street NW, Suite 800, Washington, DC, 20005. 2004

PART 2 - PRODUCTS

2.01 TREE STAKES AND TIES

A. Materials:

- 1. Wood Tree Stakes: Untreated Lodge Pole Pine tree stakes, 3" diameter x 10' long, free of knotholes and other defects (unless otherwise noted)
- 2. Tree Ties: shall be V.I.T. Cinch tree ties - 24" long tree straps.

2.02 JUTE NETTING

A. Material:

- 1. Jute netting shall be cloth of a uniform plain weave of undyed and unbleached single jute yarn, 48 inches in width plus or minus 1 inch, and weighing an average 1.2 pounds per linear yard of cloth with a tolerance of plus or minus 5%, with approximately 78 warp ends per width of cloth and 41 weft ends per linear yard of cloth.
- 2. The yarn shall be of a loosely twisted construction having an average twist of not less than 1.6 turns per inch and shall not vary in thickness by more than 1/2 of its normal diameter.

2.03 TREE ROOT BARRIERS

A. Manufacturer:

1. DEEP ROOT PARTNERS, L.P.
2. VILLA ROOT BARRIER, INC.
3. OR approved equal.

B. Material:

1. 18" deep x 10' wide.
2. Must be linear style, installed per manufacturer's published instructions.
3. Molded modular ribbed panels, 50% recycled polyethylene plastic with UV inhibitors.
4. .085" thickness
5. Vertical 90° root deflecting ribs, protruding ¾" in height.
6. Ribs .085" minimum thickness, 6" apart.
7. Integrated, self-locking connecting/joining system.

2.04 PLANT MATERIAL

A. General:

1. All plants shall meet the following criteria: Refer to 1.05 SOURCE QUALITY CONTROL and 1.06 QUALITY ASSURANCE this section.
2. Provide trees, shrubs and plants of quantity, size, genus, species and variety shown on the drawings and scheduled for landscape work. Provide healthy, vigorous stock, grown in recognized nursery containers in accordance with good horticultural practices and free of disease, insects, eggs, larvae and defects such as root girdling or bound roots, knots, sun-scald, injuries, abrasions, or disfigurement.
3. Plant material shall be subject to inspection and approval or rejection at the place of growth and on the project site at any time before and during the progress of the work. Refer to 1.06 QUALITY ASSURANCE this section.
4. Substitution in variety or size without approval will not be permitted. Refer to 1.05 SOURCE QUALITY CONTROL this section.

B. Trees:

1. Root ball shall be moist throughout, containing no roots 1/5 the tree caliper, and be free from "root knees" protruding above the soil. There shall be no roots in the upper 3 inches of the media encircling more than 1/3 of the root ball. If kinked roots are less than 1/3 of the root ball, they can be pruned. Root

defects should be removed at the point just behind the bend in the root so the remaining segment can grow straight.

2. The root collar should be within the top 1 to 2 inches of the container, and no large roots shall cross over the main roots.
3. Tree must have a single, fairly straight central leader trunk (unless specified multi-trunk), with no lateral branches below the lowest potential scaffold larger than $\frac{1}{4}$ the trunk diameter at the point of attachment and no sharp bends or exaggerated sweeps. Trunks shall be free of large wounds.
4. Branches shall be equally spaced around the central leader at least 6 inches apart. Branches shall be less than half the diameter of the trunk and the central leader as measured about 1 inch above the branch union.
5. Canopy shall be uniform in shape on all sides and free of large voids. A central leader shall exist, even with round or vase-shaped tree forms. Branch tips shall be below the tip of the central leader.

BOX SIZE FOR TREES	
Box diameter	Maximum caliper range (inches)
20	1.25-2
24	1.5-2.5
30	2.5-3
36	2.5-3.5

C. Shrubs

1. Shall be symmetrical, typical for the variety and species, and shall conform to measurements specified.
2. Roots shall not be overgrown or root bound. Root distribution should be uniform throughout the container soil.
3. Size of plants indicated on the drawings represents the minimum size acceptable. Oversize plants shall not increase the contract price.

D. Ground cover

1. Shall be of healthy, vigorous, well-rooted stock, free from weeds and foreign matter, and shall be properly protected until planted and watered.

2. Plant cuttings and root divisions shall be from six inches (6") to eight inches (8") long, and from good, healthy stock of the variety specified.
3. Plant lists and names of plants are shown on the drawings

2.05 TURF SOD

- A. Approved manufacturer:

DELTA BLUEGRASS
111 Zuckerman Road
Stockton, CA 95206
(800) 637-8873

Or approved equal.

- B. Grass Sod Product: Sod shall consist of live, growing mature as shown on the drawings.
- C. Sod shall be harvested mature with a uniform thickness of 1/2"-5/8" of soil that completely covers the roots of the sod. The sod shall be delivered and installed within a period of 36 hours.
- D. The sod shall arrive vigorous and have a lush appearance, uniform texture and dark-green color through with no dead or dry edges. The sod shall be sufficiently dense to bear handling and placement without tearing.
- E. The sod shall be free of disease and harmful insects, noxious weeds or other grasses and shall not contain any other matter deleterious to its growth or which might affect its subsistence or hardiness when transplanted.
- F. Sod shall be installed and protected from foot traffic for a minimum of **6 weeks** prior to the punchwalk and park opening.

2.06 HYDROSEED

- A. Approved manufacturer:

PACIFIC COAST SEED
533 Hawthorne Place, Livermore, CA 94550
925-373-4417

- B. Shall contain the following thoroughly mixed and applied per acre:
- i. 1,000 pounds per acre of virgin wood fiber or recycled paper fiber mulch, Nature's Own or equal
 - ii. 75 pounds per acre of tackifier.
 - iii. Sufficient water for application.

- iv. Coloring agent to be a biodegradable, nontoxic coloring agent free from copper, mercury, and arsenic.
- v. Seed mix per plans.
- C. Seed shall be kept in a cool, shaded place until utilized. Contractor shall request seed delivery just before installation and only in the amounts that can be planted that day to prevent heating and desiccation.

2.07 MULCH TOP DRESS:

A. MANUFACTURER: Sequoia Landscape Materials (707) 527-5512

- 1. Basis of Design – Small Sierra Fir Bark
OR City approved equal

B. MATERIAL:

- 1. Material shall be shredded wood and bark residual from pine and/or fir and meet the following:
 - i. Grading:

Sieve Size	Percent Passing
1"	95%
3/8"	50%
mesh	25%
- 2. Shall have acid pH, based on dry weight.
- 3. Ash content shall not exceed 7 percent based on dry weight.
- 4. Moisture shall be between 12% and 35% based on fresh material.
- 5. Shall be free of soluble salts such that the saturation extract conductivity shall not exceed 1.5.
- 6. Mulch shall be screened wood chips, uniform color, clean and free of impurities. Maximum size to be 1-1/2".
- 7. Texture of mulch shall be blended with sawdust, bark and wood chips and have an overall fine texture with no large bark chunks or only fine particles.
- 8. Color may be mahogany or have no color added but must look natural and not died red.

