

TECHNICAL SPECIFICATIONS  
FOR THE  
CITY OF CORONA  
DEPARTMENT OF WATER & POWER

CITY PARK BASKETBALL/VOLLEYBALL COURT ADDITION



Prepared By:

Vernon R. Weisner

9/26/2016

Date

Reviewed By:

Tom Koper

9-26-16

Date

City of Corona  
Department of Water and Power  
755 Public Safety Way  
Corona, CA 92880  
September, 2016



# City of Corona



## City Park Basketball & Volleyball Court Addition

Prepared for the City of Corona  
Department of Water and Power  
Contact: Vernon Weisman  
Phone: 951-739-4912



# bmla

LANDSCAPE  
ARCHITECTURE

Prepared by: BMLA Inc.  
310 North Joy Street  
Corona Ca. 92879  
Phone: 951-737-1124





CITY OF CORONA  
CITY PARK  
BASKETBALL/VOLLEYBALL COURT ADDITION

TABLE OF CONTENTS - TECHNICAL SPECIFICATIONS

<u>SECTION</u>	<u>TITLE</u>
00 89 00	PERMITS
01 00 01	REPORTS, STANDARD DRAWINGS, STANDARD SPECIFICATIONS, AND APPROVED MATERIALS LIST
01 11 00	SUMMARY OF WORK AND SEQUENCE OF CONSTRUCTION
01 22 00	MEASUREMENT AND PAYMENT
01 29 73	SCHEDULE OF VALUES
01 31 13	ACCESS AND COORDINATION
01 31 19	PROJECT MEETINGS
01 32 13	SCHEDULING OF WORK
01 32 23	CONSTRUCTION SURVEY STAKING
01 32 33	CONSTRUCTION PHOTOGRAPHIC AND VIDEO DOCUMENTATION
01 33 00	SUBMITTAL PROCEDURES
01 35 13	SPECIAL PROJECT PROCEDURES
01 40 00	QUALITY REQUIREMENTS
01 42 13	ABBREVIATIONS AND ACRONYMS
01 50 00	TEMPORARY FACILITIES AND CONTROLS
01 55 26	TRAFFIC CONTROL AND RESTRIPING
01 57 23	TEMPORARY STORM WATER POLLUTION CONTROL
01 61 00	COMMON PRODUCT REQUIREMENTS
01 63 00	PRODUCT SUBSTITUTION PROCEDURES
01 65 00	PRODUCT DELIVERY REQUIREMENTS
01 66 00	PRODUCT STORAGE AND HANDLING REQUIREMENTS
01 71 13	MOBILIZATION AND DEMOBILIZATION
01 73 00	EXECUTION
01 74 00	CLEANING AND WASTE MANAGEMENT
01 77 00	CLOSEOUT PROCEDURES
01 78 36	PRODUCT WARRANTIES
01 78 39	PROJECT RECORD DOCUMENTS
01 79 00	DEMONSTRATION AND TRAINING
02110	CLEAR AND GRUB SELECTIVE DEMOLITION
02441	IRRIGATION SYSTEM
02461	SITE AMENITIES
02580	TEXTURED ACRYLIC COLOR SURFACING

02900	PLANTING
03100	CONCRETE FORMWORK
03200	CONCRETE REINFORCEMENT
03300	CONCRETE
26 05 01	GENERAL ELECTRICAL REQUIREMENTS
26 05 26	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 29	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
26 05 43	UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS
26 05 53	IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 24 13	SWITCHBOARDS
26 24 16	PANELBOARDS
26 28 01	LOW VOLTAGE CIRCUIT PROTECTIVE DEVICES
26 56 10	EXTERIOR LIGHTING CONTROLS

**SECTION 00 89 00  
PERMITS**

**PART 1 - GENERAL**

**1.1 Work Included**

A. Obtain and/or comply with encroachment permits, license permits, licenses, and agreements from the following agencies.

- Regional Water Quality Control Board, Santa Ana Region (RWQCB)
- City of Corona Business License
- City of Corona Public Works Encroachment Permit

Obtain permits and licenses prior to starting construction.

**1.2 Related Work**

- A. General Conditions Article 14: Permits and Licenses
- B. Section 01 57 23: Temporary Storm Water Pollution Control

**1.4 Submittals**

A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Encroachment Permits	Submit copies of encroachment permits	
License Permits	Submit copies of license permits	
Licenses	Submit copies of licenses	
Agreements	Submit copies of agreements	

**1.5 Unit Prices**

A. Payment for the Work in this section shall be included as part of the lump-sum or unit-price bid amount for mobilization.

**PART 2 – PRODUCTS (Not Applicable)**

**PART 3 – EXECUTION**

**3.1 Regional Water Quality Control Board, Santa Ana Region (RWQCB) - Discharges**

A. For discharges of non-polluted water to surface waters from trench dewatering, pipeline flushing, pipeline pressure testing, and well development and testing - comply with water quality effluent limitations specified in the Santa Ana Regional Water Quality Control Board (SARWQCB) – General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant Threat to Water Quality, Santa Ana Region Order No. R8-2009-0003, NPDES Permit No. CAG998001 or most recent order or amendment which are available on the RWQCB's website at:

[www.waterboards.ca.gov/santaana/board\\_decisions/adopted\\_orders/](http://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/)

- B. Secure an authorization letter from the Regional Board prior to making the waste discharge. This authorization letter may be obtained by filing an application for coverage under Order No. R8-2003-0061 and amendments found in Order No. R8-2005-0041 and R8-2006-0004 and must be submitted at least 60 days before the intended waste discharge. The application consists of the following:
1. Notice of Intent
  2. For projects involving well development, well purging, groundwater extraction (which includes trench dewatering), a site characterization study report defining the proximity of the extraction well(s) to known contaminated sites, the presence of contaminated groundwater onsite, contaminants and their properties, and a three dimensional assessment of the extent and concentration of contaminants in the subsurface is required. The study report shall include a description of the geologic and hydrologic factors that control the migration of the contaminants. It shall also include a list of known or suspected leaking underground tanks and other facilities or operations which have or may have impacted the quality of the underlying groundwater within 200 feet of the site.
  3. A report which includes:
    - a. Characterization of the proposed waste discharge (for projects involving well development, well purging and groundwater extraction, a representative groundwater sample shall be analyzed for all 126-priority pollutants listed in Attachment B of R8-2003-0061;
    - b. the name of the receiving water;
    - c. the estimated average and maximum daily flow rates;
    - d. the frequency and duration of the discharge;
    - e. a description of the proposed treatment system (if appropriate); and
    - f. a map showing the path from the point of initial discharge to the ultimate location of discharge.
  4. Any other information deemed necessary by the Santa Ana Regional Board Executive Officer.
  5. If the non-polluted waste discharge is applied to land without entering into a municipal storm drainage conveyance system or natural drainage course, then the discharge is exempt from the requirements of *Order No. R8-2003-0061* and subsequent amendments.
  6. If the non-polluted waste discharge enters into a municipal storm drainage conveyance system or dry/seasonal drainage course such that the entire discharge will percolate completely prior to reaching any surface water downstream, then the discharge is exempt from the requirements of *Order No. R8-2003-0061* and subsequent amendments.

C. Other Wastewater Discharges.

Comply with all applicable requirements of the Regional Board for all other waste discharges, including discharges of potentially polluted or contaminated water. If required by the Regional Board, Contractor shall, at his sole expense, obtain a wastewater discharge permit from the Regional Board. Provide a copy of said wastewater discharge permit to the City. Comply with the conditions therein, and perform the monitoring required.

D. General Discharge Requirements.

Contractor shall not allow any discharges from the construction site which may have an adverse effect on receiving waters of the United States. Waste discharges shall not contain a concentration of total residual chlorine of more than 0.1 mg/l. Waste discharges shall not contain oils, greases, waxes, or other materials in concentrations which result in a visible film or coating on the surface of receiving waters. Waste discharges shall not cause erosion or sedimentation in the receiving waters.

E. Notification of Wastewater Discharge.

Provide written notification to the City and the Regional Board five (5) days prior to the start of any waste discharge; and provide written notification to the agency/municipality that owns, operates, and maintains the municipal storm drainage conveyance system a minimum of one (1) week prior to the start of any discharge into a municipal storm drainage conveyance system.

**3.2 Regional Water Quality Control Board, Santa Ana Region (RWQCB) – Stormwater Pollution Prevention Plans**

A. Comply with current California State Water Control Board (SWRCB) General Construction Activity NPDES Stormwater Permit (General Construction Permit) requirements where Stormwater Pollution Prevention Plans (SWPPP) are required. Refer to Specifications Section 01 57 23 – Temporary Storm Water Pollution Control for additional information.

**3.3 City of Corona Business License Certificate**

- A. A City of Corona business license certificate will be required for work in the City of Corona.
- B. City business license certificate forms are available at the Business License Division, 400 South Vicentia Avenue, first floor public counter, Corona, CA 92882, or by calling (951) 736-2275.

**3.4 City of Corona Public Works Encroachment Permit**

- A. A City of Corona Department of Public Works encroachment (construction) permit will be required for work in public right-of-way in the City of Corona.
- B. The City of Corona encroachment permit is a no fee permit.
- C. Information required by the Contractor for processing the City encroachment permit includes:
  - 1. Copy of Notice to Proceed
  - 2. Project Name / Project No. / Location / Scope or Work
  - 3. Project Number
  - 4. Drawing Number
  - 5. Contractor's Name / Address / Telephone Number
  - 6. Contractor's License Number
  - 7. City Business License Number
  - 8. Liability Insurance – Carrier Name / Policy No. / Expiration Date

- 9. Automobile Insurance – Carrier Name / Policy No. / Expiration Date
  - 10. Dig Alert Number
- D. Provide the information required in Item C above to the City’s Representative for processing with the Public Works Department.
  - E. Maintain the encroachment permit in force, track expiration dates, and apply for permit renewals and extensions as needed.

**END OF SECTION**

**SECTION 01 00 01**  
**REPORTS, STANDARD DRAWINGS, STANDARD SPECIFICATIONS**  
**AND APPROVED MATERIALS LIST AND FUNDING AGREEMENTS**

**PART 1 - GENERAL**

**1.1 Standard Specifications, Standard Drawings, Disadvantaged Business Enterprise, Labor Compliance, and Equal Opportunity Program Requirements**

A. Standard Specifications, Standard Drawings, Labor Compliance, and Equal Opportunity Program Requirements shall be as described in the Contract Documents.

**1.2 Reports**

A. None available.

**1.3 Reference Standards**

A. Contract Documents contain references to various standards, standard specifications, codes, and practices and requirements for products, execution, tests, and inspections. These reference standards are published and issued by agencies, associations, organizations and societies identified in individual product specification sections. Such references shall form a part of the Contract Documents to the extent that they are referenced.

B. Referenced documents shall include all revisions, amendments, supplements or addenda issued on or before the date of Issuance of Notice Inviting Bids.

C. The City of Corona Standard Plans are incorporated into this Contract by reference and will be enforced unless superseded by the Contract Documents as described in General Conditions Article 2 – Contract Documents.

D. Obtain and maintain at worksite copies of reference standards identified in Contract Documents necessary to properly execute Work.

E. At a minimum, the following shall be readily available at site, as applicable to Work:

1. Local and state building codes.

2. Safety Codes: State of California Industrial Safety Codes and regulations and Occupational Safety and Health Act (OSHA) regulations, to extent applicable to Work.

F. “Greenbook” – SSPWC - Standard Specifications for Public Works Construction, current edition.

**1.4 Approved Materials and Equipment List**

A. All the materials and equipment used on this Project shall be in accordance with items listed in the City’s current Notice Designating Sole Source Equipment and Products Specifications (Potable Water, Water Reclamation, and Reclaimed Water Facilities) available at the following City website address:

<http://www.discovercoronadwp.com/construction/eng-specs.shtml>

B. Materials not listed in the approved materials list or in these specifications must be submitted for the City’s approval and accepted for use on this contract prior to

contract award in accordance with Article 7 – Substitutions in the General Conditions and Section 01 63 00 Product Substitution Procedures.

**PART 2 - PRODUCTS (Not applicable)**

**PART 3 - EXECUTION (Not applicable)**

**END OF SECTION**

**SECTION 01 01 00**  
**SUMMARY OF WORK AND SEQUENCE OF CONSTRUCTION**

**PART 1 - GENERAL**

**1.1 Work Covered by Contract Documents**

- A. This section provides a summary of the Work, the location, Work sequence, closeout, Contractor use of premises, and activities by others at the Project site.
- B. The Work includes furnishing products, labor, tools, transportation, and services to construct the following:
  - 1. Demolition including removal and disposal of existing gravel, turf, irrigation piping and equipment, trees and stumps, concrete, electrical pull boxes and conduits, wiring, utility building and foundation, and all other work necessary to prepare area for proposed improvements.
  - 2. Over-excavation, soil import/export, backfill, compaction and grading.
  - 3. Perform weed abatement per the landscape architects specifications.
  - 4. Construct hardscape, concrete flatwork, curbs, steps and accessories.
  - 5. Construct one full size volleyball court.
  - 6. Furnish and install new volleyball court accessories including, but not limited to, netting, posts, headers, and sand.
  - 7. Construct one full basketball court and two half basketball courts.
  - 8. Furnish and install new basketball court accessories including, but not limited to, the basketball backboard, netting, post, court stripping, and rim.
  - 9. Furnish and install new picnic shelter, benches, water fountains and trash receptacles.
  - 10. Construct new irrigation system.
  - 11. Relocate trees.
  - 12. Furnish and install new planting including a 30 day, 60 day, and 90 day review.
  - 13. Furnish and install electrical conduits, pull boxes, wiring, terminations, light fixtures, electrical switchboard.
- C. Furnish and install complete operating engineered systems including appurtenant structural, mechanical and/or electrical mountings fittings or connections required for compliance with Manufacturer's installation requirements, for compliance with applicable building, fire, plumbing, mechanical, electrical, and energy codes and standards, and as needed to permit systems to perform all functions required by Contract Documents and described in Manufacturer's printed literature.
- D. Contractor's submission of bid shall constitute acknowledgment that, if awarded the contract, they have relied upon and are relying upon their own examination of (a) the Work site, (b) access to the Work site, (c) the conditions under which Work is to be performed and (d) all other data and matters requisite to fulfillment of Work and on their knowledge of existing facilities on and near the Work site.

## **1.2 Project Location**

A. Project address is as follows:

930 E. Sixth Street (access from Quarry Street)  
Corona, California

B. Project site conditions are as follows:

Ground Elevation: 653 feet MSL  
Typical Temperature Range: 31°F - 110° F  
Relative Humidity: 10% to 90%

## **1.3 Normal Working Hours**

A. Contractor shall conduct all Work within the following City-accepted schedule:

1. Normal Work Hours: 7:00 AM to 5:00 PM
2. Normal Work Days: Monday through Friday, excepting legal holidays.

B. Exceptions to this Work schedule shall be only as accepted in writing by City.

C. No work shall be done outside of normal work hours and work days, except where necessary for proper care and protection of Work already performed, or except in case of emergency, and in any case only with written notice to City's Representative.

## **1.4 Reference Standards**

A. Where items of Work are not fully specified in this document, refer to the following Reference Standards in order of precedence shown.

1. Federal, State, and local regulations and permit requirements,
2. These Contract Documents,
3. City's published Design Criteria, Standard Drawings, and Standard Specifications
4. Published Design Criteria and Standard Drawings of public and private agencies having jurisdiction over portions of work within their service area.
5. Standard Specifications for Public Works Construction "Greenbook"

B. The most recent editions and supplements to these documents adopted as of date of advertisement for bid shall govern Work covered by these Contract Documents except as expressly modified herein.

## **PART 2 - PRODUCTS (Not Applicable)**

## **PART 3 - EXECUTION**

### **3.1 Work Sequence**

A. The general sequence of Work shall be as follows:

#### Preparation

1. Before beginning Work, coordinate with servicing electrical utility regarding electric service to site. Obtain required permits, licenses and construction

easements. Call **Underground Service Alert** and utilities to obtain staking and marking of buried utilities. Submit proposed schedule of Work, insurance and bonds. Pothole as needed to supplement staking and marking. Take preconstruction photographs.

2. Verify utility locations, field dimensions, pipe sizes and types, and voltage and phase of on-site electrical services. If discrepancies or conflicts are found, bring these to attention of City's Representative.
3. Submit shop drawings and other submittals.
4. Prepare Stormwater Pollution Prevention Plan (SWPPP)
5. Begin manufacturing and shipping materials and equipment after receiving accepted submittals.
6. Provide traffic control facilities.
7. Construct temporary access to site.
8. Construct temporary security fencing and appurtenances.
9. Install erosion and pollution control measures as required by SWPPP.

#### Construction

10. Install erosion and pollution control measures as required by SWPPP.
11. Perform site grading
12. Construct underground utilities
13. Construct irrigation system improvements
14. Construct site electrical and lighting improvements
15. Construct concrete flatwork
16. Construct basketball courts
17. Construct volleyball courts
18. Construct stormwater detention and water quality improvements
19. Planting and plant maintenance
20. Demonstrate satisfactory installation and operation of installed work, including performing vendor and system functional tests.

#### Startup and System Demonstration

21. Perform equipment testing and startup.
22. Demonstrate satisfactory installation and operation of installed work, including performing vendor and system functional tests.

#### Closeout

23. Remove temporary fencing, access, and construction equipment.
24. Provide operator training, including O&M manuals containing engineering Catalog Data and Shop Drawings on all equipment.
25. Provide schedule of equipment and materials costs.
26. Provide record drawings.
27. Remove erosion and pollution control measures and closeout SWPPP.
28. Clean up and restore construction areas.
29. Provide warranty as specified.

### **3.2 Activities by Others**

- A. The City, utilities, and others may perform activities within the Project area while Work is in progress. Schedule Work with the City, utilities, and others to minimize mutual interference and delays. Activities performed by others at, or in the vicinity of the Work, may include the following construction projects, or maintenance and operational activities:
  - 1. SCE electrical service installation
  - 2. Ion Exchange Treatment Plant
- B. When cooperation fails, submit recommendations and perform Work in coordination with work of others as directed.
- C. When Work depends, for proper execution or results, upon work performed by others, inspect and promptly report apparent discrepancies or defects in work performed by others.

### **3.3 Electrical Service**

- A. Construct new electrical switchboard with metering section using the existing electrical service.
- B. Coordinate with the SCE utility planner and perform all work required for electrical meter relocation, conduit, wiring, and all other work associated with utility connection. Pay all utility company costs required for complete and functional electrical service.
- C. Coordinate and schedule electrical service installation and removal of existing electrical service with City and SCE. Provide a minimum of 14 calendar days prior notice to City to allow for complete working electrical system prior to completion of new facilities for the electrical service installation.

### **3.4 Cooperation with Other Contractors**

- A. City may have additional work performed in this area by other Contractors. Contract requires cooperation with those contractors in the area. Any difference or conflict which may arise between Contractor and other contractors shall be adjusted and determined by City. Contractor shall conduct their operations as to minimize interference with work being done by other contractors. Contractor shall, at their sole expense, make good, promptly, any injury or damage to other contractors' work caused at their hands.

### **3.5 Contractor Use of Premises**

- A. The following facilities shall remain operational throughout construction of Work:
  - 1. Portions of City Park outside the project limits
  - 2. Well 17A
  - 3. Do not shut off pipelines or power, or take action which might adversely affect City's use or operation of his facilities or premises without prior written authorization from City.
  - 4. Construct accepted signs, barricades and lights necessary to ensure public safety and safety of City's operators and personnel. Provide steel plates across ditches to facilitate safe access of City's personnel to facilities.

- B. Contractor shall restrict their area of operations to avoid damage of trees and shrubs and shall not remove trees unless specifically directed by City.
- C. Contractor shall legally dispose of all material removed.
- D. Fences, walls, shrubs, sprinkler systems, substructures or other improvements removed or disturbed by Contractor during construction shall promptly be replaced and/or repaired at Contractor's sole expense to City's satisfaction.

**3.6 Responsibility for Job Site Conditions**

- A. Contractor shall assume sole and complete responsibility for jobsite conditions during course of construction of Work, including safety and health of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that Contractor shall defend, indemnify and hold City and design consultant harmless from any and all liability except that arising from the sole negligence of City or design consultant.
- B. Refer to Section 01 50 00 for jobsite safety requirements.

**3.7 Occupancy**

- A. Successful completion of pre-startup checkout and functional testing shall precede City's use or acceptance of completed Work.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 22 00  
MEASUREMENT AND PAYMENT**

**PART 1 - GENERAL**

**1.01 Description**

- A. Measurement and payment for bid items listed in the proposal shall be based upon use of a lump sum or unit price method. Extra work or changes in the Work shall be accomplished as provided in the General Conditions.

**1.02 Related Work**

- A. The Work of the following Sections apply to Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of the Work.
  - 1. Bid Proposal Form
  - 2. Section 01 11 00 – Summary of Work and Sequence of Construction
  - 3. Section 01 29 73 – Schedule of Values
  - 4. Article 44 – General Conditions

**1.03 Submittals**

- A. Partial Payment Requests
- B. Final Payment Request

**1.04 Submittal Format**

- A. Submit typewritten Payment Requests on 8-1/2" x 11" paper AIA format approved by City

**1.05 Measurement**

**A. General**

Measurement for unit price quantities shall be based upon the appropriate bid item in the Bid Schedule. The actual quantity of measurement shall be as constructed by Contractor in place in conformance with the Plans and Specifications.

**B. Unit Measurements**

Measurement for bid items involving units of the item shall be based upon the number of units counted as indicated in the bid item.

**C. Lump Sum Measurement**

Measurement for a lump sum bid item shall be considered as a complete project or a portion of a project constituting a unit. The items to be included in the lump sum bid shall be as specified in the proposal bid item and/or as indicated on the accepted Schedule of Values.

## 1.06 Payment

### A. General

1. Payment shall be based on the approved schedule of values.
2. Partial pay requests shall be based on work performed during the pay period using the schedule of values and presented in a tabular format showing:
  - a. Bid Item No.
  - b. Work Item Description
  - c. Original Contract
    - 1) Quantity
    - 2) Unit
    - 3) Unit Price
    - 4) Value
  - d. Total Previous Billing
    - 1) Quantity
    - 2) Value
  - e. Current Billing
    - 1) Quantity
    - 2) Value
  - f. Total Billed to Date
    - 1) Quantity
    - 2) Value
  - g. % Complete
3. Where work is performed as a single unit or lump sum task substitute lump sum for quantity and unit price in the pay request form.
4. The unit and lump sum prices to be paid shall be full compensation for the items of work and all appurtenant work, including furnishing all materials, labor, equipment, tools, and incidentals.
5. Payment will not be made for materials wasted or disposed of in a manner not called for under the Contract. This includes rejected material not unloaded from vehicles, material rejected after it has been placed, and material placed outside of the Plan lines. No compensation will be allowed for disposing of rejected or excess material.
6. Whenever any portion of the Work is performed by the City at the Contractor's request, the cost thereof shall be charged against the Contractor, and may be deducted from any amount due or becoming due from the City.
7. Whenever immediate action is required to prevent injury, death, or property damage, and precautions which are the Contractor's responsibility have not been taken and are not reasonably expected to be taken, the City may, after reasonable attempt to notify the Contractor, cause such precautions to be

taken and shall charge the cost thereof against the Contractor, or may deduct such cost from any amount due or becoming due from the City. City action or inaction under such circumstances shall not be construed as relieving the Contractor or its Surety from liability.

8. Payment shall not relieve the Contractor from its obligations under the Contract; nor shall such payment be construed to be acceptance of any of the Work. Payment shall not be construed as the transfer of ownership of any equipment or material to the City. Responsibility of ownership shall remain with the Contractor who shall be obligated to store any fully or partially completed work or structure for which payment has been made; or replace any materials or equipment required to be provided under the Contract which may be damaged, lost, stolen or otherwise degraded in any way prior to acceptance of the Work.
9. Guarantee periods shall not be affected by any payment.
10. If, within the time fixed by law, a properly executed notice to stop payment is filed with the City, due to the Contractor's failure to pay for labor or materials used in the Work, all money due for such labor or materials will be withheld from payment to the Contractor in accordance with applicable laws.
11. Partial payments made after the contract completion date will reflect the amount withheld for Liquidated Damages. Any such partial payments made to the Contractor, or its Sureties, will not constitute a waiver of the City's Liquidated Damages.
12. If requested by the City's Representative, provide such additional data as may be reasonably required to support the submitted Invoice. Such data may include but is not limited to satisfactory evidence of payment for equipment, materials and labor including payments to Subcontractors and suppliers. Request for payment for delivered equipment and material shall be accompanied by certified paid invoices from the supplier. Such equipment and material shall be suitably and safely stored at the site of the Work.

#### **B. Payment for Unit Price Items**

Payment for a unit price bid item shall be based upon the amount shown in the bid schedule multiplied by the total quantity measurement of the item and shall be full compensation for furnishing all supervision, planning, design, design engineering fees, labor and services, operations, transportation, materials, equipment, tools, supplies, incidentals and appurtenances required for construction of the item complete in place in accordance with the Plans and Specifications, including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction.

#### **C. Payment for Lump Sum Items**

Payment for lump sum bid items shall be based upon the amount shown in the Bid Schedule and shall be full compensation for furnishing all supervision, planning, design, design engineering fees, labor and services, operations, transportation, materials, equipment, tools, supplies, incidentals and appurtenances required for construction of the unit of work complete in place in accordance with the Plans and Specifications, including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction.

#### **D. Work Not Listed in the Bid Schedule**

Costs for related work and appurtenances which are required and/or implied by the General Conditions, Technical Specifications, Plans, and Permits and are not listed as a separate bid item, but are necessary to complete the project shall be included in the appropriate bid item or items within the Bid Schedule of Contractor's Bid Amount.