C. Gorilla hair is prohibited.

D. Lava rock is prohibited.

PART 3 - EXECUTION

3.01 GENERAL

- A. Refer to SECTION 32 91 13- SOIL PREPARATION for preparing the soil, weed abatement, and adding amendments and fertilizers prior to planting work.
- B. Clearing and scarifying: Installer shall install planting on a clean site with positive drainage away from buildings and walks. Finish grade after installation of irrigation and planting shall maintain a minimum 2 percent slope away from buildings. Soil finish grades below finish grade of walks, pavements, and curbs shall be specified.
- C. All planting work shall be done while soil is in a dry, friable condition. Contractor shall not work in soil areas wet enough to become overly compacted or muddy. Any work done while soil is too wet is subject to rejection.

3.02 TREE ROOT BARRIERS

- A. Install specified root barriers in the “linear style” planting application immediately adjacent to walk, back of curb, header, etc. per manufacturer’s instructions unless noted otherwise for all trees closer than 5’-0” from center of tree trunk to edge of paving. See drawings for additional information.
- B. Root barriers to be centered horizontally on the tree trunk and be a minimum 8’ long in total.
- C. Root barriers shall be set 1” above the soil not mulch top dressing.

3.03 BACKFILL MIX

- A. Tree pits shall be backfilled with amended native or imported top soil, and have neither more than 50% nor less than 25% amendment in backfill. See SECTION 32 91 13 – SOIL PREPARATION for amendment schedule.
- B. Plant pits shall be backfilled with native or imported top soil, and shall have amendment on the top surface. See SECTION 32 91 13 - SOIL PREPARATION for amendment schedule.

3.04 PLANTING

- A. General:
 - 1. A mound of earth shall be formed as detailed around each shrub or tree, so as to produce a shallow basin to retain water, the diameter to exceed the diameter of the root spread. Plants shall be watered in place during and after backfilling.

2. Prune plants only at times of planting, and according to standard horticultural practice, to preserve the natural character of the plant. Pruning to be done under supervision of the Landscape Architect during plant inspection or close-out observations. Remove all dead wood, suckers, and broken or badly bruised branches without cutting tree leader unless otherwise directed by Owner's Representative. Use only clean, sharp tools.
3. Water trees and plants immediately after planting. No plant shall be out of its container more than thirty (30) minutes before being planted and watered.
4. No planting shall occur under unfavorable weather conditions.

B. Planting Trees:

1. Before excavation, Contractor shall set out all container trees as indicated on Planting Plan for review by Owner's Representative. Contractor shall secure this review giving Owner's Representative minimum 48-hours notice. Owner's Representative shall check location of all plants in the field and shall indicate the exact position before actual planting operation proceeds. Owner's Representative will also check the condition of the plant material at this review. Contractor shall promptly replace any material rejected by Owner's Representative with higher quality material per Owner's Representative's comments.
2. Excavate square pits with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Thoroughly scarify bottom and walls of all pits. Pit size shall be twice the container diameter. Pit depth shall be 2 inches less than the depth required so that the tree can be planted 2 inches above adjacent finish grade.
3. Remove the sides and bottoms of all boxed material prior to planting and/or backfill. Contractor shall retain all sides and bottoms of tree boxes (in whatever condition) on the site until their removal has been physically verified on-site by the Owner's Representative. Failure to do so may mean removal of the tree from its hole for inspection at the Contractor's expense.
4. Contractor shall thoroughly scarify rootballs of all tree material. Contractor shall perform a minimum of three vertical cuts spaced equally on rootball sides and one cut across bottom of rootball and then straighten out roots by hand, being careful to not rip them apart from plant. This is to encourage roots to grow radially from the trunk.
5. Fill excavations for all trees with water and allow to percolate out before planting. Notify Owner's Representative if water fails to completely drain out in 24 hours.
6. Install specified planting tablets per manufacturer's recommendation, unless noted otherwise.

7. Remove synthetic wraps, rope, twine from the tree and ball.

C. Tree Staking:

1. Stake the tree if the planting is in a windy area or an area of high traffic. This shall be determined by the Owner's representative on site. Many trees with heavy root balls do not need staking. If staking is required, stake trees up to 24" box container with two stakes. Trees 36" box and larger shall be guyed with a minimum of 3 guys.
2. Stake trees immediately after planting, per the planting details. Loop tree-tie around trunk and stake, forming a figure "8". Nail straps to stake. Use only galvanized, threaded nails. Strap at midpoint with two straps and near top of stakes with two straps.

D. Shrub and Groundcover Planting:

1. Before excavation, Contractor shall set out all container plants as indicated on Planting Plan for review by Owner's Representative. Contractor shall secure this review giving Owner's Representative minimum 48-hours notice. Owner's Representative shall check location of all plants in the field and shall indicate the exact position before actual planting operation proceeds. Owner's Representative will also check the condition of the plant material at this review. Contractor shall promptly replace any material rejected by Owner's Representative with higher quality material per Owner's Representative's comments. No planting shall occur under unfavorable weather conditions.
2. Excavate pits with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Thoroughly scarify bottom and walls of all plant pits. Pit size shall be twice the container diameter. Pit depth shall be 2 inches less than the depth required so that the tree can be planted 2 inches above adjacent finish grade.
3. Set plants on foot-tamped backfill mixture to such depth that, upon settlement, the top of the root ball will be at least 1 to 3 inches above the soil line with the trunk flare/root flare and uppermost roots at least level with the backfill surrounding the tree. Backfill the remainder of the hole and soak thoroughly. Water the pit until saturated to the full depth of the hole. Slice a shovel or spade around the backfill to settle the soil and remove air pockets. Break up heavy clay clods. Do not step firmly on the backfill this may cause excessive compaction.
4. Plant materials in the areas and at the spacing as shown, in neat rows, unless otherwise indicated on the plans, insuring complete coverage of all planting areas including under and around trees. Refer to planting details for additional information.

5. Immediately after planting, but prior to pre-emergent and mulch top-dress applications (Refer to 3.07 Mulching), all beds and pits shall be raked so as to achieve a uniform and neat appearance.
6. Pre-emergent Weed Control: Apply pre-emergent herbicide to all planted areas (except turf and erosion control areas) and areas to receive mulch top dress at manufacturer's recommended rates prior to application of mulch top dress, and after all visible weeds have been removed.

3.05 MULCHING

- A. Re-cultivate any compacted soil areas and rake smooth prior to application of pre-emergent weed control and mulch top-dressing.
- B. Spray out and physically remove all weeds from all planting areas and areas that will receive mulch top dress.
- C. Provide not less than 2" depth of approved mulch, slightly work into top of backfill and finish level with adjacent finish grades avoiding tree rootballs. A thin layer of mulch (1/2 inch) can be applied to the root ball area for aesthetics.
- D. Do not pile much against the trunk of the tree.
- E. Pull the thicker layer of mulch top dress 6" away from stalk or trunk of plant.

3.06 SOD TURF INSTALLATION

- A. Prepare sod areas per SECTION 32 91 13- SOIL PREPARATION (3.02 TURF AND HYDROSEED AREA PREPARATION). Water the prepared area to a depth of 6 inches if not already done so, to settle soil and provide a moist base for sod turf.
- B. Surface elevations and drainage to be the same as shown on grading plans except top of sod shall be flush with adjacent paved surfaces. But in no case will soil be graded to create a ridge to the interruption of even slope to the drainage run.
- C. Sod is to be unrolled into place with careful attention to tight joints with no overlapping and avoidance of any stretching. Stagger the joints in each new row like rows of brick. Use a sharp knife for shaping around trees, landscape edges or borders. Immediately after placement, soak with water. Roll sod after second watering to smooth out bumps and air pockets, and roll again if sod is not even. Water frequently for the first 10 - 14 days, enough water to saturate soil to a depth of 4". DO NOT LET SOD DRY OUT.
- D. Provide temporary fencing around turf areas for 6 weeks after installation. Use Tensar or Mirafi webbed plastic rolled fencing 4' in height with 1-1/2" pipe stakes 8' o.c.
- E. Mow sod to 2 inches 7 - 10 days after installation (and whenever turf reaches 3" in height), after allowing soil to dry enough to provide a firm footing for mower

wheels without rutting. The Contractor shall remove sod and re-grade any areas that have been rutted from mowers to the Owner's Representative's satisfaction.

- F. As it becomes evident that certain sod areas have not grown, re-sod the areas immediately with sod of the same type as originally used and maintain as specified.

3.07 HYDROSEED INSTALLATION

- A. Prepare sod areas per SECTION 32 91 13- SOIL PREPARATION (3.02 TURF AND HYDROSEED AREA PREPARATION).
- B. Apply pre-emergent only once hydroseed is established
- C. Hydroseeding Water: Contractor is responsible for obtaining potable, clean hydroseed water from a source using legal means, at their expense.
- D. Hydroseed at the rates described on the drawings, applying the hydro-seeding in a slurry form. When hydraulically sprayed onto the soil, the mulch shall form a blotter-like material. Direct the spray operation so that this procedure will drill and mix the slurry components into the soil, the slurry spray will also penetrate the soil surface, thus ensuring maximum impregnation and coverage. The impregnation and mixing of the components will help in retaining moisture while stabilizing soil surface from superficial erosion.
- E. Do not leave the hydro-seeding slurry components in the hydro-seeding machine for more than (2) hours because of possible seed destruction. If slurry components are left for more than two hours in the machine, add 50% more of the originally specified seed mix to any slurry mixture which has not been applied within the two hours after mixing. Add 75% more of the original seed mix to any slurry mixture which has not been applied (8) hours after mixing. All mixtures more than (8) hours old must be disposed of, off-site, at the contractor's expense.
- F. Spray the area with a uniform visible coat, using the dark color of the cellulose fiber as a visual guide. The slurry shall be applied in a downward drilling motion via a fan stream nozzle. Insure that all of the slurry components enter and mix with the soil. Insure the uniformity of the hydro-seed application. The hydraulic contractor shall be approved by the Owner's Representative.
- G. Exercise special care to prevent any of the slurry from being sprayed onto hardscape areas including concrete walkways, fences, walls, buildings, etc. Remove all slurry sprayed onto these surfaces at the contractor's expense.
- H. Contractor shall save all seed and fertilizer tags and fiber mulch bags for the Owner's Representative to verify compliance with the drawings and specifications.
- I. Keep protective barriers, similar to sod, in place around hydroseed areas until final acceptance of the project.

- J. Areas showing germination failure shall be re-seeded at 10 day intervals until a good stand of turf has been developed.
- K. Seed germination will be the responsibility of the Contractor by means of manual or temporary irrigation as necessary until underground irrigation system is fully operational per the Drawings.
- L. NATIVE GRASS MIX: As native grasses become established adjust irrigation controller programs so as to encourage gradual deep-rooting and a stand of grasses that conserves water.

3.08 MAINTENANCE

- A. Contractor shall maintain all plant materials in proper horticultural fashion after delivery to site and all planting areas immediately after planting until final acceptance. Maintain all project areas in a broom-clean, litter free, weed free condition from start of construction until final acceptance. Maintain all security and protective measures in a first-class condition at all times until final acceptance.
- B. Bamboo maintenance shall occur annually around late summer when rhizomes tend to run. Check for rhizomes that may have jumped the barriers, and remove these to maintain complete containment of the bamboo roots.
- C. A “pre-maintenance” observation will be made with the Project Inspector following Contractor’s notification to Owner’s Representative that all irrigation and planting work is complete. Give 48 hours notice minimum for “pre-maintenance” observation. At this time the Contractor shall submit first draft of record drawings, maintenance manuals, and other items as specified in Division 1 Section Project Close-out and SECTION 32 84 00 - Irrigation Work. Failure to turn over these items can result in the delay of the beginning of the maintenance period. Contractor is allowed two (2) inspections. One, to establish the “pre-maintenance punchlist”, and one to verify completion of “pre-maintenance punchlist”. Any additional walk-throughs or observations required to obtain approval for the beginning of the maintenance period will be back charged to the Contractor. The specified maintenance period will only be allowed to commence once all of the planting and irrigation work is done, irrigation is running from the controller, and all items on the “pre-maintenance punchlist” have been completed to the satisfaction of the Owner’s Representative and the Project Inspector.
- D. The Maintenance Period on this project is 90 calendar days.
- E. Maintain trees, shrubs and other plants by watering (including hand watering if automatic irrigation is non-functional), pruning, cultivating and weeding as required for healthy growth. Restore planting basins. Tighten and repair stake supports and reset trees and shrubs to proper grades or vertical position as required. Spray as required to keep trees and shrubs free of insects and disease. Maintain all areas in a weed free condition at all times.

- F. Maintain turf by watering (see below), fertilizing, spraying for weeds, mowing no lower than 2", trimming, edging and other operations such as rolling, re-grading and replanting as required to establish a smooth, acceptable turf, free of weeds and eroded or bare areas.
- G. Maintain turf sod and native grass seed by watering at least daily to avoid drying out and to enable root system to penetrate its new soil environment. Once the new sod has started to root in, watering frequency should be reduced. Stretch the time intervals between irrigation. Avoid run-off by matching water application rates to soil infiltration rates. Irrigate at night or early morning. Reduce or increase watering times according to seasonal needs. Water a minimum amount to keep turf and native grasses vigorous.
- H. Fertilize all turf areas with Gro-Power "High Nitrogen" at the rate of 25 lbs. per 1,000 sq. ft. on day 45 and day 90 (if within maintenance period) after planting. If the maintenance period has been extended due to un-established turf areas, or any other reason, apply the same at the same rate every 6 weeks.
- I. Maintain ornamental hydroseeded areas as needed to control invasive weeds. Broadleaf weeds in grassy slopes shall be controlled/killed before they reach 6 inches in height or before flowering.
- J. Weed control done with an herbicide, per SECTION 32 91 13 - SOIL PREPARATION, shall be with a pest control recommendation written by a licensed California Pest Control Advisor. Herbicides are to be applied by a qualified State of California licensed Pest Control Advisor and/or Applicator, registered in the project County.
- K. As applicable, Contractor is to provide ongoing gopher control and eradication by a licensed pest control operator. This work should begin as soon as site clearing begins with the goal of eradicating the problem prior to hydroseeding. Use any legal method with the exception of poison grain, nuts or bait. Contractor shall be responsible for repairing any damage as a result of gopher activity until final acceptance.
- L. If cultural and biological control methods, such as trapping, are not working and the State of California licensed Pest Control Advisor prescribes chemical applications, then the Contractor shall adhere to the following requirements: Pesticide materials shall be delivered to the site in the original unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration numbers.
- M. Prior to any pesticide application the Contractor shall submit to the Owner's representative all pest control recommendations for review and approval.