#### **E. Payment for Testing**

1. Party responsible for payment for testing is identified in individual sections of Contract Documents under tests required. Where specifications are silent regarding responsible party paying for tests, costs of first tests will be paid by City.
2. If testing or inspection indicates failure of a material or procedure to meet Contract Document requirements, City will backcharge Contractor for retesting and reinspection costs incurred by testing or inspection agency of City's choice. Such costs will be deducted from the progress payments to the Contractor.
3. Additional tests and inspections not specified herein, but requested by City will be paid for by City, unless result of such tests and inspections are found to not comply with Contract Documents, in which case City will pay all costs for initial testing as well as retesting and reinspection and backcharge Contractor for retesting and reinspection.
4. Costs for additional tests or inspections required because of change in materials being provided or change of source or supply shall be paid by City direct to testing laboratory.
5. Cost of testing which is required solely for convenience of Contractor in his scheduling and performance of Work shall be borne by Contractor.
6. Contractor shall pay all costs for correcting deficiencies.

### **PART 2 – PRODUCTS**

#### **2.01 SCHEDULE OF COMPLETED VALUES**

- A. The Schedule of Completed Values shall be a tabular listing of the Items of Work from the approved Schedule of Values.
- B. The Schedule of Completed Values shall show for each Item of Work the Item Number; Description; Item Value; Percent and Value Complete for the previous period; Percent and Value complete for the current period; Value of Stored Materials (if any); and the Total Billing Value.
- C. List each issued Field Order and Change Order on the Schedule of Completed Values as a separate Item.
- D. Attach a Schedule of Completed Values to each Invoice presented for payment.

## 2.02 INVOICES

- A. Invoices shall be prepared on Contractor letterhead, dated and addressed to:

*Construction Manager*  
City of Corona, Department of Water and Power  
755 Public Safety Way  
Corona, CA 92880

- B. Invoices shall have the following subject block:

Attn: *Construction Manager*  
Project Title: {CITY PARK BASKETBALL/VOLLEYBALL COURT ADDITION}  
CIP P.O. No.: 71610217  
Invoice Number: {CONTRACTOR'S INVOICE NUMBER}  
Invoice Period: {INVOICE PERIOD ENDING DATE}

- C. Consecutively number invoices and show the Amount of Original Contract; Value of Approved Changes; Current Contract Amount; Total Billing Value from the Schedule of Completed Values; Percentage and Value of Retention (if any); Value of Previous Invoices; and Payment Amount Due.
- D. Each invoice shall bear the Contractor's signature and the signature of the City's Representative. Submit an electronic copy/scan of each invoice via email to the City's Representative, the Construction Manager, and the City DWP finance department at [AccountsPayable@ci.corona.ca.us](mailto:AccountsPayable@ci.corona.ca.us) . The email subject line shall be "City of Corona, DWP, CITY PARK BASKETBALL/VOLLEYBALL COURT ADDITION Invoice #" followed by the invoice number.

## PART 3 - EXECUTION

### 3.01 Scope

- A. This section defines the bid items listed in the bid schedule and describes measurement and payment provisions for each of the bid items.

### 3.02 Bid Item 1 – Mobilization/Demobilization

- A. The amount bid for Mobilization/Demobilization shall not exceed 5.0% of Contractor's bid total. Contractor will be paid half of the Contractor's bid amount upon successful completion of mobilization work and the remaining half of the Contractor's bid amount upon successful completion of demobilization work. Any amount bid in excess of the stipulated 5.0% cap will not be paid until project completion.
- B. Payment for this item will be made at the lump sum price named in the Bid Schedule under Item Number 1, which price shall constitute full compensation for all work and expenditures required to mobilize, as described in General Conditions Article 45 – Mobilization and herein, including provide bonds and insurance; obtain required permits; provide preconstruction photos and videos; prepare project schedule; provide project sign(s); construct and remove temporary traffic control facilities; locate existing utilities; construct and remove temporary utilities; construct and remove temporary facilities; install and remove temporary fence; perform required surveys, testing, site maintenance and cleanup; remove and reinstall existing site facilities as required; implement stormwater pollution control best management

practices; comply with all General and Special conditions; demobilize; provide record drawings, operation and maintenance manuals, warranties; provide required training listed in the various portion of the contract specifications, and provide surface restoration and cleanup of construction site complete in place, as required by the Contract Documents with sole exclusion of payments to be made as defined herein for other items in the Bid Schedule.

- C. Work to be paid for under this item shall also include furnishing, setting up, and removing Contractor's operations at Project site including temporary offices, utilities, staging areas, security, etc. The Work shall also include furnishing any temporary construction facilities and trailers required by the Contract Documents.
- D. Work to be paid for under this item shall include all labor, materials and equipment for compliance with BMP Implementation and Erosion Control/SWPPP requirements of local Regional Water Quality Control Board including establishment of erosion control plan and reporting procedures, placement of erosion control measures, monitoring, reporting, payment of fines due to Contractor's negligence and any appurtenant work in accordance with warranty requirements as required by the Contract Documents.
- E. Work to be paid for under this item shall include all survey staking and verification of utility depths, locations and field dimensions prior to ordering materials and equipment including potholing, field surveys, measurements and electrical inspections as needed to ascertain that materials and equipment ordered can be properly and legally installed within verified field conditions. Work to be paid for under this bid item shall include notifying City's Representative of any found discrepancies between conditions shown on the plans and field conditions, and appurtenant work as required by Contract Documents.
- F. Work to be paid for under this item shall include potholing all utilities shown on the plans plus one additional pothole for every thousand feet or fraction thereof of pipeline or utility trench. If this number of potholes is exceeded, Contractor will be entitled to fair compensation for any additional potholing of utilities:
  - 1. Which are not shown on the plans at time of bid and are subsequently identified in the field by Underground Service Alert, surface features or walking the alignment with a reliable electronic pipe finder, or;
  - 2. Which are not shown on the plans in their proper location such that multiple potholes are necessary to find them.
- G. In the event discrepancies are discovered between field conditions and dimensions shown on submittals and the Contract Documents, City's Representative will work with Contractor to prepare such modifications to the Contract Documents as required to address the issues brought up.
- H. In the event discrepancies are discovered between field conditions and dimensions shown on submittals and the Contract Documents, but said discrepancies are not brought to the attention of City's Representative by Contractor in a clear and timely manner, City's liability shall be limited to the difference in cost between Work shown in the Contract Documents and Work that would be necessary had Contractor notified City of said discrepancy at time submittals were delivered.
- I. Work to be paid for under this item shall also include protecting existing survey monuments in place and, if Contractor's operations disturb any such monuments,

hiring a registered land surveyor to reestablish and reset the disturbed monuments.

- J. Work to be paid for under this item shall include all labor, materials and equipment for operation and maintenance manuals, record drawings and warranties including but not limited to the cost of document assembly, binders, reproduction and all appurtenant work as required by the Contract Documents.
- K. Work to be paid for under this item shall include all labor, materials and equipment for start-up, testing, troubleshooting, calibration, system demonstration and presenting the Work to City in satisfactory working condition and in accordance with warranty requirements as required by the Contract Documents.
- L. Upon completion of mobilization, 50 percent of the amount bid for this item (or 50 percent of the stipulated 5.0% cap, whichever is less, will be paid to Contractor. The remainder will be paid as part of final contract payment upon successful demobilization and project completion.

### **3.03 Bid Item 2 – Trench Safety Measures, Sheeting, Shoring and Bracing**

- A. No measurement will be made for this item.
- B. Work to be paid for under this item shall include all labor, materials and equipment for temporary sheeting, shoring and bracing required for trench safety including all planning, design, engineering fees, rental fees, furnishing and constructing, and removal and disposal of such temporary sheeting, shoring and bracing or equivalent method for the protection of life and limb of workers in trenching or open excavations, complete, as required under the provisions of any permits, these Contract Documents, and in accordance with the requirements of OSHA and the Construction Safety Orders of the State of California, pursuant to the provisions of Section 6705 of the California Labor Code.

### **3.04 Bid Item 3 – Site Civil Work**

- A. No measurement will be made for this item.
- B. Work to be paid for under this item shall include all labor, materials and equipment for all civil, demolition, grading, earthwork, import or export of soil materials, stockpiling, paving, concrete flatwork, fencing, gates, site work, and miscellaneous site work.
- C. Work to be paid for under this item shall include furnishing all labor, materials, and equipment for site demolition and soil preparation including removal of existing fencing, piping, asphalt and trees where shown, localized pavement or concrete flatwork saw-cutting, removal and replacement where shown, abandoning utilities in place including disconnection from existing work and backfilling existing pipe with 2 sack cement slurry, removal and salvage of existing valves, scarifying, and sterilizing existing soil beneath concrete pads and asphalt paving, preparation and compaction of subgrade beneath new improvements, disposal of excess excavated material, and any appurtenant work as required by the Contract Documents.
- D. Work to be paid for under this item shall include all labor, materials and equipment for structural, mechanical and electrical demolition including testing for asbestos before demolition, removal of existing concrete, masonry, steel, metal, wood, or plastic structural, mechanical or electrical items shown, removal and legal of disposal

of asbestos or other hazardous materials, salvage of materials noted and any appurtenant work as required by the Contract Documents.

- E. Work to be paid for under this item shall include all labor, materials and equipment for grading and structural excavation including excavation, stockpiling, hauloff and disposal of excavated material, placement of suitable fill, backfill, compaction, preparation and compaction of subgrade beneath new improvements, scarifying and sterilizing existing soil where shown, and any appurtenant work as required by the Contract Documents.
- F. Work to be paid for under this item shall include all labor, materials and equipment to construct asphalt paving on aggregate base where shown including subgrade preparation, aggregate base, compaction, asphalt, rolling, sealing and any appurtenant work as required by the Contract Documents.
- G. Work to be paid for under this item shall include all reinforced concrete paving and pads, and concrete flatwork, including excavation, subgrade preparation and compaction, bender boards, subdrainage, subbase, base, concrete formwork, concrete reinforcement, concrete slabs, curbs, sidewalks, gutters, ribbon drains, swales, paving, steps, ramps, and flatwork, asphalt paving, and all appurtenant work in accordance with the Contract Documents.
- H. Work to be paid for under this item shall include all labor, materials and equipment to construct basketball courts including excavation, subgrade preparation and compaction, base, concrete formwork, concrete reinforcement, concrete, basket supports, hoops, backboards, nets, and all appurtenant work in accordance with the Contract Documents.
- I. Work to be paid for under this item shall include all labor, materials and equipment to construct volleyball court including excavation, backfill, compaction, sand, netting, net supports and any appurtenant work as required by the Contract Documents.
- J. Work to be paid for under this item shall include all labor, materials and equipment to install painting, coating and striping at the locations shown on the plans, including preparation, application, cleanup and any appurtenant work as required by the Contract Documents.
- K. Work to be paid for under this item shall include all labor, materials and equipment to construct landscaping as shown including excavation, soil preparation, mulching, planting, trees, shrubs, ground cover and turf, bender board, irrigation system maintenance and one-year warranty of all plant materials and any appurtenant work as required by Contract Documents.
- L. Work to be paid for under this item shall include all labor, materials and equipment to construct complete irrigation system as shown including protection of existing utilities, trench excavation, piping, fittings, couplings, supports, brackets, wiring, pull boxes, controllers, controller boxes, sprinkler heads, incidental valves and appurtenances, backfill, compaction, surface restoration, testing, cleanup and any appurtenant work as required by the Contract Documents.
- M. Work to be paid for under this item shall include all labor, materials and equipment to construct water fountains, picnic benches, handrails, and all other miscellaneous equipment and appurtenant work as required by the Contract Documents.

### **3.05 Bid Item 4 – Structural Work**

- A. No measurement will be made for this item.
- B. Work to be paid for under this item shall include all labor, materials, and equipment to construct new picnic shelter where shown and to dimensions shown including excavation, backfill, subgrade preparation, compaction, concrete foundation, steel reinforcement, embedments, removal of forms, roof framing, roofing, finishes, mounting hardware, and all other appurtenant work as required by the Contract Documents.

### **3.06 Bid Item – Electrical Work**

- A. No measurement will be made for this item.
- B. Price shall constitute full compensation for all work performed to construct complete electrical and lighting system per NEC requirements as required to drive motors, loads and equipment shown, including, but not limited to all labor, supervision, materials, equipment, transportation, etc. procurement, delivery, logistics of materials and all labor, supervision, and equipment necessary for complete installation of the electrical systems including, but not limited to, coordination with utility service provider, servicing utility fees, meter relocation, trenching, excavation, backfill, compaction, placement of slurry mixes, furnishing and installing duct banks, conduit, pullboxes, grounding equipment, overcurrent protection, wires, wiring, utility outlets, switches, lighting, transformers, transformer and electrical equipment pads, interface connections, panels, disconnects, electrical equipment and components, installation of control panels and materials, and appurtenances necessary to electrically connect, test, and start-up the electrical system as specified in the Contract Documents. This line item shall include electrical testing.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 29 73  
SCHEDULE OF VALUES**

**PART 1 – GENERAL**

**1.1 Work Included**

- A. This section includes preparation of the Schedule of Values providing a breakdown of labor, materials, equipment and other costs for measurement and payment purposes. The schedule shall also show the division of work between the Contractor and each of the Subcontractors. The Schedule of Values shall be broken down according to each Specification Division within each project area or structure on the site.
- B. Include an item in the Schedule for County and State taxes. The Contractor may also include cost items for bond, insurance, temporary facilities and mobilization. Provide supporting data as requested by the City's Representative for any Schedule item. Schedule shall also include items for the purchase/delivery costs for each item and material which the Contractor will request payment prior to installation. Each item shall include overhead and profit directly proportional to the direct cost of that item over the total Contract cost.
- C. Assign prices to Bid Items which aggregate the Contract Price. Base prices on costs associated with scheduled activities for each Bid Item of Work.
- D. The finalized Schedule of Values shall not be approved until the Contractor has responded to all review comments of the City. Provide supporting data, including certified payrolls, as requested by the City's Representative for any Schedule item.
- E. Prepare a Schedule of Materials and Equipment Costs providing information necessary for the City to document asset valuations for the City's Enterprise Asset Management program.

**1.2 Unit Prices**

- A. Payment for the Work in this Section shall be included as part of the lump-sum or unit-price bid amount for which such Work is appurtenant thereto, including all Work and materials specified herein and as may be required to complete this portion of the Work.

**PART 2 – MATERIALS (Not Applicable)**

**PART 3 – EXECUTION**

**3.1 Submittals**

- A. Submit Schedule of Values and Schedule of Equipment and Materials Costs deliverables as described herein and in accordance with the following timeline:

<b>Deliverable</b>	<b>Paragraph Reference</b>	<b>Submittal Time</b>
Preliminary Schedule of Values	3.2.A	Within 10 calendar days from Notice of Award
Preliminary Schedule of Values; review and resubmittal	3.2.B	Within 17 calendar days from Notice of Award
Detailed Schedule of Values	3.3.A & 3.3.B	Within 21 calendar days from Notice of Award
Detailed Schedule of Values; review and resubmittal	3.3.C	Within 28 calendar days from Notice of Award
Detailed Schedule of Equipment and Materials Costs	3.5.A	Coincident with first submittal of O&M manuals / record drawings

B. Upon request, support prices with data which will substantiate their correctness.

### **3.2 Preliminary Schedule of Values**

A. Submit a Preliminary Schedule of Values for each Bid Item identified in the Bid Schedule for the major components of the Work. The listing shall include, at a minimum, the proposed value for the following major work components associated with the Bid Schedule. Include in the Schedule of Values the following:

1. The total value of civil site work.
2. The total value of electrical work.
3. The total value for structural work shall be broken down into separate values for each new and existing structure constructed or modified as a part of the work. Miscellaneous and minor concrete work may be listed as one item in this breakdown.

B. The Contractor and City's Representative shall meet and jointly review the preliminary Schedule of Values and make any adjustments in value allocations if, in the opinion of the City, these are necessary to establish fair and reasonable allocation of values for the major work components. Front end loading will not be permitted. The City may require reallocation of major work components from items in the above listing if in the opinion of the City's Representative such reallocation is necessary.

### **3.3 Detailed Schedule of Values**

A. Prepare and submit a detailed Schedule of Values for the Bid Schedule to the City. Base the detailed Schedule of Values on the accepted preliminary Schedule of Values for major work components. The City shall be the sole judge of acceptable numbers, details and description of values established. If, in the opinion of the City's Representative, a greater number of Schedule of Values items than proposed by the Contractor is necessary, the Contractor shall add the additional items so identified by the City's Representative.

B. The minimum detail of breakdown of the major work components is indicated below. Provide greater detail as directed by the City's Representative.

1. Section 01 32 13, "Scheduling of Work," broken down by submittal.
  2. Separate the Civil site work into individual drainage piping, drainage structures, site concrete, paving, excavation cut and fill, soil import or export, equipment, removal of existing pipe, clearing and grubbing and any other items determined to be necessary for the establishment of Pay and Schedule Activity items.
  3. Separate the electrical work into conduit installation, cable and wire installation, and electrical equipment and metering section installation, terminations and lighting.
  4. Separate painting and coating work by area.
  5. Separate structures into excavation, subgrade preparation, and appurtenant pre-foundation work, structural steel, foundation construction, slabs on grade, stairs, etc. (sufficient breakdown shall be provided to accommodate necessary Schedule detail).
  6. Separate irrigation system into excavation, piping/sprinklers, and controls.
  7. Separate landscaping and planting into preparation, planting, and plant establishment and maintenance.
  8. All other work not specifically included in the above items shall be broken down as necessary for establishment of pay and Schedule activity items.
- C. The Contractor and City's Representative shall meet and jointly review the detailed Schedule of Values. The value allocations and extent of detail shall be reviewed to determine any necessary adjustments to the values. Make any adjustments deemed necessary to the value allocation or level of detail and submit a revised detailed Schedule of Values to the City for record.

### **3.4 Changes to Schedule of Values**

- A. Changes to the CPM Schedule to add activities not included in the original schedule, but included in the original work (schedule omissions) shall have values assigned as approved by the City's Representative. Reduce other activity values to provide equal value adjustment increases for added activities as approved by the City.
- B. In the event the Contractor and City agree to make adjustments to the original Schedule of Values because of inequities discovered in the original accepted detailed Schedule of Values, increases and equal decreases to values for activities may be made.

### **3.5 Schedule of Materials and Equipment Costs**

- A. Submit Schedule of Materials and Equipment Costs for items as described herein and shown in the following example to establish the baseline value for the City's Enterprise Asset Management system. The following does not represent a complete list of materials and equipment required for this project.

**EXAMPLE**  
**SCHEDULE OF EQUIPMENT AND MATERIALS COSTS**

<b>Equipment / Materials Function / Description</b>	<b>Size / Capacity</b>	<b>Description / Mfg. / Model Number</b>	<b>Location</b>	<b>Materials Cost (Unit Price)</b>	<b>Estimated Installed Cost (Unit Price)</b>
Sewer Force Main	6-inch	DIP, Class 350, restrained joint, ceramic epoxy lined	Buried	\$54/LF	\$75/LF
Magnetic Flow Meter	4-inch	E+H, Proline Promag 53W1H- ULGBAA0BAAA1	Lift Station Discharge Piping	\$3,750	\$5,000
Submersible Sewage Pump	5 hp, 125 gpm	KSB, Model KRT E 80-200/34XG	Lift Station Wet Well	\$5,250	\$7,500
Swing Check Valve	4-inch	APCO, 6000 series	Lift Station Discharge Piping	\$775	\$1,100

- B. Provide the required information for equipment and materials listed in the City-provided equipment and materials cost spreadsheet.

**END OF SECTION**

**SECTION 01 31 13  
ACCESS AND COORDINATION**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Site access, licenses, permits, sales taxes, coordination with City, Federal, State and Local authorities, utilities, neighboring property owners, special events, design engineer, and other contractors.

**1.2 Related Work**

- A. Section 00 89 00: Permits
- B. Section 01 22 00: Measurement and Payment
- C. Section 01 50 00: Temporary Facilities and Controls

**1.3 Right-of-Way**

- A. The right-of-way for the facility to be constructed will be provided by the City as shown on the Contract Documents. Make arrangements and pay all expenses for additional area required by the Contractor outside the limits of the right-of-way unless otherwise specified in the Contract Documents.
- B. Where rights-of-way are on public property, they shall be subject to the work permits to be issued by the proper public agencies as described in the Permits section of this specification.
- C. Confine work, including construction activities, access to site, parking, and storage within street rights-of-way and the project easements and limits as shown on the Drawings.
- D. In case of serious interference to the Work due to City delay in furnishing rights-of-way or easements necessary for the construction, the Contractor will be allowed an extension of time to complete the Contract which is equal to the time lost by City delay. City shall not be liable for any damages, including but not limited to damage for expenses, overhead or extended overhead, resulting from such delay.
- E. If Contractor performs work outside the limits of said work area, stop all work immediately and restore all areas to their pre-construction condition to the satisfaction of the City and the property owners. Provide an indemnification letter to the City regarding any unauthorized work outside said rights-of-way or easements.

**1.4 Access**

- A. During the construction period, the Contractor will have use of the premises as directed by the City's Representative. The City reserves the right and may undertake or award other contracts for additional Work on or near the Worksite. The Contractor shall not have exclusive access to or use of work areas or the worksite. City may require Contractor to use certain facilities and areas concurrently with others.
- B. Where Contractor's Work depends on access to any premises or rights-of-way that are (a) outside the construction areas for the Project, or (b) otherwise in use by other contractor or workers employed by other agencies, provide written notice to City of its need for such access, the date when such access is needed and the expected

duration of access needed to prosecute its Work. Provide such written notice to City no later than thirty (30) days prior to Contractor's expected access date.

## **1.5 General Coordination**

- A. The Contractor warrants that it has carefully reviewed the Contract Documents and all other pertinent information made available by the City relating to the nature and scheduling of other contracts that may be awarded and to constraints related to City operations, and in submitting its bid and executing this Contract has taken into account the need to coordinate its Work with that of other Contractors and/or City Operations. It is the express obligation and duty of the Contractor under the Contract to coordinate its Work with the work of others.
- B. City will endeavor to advise the Contractor of the known other work at or near the site, including City Operations.
- C. If any part of the Contractor's Work depends on the work of any other contractor or City for proper execution or results, prior to proceeding with its own Work, Contractor shall promptly inspect and immediately, and in no event later than forty-eight (48) hours from when such work was made available to Contractor, notify the City's Representative of any discrepancies, or defects or failures to perform or complete said other work that would preclude or hinder the proper execution or achievement of the Contractor's Work. Failure to inspect and report such defects shall constitute an acceptance of the other contractor's work as fit and proper for the reception of the work, except as to latent defects in the other contractor's work. Further, any delays by then Contractor in inspecting and/or reporting any defects in such work that results in delays to the Contractor's Work shall be the sole responsibility of the Contractor and the City will not be liable for any resulting delays and/or damages.
- D. The Contractor shall be responsible for coordinating any work carried on in the construction worksite by other parties or by the City simultaneously with the construction work for this Project. The Contractor shall include as part of its Bid any costs that might be incurred as a result of coordinating the Work for this Project with such other work. In no case shall the Contractor be entitled to additional compensation from the City for damages suffered as a result of work being carried on in the construction worksite by other parties or by the City simultaneously with the construction Work for this Project. However, if such work results in a delay to the Contractor's work, the Contractor may be entitled to an extension of time as specified in the General Conditions, Article 43 – Time for Completion and Liquidated Damages.

## **1.6 Permits**

- A. Obtain, pay for, and comply with required permits, licenses, work permits and authorizations from appropriate agencies, including the following:
  - 1. Licenses
    - a. Before submitting bids, Contractors shall be licensed in accordance with provisions of Chapter 9, Division 3, of the Business and professions Code of the State of California.
  - 2. State, Federal and Railroad permits for which City has initiated permit acquisition

- a. Not applicable
  - 3. Local permits for which City has initiated permit acquisition
    - a. Not applicable
  - 4. Contractor shall obtain the following permits:
    - a. General Construction Activity NPDES Stormwater Permit
    - b. Excavation and Dirt Moving Permit from Cal OSHA
    - c. City of Corona Public Works Encroachment Permit
- B. Obtain permits before starting construction.

**1.7 Coordination with City of Corona**

- A. Contact City of Corona Department of Water and Power at the following location 72 hours before start of construction:

CITY OF CORONA  
Department of Water and Power  
755 Public Safety Way  
Corona, CA 92880  
(951) 279-3660  
Zachary Murray

- B. Submit written details and reasons for proposed deviations from the Contract Documents. Do not deviate from Contract Documents until written authorization is received.
- C. If Contractor fails to comply with a request of City, or is unable to comply with a request, and it is necessary for City's forces to do Work that is Contractor's responsibility, City will bill Contractor. Each incident requiring work by City's forces will be covered by a separate billing.
- D. Do not begin Work until Contractor's schedule, traffic control plans, haul routes, and permits have been reviewed and approved by City in writing.
- E. Notify Department of Water and Power in writing at least 14 calendar days before any proposed shutdown of, startup of, or connection to water, sewer or drainage facilities not in a plant. Do not assume water or sewer lines can be shut down. Do not shut down utilities without prior written authorization. Do not operate City valves without written authorization or direct supervision by the City.
- F. Notify Department of Water and Power in writing at least 72 hours before draining and filling of water lines, and operation of existing valves. Contractor shall not operate any main line water valve.
- G. Coordinate with Department of Water and Power regarding time of day for system tie-in work.

**1.8 Requests for Information (RFI's)**

- A. Immediately upon discovery of need for additional information or interpretation of Contract Documents, prepare and submit an RFI in format specified.