3.09 CLEANUP AND PROTECTION

- A. During all stages of work, keep pavements clean and work area in a clean and orderly condition.
- B. Protect planting work and materials from damage due to planting operations, operations by other contractors, trades people and trespassers. Maintain protection during installation and maintenance periods and until final acceptance. Treat, repair or replace damaged work or materials as necessary or as directed by Owner's Representative.

PART 4 FINAL ACCEPTANCE

- A. When all work is completed, including specified maintenance period, Owner's Representative(s) will, upon request from contractor (minimum 48 hrs notice), make the "final observation" to determine acceptability.
- B. At the "final observation" the Owner's Representative(s) will thoroughly investigate project and either issue written statement of project acceptance, or advise Contractor of work remaining. The Contractor's specified maintenance period shall be extended until project acceptance is issued, in writing, by Owner's Representative. (The date of the start of the maintenance period shall mark the beginning of the 1 Year Planting Guarantee.)

END OF SECTION 32 90 00

SECTION 32 91 13
SOIL PREPARATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.
- B. Related Sections:
 - 1. 4SECTION 31 10 00 – SITE CLEARING
 - 2. SECTION 31 20 00 – EARTH MOVING
 - 3. SECTION 32 90 00 – PLANTING

1.02 SECTION INCLUDES

- A. Weed control
- B. Topsoil
- C. Soil amendments and fertilizer
- D. Finish grading

1.03 DESCRIPTION OF WORK

- A. The work includes, but is not necessarily limited to, the following:
 - 1. Weed abatement for all planting areas prior to amending and fertilizing the soil.
 - 2. Ripping, tilling and amending native soil or imported fill material for the preparation of planting areas to be planted.
 - 3. Importing topsoil for the use in planting areas, raised planters and/or planter pots.
- B. The work to be performed under this specification includes all labor, equipment, materials and supplies necessary for the installation of the planting work included in this contract.

1.04 DEFINITIONS

- A. **Topsoil:** Upper, outermost layer of soil, possessing organic matter and horticultural nutrients. Typically, the top 2 to 8 inches of soil.
- B. **Subsoil:** Layer of soil under the topsoil on the surface of the ground. Typically, the first densely packed soil layer under the topsoil.

- C. **Planting Soil:** Surface soil mixed with soil amendments.
- D. **Fill material:** Imported soil free of organic matter, containing no rocks or lumps larger than 2 inches in greatest dimension and to be approved by the project Geotechnical Engineer.
- E. **Finish grade:** Elevation of finished surface of planting soil below mulch.
- F. **Subgrade:** Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.05 SUBMITTALS

- A. Product literature or “cut-sheets” on all specified products to be used listed below but not limited to:
 - 1. Raised planter and planter pot backfill mix sample with soil test
 - 2. Amendments and fertilizers
 - 3. Weed control herbicides
- B. Horticultural Soil Analysis Test and Recommendations: A Soil Management Report shall be provided by a qualified soils laboratory. Soil amendments shall be specified according to the recommendations of the lab based on the test results. Soil samples for testing shall be collected of the existing soils conditions after the grading contractor has fine-graded the site soil or added any imported fill material. Soil sampling shall include not less than xx samples from different representative location of the site to account for any soil variations that may be present. Samples to be obtained at a depth of 12” to 24” below grade. The following shall be tested for complete soil evaluation:
 - 1. Soil texture determination including percentages of each component.
 - 2. Calculated soil infiltration rate in inches per hour.
 - 3. pH determination
 - 4. Total Soluble Salts (EC)
 - 5. Sodium (SAR)
 - 6. Fertility for all 14 essential mineral nutrients
 - 7. Evaluation of the potential toxicity level of 14 non-essential minerals including lead, arsenic, and cadmium.
 - 8. Soil organic matter listed as percentage of overall soil composition.
 - 9. Provide recommendations for amendments and fertilizers for soil preparation, backfill and maintenance. If soil is unsuitable for plant growth provide recommendations for replacement depth.

- C. Appropriate documentation from installer to confirm to the Owners Representative that specified materials and quantities have been delivered and installed and that installer has complied with all local, state and federal documentation requirements.
- D. If topsoil material is to be imported, a horticultural soil test from a qualified lab is required prior to shipment and placing to evaluate the soil and revise any amendments outlined within this section.
- E. Qualified Soils Testing Laboratory:
 - 1. Wallace Laboratories, El Segundo, (310)-615-0166
 - 2. Waypoint Analytical, Anaheim, CA (714) 282-8777
 - 3. Perry Laboratory, Watsonville, CA (831)-722-7606

1.06 DELIVERY, STORAGE AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer.
- B. Protect materials from vandalism and deterioration during delivery, and while stored at site. The Owner's Representative may mark certain containers upon, or after, delivery. All marked containers shall be stored on site, empty or full until final acceptance of the project for review by Owner's Representative.

1.07 QUALITY ASSURANCE

- A. Notify Owner's Representative a minimum of 48 hours in advance of the following required observations by the Owner's Representative:
 - 1. Delivery, quantity verification, and container marking of soil amendment materials.
 - 2. Site reviews to assure compliance with approved specifications.
 - 3. The cross ripping depth of soil by prior to contractor amending the soil.
 - 4. The turf bed is to be inspected and approved by the Owner's Representative prior to sodding.

PART 2 – PRODUCTS

2.01 TOPSOIL FOR PLANTING AND TURF AREAS

- A. On-Site Existing Topsoil
 - 1. May be stockpiled on site for re-use in landscape work, however must be tested as described in 2.01 B .

2. Contact Owner's Representative prior to bidding for verification. If quantity of stockpiled topsoil is insufficient (refer to SECTION 31 20 00 – EARTHWORK, as applicable), coordinate with Owner's Representative and provide import topsoil as required to establish landscape finish grades.

B. Imported Topsoil

All Import Fill material used in planting areas shall meet the following requirements:

1. All import soil shall be free of harmful physical or chemical materials, roots, rocks or other debris larger than 1 inches in any direction, and any living plant materials including weed seed, roots, rhizomes, culms and or bulbs that can grow, propagate or germinate.
2. USDA CLASSIFICATION- of fraction passing 2.0-mm sieve: **sandy loam, sandy clay loam or loam** and conform to the following:

<u>Class</u>	<u>Particle size range</u>	<u>Maximum %</u>	<u>Minimum %</u>
Coarse sand	.5 – 2.0 mm	15	0
Silt	.002-.05 mm	30	10
Clay	<.002 mm	25	10
Gravel	2 – 13 mm	15	0
Rock	1/2 - 1 inch	5% by volume with non > 1 inch	
Organic	NA	15	0

3. CHEMISTRY- SUITABILITY CONSIDERATIONS-

- i. **Salinity:** Saturation Extract Conductivity (ECe) = Less than 3.0 dS/m @ 25 degrees
- ii. **Sodium:** Sodium Adsorption Ratio (SAR) = Less than 6.0
- iii. **Boron:** Saturation Extract Concentration = Less than 1.0 ppm
- iv. **Reaction:** PH of Saturated Paste = 6.0 – 7.5 without high lime content. Optimum lime content % CA CO3 <3.0.
4. Nutrients- Soil to contain sufficient quantities of available nutrients to support normal plant growth. In the event of nutrient inadequacies, provisions shall be made to add required materials prior to planting. A range for required nutrients follows:

<u>Nutrient</u>	<u>Particle size range</u>
Nitrogen,	25-75 ppm
Phosphorus	50-100 ppm
Potassium	150-300 ppm
Calcium	2000-4000 ppm

Magnesium 150-500 ppm

5. Prior to approval the Contractor shall submit a Horticultural Soil Analysis test **for the exact soil proposed soil to be used for Import Fill material.** The report shall be provided by a qualified soils lab. Soil samples for testing shall be collected of the existing soil conditions from the source in sufficient numbers (not less than 3 from different representative locations of the site or source stockpile) to account for any soil variations that may be present on the site. The recommendations of the soil test submitted for the actual fill material to be used in the planting area will supersede the soil amendment schedule provided within this section for bidding purposes only.
 6. Obtain import topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4"; do not obtain soil from bogs or marshes.
- C. The amount of topsoil to be imported, if any, shall be calculated by the Contractor. The Contractor is required to provide topsoil to the specified grades or implied grading concept as shown on the plans and as described in SECTION 31 20 00 – EARTH MOVING.

2.02 SOIL AMENDMENTS AND FERTILIZER

The recommendations below shall be used for bidding purposes only; contractor shall have any the site retested with a horticultural soil analysis test if it has been filled with imported material or imported topsoil. The following amendments/fertilizers shall be revised based on recommendations by an approved lab. Contractor shall submit to report findings to the Owners Representative for review and approval prior to amending. Refer to submittals and preparation articles in this section for more information.

Soil Amendments and fertilizer shall consist of the following materials:

- A. Soil Amendment: Shall be Nitrogen Stabilized (0 - 1/4") Organic Amendment, Ammonium Sulfate (21-0-0) and Potassium Sulfate (0-0-50)
- B. Soil Conditioner: Shall be "Gro-Power Plus (5-3-1) with 4% sulfur", available through Gro-Power Inc., 15065 Telephone Avenue, Chino, CA 91710-9614. 1-(800)-473-1307. No known equal.
- C. Fertilizer Tablets: Shall be as manufactured by Gro-Power™ Inc. 7 gram tablets containing 12-8-8, NPK in a one-year time-release formulation with 4% Humic Acid, 20% Humus, 2% Iron, 3.5% Sulfur. No known equal.
- D. Pre-Plant Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing the following percentages of available plant nutrients: 6-20-20 NPK.

- E. Ferrous Sulfate: Non-staining, manufactured for horticultural use, Gro-Power “Premium Green” or acceptable equal.
- F. Agricultural Gypsum: Manufactured for horticultural use with 90% minimum calcium sulfate.
- G. Calcium Carbonate: Calcium Carbonate Lime (Oyster shell) for horticultural use.
- H. Pre-emergent Weed Control: shall be Ronstar G or acceptable equal.
- I. Lime: Ground limestone, if required, containing not less than 85% carbonates: 50% passing a No.100 sieve and 90% passing a No. 20 sieve.
- J. Organic Amendments, if required:
 - 1. Composted manure is acceptable if well composted and if soluble salt levels are less than 3.0 millimhps/cm. Ash: Maximum, 0.6%
- K. Amendments containing biosolids which require EPA Section 503 reporting are prohibited.

2.03 WEED CONTROL

- A. Contractor shall keep disturbed areas in a weed free condition by Contractor’s choice of methods. If herbicides are used conform to all national, state, county and city reporting requirements.
- B. Herbicide materials shall be delivered to the site in the original unopened containers bearing legible labels indicating the Environmental Protection Agency (EPA) registration numbers.
- C. Pre-emergent: shall be Ronstar G or acceptable equal.

PART 3 - EXECUTION

3.01 GENERAL PREPARATION

- A. All soil preparation shall be done while soil is in a dry, friable condition. Contractor shall not work in soil areas wet enough to become overly compacted or muddy. Any work done while soil is too wet is subject to rejection.
- B. Contractor shall remove all vegetation and weeds, dead or alive, from the site per SECTION 31 10 00 – SITE CLEARING prior to beginning work on soil preparation.
- C. Mechanically cross-rip all areas exhibiting less than 3:1 slope 10”-12” deep. Areas steeper than 3:1 shall be ripped by hand or rototiller to 6” depth.
- D. Before mixing amendments, clean soil of stones over 1-1/2" in diameter, clay lumps, and other extraneous materials harmful or toxic to plant growth. Secure approval of ripping depth by Owner’s Representative prior to amending.

3.02 TURF AND HYDROSEED AREA PREPARATION

- A. WEED GERMINATION/ERADICATION: Six weeks prior to seeding or sodding, irrigate prepared turf beds thoroughly with a minimum of 6" of water to germinate weed seed. After two weeks, spray with a 1% solution of Roundup or equal as per manufacturer's recommendations. Repeat the process with the same at three weeks prior to seeding or sodding. Contractor is responsible to abide by all California State law's regarding applying herbicides on project property.
- B. If six weeks time period for above process cannot be met, it is acceptable to complete this process one time 3 weeks prior to seeding in areas that have previously been over excavated and cleared with large grading machinery at the Owner's representative's desecration. Contractor must gain approval prior to reducing weed germination time period.
- C. Lightly till and re-grade the top 1 – 2" after the above procedure, removing all dead weeds, debris, etc. prior to seeding or sodding.
- D. Fertilize and amend soil as specified in this section AND ADD an additional 10 lbs. per 1000 square feet of 6-20-20 pre-plant commercial fertilizer. Pre-plant fertilizer shall be raked into the top 2 inches of soil. Roll turf bed until a smooth, firm surface with uniform grade has been produced. The turf bed is to be inspected and approved by the Owner's Representative prior to sodding.

3.03 FERTILIZER AND AMENDMENT PLACEMENT

The Contractor shall complete a Horticultural Soil Analysis Test with recommendations via a certified plant laboratory to confirm or supersede the soil additive schedule contained here-in.

- A. Thoroughly incorporate the following soil additives and fertilizers with topsoil in all planting areas at rates specified below. Thoroughly mix soil additives into top 12" of soil by rototilling once in each direction.

TYPE	QUANTITY
Soil amendment	5 cubic yards/ /1000 SF Nitrogen
	Stabilized Organic Amendment
	7 pounds Ammonium Sulfate (21-0-0)
	5 pounds Potassium Sulfate (0-0-50)*
Pre-plant fertilizer	12 lbs/1000 SF
Soil conditioner	200 lbs/1000 SF

Agricultural gypsum	30 lbs/1000 SF
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* The rate may change based on the analysis of the chosen organic amendment. This rate is based on 270lbs. dry weight of organic matter per cubic yard of amendment. If a composted green waste product is chosen that is shown to have sufficient potassium, the potassium sulphate may be omitted.

- B. Fertilizer and amendments shall be installed per the manufacturer's published instructions including those instructions published by turf sod and seed vendors.
- C. Contractor shall save all soil conditioner bags with Owner's Representative's mark on-site for verification of proper installation of quantity and type of soil conditioning. Failure to do so shall result in the requirement of the Contractor to re-condition soil, and pay for additional lab testing and adjustments to soil condition.
- D. Plant pits shall have neither more than 50% nor less than 25% amendment in backfill.