1. City's Representative will only respond to RFI's submitted by Contractor. RFI's submitted by other entities will be returned with no response.
- B. Coordinate and submit RFIs in prompt manner to avoid delays in Contractor's Work or Work of subcontractors.
- C. RFI's shall include detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Engineer of Record.
  6. Name of City's Representative.
  7. RFI number, numbered sequentially.
  8. RFI subject.
  9. Specification Section number and title and related paragraphs, as appropriate.
  10. Drawing number and detail references, as appropriate.
  11. Field dimensions and conditions, as appropriate.
  12. Contractor's suggested resolution. If Contractor's suggested resolution impacts Contract Time or Contract Sum, Contractor shall state impact in RFI.
  13. Contractor's signature.
  14. Attachments, including sketches, descriptions, measurements, photos, catalog data, shop drawings, coordination drawings, and other information necessary to fully describe items needing interpretation. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- D. RFI Forms shall be software-generated forms with content shown above, acceptable to City's Representative.
- E. Attachments shall be electronic files in Adobe Acrobat PDF format.
- F. City's Representative will review each RFI, determine action required, and respond. Allow 7 working days for City's response for each RFI. RFIs received by City's Representative after 1:00 p.m. will be considered as received the following working day.
- G. The following Contractor-generated RFIs will be returned without action:
1. Requests for acceptance of submittals.
  2. Requests for acceptance of substitutions where no monetary rebate is included.
  3. Requests for acceptance of Contractor's means and methods.
  4. Requests for coordination information already indicated in Contract Documents.
  5. Requests for adjustments in Contract Time or Contract Sum.
  6. Requests for interpretation of actions of City's Representative on submittals.
  7. Incomplete RFIs or inaccurately prepared RFIs.

- H. City's Representative's action may include request for additional information, in which case City's Representative's time for response will date from time of receipt of additional information.
- I. City's Representative's action on RFIs that may result in changes to Contract Time or Contract Sum may be eligible for Contractor to submit Change Order requests.
- J. If Contractor believes RFI response warrants change in Contract Time or Contract Sum, notify City's Representative in writing within 10 days of receipt of RFI response.
- K. Prepare, maintain, and submit tabular log of RFIs organized by RFI number. Submit log weekly. Include the following:
  - 1. Project name.
  - 2. Name and address of Contractor.
  - 3. Name and address of City's Representative.
  - 4. RFI number including RFIs returned without action or withdrawn.
  - 5. RFI description.
  - 6. Date RFI was submitted.
  - 7. Date City's Representative's response was received.
- L. On receipt of City's Representative's action, update RFI log and immediately distribute RFI response to affected parties. Review response and notify City's Representative within 7 days if Contractor disagrees with response.

**1.9 Coordination with City, County or State Traffic Engineer**

- A. Coordinate with City, County or State Traffic Engineer as required, to perform all portions of the Work.

**1.10 Coordination with Property Owners**

- A. Coordinate construction with property owners neighboring project limits.
- B. Notify designated sensitive receptors concerning the Project timing and construction schedule. Post informational signs at the Project site at least 72-hours in advance of construction. The informational signs shall include information regarding the project and the name and phone number of a contact person to call for questions or complaints.

**1.11 Coordination with Utilities**

- A. Obtain service requirements from public utilities for water, sewer, gas, power, telephone, telemetering and other utility requirements. Work needed to connect to public utilities shall comply with utility service requirements. Pay service charges of utilities, including charges for trenching, piping, conduit, cables, boxes, metering, grounding and backfill.
- B. Protect existing underground utilities.
- C. Determine and notify those agencies requiring advance notification for inspection or other purposes before beginning construction in any jurisdictional area of an agency. Provide a minimum of two weeks advance notice to the various agencies before beginning construction in the area unless specific advance times and requirements are stated in these Specifications or in permit conditions.

- D. Electrical utility companies may maintain energized aerial electrical power lines in immediate vicinity of Work. Do not consider these lines to be insulated. Construction personnel working near these lines are exposed to an extreme hazard from electrical shock. Contractors, their employees and construction personnel working on this project must be warned of the danger and instructed to take adequate protective measures, including maintaining a minimum of 10 feet clearance between lines and construction equipment and personnel. (See OSHA Std. 1926.550(A)15). As an additional safety precaution, call electrical utility company to arrange, if possible, to have these lines de-energized or relocated when Work reaches their immediate vicinity. Cost of such temporary arrangements shall be borne by Contractor.

### **1.12 Coordination with Other Contractors**

- A. When two or more contractors are employed in related or adjacent work, each shall conduct work operation in such a manner as not to cause any delay or hindrance to the other. City will not be responsible for damage caused by such delays, but where such a delay, in the opinion of the City's Representative, is of such a nature that it could not have been prevented by a reasonable amount of cooperation on the part of the Contractor, then the Contractor may be entitled to an extension of time for completion of the Work as specified in the General Conditions, Article 43 – Time for Completion and Liquidated Damages. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly coordinate its work with theirs.
- B. Cooperate and communicate with any other contractor performing work that may connect, complement, and/or interfere with the Contractor's Work and resolve any disputes or coordination problems with such contractor.
- C. Coordinate with other contractors working onsite to avoid impacting their operations, and to insure that facility interfaces are properly joined. Where proper execution of the Work is dependent on work by others, inspect and promptly report discrepancies and defects to the City's Representative.
- D. Nothing in this section shall be construed as relieving the Contractor of the full responsibility for completing the Work in its entirety, for making good defective work and materials, for protecting the work from damage, for being responsible for damage, or for the Project as set forth in the General Conditions and General Requirements and other Contract Documents. No action undertaken by City under this section shall be deemed complete and acceptable, and such action shall not relieve the Contractor, sureties, or insurers of the provisions of the Contract Documents relating to Contractor's insurance, indemnity, or guarantees.

### **1.13 Coordination with Design Engineer**

- A. Architecture firm responsible for preparation of Plans and Specifications is:  
bmla Landscape Architecture  
Corona, CA 92879  
(951) 737-1124  
(951) 737-6551 (FAX)

Contact: Shannon Karlson

**1.14 Lines of Communication**

- A. Lines of communication between Contractor, City, and other parties shall be defined at Preconstruction Conference. Contractor shall adhere to direction regarding this matter given to them at that time.

**1.15 Schedule, Submittals, Sequence of Work**

- A. Coordinate scheduling, submittals, and work of the various sections of the Specifications to assure an efficient and orderly sequence of installation of interdependent construction elements.
- B. Submit Supplementary progress schedules after Work is in progress with each Partial Payment Request, and when requested by the City's Representative. Do not put schedule changes requiring an increase in City's personnel on Project into effect until City has made arrangements for additional personnel.
- C. Verify the utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on the drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable, place runs parallel with line of building and structures. Use spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.
- E. Coordinate completion and cleanup of work of separate sections in preparation for Substantial Completion and for portions of work designated for City's partial utilization.
- F. After City occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of the City's activities.

**1.16 Unit Prices**

- A. Payment for obtaining and complying with permits during construction, including NPDES permits, encroachment permits, excavation permits, drilling permits, disposal permits, temporary easements, licenses, inspection fees, and Federal, State and local taxes will be included in prices bid for Work for which such costs are appurtenant.
- B. Payment for coordinating with agencies, events and persons described will be included in prices bid for Work to which coordination is appurtenant.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 31 19  
PROJECT MEETINGS**

**PART 1 - GENERAL**

**1.1 Scope**

- A. This section addresses requirements for preconstruction meeting, progress meetings, specially called meetings and post-construction meeting.
- B. The City will prepare agenda, preside at meetings, and record and distribute minutes to all parties.
- C. The Contractor shall provide data required and be prepared to discuss all items on the agenda.

**1.2 Contractor's Responsibilities**

- A. Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
- B. For all meetings other than those required by Contract Documents or Owner's Representative, Contractor shall record minutes, including significant proceedings and decisions for each meeting. Reproduce and distribute copies of minutes within 5 days after each meeting. Provide copies to Owner's Representative, all other participants in meeting, and all other parties affected by decisions made at meeting.

**1.3 Preconstruction Meeting**

A. General

After execution of the contract and before construction begins, a preconstruction meeting to confirm chain of communication, define administrative processes, and discuss specific construction requirements will be held at a time and location designated by the City's Representative. Preconstruction meeting will be held at the City's field office, or a mutually agreed upon location.

B. Attendance

Meeting shall be attended by:

- 1. City's Representative.
- 2. City's Project Manager.
- 3. City staff, as required.
- 4. Design Engineer-Architect.
- 5. Engineer-Architect's design subconsultants, as required.
- 6. Contractor and his superintendent, major subcontractors – representatives present for each party shall be authorized to act on their behalf.
- 7. Representatives of government agencies, utilities, and private parties having a relevant degree of control or responsibility.
- 8. Other persons designated by the City.

## C. Agenda

The agenda for the meeting shall include the following items as a minimum.

1. Scheduling Items
  - a. Distribution and discussion of the construction schedule including critical construction sequencing.
  - b. Phasing
  - c. Critical work sequencing and long-lead items
  - d. Procedures for schedule revisions
  - e. Establishment of a schedule for progress meetings
2. Designation of key personnel and their duties
  - a. Designation of persons authorized to represent and sign documents for the City and Contractor, with examples of official signature of each
  - b. List of names, addresses and telephone numbers of those persons authorized to act for the Contractor in emergencies
  - c. Safety and first aid procedures including designation of Contractor's safety officer
3. Lines of communications
  - a. Procedures and forms for processing field decisions and Change Orders
  - b. Request for Information (RFI) forms and procedures
  - c. Submittal forms, procedures and review process
  - d. Proposal requests
  - e. Testing laboratory or agency and testing procedures
  - f. Payment application and processing procedures
  - g. Change order procedures
4. Distribution of Contract Documents
5. Use of premises
  - a. Parking availability
  - b. Field office, work, and storage areas
  - c. Equipment deliveries and priorities
  - d. Work restrictions
  - e. Working hours
  - f. City's occupancy requirements
  - g. Responsibility for temporary facilities and controls including barricades, utilities, sanitary facilities, signs and other facilities required
  - h. Procedures for moisture and mold control
  - i. Procedures for disruptions and shutdowns
  - j. Construction waste management and recycling
6. First Aid
7. Security
8. Progress cleaning and housekeeping
9. Construction permit requirements, procedures and posting
10. Identification of sub-contractor responsibilities

11. Schedule of Values
12. Procedures for maintaining record documents
13. Coordination with other contractors and activities
14. Other project related and administrative items as appropriate

#### **1.4 Progress Meetings**

##### **A. General**

Progress meetings to review progress, schedule, and administrative processes with City and Contractor shall be held weekly, or as designated by the City, at times scheduled at the preconstruction meeting unless changes are agreed to by all parties and appropriate notification of such changes has been given. Adjust work schedule to accommodate progress meetings. Avoid performing work requiring inspection when inspector or City's Representative is unavailable to observe work. Progress meetings will be held at the City's field office, or mutually agreed upon location.

##### **B. Attendance**

1. City's Representative (Construction Manager).
2. City staff, as required.
3. Design Engineer-Architect, as required.
4. Engineer-Architect's design sub-consultants, as required.
5. Contractor, Project Superintendent required.
6. Subcontractors and suppliers, as required. Representatives present for each party shall be authorized to act on their behalf.

##### **C. Agenda**

The agenda for these meetings shall include the following items:

1. Minutes of previous meeting (City).
2. Review progress of construction since the previous meeting (Contractor).
3. Discuss problems, conflicts, and field observations (City / Engineer-Architect / Contractor).
4. Identify problems which impede planned progress and develop corrective measures as required to regain the projected schedule. Revise the construction schedule if necessary. (Contractor).
5. Coordinate the progress of subcontractors (Contractor).
6. Review changes proposed by the City for their effect on the construction schedule and completion time (Contractor).
7. Schedules, including off-site fabrication and delivery schedules (Contractor).
8. At the third progress meeting of each month, review and update the CPM schedule, as required by Section 01 32 13 Scheduling and Reporting. Identify schedule deficiencies and corrective action, if any, and review contract time adjustments for pending change orders.
9. Plan progress during the next construction period; 3-week look ahead minimum (Contractor).
10. Status of change orders (City / Engineer-Architect).
11. Submittal review status (City / Engineer-Architect).

12. Review of Contractor's record drawings (City / Contractor).
13. Quality standards and control (City / Engineer-Architect).
14. Corrective measures required (City / Engineer-Architect / Contractor).
15. Applications for payment status (City).
16. Coordination between all parties (All Parties).
17. Other business (All Parties).

## **1.5 Special Meetings**

- A. Upon appropriate notice to other parties, special meetings may be called by the City's Representative or Contractor, at times agreed to by all parties involved.

## **1.6 Post-construction Conference**

### **A. General**

A post-construction conference will be held before final inspection of the Work to discuss and resolve all unsettled matters. Bonds and insurance to remain in force, and other documents required to be submitted by the Contractor will be reviewed and all deficiencies determined. Schedules and procedures for the final inspection process and for the correction of defects and deficiencies shall be discussed and agreed. Contractor shall request conference when final punchlist items are complete. Conference will be held at City's field office, or mutually agreed upon location.

### **B. Attendance**

1. City's Representative.
2. City staff, as required.
3. City's control system integrator
4. Design Engineer-Architect, as required.
5. Engineer-Architect's design sub-consultants, as required.
6. Contractor, Project Superintendent, required.
7. Subcontractors and suppliers, as required.

### **C. Agenda**

1. Review of documents required to be submitted by Contractor.
  - a. As-Built Drawings
  - b. Detailed Schedule of Equipment and Materials Costs
  - c. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance
  - d. Written warranties
  - e. O&M Manuals
  - f. Demonstration training
2. Identification of deficiencies – punch list
3. Review schedule and procedure for final inspection process
4. Confirm schedule for correction of defects and deficiencies
5. Procedures for processing Applications for Payment at Substantial Completion and for final payment

6. Coordination with other contractors on site
7. City's partial occupancy requirements
8. Responsibility for removing temporary facilities and controls
9. Notice of Completion

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

## SECTION 01 32 13

### SCHEDULING OF WORK

#### PART 1 – GENERAL

##### 1.1 Work Included

- A. This section specifies the scheduling of the work performed by the Contractor. The Contractor shall employ computerized Critical Path Method (CPM) scheduling in the development of the schedule and project status reporting requirements of the Contract.
- B. Prepare the CPM schedule and all reports with "Primavera 6" software or equal. This will be referred to as the Scheduling System. The system shall be capable of handling, processing, printing and plotting data to satisfy all requirements of this Section.
- C. All times and durations specified and schedules prepared by Contractor shall be in working days.

##### 1.2 Unit Prices

- A. Payment for the Work in this Section shall be included as part of the lump-sum or unit-price bid amount for which such Work is appurtenant thereto, including all Work and materials specified herein and as may be required to complete this portion of the Work.

#### PART 2 – MATERIALS (Not Applicable)

#### PART 3 – EXECUTION

##### 3.1 Progress of Work

- A. It is expressly understood and agreed the time of beginning, the rate of progress, and the time of completion of the work are of the essence of this Contract. Execute the work with such progress as required to prevent any delay to the general completion of the Contract, the Contract milestones, and to other contractors working on other contracts at the site.
- B. Prepare and submit a Construction Schedule in accordance with the requirements of this Section. By preparing and submitting the Construction Schedule, the Contractor represents it can and intends to execute the contracted Work and all portions thereof, including all activities of subcontractors, equipment vendors and suppliers, submittals and resubmittals within the specified times and constraints and the bid covers all costs associated with the execution of the Work in accordance with the Construction Schedule.

### 3.2 **General Submittal Schedule**

- A. Submit four (4) copies of each submittal item and an electronic copy on compact disk (CD) for all schedule submittals, including but not limited to, Preliminary Progress Schedule, Revised Preliminary Progress Schedule, Baseline CPM Schedule, CPM schedule updates, schedule revisions, recovery schedule, Time Impact Evaluation, and mitigation plan. Unless otherwise specified in this Section, procedures for the submission, review and acceptance of all schedule submittals shall be per Specifications Section 01330 and General Conditions Article 6.

Submit Project Schedule deliverables as described herein and in accordance with the following timeline:

<b>Deliverable</b>	<b>Paragraph Reference</b>	<b>Submittal Time</b>
Name and Qualifications of Contractor's Scheduler	3.2.A	No later than seven (7) calendar days after Award of Contract
Preliminary Progress Schedule to include 60-Day Plan of Operation and Project Overview Bar Chart	3.4	No later than fourteen (14) calendar days after receipt of Notice to Proceed
Revised Preliminary Progress Schedule	3.4.B	No later than seven (7) calendar days after receipt of City review comments
Original Baseline Critical Path Method (CPM) Schedule	3.6.A	No later than fourteen (14) calendar days after submittal of Revised Preliminary Progress Schedule
Original Baseline CPM Schedule Meeting	3.6.B	No later than ten (10) calendar days after submittal of Original Baseline CMP Schedule
Revised Baseline CPM Schedule	3.6.C	No later than ten (10) calendar days after Original Baseline CPM schedule meeting
Updates and Periodic CPM Schedule Submittals	3.6.E	Monthly

### 3.3 **Responsible Scheduling Person**

- A. Within the submittal time shown in paragraph 3.2.A, submit to the City the name and list of qualifications of the person responsible for the preparation, maintenance, updating and revision of all schedules. This person must have authority to act on behalf of the Contractor and have at least five (5) years verifiable experience in the preparation and updating of complex construction schedules for projects of similar type, size, and complexity. They must be very proficient in the use of Primavera Project Planner (P6) or later version. In the event the Contractor does not have an employee with this required scheduling experience and expertise, as determined by the City, the Contractor will be required to employ a qualified CPM consultant who regularly performs these services and who in the opinion of the City possesses the qualifications required to perform CPM Scheduling for the Project. The City reserves the right to remove the scheduler from the Project if found to be incompetent. The qualifications of scheduler shall be verified with references of not less than three (3) previous projects of similar type, size, and complexity on which the Contractor's Construction Scheduler has utilized CPM scheduling using P6. The Construction

Scheduler is required to attend all meetings pertaining to scheduling and progress of the Work.

- B. Provide one licensed copy of scheduling software to the City registered in the City's name. The software copy shall become the property of the City. City's approval of the Contractor's CPM scheduling person is a prerequisite to the issuance of the Notice to Proceed.

### **3.4 Preliminary Progress Schedule Submittal**

- A. Within the submittal time shown in paragraph 3.2.A, submit four (4) hardcopies and one (1) electronic copy of a cost loaded Preliminary Progress Schedule package which shall serve as the Contractor's Plan of Operation for the initial 60 working day period of the Contract Time and to identify the manner in which the Contractor intends to complete all work within the Contract Time. Submit (1) a 60-day Plan of Operation bar chart, and (2) a project overview bar chart type plan for all work as indicated below.

- 1. 60-Day Plan of Operation: During the initial 60 working days of the Contract Time, conduct Contract operations in accordance with the 60-day bar chart Plan of Operation. The bar chart so prepared and submitted shall show the dates for accomplishment of the Contractor's early activities including:
  - a. mobilization,
  - b. permits,
  - c. submittals necessary for early material and equipment procurement – including the maximum allowable review period, as specified,
  - d. submittals necessary for long lead equipment procurement – including the maximum allowable review period, as specified,
  - e. CPM submittals,
  - f. initial site work, and
  - g. other submittals and all other activities required and planned for execution in the first 60 working days.

The information shall provide sufficient durations for administration, fabrication, and transportation to produce realistic delivery dates for the procurement items.

- 2. Project Overview Bar Chart: The overview bar chart shall indicate the major components of the project work and the sequence relations between major components and subdivisions of major components. The overview bar chart shall indicate the relationships and time frames in which the various components of the work will be made substantially complete and placed into service to meet the project milestones. Include sufficient detail for the identification of subdivisions of major components into such activities as
  - a. excavation,
  - b. foundation subgrade preparation,
  - c. foundation concrete,
  - d. completion of all structural concrete,
  - e. utilities work,
  - f. major mechanical work,

- g. major electrical work,
- h. instrumentation and control work, and
- i. other important work for each major facility within the overall project scope.

Indicate approximate planned durations and start dates for each work item subdivision representing the Contractor's best estimate for the Work the summary activity represents. The total duration of the summary activities shall equal the Contract Time. Accurately plot each major component and subdivision component on time scale sheets not to exceed 24-inches by 36-inches in size. Use not more than four sheets to represent this overview information.

- B. The City will review the Preliminary Progress Schedule and provide any comments at a meeting with the Contractor within ten (10) calendar days after submittal to the City. The City's review and comment on the schedules shall be limited to Contract conformance with the sequencing and milestone requirements as stated in other sections of the Specifications. Make corrections to the schedules necessary to comply with the Contract requirements and adjust the schedules to incorporate any missing information requested by the City. Any revisions necessary as a result of the City review and meeting with the Contractor shall be resubmitted for review to the City within the submittal time shown in paragraph 3.2.A.
- C. The Preliminary Progress Schedule will be used temporarily to record and monitor the progress of the Work until the Baseline Schedule, specified hereinafter, has been completely developed and favorably reviewed. Incorporate recorded data on the Preliminary Progress Schedule into the Baseline Schedule during the first schedule update.

### **3.5 Schedule Methodology**

- A. The scheduling method to be used shall be CPM in the form of an activity on node Precedence Diagram Network (PDN) with capabilities of identifying the critical path.
- B. Work Breakdown Structure:
  - 1. Submit to the City for approval the following:
    - a. work breakdown structure,
    - b. the associated alphanumeric coding structure to implement the work breakdown structure, and
    - c. the activity identification system for labeling all work activities.
- C. Designate code fields as follows:
  - 1. The first code field shall designate the bid item.
  - 2. The second code field shall identify the type of activity and shall be defined as:
    - a. submittal,
    - b. review/approval,
    - c. procurement/fabrication,
    - d. delivery,
    - e. construction/installation,

- f. start-up, or
  - g. change order
3. The third field shall identify the specification section under which the activity will be paid.
  4. The fourth code field shall identify who is responsible to perform the activity (i.e., the Contractor, subcontractor(s), supplier, etc.).
  5. The fifth code field shall identify the area being worked in or the facility, if appropriate.
  6. The sixth code field shall identify the construction phase or project element (if phasing of work or project elements are identified in the Contract).
  7. Include all Change Orders and Notices of Non-Compliance as separate code fields.

### **3.6 CPM Schedule Submittals**

- A. Original Baseline CPM Schedule Submittal: Within the submittal time shown in paragraph 3.2.A, submit for review by the City a hard copy of the Original Baseline CPM Network Schedule and the Computerized Schedule Report tabulations. Also submit a CD (compact disk) containing all of the schedule submittal information and data. Submit a new disk with updated information with each change or submission of the CPM schedule. The disk shall contain data compatible with Primavera 6 to generate network diagrams and schedule reports identical to the hard copies submitted. This submittal shall have already been reviewed and approved by the Contractor's Project Manager, Project Superintendent, and the Project Estimator prior to submission. The CPM Schedule shall be a time-scaled network diagram of the "I-j" activity-on-arrow or precedence type. The Network Diagram shall describe the activities to be accomplished and their logical relationships and show the Critical Path.

The Computerized Schedule Report tabulations shall include the following:

1. Report of activities sorted by Activity Number
  2. Report of activities sorted by Early Start date
  3. Report of activities sorted by Total Float.
  4. Report of activities sorted by Responsibility Code. Responsibility Codes shall be established for the Contractor, City, subcontractors, suppliers, etc. Identify these codes in the Network Diagram.
  5. A successor-predecessor report which shall identify the successor and predecessor activities for each activity and ties between schedule activities
- B. Original Baseline CPM Schedule Review Meeting: Within the time stipulated above, meet with the City to review the Original Baseline CPM Schedule submittal. The Contractor's Project Manager, Project Superintendent, and Project Scheduler shall be in attendance. The City's review will be limited to the submittal's conformance to the Contract requirements. However, the review may also include:
    1. Clarifications of the design intent, process, and startup requirements.
    2. Directions to include activities and information missing from the submittal.
    3. Requests to the Contractor to clarify the schedule.

- C. Revisions to the Original Baseline CPM Schedule: Within the submittal time shown in paragraph 3.2.A, revise the Original Baseline CPM Schedule submittal to address all review comments from the Original Baseline CPM Schedule Meeting and resubmit the network diagrams and reports for the City's review. The City, within fourteen (14) days from receipt of the Revised Baseline CPM Schedule will either (1) accept the schedule as submitted, or (2) advise the Contractor in writing to review any part or parts of the schedule which either do not meet the Contract requirements or are unsatisfactory for the City to monitor the project's progress and status or evaluate monthly payment requests by the Contractor. The City may accept the schedule with conditions that the first monthly CPM schedule update be revised to correct deficiencies identified. When the schedule is accepted, it shall be considered as the "Original Baseline CPM Construction Schedule" until an updated schedule has been submitted. The City reserves the right to require the Contractor to adjust, add to, or clarify any portion of the schedule which may later be discovered to be insufficient for the monitoring of the Work. No additional compensation will be provided for such adjustments, additions or clarifications.
- D. Acceptance: The acceptance of the Contractor's schedule by the City will be based solely upon the schedule's compliance with the Contract requirements. By way of the Contractor assigning activity durations and proposing the sequence of the Work, the Contractor agrees to utilize sufficient and necessary management and other resources to perform the work in accordance with the schedule. Upon submittal of a schedule update, the updated schedule shall be considered the "current" project schedule.

Submission of the Contractor's progress schedule to the City shall not relieve the Contractor of the Contractor's total responsibility for scheduling, sequencing, and pursuing the Work to comply with the requirements of the Contract Documents, including adverse effects such as delays resulting from ill-timed work.

- E. Monthly Updates and Periodic CPM Schedule Submittals: Following the acceptance of the Contractor's Original Baseline CPM Schedule, monitor the progress of the Work and adjust the schedule continuously to reflect actual progress and any changes in planned future activities. Submit complete schedule updates in accordance with General Conditions Article 6, including all information requested in the original schedule submittal and as specified herein. Each update shall continue to show all work activities including those already completed. These completed activities shall accurately reflect the "as built" information by indicating when the work was actually started and completed.

Neither the submission nor the updating of the Contractor's original schedule submittal nor the submission, updating, change or revision of any other report, curve, schedule or narrative submitted to the City by the Contractor under this Contract, nor the City's review or acceptance of any such report, curve, schedule or narrative shall have the effect of amending or modifying, in any way, the Contract completion date or milestone dates or of modifying or limiting, in any way, the Contractor's obligations under this Contract. Only a signed, fully executed change order can modify these contractual obligations.

The monthly schedule update submittal will be reviewed with the Contractor during a monthly construction schedule review meeting held on the twentieth (20th) work day of each month. The goal of these meetings is to enable the Contractor and the City to initiate appropriate remedial actions to minimize any known or foreseen delay in

completion of the Work and to determine the amount of Work completed since the last month's schedule update. The status of the Work will be determined by the percent complete of each activity shown in the Network Diagram. These meetings are considered a critical component of the overall monthly schedule update submittal and the Contractor shall have appropriate personnel attend. As a minimum, the Contractor's Project Manager and General Superintendent shall attend these meetings. Submit within seven (7) working days after the monthly progress meeting the revised CPM Network Diagram, the revised CPM computerized tabulations as noted in this Section, the revised successor/predecessor report, the Project Status Reports as defined in Paragraph 3.10 and the Contractor's Application for Payment. Within five (5) working days of receipt of the above noted revised submittals, the City will either accept or reject the monthly schedule update submittal. If accepted, the percent complete shown in the monthly update will be the basis for the Application for Payment to be submitted by the Contractor. If rejected, correct and resubmit the update before the Application for Payment for the update period can be processed.

- F. Schedule Revisions: Highlight or otherwise identify all changes to the Network Diagram Schedule Logic or activity durations made from the previous schedule. Modify any portions of the CPM schedule which become infeasible because of activities behind schedule or for any other valid reason.

### **3.7 Change Orders**

- A. Upon approval of a change order, or upon receipt by the Contractor of authorization to proceed with additional work, the change shall be reflected in the next submittal of the CPM schedule by the Contractor. Utilize a sub-network in the schedule depicting the changed work and its effect on other activities. This sub-network shall be tied to the main network with the appropriate logic, so a true analysis of the Critical Path can be made.

### **3.8 CPM Standards**

- A. Definitions: CPM, as required by this Section, shall be interpreted to be generally as outlined in the Association of General Contractors (AGC) publication, "The Use of CPM in Construction" except that either "I-j" arrow diagrams or precedence diagramming format may be utilized. In the case of conflicts between this specification and the AGC Document, this specification shall govern.
- B. Construction Schedules: Include in the construction schedules a graphic network diagram and computerized construction schedule reports as described in Paragraph 3.6.
- C. Networks: The CPM network shall be in a form of a pure logic diagram or, if directed or approved by the City, a time scaled "I-j" activity-on-arrow or precedence type diagram and may be divided into a number of separate sheets with suitable match lines relating the interface points among the sheets. Individual sheets shall not exceed 36-inch by 60-inch (maximum 2 sheets).
- D. Except for a pure logic diagram, all construction activities and procurement shall be indicated in a time-scaled format and a calendar time line shall be shown along the entire sheet length. Plot each activity arrow or node to accurately represent beginning and completion dates of each activity along the calendar time line. Show all activities using the symbols that clearly distinguish between critical path activities, non-critical activities and free float for each non-critical activity. Identify all activity

items by their respective Activity Number, Responsibility Code, Work Duration, and their Dollar Value. All non-critical path activities shall show their total float time in scale form by utilizing a dotted line or some other graphical means.

- E. Duration Estimates: Compute the duration estimate for each activity in working days to represent the single best estimate considering the scope of the activity work and resources planned for the activity. Except for certain non-labor activities, such as curing of concrete or delivery of materials, activity duration shall not exceed 10 working days nor be less than one working day unless otherwise accepted by the City.
- F. Float Time: Float time shall be as follows:
  - 1. Definition: Unless otherwise provided herein, float as referenced in these documents, is total float. Total float is the period of time measured by the number of working days each non-critical path activity may be delayed before it and its succeeding activities become part of the critical path. If a non-critical path activity is delayed beyond its float period, that activity then becomes part of the critical path and controls the end date of the project. Thus, the delay of the non-critical path activity beyond its float period will cause delay to the Project.
  - 2. Float Ownership: Neither the City nor the Contractor owns the float time. The Project owns the float time. As such, liability for delay of the Project completion date rests with the party actually causing delay to the Project completion date. For example, if Party A uses some, but not all of the float time and Party B later uses the remainder of the float time as well as additional time beyond the float time, Party B shall be liable for the costs associated with the time that represents a delay to the project's completion date. Party A would not be responsible for any costs since it did not consume all of the float time and additional float time remained, therefore, the Project's completion date was unaffected.

### **3.9 Schedule Reports (Format)**

- A. Schedule Reports: Prepare Schedule Reports based on the Construction Schedule to include the following minimum data for each activity:
  - 1. Activity Numbers and Responsibility Codes.
  - 2. Contract Number.
  - 3. Estimated Activity Duration.
  - 4. Activity Description.
  - 5. Activity's Percent Completion.
  - 6. Early Start Date (Calendar Dated).
  - 7. Early Finish Date (Calendar Dated).
  - 8. Late Start Date (Calendar Dated).
  - 9. Late Finish Date (Calendar Dated).
  - 10. Status (Whether Critical).
  - 11. Total Float for Each Activity.
  - 12. Free Float for Each Activity.
  - 13. Cost Value for Each Activity.

- B. Project Information: Preface each Schedule Report with the following summary data:
1. Project Name.
  2. Contractor.
  3. Contract No.
  4. Type of Tabulation.
  5. Project Duration.
  6. Contract Completion Date (revised to reflect time extensions).
  7. The Commencement Date Stated in the Notice to Proceed.
  8. The Data Date and Plot Date of the Network Diagram.
  9. If an update, the new schedule completion date.

### **3.10 Project Status Reporting**

- A. In addition to the submittal requirements for the CPM scheduling identified in this Section, provide monthly project status reports (Overview Bar Chart and a written narrative report) to be submitted in conjunction with the revised CPM Schedules as specified in Paragraph 3.6. Status reporting shall be in the form specified below.
- B. Prepare and submit monthly an Overview Bar Chart schedule of the major project components. The overview bar chart schedule shall be a summary of the current CPM schedule (original and as updated and adjusted throughout the entire construction period). It shall be limited to not more than two sheets which shall not exceed 36-inch by 60-inch. Represent the major project components as time bars subdivided into various types of work including demolition, excavation and earthwork, yard piping, concrete construction, mechanical, electrical and instrumentation installations. Major components shall include each new structure by area designation, sitework, modifications to existing structures, tie-ins to existing facilities and plant startups.

Accurately time scale plot each major component and subdivision consistent with the project overview bar chart specified above. It shall represent the same status indicated by early start and finish activity information contained in the latest update of the CPM schedule. In addition, indicate a percent completion for each major component and subdivision. The initial submittal of the overview bar chart schedule shall be made at the time the revised Original Baseline CPM Schedule is submitted to the City within the submittal time shown in paragraph 3.2.A. Amend the overview schedule to include any additional detail required by the City. Include any additional information requested by the City at any time during the construction of the Work.

- C. Prepare monthly written narrative reports of the status of the project for submission to the City. Written status reports shall include:
1. The status of major project components (Percent Complete, amount of time ahead or behind schedule) and an explanation of how the project will be brought back on schedule if delays have occurred.
  2. The progress made on critical activities indicated on the CPM schedule.
  3. Explanations for any lack of work on critical path activities planned to be performed during the last month.
  4. Explanations for any schedule changes, including changes to the logic or to activity durations.

5. A list of the critical activities scheduled to be performed in the next two month period.
6. The status of major material and equipment procurement.
7. The value of materials and equipment properly stored at the site, but not yet incorporated into the work-in-place.
8. Any delays encountered during the reporting period.
9. An assessment of inclement weather delays and impacts to the progress of the Work.

The Contractor may include any other information pertinent to the status of the project. Include additional status information requested by the City.

### **3.11 Inclement Weather Provisions of the Schedule**

Include in the Contractor's construction schedule at least ten (10) lost days on the CPM schedule's critical path due to inclement weather.

**END OF SECTION**

## SECTION 01 32 23

### CONSTRUCTION SURVEY STAKING

#### PART 1 – GENERAL

##### 1.1 Work Included

- A. This Section specifies the Contractor's administrative and procedural requirements for field-engineering services and the Contractor's daily construction reporting for land survey work.
- B. Surveys and survey controls prepared for design will be provided by the City.
- C. Lines, grades, and measurements for the Work, including constructing staking, will be the responsibility of the Contractor. Preserve and/or relocate all benchmarks and in the case of their removal by the Contractor, his employees or sub-contractors, or by reason of his negligence, he shall be liable for the cost of their replacement. Develop and make such additional detailed surveys as are needed for construction. Contractor provided surveys shall be performed under the supervision of a California licensed Land Surveyor or California Registered Civil Engineer experienced in and permitted to practice this type of work.

##### 1.2 Submittals

- A. Certificates – Submit a certificate signed by the licensed surveyor or professional engineer certifying the location and elevation of Project improvements.
- B. Surveyors Notes - Submit one (1) set of all calculations, cut sheets, and field notes provided by licensed land surveyor or professional engineer for constructing the Work.
- C. Project Record Documents - Submit a CD or DVD with record of Work performed and record survey data to include an electronic copy of all AutoCAD 2011 (.dwg format), coordinate (ASCII.txt format), and alignment geometry files (format varies).

##### 1.3 Quality Assurance

- A. Qualifications - Engage a land surveyor or civil engineer registered in the state of California to perform required surveying services.
- B. City's Representative will coordinate and/or perform field observation to ascertain if the Work is being performed in accordance with the Contract Documents. Cooperate with the City's Representative and make any necessary provisions to allow for the safe observation of the Contractor's work.

##### 1.4 Unit Prices

- A. Payment for the Work in this Section shall be included as part of the lump-sum or unit-price bid amount for which such Work is appurtenant thereto, including all Work and materials specified herein and as may be required to complete this portion of the Work.

#### PART 2 – MATERIALS (Not Applicable)

## **PART 3 – EXECUTION**

### **3.1 Examination**

- A. Verify layout information shown on the Drawings, in relation to the property lines and existing benchmarks, before proceeding to lay out the Work. Locate and protect benchmarks and control points. Preserve permanent reference points during construction.
  - 1. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points or requirements to relocate reference points because of necessary changes in grades or locations.
  - 2. Promptly replace lost or destroyed project control points. Base replacements on the original survey control points.
- B. Establish and maintain a minimum of two (2) permanent benchmarks on the site, referenced to data established by survey control points.
  - 1. Record horizontal and vertical data, and benchmark locations, on Project Record Drawings.

### **3.2 Performance**

- A. Work from lines and levels established from the survey control shown on the Drawings, or as provided by the City's Representative or Engineer. Establish benchmarks and markers to set lines and levels at each segment of construction and elsewhere as needed to locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions. Use dimensions provided on civil and/or architectural Drawings to determine locations of improvements.
  - 1. Advise subcontractors engaged in construction activities of marked lines and elevations provided for their use and the responsibility to protect and preserve these points.
  - 2. As construction proceeds, incorporate horizontal and vertical checks to verify the location of key and/or major improvements.
- B. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference.
  - 1. Record deviations from design grade, profiles and elevations, and advise the City's Representative when deviations exceed industry standards for maintaining design criteria. On Project Record Drawings, record deviations that are accepted and not corrected, and record deviations that are not corrected.
  - 2. On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building and Structure Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels, and control lines and levels required for mechanical and electrical work.

- E. Existing Utilities: Furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, services, or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction.

### **3.3 Survey Staking for Constructing Structures and Appurtenances**

- A. Provide survey staking and reference points.
- B. Major structures will be controlled by two lines set at right angles to each other, along two faces of the structure, the ends of each line to be beyond the limits of the work, and with elevations only marked on at least two of these control points.

### **3.4 Final Property Survey**

- A. Prepare a final property survey showing significant features (real property) for the Project. Include on the survey a certification, signed by the surveyor, that principal metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 32 33  
CONSTRUCTION PHOTOGRAPHIC AND VIDEO DOCUMENTATION**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Administrative and procedural requirements for the following:
  - 1. Preconstruction video recordings.
  - 2. Periodic construction photographs.
  - 3. Final completion construction photographs or video recordings.
- B. Submit preconstruction photographs or videos to City's Representative before Work is performed which has potential to disturb or modify public or private property not owned by City. Contractor has the choice of which format to submit.
- C. Failure by Contractor to submit preconstruction photographs or videos may be taken by City as evidence subsequent claims by property owners for damage to their property can be rightfully attributed to Contractor's actions.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 40 00: Quality Requirements
- C. Section 01 61 00: Common Product Requirements
- D. Section 01 73 00: Execution
- E. Section 01 77 00: Closeout Procedures

**1.4 Quality Assurance**

- A. Use adequate numbers of skilled workmen trained and experienced in necessary trades and crafts and completely familiar with specified requirements and methods for proper performance of Work of this section.

**1.5 Submittals**

- A. The following minimum photographic or video documentation shall be required.
  - 1. One submittal of preconstruction videos taken before start of Work.
  - 2. Periodic construction photographs submittals showing construction work in progress taken every month Contractor is on site.
  - 3. One submittal of final completion construction photographs.
- B. Submittals shall meet the following requirements.

SUBMITTAL	DESCRIPTION	
Photograph Key Plan	Key plan of Project site with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation. Submit key plan with each digital or construction photograph submittal.	.
Digital Photographs	Submit pre-construction image files or video recording before beginning Work. Submit progress digital photograph image files with each monthly pay request. Use digital camera with minimum sensor resolution of 8 megapixels. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as sensor, uncropped, date and time stamped, in folder named by	

SUBMITTAL	DESCRIPTION	
	date of photograph, accompanied by key plan file. CD ROM Discs in labeled plastic jewel cases. Identification: Provide the following information with each image description in file metadata tag: Name of Project. Name and contact information of photographer. Name of City and City's Representative. Name of Contractor. Date photograph was taken. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction. Unique sequential identifier keyed to accompanying key plan.	
Video Recordings	Submit video recordings within 7 days of recording. Submit video recordings in digital video disc format acceptable to City's Representative. With each submittal, provide the following information: Name of Project. Name and contact information of photographer. Name of City and City's Representative. Name of Contractor. Date video recording was recorded. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction. Weather conditions at time of recording.	

**1.6 Unit Prices**

- A. Payment for Work in this section shall be included as part of lump-sum or unit-price bid amount for which such Work is appurtenant.
- B. Base number of construction photographs on average of 30 photographs per month over duration of Work plus one preconstruction video and one post construction video.

**PART 2 - PRODUCTS**

**2.1 Materials**

- A. Refer to Section 01 61 00 for basic requirements for products and materials.
- B. Digital images shall be in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.
- C. Digital video recordings shall be high-resolution, digital video disc in format acceptable to City's Representative.

**PART 3 - EXECUTION**

**3.1 Preparation**

- A. Obtain and transfer copyright usage rights from photographer to City for unlimited reproduction of photographic documentation.

**3.2 Photography**

- A. Engage qualified photographer to take construction photographs.

- B. Take photographs using maximum range of depth of field. Photographs shall be in focus and clearly show Work. Photographs with blurry or out-of-focus areas will not be accepted.
- C. Maintain key plan with each set of construction photographs that identifies each photographic location.
- D. Submit digital images exactly as originally recorded in digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 1. Include date and time in file name for each image.
  - 2. Maintain one set of images accessible in field office at Project site, available at all times for reference. Identify images in same manner as those submitted to City's Representative.

### **3.3 Video Recordings**

- A. Engage qualified videographer to record construction video recordings.
- B. Mount camera on tripod before starting recording unless otherwise necessary to show area of construction. Display continuous running time and date. At start of each video recording, record weather conditions from local newspaper or television and actual temperature reading at Project site.
- C. Describe scenes on video recording by audio narration by microphone while video recording is in progress. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
  - 1. Confirm date and time at beginning and end of recording.
  - 2. Begin each video narration with name of Project, Contractor's name, videographer's name, and Project location.
- D. Provide printed transcript of narration. Display images and running time captured from video recording opposite corresponding narration segment.

### **3.4 Preconstruction Videos**

- A. Before starting excavation and/or demolition, record video recording of Project site and surrounding properties from different vantage points, as directed by City's Representative.
- B. Videos shall be of sufficient quality and thoroughness to fully document preexisting damage or wear to video-recorded property for which Contractor or City might be asked to compensate property owner were it not for video evidence of preexisting damage. Where existing cracks in concrete, masonry or other materials are wider than thickness of a dime, include a dime or similar visual standard in photo or video for reference.
- C. Flag excavation areas and construction limits before recording preconstruction videos.
- D. Show existing conditions adjacent to Project site before starting Work.
- E. Show existing buildings either on or adjoining Project site to accurately record physical conditions at start of excavation and/or demolition.
- F. Show protection efforts by Contractor.

### **3.5 Periodic Construction Photographs**

- A. Periodic Construction Photographs: Take minimum 10 photographs weekly, with timing each month adjusted to coincide with cutoff date associated with each Application for

Payment. Select vantage points to show status of construction and progress since last photographs were taken.

- B. Take photographs of all Work to be covered or buried prior to covering or burying. Photographs shall show:
  - 1. Subgrade,
  - 2. Conduit,
  - 3. Duct banks,
  - 4. Utilities,
  - 5. Steel reinforcement,
  - 6. Concrete footings, retaining walls, and foundations,
  - 7. Fasteners,
  - 8. Embedments
  - 9. Bare concrete surfaces,
  - 10. Decking,
  - 11. Framing,
  - 12. Insulation,
  - 13. Piping,
  - 14. Pipe connections,
  - 15. Valves and fittings,
  - 16. Equipment,
  - 17. Ductwork,
  - 18. Wiring,
  - 19. Other items directed by City's Representative.
- C. Provide construction site, electrical, and mechanical progress photographs taken not less than weekly showing progress of the Work.
- D. Where structural members are fabricated off site, provide photographic documentation of fabrication in sufficient detail and quantity to show all work not visible at time of delivery to jobsite.
- E. Where on-site events may result in construction damage or losses, take photographs as needed to document damage or losses.
- F. From time to time, City's Representative will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show status of construction and progress since last photographs were taken.

### **3.6 Final Completion Construction Photographs**

- A. Take minimum 30 color photographs after date of Substantial Completion for submission as project record documents. City's Representative will inform photographer of desired vantage points.
- B. Do not include date stamp on final completion construction photographs.

**END OF SECTION**

**SECTION 01 33 00  
SUBMITTAL PROCEDURES**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. General procedures and requirements for submittals, initial submittal, submittals required on Owner's request, progress reports, Shop Drawings, product data and samples, notification of affected residences and businesses, and submittal forms.

**1.2 Related Work**

- A. Section 01 40 00: Quality Requirements
- B. Section 01 61 00: Common Product Requirements
- C. Section 01 63 00: Product Substitution Procedures
- D. Section 01 65 00: Product Delivery Requirements
- E. Section 01 66 00: Product Storage and Handling Requirements
- F. Section 01 73 00: Execution
- G. Section 01 78 23: Operation and Maintenance Data

**1.3 General**

- A. Submit descriptive information, including shop drawings and engineering data covering materials, equipment, and/or methods of work, which will enable the Engineer to advise the City whether the Contractor's proposed materials, equipment, or methods of work are in general conformance with the design concept and are in compliance with the Drawings and Specifications. The information to be submitted shall consist of drawings, specifications, descriptive data, certificates, samples, test results, and other such information, all as specifically required in the Specifications and Contract Documents, and shall become a permanent part of the work under this contract.
- B. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure the material, equipment, or method of work shall be as described in the submittal. Submittals shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the Contract Drawings and Specifications. Verify the material and equipment described in each submittal conforms to the requirements of the specifications and drawings. Unless otherwise approved by the City, submittals shall be made only by the Contractor, who shall indicate by a signed stamp on the submittals the Contractor has checked the submittals and the work shown conforms to contract requirements and has been checked for dimensions and relationship with work of all other trades involved. If the information shows deviations from the Specifications or Drawings, the Contractor, by statement in writing accompanying the information shall identify the deviations and state the reason(s) therefore. Ensure there is no conflict with other submittals and notify the City in each case where the Contractor's submittal may affect the work of another contractor or the City. Ensure coordination of submittals among the related crafts and subcontractors.
- C. The Contractor may authorize a material or equipment supplier to deal directly with the City or Engineer with regard to a submittal on a case-by-case basis with the

consent of the City. The Contractor, however, shall be responsible for the accuracy and completeness of information contained in all submittals.

- D. Number submittals using numbering system as directed by City's Representative.
- E. Shop Drawing Transmittal Form. Use form included at end of this section unless otherwise directed by City. Submit separate form for each submittal and assign a submittal number. Form shall be first page of each digital submittal. Submittals without completed Contractor's Transmittal Form as first page will be returned without review and stamped "REJECTED/RESUBMIT AS SPECIFIED."
- F. Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.
- G. Clearly note exceptions and departures from Contract Documents, along with brief justification for each exception or departure.
- H. Provide space for reviewer's review and acceptance stamp.

#### **1.4 Electronic (Digital) Submittals**

- A. Submit one (1) digital copy of **each** submittal using one of the following methods:
  - 1. Email: Send submittal as pdf attachment to City's Representative.
  - 2. Data tracking System (DTS): Upload digital file to server maintained by City's Representative.
- B. Multiple hard copies of submittals will not be accepted in lieu of digital submittal unless otherwise authorized or directed by City's Representative.
- C. One digital copy of stamped submittal with cover letter will be returned to Contractor by email or DTS as appropriate.
- D. Contractor shall verify emails sent with large attachments have been successfully received by City's Representative. Files in excess of 5 MB in size shall not be sent as attachments to emails due to size restrictions associated with users' email systems.

#### **1.5 Paper Submittals**

- A. Submit paper submittals for the following items.
  - 1. Reinforcing steel schedules larger than 11"x17" original format
  - 2. Original drawings larger than 11"x17" size
- B. Submit six (6) copies of submittals unless otherwise stated.
- C. Fold paper submittals to approximately 9-inches by 12-inches.
- D. Bind product data with sturdy, labeled covers with an index listing the contents. Loose unbound submittals will be returned without review.
- E. Four (4) copies will be returned to Contractor.

#### **1.6 Assembly, Installation, and Operation and Maintenance Manual Submittals**

- A. Assembly and Installation Manuals. Submit two paper copies for review and four copies of the complete, bound set of assembly and installation manuals for each item

of equipment for which such a manual is required. Submit digital file in pdf format of final submittal.

- B. Operation and Maintenance Manuals. Submit two copies for review and four copies of the complete, bound set of operation and maintenance manuals for each item of equipment for which such a manual is required. Included in the binder shall be all shop drawings and a section for the City to add 11"x17" copies of record drawings. Submit digital file in pdf format of final submittal.

## **1.7 City's Review of Submittals**

- A. City's review or acceptance of submittals shall only constitute acceptance of the following:
  - 1. Portions of submittal in compliance with Contract Documents.
  - 2. Exceptions or departures expressly noted on Contractor's submittal as "exceptions" or "departures" and accepted in writing by City.
  - 3. Exceptions or departures the City or their Representative may by chance discover and acknowledge and accept in writing in City's response to said submittal.
- B. In the event a submittal's exception or departure from Contract Documents is neither noted by Contractor on their submittal nor acknowledged and expressly accepted by City, Contract shall remain unchanged. City's failure to discover all exceptions and departures in submittals whether intentional or unintentional on Contractor's part shall in no way relieve Contractor of any Contract responsibilities.
- C. Resubmittal review will focus on items expressly noted by the City or their Representative as requiring correction in a prior submittal. In the event a resubmittal deviates from a prior submittal with respect to items accepted in the prior submittal, and the Contractor does not note the exception or deviation, Contract shall remain unchanged. City's failure to discover all exceptions and departures in resubmittals whether intentional or unintentional on Contractor's part shall in no way relieve Contractor of any Contract responsibilities.
- D. Review of submittals will proceed as follows:
  - 1. Submit specified quantity of complete submittals together with Contractor's submittal forms to City's Representative for review. At the City's discretion, the City can review the submittals prior to, parallel with, or after the City's Representative has reviewed the submittals.
  - 2. Submittals will be stamped "ACCEPTED", "ACCEPTED AS NOTED", "REVISE AS NOTED/RESUBMIT", "REJECTED/RESUBMIT AS SPECIFIED," "NO ACTION REQUIRED," or "SUBMITTAL NOT REQUESTED, RETURNED WITHOUT REVIEW." Three copies with letter of transmittal will be returned to Contractor.
  - 3. If the review indicates the material, equipment, or work method is in general conformance with the design concept and complies with the Drawings and Specifications, submittal copies will be marked "ACCEPTED". In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.
  - 4. If the review indicates limited corrections are required, copies will be marked "ACCEPTED AS NOTED". The Contractor may begin implementing the work

method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Provide a corrected copy where submittal information will be incorporated in Operation and Maintenance Data.