3.04 FINISH GRADING

- A. Created landforms shall be integrated into the existing site providing naturalized contouring to integrate newly graded areas with the natural topography.
- B. Compact amended planting areas by watering and soaking soil. For planting areas, soils shall be pre-irrigated. Soil shall be between 70-80% relative compaction (this should be attained naturally after pre-irrigation).
- C. Fine grade planting and turf areas to smooth, even surface with loose, uniformly fine texture. Roll, rake and drag all TURF areas, remove ridges and fill depressions, as required to meet finish grades (refer to SECTION 31 20 00 - EARTH MOVING) while providing positive drainage to drain structures and away from buildings. Limit fine grading to areas which can be planted immediately after grading. Finish grade of soil shall be 3 inches below top of paving, headers, boxes etc. to allow for 3 inches of mulch top dressing unless directed otherwise.
- D. Finish grade after installation of irrigation and planting shall maintain a minimum 2 percent slope away from buildings. Soil finish grades below finish grade of walks, pavements, and curbs shall be specified.

3.05 LEACHING

- A. After soil amending and prior to planting, irrigate prepared planting areas with a minimum of 3" of potable water to leach and start fertilizer breakdown. Apply irrigation in increments of 1/2 to 3/4 of an inch of precipitation, and then allow

ample time for infiltration, repeating this procedure until the specified amount of water has been applied. Allow surface moisture to dry before planting. Do not create a muddy or overly compacted soil conditions.

- B. Restore planting areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.06 CLEANUP

- A. During all stages of work, keep pavements clean and work area in a clean and orderly condition.

END OF SECTION 32 91 13

**SECTION 32 93 00
PLANT MAINTENANCE**

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including Special Provisions and all Specification sections, may apply to work of this section.

1.02 RELATED SECTIONS

- A. SECTION 32 84 00 – IRRIGATION WORK
- B. SECTION 32 90 00 – PLANTING

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 MAINTENANCE

- A. Maintenance Period: The Contractor is responsible for maintaining all plants within the limits of work for 90 days from the date of Substantial Completion. At their discretion, the Owner may choose to request the Landscape Contractor responsible for the installation of the contract planting work to enter into a contract for maintenance.
- B. Maintain all planting areas during the following maintenance period by cultivating, watering, weeding, pruning at the direction of the Engineer, fertilizing, restoring planting basins, and resetting to proper grades or vertical position, as required to establish healthy plantings.
- C. General
 - 1. Maintain all plant material by watering (including hand watering non-irrigated plantings and all other plantings if automatic irrigation is non-functional), pruning, cultivating and weeding as required for healthy growth. Restore planting basins. Tighten and repair stake supports and reset trees and shrubs to proper grades or vertical position as required. Keep trees and shrubs free of insects and disease. Maintain all areas in a weed free condition at all times.
 - 2. In order to expedite the plant establishment work, the Contractor shall maintain a sufficient staff and adequate equipment to perform the work herein specified, from the time any planting is done, until the end of maintenance period.

3. Contractor shall remove dead plants immediately. Replace dead material within 7 days, unless directed by the Owner's Representative to plant in the succeeding planting season.
4. Contractor shall replace all plants that are more than 25 percent dead or in an unhealthy condition at end of maintenance period.
5. A limit of one replacement of each plant will be required, except for losses or replacements due to failure to comply with requirements.
6. No herbicide or pesticides shall be used on site, unless approved in writing by the Owner's Representative prior to application.

D. Irrigation Schedule

1. Installed plant material shall be irrigated with adequate frequency and quantity to prevent the visible signs of drought stress and promote healthy growth.
2. During the first month of plant establishment, the plants will be irrigated with enough regularity to keep the soil within the root zone moist.
3. Precise irrigation requirements will be determined through site observations using an adaptive management approach toward irrigation.

E. Weed Control

1. Each irrigation basin shall be kept weed free by maintaining a thick mulch layer, at a depth consistent with the plans. All weeding shall be removed by hand within the irrigation basins.
2. Contractor shall perform weed control as needed to maintain plantings in a healthy condition.
 - i. Weed control activities shall occur before seed set, to the extent possible, to control the spread of non-native species.
 - ii. Woody invasive species such as ivy, vinca, and blackberry shall be hand removed in a manner that completely removes the root system.
 - iii. All non-woody invasive species shall be cut using a mower, weed whacker, or hand tool, as acceptable to the Owner's Representative, once they have reached 6 inches in height, or at a minimum of once per month, whichever occurs first, throughout the work limits.
3. Contractor shall ensure that the weeding does not harm any of the new plantings or native plant species. Native tree and shrub species that colonize between plantings shall be protected.

F. Irrigation Basin Maintenance

1. Irrigation basins and the surrounding earthen berms shall be reformed and maintained as necessary to retain water.

2. Bark mulch shall be added to each irrigation basin as necessary to maintain the layer throughout the bottom of the basins, at a depth consistent with the plans.

G. Inspection of Completed Work

1. Inspection of plant installation work will be made at the Contractor's request upon completion of work. Written notice requesting inspection shall be submitted to the Owner's Representative at least 5 days prior to the anticipated inspection date.
2. The Contractor may be relieved from maintenance work when the plant establishment work has been completed to the satisfaction of the Owner's Representative.

END OF SECTION 32 93 00

SECTION 33 11 00
WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Locate and verify pipe size at water system connections.
- B. Provide and install water system pressure pipe, fittings, and appurtenances.
- C. Provide and install all water system appurtenances, i.e. post-indicator valve(s), fire department connection(s), backflow preventer(s), hose bibb(s), fitting(s), valves(s), etc.
- D. Provide and install concrete thrust blocks.
- E. Connect new water system to existing service lines.
- F. Disinfection and testing of new water line.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Division 01 Specification Sections apply to this Section.
- B. Related Sections include the following:
 - 1. Trenching, Backfilling and Compaction – Section 312316.

1.3 SUBMITTALS

- A. In accordance with Section 013300, Submittal Requirements:
 - 1. Submit choice of pipe, fittings, and appurtenances for review prior to ordering.

1.4 REFERENCES

- A. California Plumbing Code (CPC), latest edition.
- B. California Fire Code (CFC), latest edition.
- C. National Fire Protection Association (NFPA) Standard for the Installation of Private Fire Service main and their Appurtenances, latest edition.

- D. City of Lakeport Standard requirements.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Water pipe shall be delivered, handled, and stored in a way that prevents damage to the pipe and the entry of foreign materials into the pipe.
- B. Regardless of cause, damaged pipe shall be replaced with new products at the expense of the Contractor.

PART 2 - PRODUCTS

2.1 WATER SERVICE PIPE AND FITTINGS

- A. All domestic water piping 3-inch diameter and smaller shall be PVC Sch. 80, with solvent cement fittings compatible with the pipe.
- B. All domestic water piping 4-inch in diameter shall be PVC C900, DR18.
- C. All fire and domestic water piping 6-inch diameter and larger shall be PVC C900, DR14.
- D. All recycled/reclaimed water piping 3-inch in diameter and smaller shall be purple PVC Sch. 80, with solvent cement fittings compatible with the pipe.