5. If the review reveals the submittal is insufficient or contains incorrect data, copies will be marked "REVISE AS NOTED/RESUBMIT ". Except at its own risk, the Contractor shall not undertake work covered by this submittal until the submittal has been revised, resubmitted, and returned marked either "ACCEPTED " or "ACCEPTED AS NOTED".
  6. If the review indicates the material, equipment, or work method is not in general conformance with the design concept or in compliance with the Drawings and Specifications, copies of the submittal will be marked "REJECTED/RESUBMIT AS SPECIFIED". Submittal with deviations which have not been identified clearly may be rejected. Except at his own risk, the Contractor shall not undertake work covered by such submittal until a new submittal is made and returned marked either "ACCEPTED" or "ACCEPTED AS NOTED".
  7. If drawing or data is returned stamped "ACCEPTED", "ACCEPTED AS NOTED", "NO ACTION REQUIRED," or "SUBMITTAL NOT REQUESTED, RETURNED WITHOUT REVIEW." No further resubmittals will be required for that item.
  8. If drawing or data is stamped "REVISE AS NOTED/RESUBMIT," or "REJECTED/RESUBMIT AS SPECIFIED," make necessary corrections and resubmit documents as required in Instruction 1. Contractor's submittal form transmitting revised documents shall show that documents comprise a resubmittal. Revisions and re-submittals shall be numbered as Revision 01, Revision 02, or as appropriate.
  9. If changes other than those noted by City are made on a submittal before resubmittal, note such changes on resubmittal.
  10. Revise and resubmit submittals as required, until confirmation of compliance is obtained.
  11. Include in resubmittals the entire submittal package unless partial resubmittals are approved in writing by the City.
- E. Costs incurred by City for original submittal and first re-submittal will be paid by City. Costs incurred by City for the second and subsequent re-submittals will be deducted from payment due Contractor.
- F. Allow not less than 31 calendar days for review and response to submittals. Review may be delayed if contingent on receipt of other submittals. Upon timely written request by Contractor, City's Representative will make reasonable efforts to shorten review periods which may fall on Contractor's critical path.
- G. Contractor shall have no claim for damages or extension of time due to any delay resulting from making required revisions to submittals.
- H. Correct and resubmit rejected submittals within 14 calendar days of receipt of rejected submittal.
- I. Wait to correct and resubmit submittals until reviewed submittal has been returned to Contractor. Submittals that are revised and resubmitted prior to Contractor's receipt of review comments for the submittal will be returned without review. Multiple

versions of a submittal in various stages of review generates confusion and will not be allowed.

- J. Do not order products or begin work described in required submittals until such submittals have been reviewed and returned by City stamped "ACCEPTED" or "ACCEPTED AS NOTED". Contractor's acceptance of delivery of products prior to receipt of City's Representative's satisfactory return of applicable submittals shall be at Contractor's risk.
- K. Review of submittals by City's Representative shall extend solely to the general type and layout of the Work and shall not be construed as relieving Contractor of full responsibility for adequacy and accuracy of submitted designs and details shown in submittals.

### **1.8 Initial Submittals**

- A. Submit the following within 14 calendar days after Notice to Proceed.
  - 1. Letter addressed to City's Representative identifying Contractor's superintendent, safety officer, and traffic control coordinator, including emergency telephone numbers and signature authorization, and listing names, addresses and telephones for subcontractors.
  - 2. Proposed Construction Schedule.
  - 3. Submittal Log listing all required submittals to be submitted, including required submittals by all Subcontractors. Extension of contract time will not be granted as a result of the Contractor's failure to make timely submittals.

### **1.9 Submittals on City's Request - Supplemental Information**

- A. Submit detailed construction schedule updates with monthly pay requests to describe scheduling of elements of construction requiring City's or Contractor's coordination with public, or other private parties or public agencies.
- B. Supplemental information will be requested for "accepted equals" and may be requested when there is a question a manufacturer's product conforms to Contract Documents. City reserves right to require submittal of supplemental information as described herein before acceptance of product.
- C. Certification of compliance with listed reference standards shall be submitted by manufacturers on City's request. Failure of City to request certification of compliance shall not serve as waiver of Contractor's duty to comply with reference standards.
- D. Submit transcripts of results of acceptance tests performed at point of manufacture of products furnished by manufacturers on City's request.
- E. Submit samples on City's request.
- F. Submit names and addresses of nearest local service representatives maintaining technical service personnel and complete inventory of spare parts and accessories on City's request.
- G. Submit list of three installations in which products comparable in size, capacity and rating with those required in Contract Documents are now in regular operation on City's request. Include listing of size capacity or rating of each installation. Include name and telephone number of at least one reference responsible for operations at each installation whom City's Representative may contact.

### **1.10 Progress Reports**

- A. Submit daily log of construction activities to City's Representative by end of following workday on a one page form provided by City. Provide sufficient detail in these logs to describe activities occurring during each day.
- B. Submit schedule updates with monthly pay requests. If Work falls behind schedule, include in the monthly pay requests revised schedules to demonstrate how Contractor intends to bring work back on schedule.
- C. Record drawings, consisting of one set of full size annotated bond paper plans and other drawings forming a part of contract, showing installed locations of improvements and all changes made during construction shall be available to City for inspection throughout project. Record all deviations from Contract Documents, including accepted change orders, using additional sketches or ink revisions, immediately after installing each portion of Work. Show locations of underground piping, conduit, sensor lines, valves, capped ends, branch fittings, pull boxes and Work. Keep one current record copy of Contract Documents, addenda, supplementary drawings, working drawings, change orders and clarifications at site and in good order. Report changes and deviations promptly to City's Representative.
- D. Partial payment requests may be withheld if daily logs, schedule updates or record drawings are damaged, lost or not kept current to satisfaction of City's Representative.

### **1.11 Contractor's Notice of Pending Delay Claim**

- A. In the event a delay claim is foreseen by Contractor, immediately notify City in writing. Following said notice, Contractor shall have no more than seven calendar days to furnish follow-up information as is required by City to allow City to act judiciously to minimize losses. As a minimum, said information shall consist of a letter identifying and substantiating the cost of the expected claim per day of delay accompanied by a schedule showing any available float and delay's impact on overall schedule.

### **1.12 Shop Drawings, Product Data, and Submittals**

- A. Shop drawings shall be defined as job-specific drawings prepared to scale wherever possible and shall include the project name on the shop drawing.
- B. Except where preparation of a submittal is contingent upon acceptance of a prior submittal, make every reasonable effort to combine all submittals relating to same class or portion of Work into a common package, regardless of the variety of trades or types of equipment that may be required to construct that portion of Work. For example, submit all above ground piping, fittings, valves, actuators, pipe stands, couplings, flow meters and appurtenances as one package for review of flange compatibility, linings and coatings, pressure class, etc.
  - 1. Packages that are clearly incomplete will be returned without review.
  - 2. To facilitate approval of critical path items or to facilitate Contractor's communication with multiple suppliers and subcontractors, packages may contain several submittals from several suppliers so long as all relevant submittals are contained in the package.

3. Where expedited review of a single submittal within a package is desired to facilitate critical path items, notify City's Representative in writing to request expedited review of said item. Contractor's request for expedited review of a portion of a package of submittals shall be taken as full acceptance of responsibility by Contractor for any subsequent field modifications or substitutions later found necessary to correct any lack of coordination between expedited submittals and other submittals or to correct any lack of coordination between expedited submittals and Contract Documents is not brought to City's attention at time of submittal.
- C. Catalog cuts may be manufacturer's pre-printed drawings and need not include the project name. However, where multiple products or options are shown in the same catalog cut, the product, size, finishes, features, or option being furnished shall be clearly delineated as specified below. Delete or cross out inapplicable data.
  - D. Show US units in all submittals. For submittals prepared in foreign countries where manufacturer's literature is printed solely in metric units, Contractor may make hand annotations to convert to US units as long as annotations are clear and legible. Submittals not bearing US units will be returned without review.
  - E. Submittals bearing text in languages other than English will be returned without review.
  - F. All materials submittals shall include the following:
    1. Brand names.
    2. Manufacturer.
    3. I.D. Plate – Product No., etc.
    4. Specification section and/or plan drawing number.
    5. Intended use of product, locations, etc.
  - G. Shop drawings for piping shall include the following:
    1. Brand names.
    2. Manufacturer.
    3. Specification section and/or plan drawing number.
    4. Intended use of product, locations, etc.
    5. Couplings and end types of all pipe, fittings, and valves or piping equipment.
    6. How connections will be made between Work under this contract and existing work or work under other contracts.
  - H. Include in the shop drawings for valves or piping equipment the following:
    1. Brand names.
    2. Manufacturer.
    3. I.D. Plate – Product No., etc.
    4. Packager, assembler, or supplier.
    5. Specification section and/or plan drawing number.
    6. Intended use of product, locations, etc.
    7. Laying lengths, dimensions, sizes, clearances, tolerances and end types.
    8. Special features.

9. Parts and materials lists and ratings, and details of accessories, auxiliary items, and appurtenances to be furnished, along with references to appropriate ASTM, Federal Specifications and other reference standards and grades.
  10. Piping and conduit attachments and sizes.
- I. Include in the shop drawings for concrete work the following:
    1. Proposed locations and type of construction joints, including joints shown on the construction drawings and joints required for construction, but not shown on the construction drawings
    2. Sequence of concrete placing operations
  - J. Include in the shop drawings for structural and architectural items the following:
    1. Brand names.
    2. Manufacturer.
    3. I.D. Plate – Product No., etc.
    4. Specification section and/or plan drawing number.
    5. Intended use of product, locations, etc
    6. Lengths, widths, sizes, thickness, embedment, dimensions and tolerances of structural members or architectural items.
    7. Connection details including applicable sizes, diameters, thickness, spacing, embedment and edge distances of bolts, anchors, rivets, nails, screws, spikes, connection plates, holdowns, joints, sleepers and other fasteners and fastening systems.
    8. Welding details using standard ANSI/AWS 2.4 symbols and showing type, electrode, length, spacing and thickness of welds.
    9. Materials listing and properties, including types, strengths and finishes of concrete, masonry, grout, metals, wood, plastics and other construction materials.
  - K. Include in the shop drawings for electrically powered or controlled equipment, and electrical and instrumentation panels the following in addition to the above requirements for shop drawings for machinery and equipment:
    1. Plans, elevations, and sections showing arrangements and positions of all panel components including nameplates.
    2. Grounding.
    3. Dielectric connections and materials used to isolate dissimilar metals.
    4. Electrical diagrams as needed to show wiring circuit schematics, single line diagrams, voltage wire numbers and identified interlocks and terminals.
    5. Nameplate data showing nameplate material, height of letters, number of lines, inscriptions and dimensions.
    6. Special features.
  - L. Clearly indicate in catalog data the applicable items when several products are covered on one page. Using black ink, indicate on submitted catalog data, specification section, or plan the reference being satisfied.

- M. Installation or application instructions shall be Manufacturer's printed instructions including warranty requirements, clearances required and proper field procedures to deliver, handle, install and prepare product for use. In the absence of Manufacturer's published literature, ASTM, AWWA or trade standards for proper installation will usually be accepted. If no instructions at all are submitted for installing or applying an item of Work, City reserves right to stop work on subject item at any time, and to retain experts of City's choosing to prepare appropriate installation or application instructions to control Contractor's work. Include in installation instructions recommended bolt torques for assembly and installation of bolted items.
- N. Operation and maintenance instructions shall be Manufacturer's printed instructions for correct operation and maintenance procedures for product, along with data which must accompany manual as directed by current regulations of government agency. Include operating instructions for each piece of equipment. Describe equipment function, operating characteristics, limiting conditions, operating instructions, startup procedures, normal and emergency conditions, regulation and control, and shutdown. Include preventative maintenance instructions. List warranty requirements. Explain and illustrate preventative maintenance tasks. Include lubrication charts, lists of acceptable lubricants, trouble-shooting instructions, and lists of required maintenance tools and equipment. List recommended spare parts, their costs, and ordering information for one manufacturer who can supply these parts. Index instructions for easy reference. Include information for installed equipment only.
- O. Certificate of compliance shall certify materials or procedures have been sampled, tested and found to comply with applicable reference standards, and must be accepted by City prior to shipping items described therein.
- P. Engineering calculations shall be clearly legible, shall follow recognized engineering principles and shall be sufficiently detailed to permit ready check of procedures used. Where published tables or charts are included in calculations, clearly show design or load variables used to make selection, highlighting applicable columns or rows in tables and highlighting intersecting variables on chart axes. Engineering calculations shall demonstrate compliance with current state and local codes, applicable standards, and contract requirements. Calculations shall be sealed by a registered engineer licensed in State of California. Calculations or drawings bearing seals with expired expiration dates will not be accepted.
- Q. Foundry or test record transcripts shall fully describe required tests in accordance with specified test standards, shall certify that factory quality control, testing and inspection requirements have been successfully completed and must be accepted by City prior to shipping items described therein.
- R. City's review of submittals shall be limited to review of products to be incorporated in Work and to remain in place upon Project completion. Contractor shall have sole responsibility at all times for construction means, methods and jobsite safety. Contractor shall retain services of California-licensed civil, structural or traffic engineer, as appropriate, to design and prepare plans for necessary safety equipment required by OSHA, Cal OSHA and other state and local regulatory authorities during construction, and to prepare summary documents for Contractor's use for accomplishing said work including, but not limited to sheeting, shoring, trench plating, excavation protection, falsework, formwork, scaffolding, barricading, pedestrian safety and traffic control. Originals of summary documents, signed and

sealed by engineer of record who prepared them, shall be submitted solely as proof this requirement has been fulfilled. Since Contractor has sole responsibility for means, methods and jobsite safety, review of said documents will be limited to verifying preparing engineer's registration is current and that engineer of record has no active complaints filed against them with California Board for Professional Engineers and Land Surveyors.

S. Use of contract drawing reproductions for shop drawings is subject to rejection.

### **1.13 Samples**

- A. Furnish samples, finished as specified, and as intended to be used on or in Work. Send samples to City's Representative, carriage prepaid.
- B. Submit samples at least 21 days before date by which City's approval is required. Allow at least 14 days for review and return of samples.
- C. Submit two of each sample, except for field samples. Attach completed Contractor's submittal form to sample. List items being transmitted, stating proposed use and location, product, color, trade name, lot, style, and model as appropriate.
- D. Resubmit samples until acceptable. One of each sample will be returned to Contractor upon acceptance.
- E. Samples of finishes shall be 8" x 10" and shall be of minimum thickness consistent with sample presentation. In lieu thereof, submit actual full-size item.
- F. Samples of value may be returned to Contractor for use in Work after review, analysis, comparison, and/or testing as may be required by City's Representative.
- G. Furnish one sample of accepted products, colors, or textures to City's Representative for final record. Show identification previously described including, if finish sample, manufacturer, mix proportion, name of color, building, Contractor, subcontractor, and surfaces to which applied on back of sample.

### **1.14 Notification of Affected Residences and Businesses**

- A. Provide written notification, with Contractor's 24-hour emergency phone number, to residences and businesses fronting the project on either side of street for work within City right-of-way or within 500 feet of projects on sites outside of right-of-way. Notify these parties 72 hours in advance of construction which will affect these properties. Door-hangers or other means of notification shall be submitted to and accepted in advance by City's Representative.

### **1.15 Unit Prices**

- A. Payment for submittals and re-submittals, will be included in the price bid for those items of Work for which the submittals are required.

## **PART 2 - PRODUCTS (Not Applicable)**

## **PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

**SUBMITTAL TRANSMITTAL FORM**

FROM: \_\_\_\_\_ DATE: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_  
PROJECT NAME: \_\_\_\_\_  
\_\_\_\_\_

TELEPHONE: \_\_\_\_\_ PROJECT NO.: \_\_\_\_\_

TO: City of Corona  
Department of Water and Power  
755 Public Safety Way  
Corona, CA 92880

ATTN: XXXX XXXXXXXXXXXX  
Construction Manager

---

	THIS IS AN ORIGINAL	THIS IS A REVISION
SUBMITTAL NO.: _____	SUBMITTAL _____	OF SUBMITTAL NO.: _____
SUBJECT OF SUBMITTAL: _____		
SPECIFICATION SECTION(S): _____		
PLAN SHEET NUMBER(S): _____		

---

CONTRACTOR'S CERTIFICATION: Check & Complete either (A) or (B) below:

(A) We have reviewed in detail and certify that the material, equipment or construction procedure(s) contained in this submittal meet all the requirements specified in or shown on the Contract Documents, Construction Specifications and Construction Plans with no exceptions.

(B) We have reviewed in detail and certify that the material, equipment or construction procedure(s) contained in this submittal meet all the requirements specified in or shown on the Contract Documents, Construction Specifications and Construction Plans except for the following deviations:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

CONTRACTOR'S AUTHORIZED SIGNATURE:

\_\_\_\_\_

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 35 13  
SPECIAL PROJECT PROCEDURES**

**PART 1 - GENERAL**

**1.1 Scope**

- A. This section covers special construction conditions and procedures associated with this construction contract.

**1.2 Requirements Covered in Other Specification Sections**

- A. Section 01 11 00: Summary of Work and Sequence of Construction
- B. Section 01 22 00: Measurement and Payment
- C. Section 01 31 13: Access and Coordination
- D. Section 01 50 00: Temporary Facilities and Controls
- E. Section 01 75 00: Starting and Adjusting

**1.3 Normal Work Schedule**

- A. Conduct all Work within the following City-approved schedule:
  - 1. Normal Work Hours: 7:00 AM to 5:00 PM
  - 2. Normal Work Days: Monday through Friday
- B. Exceptions to this Work schedule are described in Paragraphs 1.4 and 1.5 below.

**1.4 Saturday, Sunday, Holiday and Night Work**

- A. No work shall be done between the hours of 5:00 p.m. and 7:00 a.m., nor on Saturdays, Sundays or legal holidays, except such work as is necessary for the proper care and protection of the Work already performed, or except in case of emergency, and in any case only with the written approval of City.
- B. It is understood, however, that night work may be established as a regular procedure by Contractor if he first obtains the written approval of City, and that such notice may be revoked at any time by City if Contractor fails to maintain at night adequate force and equipment for reasonable prosecution and to justify inspection of the Work.

**1.5 Cooperation with Other Contractors**

- A. City may have additional work performed in this area by other contractors. The Contract requires cooperation with those contractors in the area. Any difference or conflict which may arise between the Contractor and other contractors shall be adjusted and determined by the City. Contractor shall conduct his operations as to interfere to the least possible extent with the work being done by other contractors. Promptly make good, any injury or damage to other contractor's work caused at his hands and at his own expense, with no additional allowance made therefor.

**1.6 Site Clearance**

- A. Restrict the area of activity to avoid damage of trees and shrubs and do not remove trees unless specifically directed by the contract Plans and Specifications or at the

City's direction. Contractor is responsible for the disposal of all material to be removed.

- B. All fences, walls, shrubs, sprinkler systems, substructures or any other improvement removed or disturbed by Contractor during construction, and not shown for demolition, shall be replaced and/or repaired within 48 hours at the Contractor's expense to the satisfaction of the City and/or property owner.

### **1.7 Standardization and Uniformity of Equipment and Certain Materials**

- A. To ensure standardization and uniformity in all parts of the Work under this Contract, like items of new (i.e., non-salvaged) equipment shall be the products of one manufacturer. Like items of certain materials shall be the products of one manufacturer. Materials, equipment, and appliances shall be current models now in production.
- B. Uniformity in like equipment items is required in order to provide the City with interchangeability capabilities, simplified spare parts inventory, and standardized maintenance programs and manufacturers' services.
- C. Standardization requirements shall be as specified in the various technical sections.
- D. Generally, material items exempt from standardization include structural steel, reinforcing steel, building insulation, roofing materials, sheet metal, materials specified only by reference to a recognized standard, and items hidden from view where interchangeability, color, and texture is not a significant factor for standardization.
- E. Inform suppliers and subcontractors of these requirements, and provide the necessary coordination to accomplish the standardization specified.

### **1.8 Field Tests, Adjustments and Operation**

- A. Operate and test all mechanical and electrical equipment installed by the Contractor to the satisfaction of the City. Perform tests to determine whether the equipment has been properly assembled, aligned, adjusted, wired and connected. Any changes, adjustments or replacements of equipment which are due to errors or omissions on the part of the Contractor shall be done at his own expense.
- B. Test equipment at rated speeds for required performance, instrumentation control and automatic operation.
- C. The use of water during these tests shall be in conformance with Specification Section 01 50 00, Temporary Facilities and Controls.
- D. During the testing of equipment, arrange for the presence, as necessary, of representatives of the manufacturers of all the various pieces of equipment furnished, to provide instruction for City personnel appointed by the City in the operation and care thereof. The cost of providing qualified instruction personnel shall be borne by the Contractor.

### **1.10 Lubricants**

- A. Properly lubricated and furnished with a one (1) year supply of all necessary lubricants.

**1.11 Services of Manufacturer's Representative**

- A. Provide the services of factory-trained and authorized manufacturer's representative familiar with all equipment to supervise installation of equipment furnished and its start-up. Cost for this service shall be included in prices bid for the Work.
- B. Check all equipment for lubrication, alignment, rotation, vibration, and notify the Contractor and the City of anything in the installation which might render the manufacturer's guarantee null and void.
- C. The Equipment Supplier's representative shall also provide instruction to the operating personnel as to the proper method of operation and recommend lubrication (products and schedule).
- D. Minimum on-site services of manufacturer's representatives shall be as specified elsewhere herein (reference specific specification sections for the various equipment), or if not specified, shall be as necessary for proper installation by Contractor and proper instruction of City in the use and maintenance of the Work.

**1.12 Responsibility for Job Site Conditions**

- A. Contractor agrees he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; this requirement shall apply continuously and not be limited to normal working hours; and the Contractor shall defend, indemnify and hold the City and the design consultant harmless from any and all liability except for that arising from the sole negligence of the City.
- B. It is the Contractor's sole responsibility to protect the safety of employees from construction-related conditions or activities.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 40 00  
QUALITY REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Inspection and testing laboratory qualifications, duties and responsibilities, Contractor's quality control requirements, City's inspection and testing.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 75 00: Starting and Adjusting

**1.3 Reference Standards**

- A. ASTM E329 Agencies Engaged in Construction Inspection, Testing, or Special Inspection

**1.4 Quality Assurance**

- A. Work shall conform to Federal, State and local building codes, electrical codes, fire codes, mechanical codes, energy codes, green building standards codes, and plumbing codes, and to Occupational Safety and Health Act (OSHA) Regulations. Nothing in Contract Documents shall be interpreted as permission or direction to violate any governing code or ordinance.
- B. Piping systems and elements shall comply with ASME Codes, and appropriate ASTM, API or AWWA standards.
- C. Products requiring electrical connection shall be listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose shown.
- D. Wiring terminations shall match branch circuit conductor quantities, sizes, and materials shown. Enclose terminal lugs in terminal box sized to NFPA 70.
- E. Where reference is made to third-party standards such as ANSI, AWWA or ASTM specifications, or any standard or code adopted or promulgated by a public agency, it shall mean latest edition thereof formally adopted and published at time of advertisement for bids.
- F. "Tying" or "Bundling" of manufactured equipment into packages to thwart competition shall be considered in non-compliance with Contract Documents. City is under no obligation to accept any Manufacturer based on such "bundling" arrangements, and may elect to reject any bundled Manufacturer solely on basis such bundling in City's opinion represents an unfair business practice.
- G. Manufacturer's production facilities shall be open for inspection by City or City's Representative at all times during production of products furnished under this contract.
  - 1. Notify City's Representative in writing of time and place of shop tests no later than 14 calendar days before they begin. Complete manufacturing operations, checks, adjustments and tests before factory inspection.

2. Notify City's Representative promptly if scheduled test or inspection must be cancelled or rescheduled. City will back-charge Contractor for costs incurred by City due to Contractor's failure to notify City's Representative of scheduling, rescheduling or cancellation of tests and inspections in a prompt and timely manner.
3. Complete factory tests, where required, no sooner than 14 calendar days after written notification is delivered to City. Should test result indicate, in the opinion of the City's Representative, that test equipment fails to meet the specified requirements, City's Representative will notify Contractor of performance test failure. Notify Manufacturer to reschedule testing and notify City of time of retest. Manufacturer shall make modifications and perform tests, at no expense to the City, as required to demonstrate compliance with Specifications.

H. Testing by independent testing agencies shall proceed as follows:

1. Testing Agencies shall comply with ASTM E329 and have five years minimum experience in appropriate area of specialty and shall be listed on "Roster of Approved Testing Agencies" for either City of Los Angeles, or City of San Diego, or shall be accepted by City.
2. Where required by these specifications, or where tests occur more than 50 miles from Work, Contractor shall hire City-accepted independent laboratory to perform testing and certify results. Provide labor, products, tools, instruments, water, and power as directed for sampling for required tests.
3. Samples for testing shall be representative of final work product. Samples treated differently from final work product will not yield valid test results.
4. Tests of products shall follow commonly recognized standards of national technical organizations, and specified sampling and testing methods.
5. Contractor shall pay for quality assurance testing unless otherwise shown.
6. Retest costs or other testing costs invoiced to City and specified to be paid by Contractor may be deducted from Contractor's next progress payment in lieu of Contractor's direct payment of invoice.
7. City may test representative samples of each type and size of product furnished using independent testing agency. Failure of samples to pass tests will be deemed sufficient cause to reject entire lot delivered.

I. Testing by City shall proceed as follows:

1. Notify City's Representative in writing at least 14 calendar days before City testing of materials is required. Written notice shall include name of supplier along with contact information, address and telephone number for source of material.

J. Employ only competent workers on Work. Any person employed found to be incompetent, intemperate, troublesome, disorderly, or otherwise objectionable or who fails to perform Work properly, acceptably and in accordance with Manufacturers' installation and warranty requirements, shall be immediately removed from Work by the Contractor and not reemployed on the Work.

1. Welders shall be AWS certified for type of work they are performing.

- 2. Fabricators shall have five years minimum experience in appropriate area of specialty and shall be listed on “Roster of Licensed Fabricators” for either City of Los Angeles, or City of San Diego, or shall be accepted by City.
  - 3. Deputy Inspectors shall comply with ASTM E329 and have five years minimum experience in appropriate area of specialty and shall be listed on “Roster of Approved Testing Agencies” for either City of Los Angeles, or City of San Diego, or shall be accepted by City.
- K. Upon completion of Contract, Work shall be finished, tested and ready for operation. Work shall fulfill its intended purpose as described in Contract Documents, in submittals, and in Manufacturer’s literature.
- L. The form of evidence of satisfactory fulfillment of installed test and inspection requirements shall be, at the discretion of the City’s Representative or Engineer, either tests or inspections carried out in his or his representative's presence; or by certificates and reports of tests and inspections carried out by approved persons or organizations.

**1.5 Submittals**

- A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Certificates of Compliance	Furnish on City's Request	.
Transcripts of Acceptance Test Results	Furnish on City's Request as needed to verify quality of manufactured products	
Factory Testing	Test of items at the place of manufacture during and/or on completion of manufacture, comprising material tests, hydraulic pressure tests, electric and instrumentation subsystem tests, performance and operating tests and inspections in accordance with the relevant standards of the industry and more particularly as detailed in individual clauses of these specifications to satisfy the Engineer the items tested and inspected comply with the requirements of this contract.	
Report of Installed Test and Inspection Results	Provide and use forms which include all test information, including specified operational parameters acceptable in content to the Engineer.	
Manufacturer’s Certification	Furnish certification letters on manufacturer’s letterhead.	

- B. Furnish samples as required for testing. Cost of material samples to be tested shall be paid by Contractor in all cases. Cost of testing, sampling and laboratory services shall be paid for by City or Contractor as shown.

**1.6 Testing Laboratory Services**

- A. Where required by these specifications, or where tests occur more than 50 miles from the Work, hire a City-accepted independent laboratory to perform testing and certify results. Provide labor, products, tools, instruments, water, and power as directed for sampling for required tests.
- B. Samples for testing shall be representative of final work product. Samples treated differently from final work product will not yield valid test results.
- C. Tests of products shall follow commonly recognized standards of national technical organizations, and specified sampling and testing methods.
- D. Contractor shall pay for quality assurance testing unless otherwise shown.

- E. Retest costs or other testing costs invoiced to City and specified to be paid by Contractor may be deducted from Contractor's next progress payment in lieu of Contractor's direct payment of invoice.
- F. City may test representative samples of each type and size of product furnished using an independent testing agency. Failure of samples to pass tests will be deemed sufficient cause to reject entire lot delivered.

### **1.7 Contractor's Quality Control**

- A. Arrange work to be readily accessible and easy to operate and maintain where detail drawings are not included in Contract Documents, supplementary drawings or shop drawings and submittals.
- B. Combinations of manufactured equipment shall be fully compatible and work safely and successfully as a unit. Furnish necessary mountings, couplings and appurtenances with each unit.
- C. Relocate or adjust existing facilities noted in Contract Documents as needed. If existing items are lost or damaged during construction, replace with new items of equal or better quality.
- D. Make field measurements needed to fabricate and install Work before ordering or beginning work. Make minor changes in alignments and dimensions as needed to remedy or avoid utilities and structural conflicts.

### **1.8 Manufacturer's Certification**

- A. The manufacturer certifies the equipment is approved for operation. The equipment operates within the allowable limits for vibration. All controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning. All Control logic for start-up, shutdown, sequencing, interlocks, and emergency shutdown have been tested and are properly functioning.
- B. The equipment has been installed and adjusted in accordance with the manufacturer's requirements and is properly aligned and ready for operation.
- C. The equipment has been serviced, lubricated and properly prepared to perform in accordance with the intent of the Contract Documents.
- D. The equipment is ready for operation and the City's Staff is suitably instructed in operation and maintenance of the equipment.
- E. The manufacturer's warranty will commence, and be in full force from the date of the final acceptance of the project or applicable portion of the project by the City.
- F. The signer has visited the site; inspected the equipment and installation; and certifies the equipment is ready and suitable for full time operation under full load conditions.
- G. Submit certification letters to include the following on the manufacturer's letterhead for all equipment provided in the Contract

### **1.9 Project Conditions**

- A. Ascertain suitability of native soil for backfill before submitting bid. If native soil is found to be unsuitable, provide suitable material for meeting compaction requirements at no additional cost to City.

- B. Items furnished shall be capable of fulfilling their intended purpose in environment in which they are installed. Allow for local temperature extremes, climactic conditions and corrosive environments where necessary to ensure proper functioning of furnished products.

#### **1.10 Unit Prices**

- A. Payment for Contractor-provided testing required in Contract Documents will be included in the price bid for items of work for which Contractor-provided testing is specified.

### **PART 2 - PRODUCTS (Not Applicable)**

### **PART 3 - EXECUTION**

#### **3.1 Inspection**

- A. Products and Work shall be subject to field and factory inspection and testing in accordance with standards required and defined in Contract Documents. Waiver by City of his right to inspect shall not relieve Contractor of duties to comply with Contract Documents.
- B. Contractor shall provide and pay for independent inspection, deputy inspection and testing services required by Contract Documents.
- C. City will provide certain inspection and testing duties not required of the Contractor under Contract Documents. Performance of these tests and costs will be borne by City; except, that Contractor shall pay cost of any failing test.
- D. Inspection will be provided by City's Representative. Inspection shall not be considered as direct control of the individual workman and his work. Inspections, tests, or approvals by City's Representative or others shall not relieve Contractor from his duty to perform Work in accordance with Contract Documents.
- E. Inspection and testing fees imposed by public agencies other than City shall be paid for by Contractor. If Contract Documents, permits, laws, ordinances, rules, regulations or orders of public authorities having jurisdiction require Work to be inspected, tested, or accepted by someone other than the Contractor, give City's Representative notice of readiness in accordance with General Conditions Article 26. Submit the required certificates of inspection, testing or approval to City's Representative.
- F. Maintain access to Work for City and City's Representatives. Permit authorized representatives and agents of Federal or State agencies to inspect work, products, and other relevant data and records. Provide safe and proper facilities to access and observe Work and to inspect or perform tests.
- G. City's Representative will inspect products after delivery and throughout construction process. Products will be subject to rejection at any time on account of failure to meet Contract Documents even though samples may have been accepted as satisfactory at place of manufacture.
- H. Before backfilling, request inspection by City's Representative to verify proper installation of buried work.

- I. Before finishing, request inspection by City's Representative to verify that no surfaces to receive product have defects or errors which could result in poor or potentially defective application or cause latent defects in workmanship.
- J. If Work is covered contrary to written instructions, or Work is covered before Contractor requests and receives inspection, uncover the Work at Contractor's expense, if requested by City's Representative. Replace at Contractor's expense.
- K. If City's Representative considers it advisable that covered Work be reinspected or tested by others, at City's Representative's written request, uncover Work in question, furnishing necessary labor, products, and tools. If Work is found defective, Contractor shall pay for uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, Work is not found defective, Contractor will be allowed an increase in Contract Price or an extension of Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction, and a Change Order will be issued.

### **3.2 Installation/Application/Erection**

- A. All materials and equipment shall be installed by specialists properly skilled in the trades and professions required to assure first-class workmanship. Where required by detailed specifications, the Contractor shall cause the installation of specific equipment items to be accomplished under the supervision of factory-trained installation specialists furnished by the equipment manufacturers. Be prepared to document the skills and training of all workmen engaged in the installation of all equipment furnished either by the Contractor or the City.
- B. Coordinate with the equipment manufacturer when manufacturer's field services are provided. Provide City at least 30 days written notice prior to the need for manufacturer's field services furnished by other.
- C. Install products according to manufacturer's installation and warranty requirements. Install products to tolerances recommended by manufacturer. Unless otherwise shown, install equipment true and level using precision gauges and levels. Do not shim between machined surfaces.
- D. Refer variances between manufacturer's installation instructions and Contract Documents to the Engineer.
- E. Construct walls plumb, straight, level, square and true. Acceptable deviations from plumb or level shall not exceed 1/4 inch in any 32 inch section. Flatwork shall not deviate from plan elevation by more than 3/4 inch at any location.
- F. Welds, unless otherwise shown, shall be continuous, watertight, and conforming to Structural Welding Code of American Welding Society. Welds shall be free of sharp points or edges. Before welding, abutting joints shall be free of strain.
- G. Pipework, valves, fittings, tanks and appurtenances shall have no leaks at rated pressures.
- H. Exposed surfaces shall be finished in appearance. Grind smooth exposed welds. Round or chamfer corners of exposed structural shapes for personal protection.
- I. Prime and paint exposed surfaces of ferrous products, piping, and conduit except for stainless steel or galvanized or sherardized surfaces or unless otherwise shown. Clean painted surfaces and touch up bare or marred spots with finish to match factory finish.

- J. Buried pipework and conduit shall provide a clear and unobstructed pathway free from obstructions due to pipe or conduit deflection and free from interior debris. Where City has reason to suspect the presence of such obstructions, the City's Representative reserves the right to require mandrel testing to demonstrate compliance before subsequent work such as paving, before charging or commissioning of piping, or before installation of wire within conduit.
- K. If products are furnished which differ from those shown and which require changes to enclosures, mounting and support structures, power and control circuitry or other work to accommodate furnished product, provide changes required at no additional cost to City and of same quality as shown.
- L. Upon completion of Contract, Work shall be finished, tested and ready for operation. Work shall fulfill its intended purpose as described in Contract Documents, in submittals, and in manufacturer's literature.

### **3.3 Field Quality Control**

- A. Perform sampling and testing at the frequency shown, and at such other times as necessary to document contract compliance.
- B. Notify City's Representative and regulating authorities three days before field tests.
- C. Perform field tests in presence of City's Representative who will record results.
- D. Remedy or remove and replace in a manner acceptable to the City's Representative all Work not conforming to the requirements of the Contract Documents. No compensation will be allowed the Contractor for such removal or replacement.
- E. Remove rejected work from jobsite. Work rejected by City's Representative for failure to comply with Contract Documents, shall be removed within 10 calendar days after Written Notice of rejection, whether incorporated in Work or not, unless repairs have been made to City's satisfaction.
- F. Defective work or unsuitable materials and/or equipment may be rejected, even though such defective items may have been previously overlooked by the City's Representative.
- G. Promptly replace and re-execute removed Work in accordance with Contract Documents and without expense to City. Contractor shall bear cost of making good Work of other Contractors destroyed or damaged by such removal or replacement.
- H. If Contractor does not act to remove rejected Work within 10 calendar days after receipt of Written Notice, City may remove such Work and store products at Contractor's expense.
- I. If the Contractor fails to remedy, remove, replace, or correct Work under the provisions of this section, City shall have the authority to cause defective work to be remedied, or removed and replaced, and any unauthorized work to be removed by City forces, or otherwise, and to deduct the costs thereof from any monies due or to become due the Contractor, or to bring suit against the Contractor and the Contractor's sureties for money damages sustained by City or for specific performance of the contractual obligations of the Contractor.
- J. Repair, correct or replace work failing tests or inspection. Repeat tests at Contractor's expense, until results satisfy specifications. Repair damages resulting from tests.
- K. Repair damage to work that is not cause for rejection.

- L. Any Work done beyond the lines and grades shown on the Plans, or any extra work done without written authority of the City's Representative will be considered as unauthorized and no compensation shall be made therefor. Remove all nonconforming materials from the site.

**END OF SECTION**

**SECTION 01 42 13**  
**ABBREVIATIONS AND ACRONYMS**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. This section lists abbreviations and acronyms and defines them for use in these Contract Documents.

**1.2 References**

- A. The Plans and Specifications contain references to various standards, standard specifications, codes, practices and requirements for products, execution, tests, and inspections. These reference standards are published and issued by the agencies, associations, organizations and societies listed in this section or identified in individual product specification sections. Such references are incorporated into and made a part of the Plans and Specifications to the extent applicable. Reference shall be made to the latest edition of said standards at time of bid.
- B. Obtain and maintain at the worksite copies of reference standards identified on the Plans and in the Specifications necessary to properly execute the Work.
- C. At a minimum, the following shall be readily available at the site, as applicable to the Work:
1. Local and state building codes.
  2. Safety Codes: State of California Industrial Safety Codes and regulations and Occupational Safety and Health Act (OSHA) regulations, to extent applicable to the Work.
  3. "Greenbook" – SSPWC - Standard Specifications for Public Works Construction, current edition.
- D. Publications listed below form part of this specification to extent referenced and are referred to in text by the basic designation only.
1. CSI TD-2-4 - Construction Specifications Institute Abbreviations.
  2. SSPWC - Standard Specifications for Public Works Construction "Greenbook".

**1.3 Application**

- A. When references are made in these specifications to standards, specifications, or other published data of various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only.
- B. If an abbreviation is not listed below refer to CSI TD-2-4.
- C. Where use of Standard Specifications for Public Works Construction "Greenbook" is made, refer to SSPWC for use and description of abbreviations.
- D. Interpretation of abbreviations shall consider context or discipline in which they are used. For example:
1. FF means "finish floor" when referring to a floor slab.

2. FF means "flat face" when referring to a pipe flange.

E. Refer discrepancies to City's Representative for interpretation.

#### **1.4 List of Abbreviations**

A	Ampere/Area
AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
AB	Anchor Bolt/Aggregate Base
ABAN	Abandoned
ABC	Asphalt Base Course
ABMA	American Bearing Manufacturers Association
AC	Acre/Asphalt Concrete/Alternating Current
ACI	American Concrete Institute
ACP	Asbestos-Cement Pipe
ACU	Access Door
AE	Architect-Engineer
AEC	Association of Edison Illuminating Companies
AFBMA	Anti-Friction Bearing Manufacturers Association
AFF	Above Finished Floor
AGA	American Gas Association
AGG	Aggregate
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AL	Aluminum
AMB	Ambient
AMCA	Air Moving and Conditioning Association
AMP	Ampere
ANG	Angle
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ARCH	Architecture/Architectural
AREA	American Railway Engineering Association
ARV	Air-Release Valve
ARVV	Air-Release and Vacuum Valve
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPH	Asphalt
ASSY	Assembly
ASTM	American Society for Testing and Materials
ATS	Automatic Transfer Switch
AVE	Avenue
AVG	Average
AWG	American Wire Gage
AWPI	American Wood Preservers Institute

AWS	American Welding Society
AWWA	American Water Works Association
BB	Back-to-Back
BBL	Barrel
BC	Beginning of Curve/Back of Curb/Bare Copper
BEG	Begin
BETW	Between
BF	Blind Flange
BHP	Brake Horsepower
BK	Back/Brake
BKR	Breaker
BL	Building
BLK	Block
BLVD	Boulevard
BM	Bench Mark/Beam
BO	Blowoff
BOP	Bottom of Pipe
BOT	Bottom
BP	Baseplate
BRG	Bearing
BRNZ	Bronze
BTN	Button
BTU	British Thermal Unit
BUR CBL	Buried Cable
BFV	Butterfly Valve
BVC	Begin Vertical Curve
BW	Block Wall
C	Conduit/Celsius/Civil Drawings/Copper
CAB	Crushed Aggregate Base
CALTRANS	California State Department of Transportation
CAP	Capacity
CARB	California Air Resources Board
CB	Catch Basin/Circuit Breaker
CBC	California Building Code
CBM	Certified Ballast Manufacturers
CC	Cooling Coil
C-C	Center-to-Center
CCB	Concrete Block
CD	Cross Drain/Condensate Drain/Ceiling Diffuser
CEM	Cement
CF	Cubic Feet/Curb Face
CFC	California Fire Code
CFH	Cubic Feet Per Hour
CFM	Cubic Feet Per Minute
CFS	Cubic Feet Per Second
CG	Construction Grade
C&G	Curb and Gutter
CHG	Change
CHKD PL	Checkered Plate

CI	Cast Iron
CIP	Cast In Place/Cast-Iron Pipe
CISP	Cast Iron Soil Pipe
CISPI	Cast-Iron Soil Pipe Institute
CJ	Construction Joint
CL	Centerline/Class/Clearance/Chlorine
CLR	Clear
CMC	California Mechanical Code
CMLCSP	Cement-Mortar Lined & Coated Steel Pipe
CMLS	Cement-Mortar Lined Steel Pipe
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CMU	Concrete Masonry Unit
CO	Cleanout/Conduit Only
COL	Column
COMM	Communication
COMP	Composite
COMPL	Complete
CONC	Concrete
CONN	Connection
CONST	Construct or Construction
CONT	Continuous
CONTR	Contractor
COORD	Coordinate/Coordinated
COP	Copper
COR	Corner
CORP	Corporation
CP	Cathodic Protection
CPC	California Plumbing Code
CPLG	Coupling
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard, US Department of Commerce
CSI	Construction Specifications Institute
CT	Center Top/Current Transformer
CTG	Coating
CTR	Center
CULV	Culvert
CU YD,CY	Cubic Yard
CYL	Cylinder
D	Degree of Curvature
DB	Direct Buried/Decibel
DBL	Double
DC	Direct Current
DEPT	Department
DET	Detail/Detour
DG	Decomposed Granite
DI	Drop Inlet
DIA	Diameter
DIAG	Diagonal
DIM	Dimension

DIMJ	Ductile-Iron Mechanical Joint
DIP	Ductile-Iron Pipe
DIPRA	Ductile-Iron Pipe Research Association
DISCH	Discharge
DIST	Distance
DMH	Drop Manhole
DN	Down
DR	Drain/Door
DSL	Diesel
DWG	Drawing
DWY	Driveway
E	East/Electrical Drawings
EA	Each
EC	End of Curve
ECC	Eccentric
ED	External Distance
EE	Each End
EF	Each Face/Exhaust Fan
EFF	Efficiency
EFL	Effluent
EGL	Energy Grade Line
EL	Elevation/Each Layer
E/L	Easement Line
ELEC	Electric
ELP	Elliptical
ENC	Encasement or Encased
ENCL	Enclosure
ENG	Engine
ENGR	Engineer
EOS	Equivalent Opening Size
EP	Edge of Pavement/Explosion Proof
EPA	United States Environmental Protection Agency
EQ	Equation
EQL	Equal
ESMT	Easement
EST	Estimate or Estimated
ETC	And so Forth
EVC	End Vertical Curve
EW	Each Way
EXC	Excavate or Excavation
EXP	Expansion
EXST	Existing
EXT	Exterior/Extension
F	Fahrenheit/Floor
FAB	Fabricate
FBRBD	Fiberboard
FC	Foot-Candle
FCI	Fluid Controls Institute, Inc.
FCO	Floor Cleanout

FCV	Flow Control Valve
FD	Floor Drain
FDN	Foundation
FE	Flanged End/Fence
Fed Spec	Federal Specification
FF	Finished Floor/Flat Face
FG	Finished Grade
FH	Fire Hydrant
F&I	Furnish and Install
FIG	Figure
FIP	Female Iron Pipe Thread
FIT	Fitting
FL	Floor/Flow Line
FLG	Flange
FM	Force Main/Factory Mutual
FMH	Flexible Metal Hose
FNSH	Finish
FOC	Face of Concrete
FPC	Flexible Pipe Coupling
FPM	Feet Per Minute
FPS	Feet Per Second
FS	Finished Surface/Floor Sink/Federal Specifications
FSTNR	Fastener
FT	Feet
FTG	Footing
FUT	Future

G	Gas/General Drawings/Gram
GA	Gage
GAL	Gallon
GALV	Galvanized
GB	Grade Break
GDR	Guard Rail
GR	Grooved End
GENL	General
GFI	Ground Fault Interrupter
GM	Gas Main
GND	Ground
GPD	Gallons Per Day
GPM	Gallons Per Minute
GR	Grade
GSKT	Gasket
GUT	Gutter
GV	Gate Valve

H	Humidistat/Horizontal
HARN	Harness
HB	Hose Bib
HD	Heavy Duty
HDPE	High-Density Polyethylene Pipe
HGL	Hydraulic Grade Line

HGT	Height
HMWPE	High-Molecular Weight Polyethylene
HORIZ	Horizontal
HP	Horsepower/High Pressure
HPT	High Point
HR	Hour/Handrail
HS	High Strength
HV	Hose Valve
HVAC	Heating, Ventilating, and Air Conditioning
HW	Headwall/Hot Water
HWL	High Water Level
HWY	Highway
HYDR	Hydraulic
HZ	Hertz (cycles per second)
I	Intersection Angle/Instrumentation Drawings
IBC	International Building Code
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association
ID	Inside Diameter
IE	Invert Elevation
IEEE	Institute of Electrical and Electronics Engineers
IN	Inches
INCL	Include
INL	Inlet
INSUL	Insulating
INSTL	Install or Installation
INT	Interior
INTR	Intersection
INV	Invert
I/O	Inlet/Outlet
IP	Iron Pipe
IPCEA	Insulated Power Cable Engineers Association
IPS	Iron Pipe Size
IPT	Iron Pipe Thread
IRR	Irrigation
ISA	Instrument Society of America
JB	Junction Box
JCT	Junction
JN	Join
JT	Joint
KG	Kilogram
KM	Kilometer
KIPS	Thousands of Pounds
KPA	Kilopascal
KV	Kilovolt
KW	Kilowatt
KWH	Kilowatt-Hour
KWHM	Kilowatt-Hour Meter

L	Length of Curve/Long/Landscaping Drawings
LATL	Lateral
LB	Pound
LCL	Local
LF	Linear Foot
LNDSCP	Landscaping
LOCN	Location
LP	Light Pole
LPT	Low Point
LR	Long Radius
LS	Lift Station
LT	Left/Light
LWC	Lightweight Concrete
LWIC	Lightweight Insulating Concrete
LWL	Low Water Level
M	Mechanical Drawings/Meter
MATL	Material
MAX	Maximum
MB	Machine Bolt/Megabyte/Millibars
MC	Metal Channel
MCM	Thousand Circular Mils
ME	Machined End
MECH	Mechanical
MFR	Manufacturer
MG	Million Gallons/Milligram
MGD	Million Gallons Per Day
MH	Manhole
MHZ	Megahertz
MI	Malleable Iron/Mile
MIL	Military Specifications
MIL-	Military Specification (leading symbol)
MIN	Minimum
MIP	Male Iron Pipe Thread
MISC	Miscellaneous
MJ	Mechanical Joint
MM	Millimeter
MO	Motor Operator/Motor Operated/Masonry Opening
MOD	Modification
MON	Monument
MOT	Motor
MOV	Motor Operated Valve
MSDS	Material Safety Data Sheet
MSL	Mean Sea Level
MTD	Mounted
N	North/Neutral/Nitrogen
NA	Not Applicable
NAAMM	National Architectural Association of Metal Manufacturers
NACE	National Association of Corrosion Engineers

NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
N & C	Nail and Cap
NC	Normally Closed
NCPI	National Clay Pipe Institute
NCV	Normally Closed Valve
NE	Northeast
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NFC	National Fire Code
NFPA	National Fire Protection Association
NIC	Not in Contract
NIP	Nipple
NO	Number/Normally Open
NOAA	National Oceanic and Atmospheric Administration (Dept. of Commerce)
NOM	Nominal
NPDES	National Pollutant Discharge Elimination System
NPT	National Pipe Taper
NRS	Non-Rising Stem
NSF	National Sanitation Foundation
NTS	Not to Scale
NW	Northwest
NWL	Normal Water Level
OA	Overall/Outside Air
OC	On Center/Overcurrent
OD	Outside Diameter
OE	Or Equal
OF	Outside Face
OFCI	Owner-Furnished Contractor-Installed
OFCR	Owner-Furnished Contractor-Relocated
OPER	Operator
OPNG	Opening
OPP	Opposite
OSHA	Occupational Safety and Health Administration, U.S. Department of Labor, as defined in the General Conditions
O TO O	Out to Out
OUTL	Outlet
OVFL	Overflow
OVHD	Overhead
P	Pole
PARA	Paragraph
PB	Push Button/Pull Box
PC	Point of Curvature/Programmable Controller
PCA	Portland Cement Association
PCC	Point of Compound Curvature/Portland Cement Concrete
PE	Plain End/Polyethylene/Professional Engineer
PEN	Penetration
PG	Pressure Gage

PI	Point of Intersection
PJTN	Projection
PKWY	Parkway
PL	Plate/Property Line
PLATF	Platform
PLF	Pounds Per Lineal Foot
PM	Parcel Map
PNL	Panel
PO	Push-On
POB	Point of Beginning
POC	Point of Connection
PE	Polyethylene
POR	Portion
PP	Power Pole/Polypropylene
PPB	Parts Per Billion
PPM	Parts Per Million
PR	Pair
PRC	Point of Reverse Curve
PRESS	Pressure
PRL	Parallel
PRPSD	Proposed
PRVC	Point of Reverse Vertical Curve
PSI	Pounds Per Square Inch
PSIG	Pounds Per Square Inch Gage
PSF	Pounds Per Square Foot
PT	Point of Tangency
PV	Plug Valve
PVC	Polyvinyl Chloride/Point of Vertical Curvature
PVI	Point of Vertical Intersect
PVMT	Pavement
PWR	Power
Q	Flow Rate
QTY	Quantity
R	Right/Radius
RAF	Return Air Fan
RC	Reinforced Concrete
RCP	Reinforced Concrete Pipe
RCPA	Reinforced Concrete Pipe Arch
RCSC	Research Council on Structural Connections of the Engineering Foundation
RD	Road
RDC	Reduce
RDCR	Reducer
RDWY	Roadway
REF	Reference
REINF	Reinforce or Reinforced
RELOC	Relocate
REQD	Required
RES	Reservoir
REV	Revise/Revision