2.2 WATER SYSTEM APPURTENANCES

- A. All domestic water line valves shall be bronze body ball valves centered in a valve box with a PVC riser.
- B. All fire water line valves shall be resilient wedge, non-rising stem suitable for 200 psi minimum working pressure centered in a valve box with a PVC riser.
- C. Domestic and fire water valve boxes shall be model G05 as manufactured by Oldcastle Infrastructure, or approved equal with lid marked "WATER."
- D. All recycled/reclaimed water line valves shall be bronze body ball valves centered in a valve box with a purple PVC riser. Valve handle shall be purple and lettered "RECLAIMED WATER."
- E. Recycled/reclaimed water valve boxes shall be model G05, color coded purple, as manufactured by Oldcastle Infrastructure, or approved equal with lid marked "RECLAIMED WATER."
- F. Post-indicator valves, fire department connections, backflow preventers shall be the model indicated on the plans per the drawing details and the City of Lakeport approved list and standard drawings, or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. Construction of the private domestic and recycled/reclaimed water system shall conform to the requirements of the CPC.
- B. Construction of the private fire water system shall conform to the requirements of the CFC and NFPA 24, and shall be inspected during installation by the local fire authority.

3.2 POTHOLING AT CONNECTION POINTS

- A. The exact location and size of existing water service lines is unknown and is depicted on the plans based upon the best information available.
- B. The Contractor shall pothole in the vicinity of each connection point to verify the exact location and size of the existing water line. That information shall be presented in the form of a field sketch through the RFI process, for confirmation by the Engineer that the line as located is adequate to serve the proposed buildings.

3.3 PIPE DISTRIBUTION AND HANDLING

- A. Pipe distribution shall not take place too far in advance of laying operations.

- B. Pipe shall be handled carefully to avoid damage. Pipe handling by mechanical equipment shall be in accordance with the pipe manufacturer's recommendations.
- C. The spigot ends of pipes and fittings that utilize polyvinyl chloride or polyurethane factory applied flexible compression joints shall not rest on the ground or pavement.
- D. All pipe, fittings, and valves shall be carefully lowered into the trench by means of a derrick, ropes or other suitable tools or equipment, in such a manner as to prevent damage to pipe materials, protective coatings and linings. Under no circumstances shall pipe materials be dropped or dumped into the trench.

3.4 PIPE LAYING

- A. No pipe shall be laid in water or when trench conditions are unsuitable to allow performing the job in a professional manner.
- B. Pipe shall be laid with bell ends facing in the direction of laying, and shall progress uphill.
- C. Pipe deflections, where permitted, shall not exceed that recommended by the pipe manufacturer.
- D. Pipe and fittings which do not allow sufficient space for joints shall be removed and replaced with pipe and fittings of proper dimensions.
- E. Every precaution shall be taken to prevent foreign material from entering the pipe. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. If foreign materials do enter the pipe, they shall be removed continuously as work progresses.
- F. At times when pipe laying is not in progress, the open ends of laid pipe shall be closed by a watertight plug.
- G. Wherever the jointing material specified is cement, two or more lengths of pipe shall be in place ahead of each joint before such joint is finished.
- H. Where PVC, SCH 80, pipe is used, pipe ends shall be lightly sanded and wiped just prior to making the joint to assure good adhesion.
- I. The Contractor is advised that the City Fire Department typically inspects private fire

main testing and generally requires that testing be performed with exposed joints and with the pipe restrained with partial backfill over the center of the pipe.

3.5 FLUSHING AND TESTING

- A. Private Potable Water System
 - 1. The system shall be flushed with potable water until only potable water appears at the outlet point.
 - 2. The system shall be disinfected in accordance with Section 609.9 of the CPC.
 - 3. The system shall be hydrostatically tested in accordance with Section 609.4 of the CPC.
- B. The private fire mains shall be flushed and tested in accordance with NFPA 24:
 - 1. Pipes shall be flushed at the design flow rate of the system or at a rate which produces a velocity in the pipe of 10 feet per second, whichever is greater.
 - 2. The systems shall be hydrostatically tested at not less than 200 psi for two hours. Leakage at the joints shall not exceed two quarts per hour per 100 gaskets or joints.
 - 3. Testing shall be observed by the local fire authority.
- C. Tests shall be made by the Contractor in the presence of the authority having jurisdiction and the Owner's Representative.

3.6 CONNECTIONS TO EXISTING SERVICES AND MAINS

- A. Contractor shall make connections to existing mains where indicated on the plans. Said connections shall be made after new water pipe is flushed and tested in accordance with this specification. The Owner's Representative and City of Lakeport Inspector shall observe all tests.
- B. Sawcut, remove, and repair existing pavements as noted on plans.

3.7 CLEAN UP

- A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 33 30 00
SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Locate and verify invert elevation of existing pipe at proposed point of connection.
- B. Provide and install gravity sewer pipe.
- C. Provide and install sewer cleanouts.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Trenching, Backfilling and Compaction - Section 312316

1.3 SUBMITTALS

- A. In accordance with section 013300, Submittal Requirements:
 - 1. Submit choice of pipe and appurtenances for review prior to ordering.

1.4 REFERENCES

- A. California Plumbing Code (CPC), latest edition.
- B. City of Lakeport Standards

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Sewer pipe and appurtenances shall be delivered, handled, and stored in a way that prevents damage to the pipe and prevents entry of foreign materials into the pipe.
- B. Regardless of cause, damaged pipe and appurtenances shall be replaced with new products at the expense of the Contractor.

1.6 GRADE AND ALIGNMENT CONTROL

- A. General

1. Necessary installation procedures, as needed to ensure pipes are installed at the location and grade staked in the field, shall be used.
- B. Method
1. One of the following methods shall be utilized to control grade and alignment:
 - a. Batter boards set at 25' intervals with a string line set over at least three batter boards.
 - b. Electronic 'Laser' beam set at manhole locations or grade breaks (with at least three grade points shall be checked to verify the set grade).
 - c. Survey instrument set at cleanout to site, between cleanouts at the set grade.
- C. Equipment
1. The Contractor shall furnish all equipment necessary to install and inspect the pipe installation. Grade rod shall be held to a minimum in all cases.

PART 2 - PRODUCTS

2.1 GRAVITY SEWER PIPE AND SERVICE LATERALS

- A. Sewer pipe 6 inches in diameter and smaller shall be PVC, SDR 35 with gasketed joints, or approved equal.
- B. Pipe shall be green in color.

2.2 CLEANOUTS

- A. As shown and detailed on the Drawings.
- B. Lids shall be concrete, marked "sewer".

PART 3 - EXECUTION

3.1 GENERAL

- A. Construction of the private sewer system shall conform to the requirements of the CPC, as well as City of Lakeport Standards and drawings details.

3.2 VERIFY EXISTING CONDITIONS

- A. The exact location and depth of existing sewer lines is unknown and is shown based upon the best information available.
- B. Prior to ordering any materials, Contractor shall pot hole in the vicinity of each point of connection and crossing with existing utilities to verify the exact location (horizontal and vertical) and size of the existing sanitary sewer/utilities. This information shall be presented in the form of a field sketch through the RFI process for review and confirmation by the Engineer that the existing line and proposed design is adequate to serve the project.

3.3 PIPE DISTRIBUTION AND HANDLING

- A. Pipe distribution shall not take place too far in advance of laying operations.
- B. Pipe shall be handled carefully to avoid damage. Pipe handling by mechanical equipment shall be in accordance with the pipe manufacturer's recommendations.

- C. The spigot ends of pipes and fittings that utilize polyvinyl chloride or polyurethane factory applied flexible compression joints shall not rest on the ground or pavement.
- D. All pipe and fittings shall be carefully lowered into the trench by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to pipe materials, protective coatings and linings. Under no circumstances shall pipe materials be dropped or dumped into the trench.