RF	Raised Face
RH	Relative Humidity
RJ	Restrained Joint
RND	Round
RM	Record Map
ROS	Record of Survey
RPM	Revolutions Per Minute
RS	Road Survey
RSD	Regional Standard Drawings
RST	Reinforcing Steel
RT	Right
R/W	Right-of-Way
RWGV	Resilient-Wedge Gate Valve
RWQCB	Regional Water Quality Control Board
S	South
SA	Sweetwater Authority
SAE	Society of Automotive Engineers
SAMA	Scientific Apparatus Manufacturer's Association
SAN	Sanitary
SC	Seal Coat
SCADA	Supervisory Control and Data Acquisition
SCAQMD	South Coast Air Quality Management District
SCFM	Standard Cubic Feet Per Minute
SCHED	Schedule
SCRN	Screen
SD	Storm Drain
SDG	Siding
SE	Southeast
SECT	Section
SF	Square Feet
SGL	Single
SH	Sheet/Sheeting/Shielded
SHT	Sheet
SIM	Similar
SKWK	Sidewalk
SLP	Slope
SLV	Sleeve
SM	Sheet Metal
SOL	Solenoid
SOV	Solenoid-Operated Valve
SP	Space/Steel Pipe/Static Pressure/Spare/Stand Pipe
SPCG	Spacing
SPEC	Specification
SPLC	Splice
SPRT	Support
SQ	Square
SS	Sanitary Sewer
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
SS	Stainless Steel

ST	Street
STA	Station
STBY	Standby
STD	Standard
STK	Stake
STL	Steel
STR	Straight
STRL	Structural
STRUCT	Structure
STS	Storm Sewer
SURF	Surface
SW	Southwest
SWG	Swing
SWRCB	State Water Resources Control Board
SYMM	Symmetrical
SYS	System

T	Ton/Tangent Length of Curve
TAN	Tangent
T/B	Top of Beam
TB	Top of Bank/Terminal Board
T&B	Top and Bottom
TBG	Tubing
TBM	Temporary Bench Mark
TC	Top of Curb
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
TEL	Telephone
TEMP	Temperature/Temporary
THB	Thrust Block
THD	Thread or Threaded
THH	Thrust Harness
THK	Thick
TO	Turnout
T/O	Top of
TOC	Top of Concrete/Top of Curb
TOP	Top of Pipe
TOS	Top of Slab
TOT	Total
TP	Telephone Pole
TRD	Thread
TRA	Tie Rod Assembly
TS	Tube Sheet
TYP	Typical
UBC	Uniform Building Code
UD	Underdrain
UG	Underground
UL	Underwriters Laboratories, Inc.
ULT	Ultimate
UON	Unless Otherwise Noted
UPC	Uniform Plumbing Code

USA	Underground Service Alert
USDC	United States Department of Commerce
USGS	United States Geologic Survey
UTC	Underground Telephone Cable
UTIL	Utilities
V	Vent/Valve/Volt/Vertical
VAC	Vacuum/Volts, Alternating Current
VC	Vertical Curve
VEL	Velocity
VERT	Vertical
VFD	Variable Frequency Drive
VOL	Volume
VPC	Vertical Point of Curve
VPI	Vertical Point of Intersection
VPT	Vertical Point of Tangency
W	West/Watt/Wide/Water/Wire
W/	With
WADG	Water Agencies' Design Guide
WAS	Water Agencies' Standards
WASC	Water Agencies' Standards Committee
WATCH	Work Area Traffic Control Handbook
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WE	Weld End
WG	Water Gage
WL	Waterline
WLD	Welded
WM	Water Meter
W/O	Without
WP	Waterproof/Working Point
WRI	Wire Reinforcement Institute
WSE	Water Surface Elevation
WSP	Water Stop
WT	Weight
WTR	Water
WWF	Welded Wire Fabric
WWM	Woven Wire Mesh
WWPA	Western Wood Products Association
WWR	Welded Wire Reinforcement
YCO	Yard Cleanout
YD	Yard
YP	Yield Point
YR	Year
YS	Yield Strength

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 50 00  
TEMPORARY FACILITIES AND CONTROLS**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Provide all necessary temporary facilities and controls required for execution of the Work, including, but not limited to storage yard, field offices, sheds, temporary utilities, temporary controls, construction aids, barriers and enclosures, security, establishing fire protection system, access roads and parking areas, traffic regulation, and modifying existing irrigation system. The costs of these temporary facilities and controls are considered incidental to the Work and shall be included in the Contractor's bid proposal. A field office for City use is not required for this project.
- B. The Contractor shall be solely responsible for the storage, usage, handling and application of all hazardous materials encountered or provided as part of the Work.
- C. No attempt is made to set out in detail means or methods necessary to satisfy requirements. Recognition of requirements is made to assist Contractor in the identification of necessary costs.

**1.2 Related Work**

- A. Section 01 31 13: Access and Coordination
- B. Section 01 33 00: Submittal Procedures
- C. Section 01 52 13: Field Offices
- D. Section 01 74 00: Cleaning Waste Management
- E. Section 01 77 00: Closeout Procedures

**1.3 Submittals**

- A. Furnish the following submittals:

SUBMITTAL	DESCRIPTION	
Storage Yard	Description of Contractor's proposed methods for dust and noise control in storage areas	
	Property owner's written approval of storage yard for use of property used as storage yard for project.	
Construction Facilities Plan	Layout, equipment, materials and procedures proposed for construction of temporary power, telephone, lighting, heating, water, sanitation, field offices and sheds, storm water management, security, dewatering, etc.	
Injury and Illness Prevention Program	Description of Contractor's procedures and requirements for safety and hygiene.	
Confined Space Entry Permitting Program	Contractor's confined space work procedures and rescue plan documentation in accordance with State law and City's policy.	
Excavation and Shoring Plans and Drawings	Detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during excavation of any trench, pit, or excavation for structure five (5) feet or more in depth.	

## 1.4 Temporary Utilities

- A. Power: Purchase or generate on-site construction power for constructing Work where existing outlets are not available.
- B. Construction Water: Unless otherwise stated, Contractor shall, at his expense, arrange to develop water sources, furnish and install piping, valves and appurtenances necessary to connect to the water supply, and supply labor and equipment to collect, load, transport, and apply water as needed for compaction, testing, concrete work, dust control, and other construction use.

Use of the City's water will be under the City's control, and the Contractor shall follow any requirements or provisions set forth by the City regarding its use. Obtain a construction water meter from the City to document water usage. Pay the construction water meter deposit. The Contractor(s) shall not be required to pay for the water used in the prosecution of the Work. If water is taken through fire hydrants, use one 2½-inch connection for construction water. Reserve the remaining outlets for use by fire department. Do not draw water from any fire hydrant, except to extinguish a fire, without obtaining permission from the City.

Construction water shall be clean and free from objectionable deleterious amounts of acids, alkalis, salts, or organic materials.

Use potable water for moisture conditioning of backfill in potable waterline and untreated waterline trenches, and flushing of potable waterlines and untreated waterlines. Provide a CDPH approved backflow device for potable water use.

Contractor must use reclaimed water for all other general construction purposes, where applicable and when available. Reclaimed water is available along Quarry Street in the vicinity of the project site. A person in responsible charge of the contractor's site activities must successfully pass reclaimed water use training provided by the City DWP prior to receiving a reclaimed water construction meter. Submit an application for use of Reclaimed Water at the time the construction meter is requested. The use of reclaimed water does not require a backflow device.

- C. Drinking Water: Provide at all times abundant supply of safe drinking water for employees and give orders against the use of, for drinking purposes, any water in the vicinity of the Work known to be unsafe.
- D. Sanitation: Provide suitable and conveniently located temporary toilets, sanitation, and hand washing facilities for employees in full compliance with the rules and regulations of the State Board of Health and/or other bodies having jurisdiction. Do not use any City sanitation facilities. Leave Contractor-provided toilets and sanitation facilities at the site until final inspection has been made. Following final inspection remove temporary sanitation facilities and leave site in neat and sanitary condition. Clean toilets at least once per week.

Do not interrupt wastewater conveyance and disposal. Should the Contractor disrupt existing sewer facilities, convey sewage in closed conduits and dispose of in a sanitary sewer system. Submit a proposed bypass system for City review. Do not permit sewage to flow in trenches or be covered by backfill.

Dispose of all rubbish, surplus, and waste materials of any nature occurring at the work site offsite in accordance with local, state, and federal codes and ordinances governing locations and methods of disposal, all at the Contractor's expense. Establish regular intervals of collection and disposal of such materials and waste.

Take care to prevent spillage on haul routes. Contain and remove any such spillage and clean the area.

- E. Communications: Make construction telephone available at site at all times when Work is in progress. Cellular phones are acceptable.
- F. Lighting: Install temporary lighting when Work is performed at night or under deficient daylight conditions to ensure correct performance, to provide for inspection, and to maintain lighting levels during working hours meeting or exceeding lighting levels required by OSHA and state agency administering OSHA regulations.

## **1.5 Construction Aids**

- A. Provide scaffolding, rigging, hoisting and services needed to safely deliver, support, move, and install products. Remove same from premises when installation is complete.
- B. Comply with OSHA requirements and applicable laws, ordinances, rules, regulations, and orders pertaining to construction machinery and equipment, hoists, cranes, scaffolding, staging, materials handling facilities, tools, appliances and other construction aids. OSHA requirements shall govern where mandatory; otherwise comply with the most stringent requirements.
- C. Provide railings, kick plates, enclosures, safety devices, and controls required by Laws and Regulations and as required for adequate protection of life and property.
- D. Design temporary supports with adequate safety factor to assure adequate load bearing capability.
  - 1. When requested, submit design calculations by professional engineer registered in the State of California prior to application of loads.
  - 2. Submitted design calculations are for information and record purposes only.
- E. Prepare and implement accident prevention and safety program to include, but not be limited to:
  - 1. Exercise precautions throughout construction for protection of persons and property.
  - 2. Observe safety provisions of applicable Laws and Regulations.
  - 3. Guard machinery and equipment, and eliminate other hazards.
  - 4. Make reports required by authorities having jurisdiction, and permit safety inspections of the Work.
  - 5. Before commencing construction Work, take necessary action to comply with provisions for safety and accident prevention.
- F. Adequately identify and guard hazardous areas and conditions by visual warning devices and, where necessary, physical barriers. Devices shall conform to minimum requirements of OSHA and State agency which administers OSHA regulations where Project is located.
- G. Mark or guard excavations in areas from which public is excluded, in manner appropriate for hazard.

## **1.6 Access Roads and Parking Areas**

- A. Construct and maintain access or haul roads required for Project, and personnel movement into and within construction and excavation areas, subject to prior approval by City. Access facilities constructed by the Contractor shall provide for surface drainage. Install and remove earth ramps as needed to protect concrete and asphalt curbs. Grade and restore to original condition areas used for temporary access, haul roads and access from public roads. Grade conditions to City's satisfaction.
- B. Do not block any access roads or entrances unless otherwise approved by the City's Representative. Maintain at least one-way traffic. Provide all signs, traffic cones and other barriers for traffic detours.
- C. Maintain emergency access routes as shown on the Contract Documents open at all times. Do not excavate, store equipment, or otherwise restrict access for emergency vehicles on emergency routes. When work is required in emergency routes, provide necessary traffic control, including flagmen, to provide emergency access. Submit a plan to the City's Representative for review within 14 calendar days of the Notice to Proceed to maintain emergency access and operator access to all operating facilities during construction. As circumstances and conditions change, submit revised access plans to the City's Representative. Immediately restore and pave emergency routes when Work is finished.
- D. The location of Contractor storage and parking areas on City property will be designated by the City's Representative, subject to change as operational requirements dictate.
- E. Access to the site for Contractor's and sub-contractor's employees, materials, tools, and equipment shall be from Quarry Street. Any damage to off-site and on-site roads must be repaired in kind at no cost to City or property owner.
- F. Follow the requirements of the traffic control plan for haul routes and site access. If special circumstances require modifications to the established haul routes and site access, consult with City and governing authorities for exceptions to the traffic control plan requirements. If no traffic control plan is in effect, consult with City and governing authorities and establish thoroughfares which will be used as haul routes and site access.

## **1.7 Temporary Controls**

### **A. Noise Control**

Comply with local noise ordinances and OSHA regulations for acceptable noise exposure, including scheduling Work to comply with noise ordinances and installing sound barriers, if needed to comply with noise ordinances and Contract Documents. All internal combustion engines in vehicles and construction equipment shall be equipped with manufacturer-recommended mufflers. Do not operate noise-generating construction equipment except during normal working hours unless written permission is obtained from City's Representative. Back up bells on equipment may only be operated between 7:00 a.m. and 5:00 p.m. Monday - Friday. Air compressors and diesel engine-driven equipment operation will not be permitted between 5:30 p.m. and 7:00 a.m. Monday-Friday. Temporary generators will be permitted to operate between 7:00 a.m. and 5:30 p.m. Monday – Friday providing the generator noise level will not exceed 85 dB at 3 feet. If noise at doorstep of any

private residence exceeds allowable noise specified, City may require Contractor to pay each affected household \$200 per day to cover expenses of alternative lodging.

It is the City's desire to maintain a courteous relationship with the residents adjacent to the construction site. Prior to construction mobilization, the City will prepare and distribute a letter to the surrounding residents informing them of the pending construction and expected schedule of activities. In support of this, the Contractor's employees will be expected to conduct their work in a professional manner compatible with a residential neighborhood environment.

Occupied residences and a public park border all sides of the project site. Noise abatement shall consist of no undue noise and all motors will be equipped with proper mufflers. Install primary sound attenuation measures around air compressors, generators, and other engine-driven devices. All internal combustion engines in vehicles and construction equipment shall be equipped with manufacturer-recommended mufflers.

Schedule Work as necessary to minimize noise between 5:00 p.m. and 7:00 a.m. Do not operate noise-generating construction equipment except during normal working hours unless written permission is obtained from City's Representative.

#### **B. Fire Prevention**

Minimize fire danger at and near construction site. Protect surrounding private property from fire damage resulting from construction operations. Provide sufficient number of fire extinguishers of type and capacity required to protect the Work and ancillary facilities, per local fire code requirements.

#### **C. Storm Water Management**

Conduct storm water management operations and maintain controls as needed to prevent runoff or seepage from entering excavations and to control erosion in conformance with Federal, State and local regulations and requirements of Specifications Section 01 57 23. Legally dispose of surface water, and subsurface water. Do not allow mud, silt, or debris to flow on to adjoining or public property.

#### **D. Protection of Existing Improvements**

Exercise care to avoid injury to existing improvements, adjacent property, and trees and shrubbery that are not to be moved. Protect from injury or damage trees and shrubbery that are not to be moved, poles, fences, signs, property corners, all underground pipe and conduit, and other improvements within or near the work area. If such objects, or improvements, are injured or damaged by reason of the Contractor's operations, they shall be replaced or restored, at the Contractor's expense, to a condition at least as good as prior to construction operations.

#### **E. Protection of Existing Utilities**

For the purpose of the Contract Documents, utilities shall be considered as including but not limited to, and irrespective of ownership: pipelines (including irrigation lines), conduits, transmission lines, and appurtenances of "Public Utilities" (as defined in the Public Utilities Act of the State of California), and those of private industry, business, or individuals solely for their own use or their tenants; and storm drains, sanitary sewers, street lighting, traffic signal systems, duct banks, telephone cables, power

lines, cable television, fiber optic lines, gas lines, petroleum lines, transmission cables, and completely buried structures, hereafter referred to as utilities.

City has endeavored to locate and indicate on the Contract Documents, utilities that exist within the limits of the project, as derived from information provided by the owners of such utilities. However, the accuracy or completeness of the utilities indicated on the Contract Documents is not guaranteed. No attempt has been made to show service connections on the Contract Documents. It shall be the Contractor's responsibility to make his own investigations, including exploratory excavations to determine exact location of utilities shown on the Contract Documents and locations of service connections prior to earthwork operations and to notify the City's Representative of any utility which has been incorrectly shown or omitted from the Contract Documents.

Protect in place, at no additional cost to City, all existing utilities running parallel to proposed pipelines, sewers, conduits, structures and all other improvements. This includes protection in place of all backfill above the utility and pipe bedding.

Work required in connection with utilities, because of interference with Contract Work, will be performed and paid for as specified in this section. However, when directed or approved by the City, changes in line or grade of any structure being built may be made in order to avoid utilities. Any additional costs because of such changes will be paid for by change order as Extra Work.

The right is reserved to governmental agencies and to owners of utilities to enter at any time upon any street, alley, right-of-way, or easement for the purpose of making changes in their facilities and for the purpose of maintaining and making repairs.

The Contract Documents provide guidance regarding disclosure of utilities. This section provides guidance as to payment for protection relocation, or disposal of utilities shown and not shown on the Plans.

Do not begin any trench or excavation work until the Contractor has contacted a regional notification center as defined in California Government Code Section 4215 and the location of all utilities within the Project limits has been identified. If a Contractor hits a utility, take prompt action to make sure employees and the public are not endangered. If a water line is hit, the trench must be evacuated immediately. If an oil or gas line is hit, all employees and the public shall be evacuated from the immediate vicinity. Treat all conduits as though they are high voltage or high current electrical conduits. Do not tamper with any conduit until the owner is called and power shut off. In all cases, call the Fire Department and utility owner immediately.

#### **F. Advance Notification and Exposure of Utilities – In Advance of Work**

It shall be the Contractor's responsibility to determine and notify those agencies requiring advance notification for inspection or other purposes before beginning construction in any jurisdictional area of any agency. Provide at least two full working days (48 hours minimum) advance notice to the various agencies before beginning construction in the area unless specified advance times and other requirements are stated in the Contract Documents or in permit requirements.

Make exploratory excavations to determine the true location and depth of all utilities, services, and buried structures in the vicinity of the proposed work prior to any construction activity. Determine the type of material and condition of any utility which may be affected by or affect the Work. Conduct exploratory excavations a minimum

of five (5) days in advance of planned construction to provide sufficient lead-time to resolve utility conflicts.

All costs incurred in exposing utilities shall be included in the various bid items and no additional allowance will be made therefor.

#### **G. Utility Relocations by City**

When it is stated in the Contract Documents that a utility is to be relocated, altered, or reconstructed by other than the Contractor, City will conduct all negotiations in respect to such work and the Work will be done at no cost to the Contractor. No additional compensation will be given for delays or inconvenience by others to finish their work on schedule due to unforeseen difficulties.

#### **H. Utility Relocation by Contractor as Shown in the Contract Documents**

When work on a utility is specified on the Contract Documents or indicated on the drawings to be done by the Contractor, but is not included as a separate bid item, the Contractor shall make all arrangements and coordinate with the owner of the utility regarding schedule for performance of the Work. Any costs for such Work shall be included in the unit prices or included in the lump sum amounts bid for the various Contract items. Submit a proposed method of relocation or protection of the utility for review. Review by the City will not relieve the Contractor of any responsibility.

#### **I. Utility Relocation by Contractor for Contractor's Convenience**

The temporary relocation or the alteration of any utility, desired by the Contractor solely for convenience in the performance of the Work, to a position or condition other than that provided for on the Contract Documents shall be the Contractor's own responsibility. Make all arrangements with the property owners regarding such work. Any costs of such work for the Contractor's own convenience shall be absorbed in the unit prices or included in the lump sum amounts bid for the various Contract items at no additional cost to the City.

#### **J. Unknown Utility Installation by Others During Contract Work**

In the event a utility is disclosed or installed subsequent to the award of Contract, such utility not being indicated on the Contract Documents, with reasonable accuracy, and when said utility is found to occupy the space required to be occupied by a part of the permanent works, that, in the judgment of the City's Representative, such utility requires location, relocation, removal, repair of damages, alteration, support or protection, City will determine the method and manner of accomplishing such work and may order the Contractor to do so pursuant to a change order issued by City. Perform the Work in accordance with Contract Documents provided or approved by City and in accordance with the following:

1. When said utility is found to occupy the space required to be occupied by a part of the permanent Works to be constructed under the Contract or parallel to the permanent works and within vertical planes on each side at a distance away equal to the maximum allowable trench width measured at a point 12 inches above the top of the pipe, exclusive of branches or other facilities, as specified in the Specifications for Earthwork, or to be within the specified excavation pay lines (when such are specified in the Contract Documents);

City shall arrange for the relocation or alteration of said utility or require the Contractor to do the same.

2. Utilities found to cross the excavation, but not intercepting the permanent works to be constructed or interfering with the construction will be maintained in place at the Contractor's expense. Utilities which interfere with the construction technique in use will be protected or relocated.
3. When said utility is more or less parallel with, and any portion of it does not lie within the vertical planes specified herein above, or does not lie within the excavation pay lines (when such are specified or shown on the Contract Documents); advise City and owner thereof, and in cooperation with the owner of the utility, provide and place the necessary support for proper protection to guarantee continuous and safe operation of the utility.
4. Maintain continuous sanitary sewer service at all times. Should any existing sanitary sewer or manhole extend within the proposed excavation, submit a method of construction or support for approval by the City and assume all responsibilities therefor. All costs for such work shall be borne by the Contractor.
5. If the Work is done by others, provide time and working space for protection and relocation as required.
6. Where undisclosed utilities are discovered and located by the Contractor when performing this Contract, immediately notify City in writing.
7. City will compensate the Contractor for its direct costs of locating, relocating, removal, repair, support or protection of the undisclosed utilities, together with the cost of equipment used for the Work necessarily idled during such Work. The Contractor will be granted an extension of time for the completion of the Contract equal to the time determined by City, to be reasonably necessary to perform the Extra Work and City will not assess liquidated damages against the Contractor for delay in completion of the Work when such delay was caused by the failure of City to provide for the removal or relocation of such utility facilities.
8. The Contractor will not be entitled to extra compensation or an extension of time when Extra Work is required to repair damage to undisclosed utilities caused by the failure of the Contractor to exercise reasonable care. The Contractor will not be entitled to any compensation for indirect or consequential costs or damages incurred as a result of the Extra Work required.

#### **K. Monuments, Survey Markers, and Bench Marks**

1. Do not disturb any monuments, survey markers, or bench marks without permission from the City's Representative or Engineer.
2. Bear the expense of resetting any monuments, survey markers, or bench marks which may be disturbed without permission.
3. File a corner record form referencing survey monuments subject to disturbance in the Office of the County Surveyor prior to start of construction and also prior to completion of construction for replacement of any survey monuments. Such points shall be referenced and replaced with appropriate monumentation by a Registered Land Surveyor or a Registered Civil Engineer authorized to practice land surveying within the State of California.

#### **L. Protect Landscaping, Vegetation, and Irrigation Facilities**

1. During the progress of construction take proper precautions to prevent damage to trees, plants, and shrubs. The piling of excavated material, equipment, construction materials, or anything else on top of branches or against the tree trunks will not be permitted. Notify the City of any potential impact to any protected tree or plant, and do not damage, move or otherwise harm said tree or plant prior to investigation and direction from the City. Costs associated with damage to any protected tree or plant shall be the sole responsibility of the Contractor.
2. Protect, or replace in kind, at no additional cost to the City, existing irrigation facilities affected by the Work. Irrigation system record drawing information is typically missing or incomplete. Therefore, the project plans do not show the details of the existing irrigation system. Locate irrigation piping, spray heads, control wiring, and controllers and modify all components of the irrigation system during the progress of the Work to continue irrigating existing landscaping and vegetation as necessary to maintain the health of existing plants, trees, and vegetation.

#### **M. Historical or Archaeological**

Should any items having historical or archaeological interest be discovered in the course of any construction activities, halt work and notify the City's Representative immediately. Perform an on-site inspection under direction of the City-retained Archaeologist. Use the on-site inspection to make recommendations to the City and other applicable jurisdictions for determination of mitigation actions to be taken.

If cultural resources are encountered at any time during project excavation, avoid altering these materials and their context until a qualified archaeologist has evaluated the situation. Project personnel will not collect or retain cultural resources. Prehistoric resources include, but are not limited to, chert or obsidian flakes, projectile points, mortars, and pestles; and dark, friable soil containing shell and bone, dietary debris, heat-affected rock, or human burials. Historic resources include stone or adobe foundations or walls; structures and remains with square nails; and refuse deposits (glass, metal, wood, and ceramics) often found in old wells and privies.

Records of site inspections will be maintained in the City's administrative records. Following construction, a post-construction site inspection will be made to determine the degree to which the final site modifications have impacted site descriptions and future access.

#### **N. Human Remains**

In the event of accidental discovery or recognition of any human remains, the County Coroner must be notified immediately and construction activities halted. If the remains are found to be Native American, the Native American Heritage Commission must be notified within 24 hours. Follow the guidelines of the Native American Heritage Commission regarding the treatment and disposition of the remains.

**O. Protection from Weather**

Heat and ventilate work areas to protect the Work from damage by freezing, high temperatures, weather, and to provide safe environment for workers.

**P. First Aid Information**

Post first aid facilities and information posters conforming to requirements of OSHA and other applicable Laws and Regulations in readily accessible locations.

**Q. Vector Control**

Provide rodent and pest control as necessary to prevent infestation of construction or storage areas. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.

**R. Odor Control**

Furnish all labor, materials, and equipment required to carry out effective measures wherever and as often as necessary to prevent the discharge of a nuisance odor from its operation into the atmosphere in such quantity as will violate the regulations of any legally constituted authority. Notify the City's Representative at least forty-eight (48) hours in advance of any potential odor-causing activities scheduled for construction.

**S. Chemicals**

The following paragraph does not relieve the Contractor from its responsibility for obtaining prior approval from the City for chemical usage when otherwise required.