3.4 PIPE LAYING

- A. No pipe shall be laid in water or when trench conditions are unsuitable to allow performing the job in a professional manner.
- B. Pipe shall be laid with bell ends facing in the direction of laying and shall progress uphill.
- C. Pipe deflections where permitted shall not exceed that recommended by the pipe manufacturer.

- D. Pipe and fittings which do not allow sufficient space for joints shall be removed and replaced with pipe and fittings of proper dimensions.
- E. Every precaution shall be taken to prevent foreign material from entering the pipe. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. If foreign materials do enter the pipe, they shall be removed continuously as work progresses.
- F. At times when pipe laying is not in progress, the open ends of laid pipe shall be closed by a watertight plug.
- G. Wherever the jointing material specified is cement, two or more lengths of pipe shall be in place ahead of each joint before such joint is finished.

3.5 TESTING

- A. All new sewer laterals shall be tested in accordance with procedures specified in the CPC, Section 712.2 (Water Test) as described herein. The tests shall be observed by the Owner's Representative.
- B. The water test shall be applied to the drainage and vent systems either in its entirety or in sections. If the test is applied to the entire system, openings in the piping shall be tightly closed, except the highest opening, and the system filled with water to point of overflow. If the system is tested in sections, each opening shall be tightly plugged, except the highest opening of the section under test, and each section shall be filled with water, but no section shall be tested with less than a ten (10) foot (3,048 mm) head of water. In testing successive sections, not less than the upper ten (10) feet (3,048 mm) of the next preceding section shall be tested, so that no joint or pipe in the building (except the uppermost ten (10) feet (3,048 mm) of the system) shall have been submitted to a test of less than a ten (10) foot (3,048 mm) head of water. The water shall be kept in the system, or in the portion under test, for not less than fifteen (15) minutes before inspection starts. The system shall then be tight at points.
- C. A City of Lakeport Inspector shall witness all sewer utility testing.

3.6 CLEAN UP

- A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 33 40 00

SITE DRAINAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide and install storm and roof drain pipe and appurtenances.
- B. Provide and install subdrain pipe and appurtenances.
- C. Provide and install storm and roof drain system structures, including clean-outs, drainage inlets, etc.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Trenching, Backfilling and Compaction - Section 312316

1.3 SUBMITTALS

- A. In accordance with Section 013300, Submittal Requirements:
 - 1. Submit choice of storm drain pipe and cleanouts, drainage structures, and drainage grates to Engineer for review prior to ordering.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Storm drain and roof drain piping and structures shall be delivered, handled, and stored in a way that prevents damage to the pipe/structures, or the entry of foreign materials into the pipe.
- B. Regardless of cause, damaged pipe/structures shall be replaced with new products at the expense of the Contractor.

1.5 GRADE AND ALIGNMENT CONTROL

- A. General
 - 1. The necessary installation procedures that will insure the pipes are installed at the location and grade staked in the field shall be used.

B. Method

1. One of the following methods shall be utilized to control grade and alignment:
 - a. Batter boards set at 25' intervals with a string line set over at least three batter boards.
 - b. Electronic 'Laser' beam set at structure locations or grade breaks. At least three grade points shall be checked to verify the set grade.
 - c. Survey instrument set at structure to site between structures at the set grade.

C. Equipment

1. The Contractor shall furnish all equipment necessary to install and inspect the pipe installation. Grade rod shall be held to a minimum in all cases.

PART 2 - PRODUCTS

2.1 STORM DRAIN PIPE

- A. Storm drain and roof pipe 8" to 12" in diameter shall be Polyvinyl Chloride Pipe (PVC), SDR 35, Series 46, High Density Polyethylene (HDPE), Type S, or approved equal.
- B. Storm drain and roof pipe 4" to 6" in diameter and shall be Polyvinyl Chloride Pipe (PVC), SDR 35, Series 46, or approved equal
- C. Storm and roof drain pipe 3" diameter and smaller shall be Polyvinyl Chloride Pipe (PVC), SCH 80, or approved equal.
- D. Subdrain pipe shall be perforated Polyvinyl Chloride Pipe (PVC), SDR 35, Series 46, or approved equal.
- E. PVC pipe (SDR 35) shall be have with water tight, gasketed couplings.
- F. PVC pipe (SCH 80) shall have solvent weld couplings.
- G. PVC pipe shall have fittings (ells, tees, wyes, etc.) compatible to the pipe type.

2.2 DRAINAGE STRUCTURES

- A. Drainage inlets (SDDI) noted on the plan as "1212", "1818" or "2424" shall be as manufactured by Oldcastle Infrastructure, or approved equal, and shall be of the model/size indicated on the plans. Grates shall be heavy duty in hard surfaced areas with 1/2" maximum opening bolt down grates, and standard duty in planting areas, with bolt down grates.
- B. SDDIs placed in concrete areas shall be installed with a paving notch.

PART 3 - EXECUTION

3.1 GENERAL

- A. All construction of the storm drain shall conform to the requirements of the City of Lakeport Standards.

3.2 VERIFY EXISTING CONDITIONS

- A. The exact location and depth of the existing storm drains is unknown and is shown based on the best information available.
- B. Prior to ordering of any materials, Contractor shall pot hole in the vicinity of each point of connection and crossing with existing utilities to verify the exact location (horizontal and vertical) and size of the existing storm drain/existing utilities. This information shall be presented in the form of a field sketch through the RFI process for review and confirmation by the Engineer that the proposed design is adequate to serve the project.

3.3 STORM DRAIN PIPE

- A. Trenching shall be as indicated in Section 312316, Trenching, Backfilling and Compaction.
- B. Pipe laying shall be as indicated in paragraph 3.05 herein.
- C. No pipe shall be installed which is cracked, damaged or otherwise unsuitable for use in the opinion of the Engineer.

3.4 STORM DRAINAGE STRUCTURES

- A. Excavation and backfill shall conform to Section 312316, Trenching, Backfilling and Compaction.
- B. Joints shall be grouted to form a watertight seal. Any visible leaks shall be permanently plugged.

3.5 PIPE LAYING

- A. No pipe shall be laid when trench conditions are unsuitable to allow performing the job in a professional manner.
- B. Where ground water occurs, pumping shall continue until backfilling has progressed to a sufficient height to prevent flotation of the pipe. Water shall be disposed of in such a manner as to cause no property damage or be a hazard to public health in accordance with Section 31 2316, Trenching, Backfilling and Compaction.
- C. Pipe shall be laid with bell ends facing in the direction of laying and shall progress uphill/upslope.
- D. Pipe deflections where permitted shall not exceed that recommended by the pipe manufacturer.
- E. If High Density Polyethylene (HDPE) pipe is used, the exterior ribbed wall may be removed to avoid conflicts with other utilities. The extent of the removal shall not exceed 18" measured along the length of the pipe.
- F. Every precaution shall be taken to prevent foreign material from entering the pipe. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. If foreign materials do enter the pipe, they shall be removed continuously as work progresses.
- G. At times when pipe laying is not in progress, the open ends of laid pipe shall be closed by a water-tight plug.

3.6 CLEAN UP

- A. Remove all debris and stains resulting from the work of this section.
- B. Properly repair all surfaces disturbed by construction.

END OF SECTION