Provide four (4) copies of the MSDS to the City's Representative for all chemicals used during construction or operational activities, prior to bringing them on site, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, which shows approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use and dispose of residues of all such chemicals in strict accordance with the printed instructions of the manufacturer.

**T. Explosives for Blasting**

The use of explosives on the Work shall not be permitted.

**U. Protection of Wildlife**

If any work in this Contract might disturb wildlife, even in urban areas, hire a Biological Monitor to provide assistance in the field to assure that biological resources are protected and that project-specific mitigation measures are implemented. Perform biological survey within 150 feet of limits of construction prior to beginning construction (February 1 thru August 31) to identify nesting birds. The Biological Monitor shall be qualified for the tasks to be performed. If endangered or threatened species are present in the project area and require removal or relocation, the Biological Monitor must hold the appropriate permits and approvals for access and capture or marking of the species of concern. Specific activities of the Biological Monitor may include the following:

- Marking areas to be protected from construction activity.
- Observing construction activities and their impacts on biota.
- Capturing and relocating biota as necessary to protect them from construction activities.

Prior to the removal or relocation of healthy trees at a worksite, a Biological Monitor must survey the trees to determine if active bird nests are present. If nests of sensitive species are present, tree removal or relocation will be scheduled to avoid the nesting season. Provide a written record of whether tree removal or relocation is required, and as needed, hire a biologist or provide documentation that nesting birds (listed species of special interest of those as threatened or endangered) are not present in the trees to be removed or relocated.

## **V. Surface Water Diversions and Groundwater Dewatering**

Include all costs for providing materials, equipment, power, labor, and related expenses associated with diverting surface water runoff from excavations, dewatering surface water that enters the excavations, and dewatering groundwater within the excavations within each associated bid amount. Construct, operate and remove Well Points (if necessary) or pumping locations in the excavations to adequately remove water from within the excavations during construction.

Perform all dewatering in conformance with all safety regulations and RWQCB requirements. Obtain all permits and clearances from any and all regulatory agencies. Perform monitoring where required by RWQCB.

Construct all permanent improvements in areas free from water. Construct and maintain all permanent or temporary slopes, dikes, levees, drainage ditches, and sumps necessary for removal of water from work areas. Design, furnish, install, maintain, and operate all necessary pumping and other dewatering equipment required for dewatering the various work areas and for maintaining the foundation and other work areas free from water from any and all sources whatsoever.

Perform no excavation below any standing water level regardless of water source until the area has been dewatered. Perform dewatering by use of filtered well points or gravel-packed deep wells in such a manner as to protect adjacent structures.

Accomplish dewatering in a manner that will prevent loss of fines from the foundation, will maintain stability of all excavated slopes and bottoms of excavations, and will permit all construction operations to be performed in the dry. Perform dewatering of excavations to the extent required to permit placement of compacted fill materials in the dry and to prevent sloughing of the excavation side slopes. Lower the groundwater level a minimum of three feet below foundation grade prior to foundation preparation and placement of structural foundations. During the placement and compaction of fill or bedding materials, maintain the water level at every point within the limits of fills being placed a minimum of three feet below fill placement level.

Dewatering shall consist of furnishing all approved Plans, labor, equipment and materials, performing all Work to design, construct, and operate dewatering systems, maintaining in a safe and dewatered condition the areas on which the construction Work will be performed, and removing the dewatering system upon completion of the Work.

Submit for the City's review, drawings and data showing the proposed plan for dewatering of all work areas, which shall include the planned method of dewatering, excavation and shoring plan, location and capacity of such facilities as dewatering wells, well points, pumps, sumps, collection and discharge lines, standby units proposed, and protective fills and ditches required for control of groundwater and surface water. Submit the plan for dewatering to the City's Representative 15 days prior to the start of construction. Furnish such other information as may be required for the complete understanding and analysis of the dewatering and excavation plan by the City's Representative.

Review by the City's Representative will not relieve the Contractor of the responsibility for the adequacy of the dewatering and excavation plan or for furnishing all equipment, labor and materials necessary for performing the various parts of the Work. If, during the progress of the Work, it is determined by the City's Representative the dewatering system and excavation plan are inadequate or the Contractor's plan of construction is inoperative, the Contractor shall, at his expense, furnish, install, and operate such additional dewatering equipment and make such changes in other features of the plan or operation as may be necessary to perform the Work in a manner satisfactory to the City.

Monitor settlement and groundwater levels around existing structures during dewatering. Keep and evaluate daily records of settlement and groundwater levels. Notify the City's Representative immediately if excessive settlement or a significant drop in groundwater level is recorded.

Furnish standby equipment of sufficient size and capacity to insure continuous operation of the dewatering system as designed. Repair any damage or settlement to the foundation or other work or any existing structures caused by temporary or permanent failure or operation of the dewatering system to the satisfaction of the City at the Contractor's expense. The Contractor should consider the use of recharge systems or other methods of protecting existing facilities. The Contractor will be required to perform the dewatering and to maintain the permanent work areas for the length of time as required by the Earthwork Specifications, or for such additional time as necessary for the Work under this contract. Upon completion of the dewatering and control of water operation, remove all temporary works and dewatering facilities in a manner satisfactory to the City.

Dispose of water from dewatering operations in a suitable manner in conformance with the National Pollutant Discharge Elimination System (NPDES) Permit, as approved by the Regional Water Quality Control Board, Santa Ana Region (RWQCB).

## **1.8 Traffic Regulation**

- A. Maintain traffic control at all times and protect the work area, equipment, personnel, private property, and the public with adequate barricades, lights, signs, and warning devices per the current Work Area Traffic Control Handbook (WATCH) Manual, or the City-approved traffic control plan prepared for the project, and at the direction of the City's Representative.
- B. Implement whatever traffic control measures may be required to facilitate the Work of this contract, at no additional cost to City.

## **1.9 Safety and Health Regulations**

- A. Comply with Safety and Health Regulations for Construction, promulgated by the Secretary Standards Act, as set forth in Title 9, C.F.R. Copies of these regulations may be obtained from Labor Building, 14th and Constitution Avenue NW, Washington, DC 20013.
- B. Comply with the provisions of the Federal Occupational Safety and Health Act, as amended, and with all applicable State of California, Department of Industrial Relations, Construction Safety Orders (Cal-OSHA) requirements.
- C. Prepare and submit one copy of Contractor's Injury and Illness Prevention Program.
- D. Comply with all federal, state, and local laws, regulations, and requirements for handling and storage of chemicals.
- E. Monitor for explosive gas levels.
- F. Confined Spaces:
  1. The Contractor's attention is directed to the General Industry Safety Orders of the State of California Article 108, Confined spaces, Section 5157. (Title 8 of California Code of Regulations, Sections 5156, 5157, and 5158.)
  2. Retain a copy of said regulations on the worksite.
  3. State law and City's policy on confined spaces require a two-week advance notification from the Contractor for work within confined spaces, submittal of Contractor's confined space work procedures and rescue plan, compliance with Entry Permit procedures, participation in a hazard assessment review of planned precautions and a debriefing upon completion of the confined space operation. Compliance with the General Industry Safety Orders remains the Contractor's responsibility and City review is for general compliance and coordination only.
  4. This notice is provided for bidding purposes. In accordance with the General Industry Safety Orders, Section 5157(c)(8), City will provide available information to the Contractor for each confined space location.

CONFINED SPACE WORK AREA(S)

- a. Work areas for which entry is expected to be in accordance with Section 5157 (c)(5), Non-Permit required Confined Spaces;
- b. Work areas in which hazardous or potentially hazardous atmospheric conditions exist or may exist shall be in accordance with Section 5157 (d), (e) and (f) (Permit-Required Confined Space):
  - None

It is the Contractor's obligation to satisfy all requirements of Title 8, CCR 5157.

Attention is also directed to "Sewer System Entry", Appendix E to CCR 5157.

NOTE: A permit required confined space may be reclassified by City Safety staff to a non-permit required confined space at the Contractor's expense through the provisions set forth in 5157 (c)(7), or a listed non-permit required work area may become a permit required confined space work area.

The importance of working safely in confined spaces cannot be over emphasized. Due to the continuous flow of sewage and contaminant that

may be contained therein, the atmosphere may suddenly and unpredictably become lethally hazardous. Where there is conflict between applicable safety orders, laws and regulations and policies, the more stringent measures shall apply.

G. Job Hazard Analysis:

Comply with the provisions of the Hazards Communication Act (CCR Title 8, Section 5194). If hazardous substances are to be utilized or handled in the course of the Contractor's activities, before commencing each task conduct a job hazard analysis for the City. The analysis shall document the following:

1. Hazard communications program.
2. Safety precautions for all persons who may be exposed to hazardous substances utilized by the Contractor as presented in the Construction Safety Plan.
3. Number of people to be involved in the Work.
4. Written verification that all safety measures will be carried out.
5. Written verification that required safety equipment is available.

H. Be especially careful to avoid fire hazards in all welding, cutting, and equipment fueling. Furnish all safety devices, fire extinguishers and fire watch personnel required to protect the Work and provide for worksite and public safety.

I. Excavation Plans for Worker Protection Required by California Labor Code Section 6705:

1. All excavations must be performed, protected, and supported as required for safety and in a manner set forth in the operation rules, orders, and regulations prescribed by the CAL/OSHA Construction Safety Orders.
2. Submit to City for acceptance, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of any trench, pit, or excavation for structures five (5) feet or more in depth. The plan shall be prepared and signed by a California registered civil or structural engineer as required by all applicable laws including CAL/OSHA construction safety orders. As a part of the plan, include a note stating the registered civil or structural engineer certifies the plan complies with the CAL-OSHA Construction Safety Orders, or that the registered civil or structural engineer certifies the plan is not less effective than the shoring, bracing, sloping, or other provisions of the Safety Orders.
3. Include in the shoring and bracing plan the sequence and procedure for installation and removal of the shoring system components.
4. The City or its Engineer(s) may have made investigations of subsurface conditions in areas where the work is to be performed. If so, these investigations are provided for the Contractor's use, but not made a part of the Contract Documents. Records of such investigations, if performed, are available for inspection at the City's office. See the Contract General Conditions for more information regarding soils investigations.
5. The detailed plans showing the design of shoring, etc., which the Contractor is required to submit to City for acceptance in advance of excavation, will not

be accepted by City if the plan is based on subsurface conditions which are more favorable than those revealed by the investigations made by City or its Engineer(s); nor will the plan be accepted if it is based on soils-related design criteria which are less restrictive than the criteria set forth in the report on the aforesaid investigations of subsurface conditions.

6. Include in the detailed plans showing the design of shoring, etc., the surcharge loads for nearby embankments and structures, for spoil banks, and for construction equipment and other construction loading. Indicate on the plans, for all trench conditions, the minimum horizontal distances from the side of the trench at its top to the near side of the surcharge loads.
7. Maintain excavations within street right-of-way and easements.
8. Do not use a shoring system as a form for cast-in-place concrete. Provide adequate space between structure and shoring system for installation and removal of forms. Where space between shoring and structure is not sufficient to provide adequate backfill compaction equipment, backfill with two-sack sand cement slurry.
9. Nothing contained in this section shall be construed as relieving the Contractor of the full responsibility for providing shoring, bracing, sloping, or other preventive measures which are necessary for worker protection, nor for the liability resulting from the failure to do so.

#### Excavations Below Four (4) Feet

Perform all work in excavation below four (4) feet in accordance with General Conditions Article 17.

Nothing in this section is intended to relieve the Contractor of the responsibility to fully examine the Contract Documents and the site where the work is to be performed in accordance with the General Conditions; to be familiar with all local conditions and federal, state, and local laws, rules and regulations that may affect the performance of any work; to study all surveys and investigative reports about subsurface and latent physical conditions pertaining to the worksite; to perform such additional surveys and investigations as the Contractor deems necessary to complete the work at the bid price; and to correlate the results of all such data with the requirements of the Contract Documents.

In the event a dispute arises between City and the Contractor involving hazardous waste and whether site conditions differ materially from those the Contractor could or should have discovered by the investigations required by these Contract Documents, the Contractor shall not be excused from the scheduled completion date provided in the Contract Documents and shall proceed with all work in the manner and in the time required by the Contract Documents.

#### J. Open Trenches

1. No trench may be left open overnight unless authorized in writing by the City's Authorized Representative.
2. Cover open excavations with steel plates in areas requiring vehicle/truck traffic when not in use. Provide safety fencing around the entire area at all other excavations when not in use.

## **1.10 Site Security**

- A. Safely guard all Work, materials, equipment and property from loss, theft, damage and vandalism. Project site is subject to vandalism. Contractor's duty to safely guard property shall include the City's property and other private property from injury or loss in connection with the performance of the Contract.
- B. Upon completion of each day's work, leave the work area secure and free of hazards. Provide necessary temporary signs, warning devices, chain link fences, and barricades.
- C. Make no claim against the City for damage resulting from trespass. City is not responsible for items lost, damaged, or stolen from construction or storage areas or for injuries to the public due to unsafe conditions.
- D. Party responsible for security shall make good all damage to property of City and others arising from failure to provide adequate security.
- E. If existing fencing or barriers are breached or removed for purposes of construction, provide and maintain temporary security fencing equal to the existing in a manner satisfactory to the City.
- F. Protect temporary and permanent fence, gate, and driveway openings to prevent intrusion by unauthorized persons. Bear responsibility for protection of equipment and material on site of the Work when openings are not closed. Provide temporary fencing around construction staging area. Fence temporary openings when openings are no longer necessary.
- G. Provide temporary access to all adjacent properties during non-construction hours.
- H. During night hours, weekends, holidays, and other times when no work is performed at site, provide temporary closures or enlist services of security guards to protect temporary openings.
- I. Install and maintain for the duration of construction a remotely monitored site surveillance system to include video cameras mounted on temporary poles. Install surveillance system to provide full video surveillance of site with connection to monitoring station where police can be notified when unauthorized activity occurs.
- J. Maintain security program throughout construction until City's acceptance and occupancy precludes need for Contractor's security program. Remove surveillance system following notice of substantial completion.
- K. All costs for security as specified in this Section shall be borne by the Contractor.

## **1.11 Unit Prices**

- A. Payment for mobilization, demobilization, including payment for construction, modification, maintenance, removal and restoration associated with access, and storage facilities, will be included in the price bid for major items of Work for which mobilization is required.
- B. Payment for verification of field dimensions and utility locations will be included in the price bid for items of Work which may require relocation or refitting if field dimensions differ from those shown on plans.

- C. Payment for work necessary to develop water sources for construction use will be included in the price bid for items to which it is appurtenant. Payment under these items will include full compensation for furnishing labor, products, tools and equipment and doing work necessary to develop sufficient water supply and furnishing necessary equipment for applying water as specified.
- D. Payment for temporary utilities to be furnished by Contractor for construction use will be included in the price bid for items to which it is appurtenant. Payment under these items will include full compensation for furnishing labor, products, tools, and equipment and doing work necessary to obtain, distribute, and use temporary utilities for construction purposes.
- E. Payment for providing construction aids to be furnished by Contractor in support of construction activities will be included in the price bid for items to which it is appurtenant. Payment under these items will include full compensation for furnishing labor, products, tools, and equipment and doing work necessary to obtain, distribute, and use temporary utilities for construction purposes.
- F. Payment for dust control, including dust palliatives and water supply and application will be included in the price bid for items of Work for which dust control during construction is appurtenant.
- G. Payment for costs arising from fire or prevention of fire will be included in the price bid for items of Work for which fire protection during construction is needed.
- H. Payment for noise control will be included in the price bid for items of work where noise control is required during construction.
- I. Payment for complying with safety and health regulations will be included in the price bid for items to which it is appurtenant. Payment under these items will include full compensation for furnishing labor, products, tools, and equipment and doing Work necessary to comply with safety regulations and requirements.
- J. Payment for providing site security will be included in the price bid for items to which it is appurtenant. Payment under these items will include full compensation for furnishing labor, products, tools, and equipment and doing work necessary to comply with site security requirements.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 55 26  
TRAFFIC CONTROL**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Mobilization, temporary signs, barriers, lights and flagging personnel.
- B. Maintain Traffic and Detours for all portions of this contract within or adjacent to public rights-of-way and streets and drives, and replace all striping, reflectors, dots, or other traffic control materials in kind.
- C. Maintain traffic throughout Project duration in conformance with Contract Documents and public agency permits. Furnish, construct, maintain and finally remove detours, road closures, lights, signs, barricades, fences, miscellaneous traffic devices, flagmen, and reconstruct paving and other such items and services necessary to safeguard the public from hazard and inconvenience. All such work shall comply with the ordinances, directives, and regulations of authorities with jurisdiction over the public roads in which the construction takes place, and over which detoured traffic is routed by the Contractor.
- D. It is the intent of the Contract Documents to provide for adequate traffic detour routing and signing to maintain a smooth and safe flow of traffic through and around construction areas.

**1.2 Related Work**

- A. Section 01 31 13: Access and Coordination
- B. Section 01 33 00: Submittal Procedures
- C. Section 01 40 00: Quality Requirements
- D. Section 01 61 00: Common Product Requirements
- E. Section 01 65 00: Product Delivery Requirements
- F. Section 01 66 00: Product Storage and Handling Requirements
- G. Section 01 73 00: Execution

**1.3 References**

- A. Caltrans Standard Specifications Section 12-3.01
- B. Caltrans Manual of Traffic Controls
- C. State of California, Department of Public Works "Manual of Warning Signs, Lights, and Devices for Use in Performance of Work Upon Highways"
- D. Work Area Traffic Control Handbook (WATCH Manual)

**1.4 Submittals**

- A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Traffic Control Implementation Plan	Required thirty days before beginning of construction. Submit to respective authority or authorities having jurisdiction over public right-of-way in which construction occurs.	.
	Include proposed street closure schedule, if any	
	Include names and cell phone numbers of parties responsible for maintenance of traffic control devices.	

SUBMITTAL	DESCRIPTION	
	Do not start construction until City encroachment permit with traffic control requirements are approved in writing by City.	

**1.5 Permanent Traffic Controls**

- A. All existing permanent traffic control signs, barricades and devices shall remain in effective operation unless a substitute operation is arranged for and approved by the appropriate jurisdiction as a portion of vehicular traffic control above, except inductive traffic loops, and magnetometer traffic detectors.
- B. Replace inductive traffic loops damaged or removed during construction in kind, from the nearest pullbox, in accordance with appropriate provisions of Section 86 "Signals and Lighting" of the Caltrans Specifications (except measurement and payment), and the existing record drawings for each intersection involved. Obtain copies of these record drawings from the offices of the respective authorities.

**1.6 Unit Prices**

- A. Payment for the Work in this section shall be included as part of the lump-sum or unit-price bid amount for which such Work is appurtenant thereto.

**PART 2 – MATERIALS (Not Applicable)**

**PART 3 – EXECUTION**

**3.1 Preparation**

- A. After award of contract, submit to appropriate jurisdiction his proposed schedule for closure based on the Traffic Control Plan and comply with the requirements specified herein. Make this submittal sufficiently in advance of any rerouting or diversion of traffic by the Contractor to allow for a review of Contractor's proposed traffic control by the appropriate jurisdiction(s).
- B. Submit street closure schedules ten working days prior to closing the affected street.
- C. Before start of construction, provide fire and police departments in whose jurisdiction the project lies with construction schedule showing expected starting date, sequence of work, and timing for each phase of construction completion date, and name and telephone number of two responsible persons who may be contacted at any hour in the event of a condition requiring immediate correction.
- D. Inform affected property owners seventy-two (72) hours prior to blocking driveways with any pipe installation or other work. After working hours, backfill trenches and restore access to all driveways. If requested by City's Representative during working hours, provide access over the trench from any driveway previously blocked.
- E. Notify appropriate jurisdiction at least ten working days in advance of closing or partially closing any street or alley and comply with jurisdictional requirements. In addition, notify the appropriate police or sheriff's department and fire department at least two working days in advance of such closing.
- F. Allow passage of public transportation coaches through construction area at all times. Notify appropriate public transit agency at least 48 hours prior to construction affecting

bus stop zones to allow said transit agency to temporarily abandon and relocate bus stop zones within construction area.

- G. Immediately notify the above parties upon completion of construction work and opening or reopening of any street or alley.

### **3.2 Installation**

- A. Refer to Section 01 70 00 for basic execution and installation requirements.
- B. Furnish and install traffic control devices at locations shown on Plans and Submittals.
- C. The following installation standards shall apply:
  - 1. Manufacturer's installation and warranty requirements
  - 2. Applicable OSHA and Cal OSHA regulations
  - 3. Caltrans Standard Specifications Section 12-3.01
  - 4. Caltrans Manual of Traffic Controls
  - 5. Work Area Traffic Control Handbook
  - 6. Other applicable code requirements
- D. Place temporary "No Parking" signs as follows:
  - 1. Post "Temporary No Parking" signs at least seventy two (72) hours in advance of first date of work and required enforcement. If work is to begin on either a Monday or Tuesday, post signs on preceding Friday.
  - 2. Each sign must include text indicating beginning and end dates and hours in effect. "Tow-Away" and "No Parking" must appear on each sign face.
  - 3. If it is required to temporarily restrict parking 24 hours/day, then "Tow-Away" and "No Parking Any Time" must appear on each sign face.
  - 4. Mount signs on either 1" x 2" x 3' high wood stakes, Type II barricades, or 39-inch high delineators.
  - 5. Place signs at approximately 100' intervals on affected side(s) of the street. Do not post signs on trees, traffic signal poles, utility poles, street lights, or any other street furniture.
  - 6. Signs shall be professionally made of moisture-resistant, heavy duty cardboard or other approved material.
  - 7. Maintain all signs and keep free of graffiti. Replace any sign that becomes illegible or is removed within twenty-four (24) hours.
  - 8. Contractor shall only be permitted to restrict parking for the minimum time necessary to complete on-going work. Remove and repost "Temporary No Parking" signs when work will be delayed more than five (5) consecutive days, or if the work must go beyond the end date shown on the signs, or otherwise directed by City's Representative.
  - 9. Notify applicable police or sheriff's department, for review and enforcement. Parking restriction cannot be enforced until Police or Sheriff are notified and signs have been in place 48 hours.
  - 10. Maintain signs through the day of work. Remove all signs on or within one calendar day of Work completion within the restricted parking area.
  - 11. If a street scheduled for slurry or cape sealing was missed, immediately remove all "No Parking" signs and notify all residents and others previously

notified, with printed notices, that due to unforeseen circumstances, Contractor was not able to seal the street as previously notified, that the street will be rescheduled in approximately 1 to 2 weeks, and that they will be re-notified. Contractor shall, on the job site prior to the start of each day's work, have an adequate supply of approved letters of notification to residents for missed streets.

E. Place, or cause to occur, street closures, detours and barricades as follows:

1. Provide notifications of public agencies required above.
2. Install, maintain, and remove all temporary delineators, barricades, lights, warning signs and other devices necessary to control traffic as specified in Contract Documents and approved Traffic Control Plans.
3. Materials for a temporary facility may be provided from new or used materials. If used materials are provided, they shall be sound, in good condition and otherwise meet the requirements of new materials. All traffic control devices shall be free of graffiti, and immediately clean and/or replace any device to the satisfaction of City.
4. Where streets in which improvements are being constructed are specified hereinafter to be closed to through traffic, such closures shall apply only to portions of such streets where construction is actually in progress.

F. Protect open excavations and trenches as follows:

1. Provide temporary railing (Type K) per Caltrans Standard Plan T3, five-foot high chain link fences, or equivalent protection, to completely enclose all open excavations over three feet (3') in depth.
2. Fencing may be removed during working hours to extent necessary to provide access and working room, in which case Contractor shall provide equivalent security, to City's satisfaction during said periods. Completely backfill any excavation not secured to City's satisfaction prior to end of each day's construction activities.
3. When backfilling operations of an excavation in the traveled way, whether transverse or longitudinal cannot be completed within a work day, steel plate bridging with a non-skid surface and shoring may be required to preserve unobstructed traffic flow. In such cases, the following conditions shall apply:
  - a. Steel plate used for bridging shall extend at least 12-inches beyond trench edges.
  - b. Install steel plate bridging to operate with minimum noise.
  - c. Adequately shore trench to support the bridging and traffic loads.
  - d. Use temporary paving with cold asphalt concrete to feather plate edges where posted speed limits are 45 miles per hour or less
  - e. Secure bridging against displacement by using adjustable cleats, shims, or other devices.
  - f. Where posted speed limits exceed 45 mph, cold plane pavement to a depth equal to plate thickness and width and length equal to the plate dimensions.
  - g. Where posted speed limits are 45 mph or less, attach approach plate(s) and ending plate (if longitudinal placement) to roadway by a minimum of two (2) dowels pre-drilled into the corners of the plate and drilled 2-

inches into the pavement. Butt subsequent plates to each other. Compact fine grade asphalt concrete to form ramps, maximum slope of 8.5% with a minimum 12 inches of taper to cover all steel plate edges. When steel plates are removed, backfill dowel holes in pavement with either graded fines of asphalt concrete mix, concrete slurry or an equivalent slurry satisfactory to appropriate jurisdiction responsible for road maintenance.

- h. Maintain steel plates, shoring and asphalt concrete ramps. Plate thicknesses shall be as follows: (A-36 grade steel, designed for HS20-44 truck loading).

TRENCH WIDTH	MINIMUM PLATE THICKNESS
0-10"	1/2"
10" -1'-11"	3/4"
1'-11" - 2'-7"	7/8"
2'-7" - 3'-5"	1"
3'-5" - 5'-3"	1 1/4"
5'-3" and wider	Submit structural design prepared by California registered civil engineer

- i. Steel plates shall be non-skid.
  - j. Advance signs shall be required for steel plates within traveled ways (Type P per the WATCH Manual or a "Rough Road" sign (W33) per Caltrans requirements).
- G. Provide signs as required herein and by accepted Traffic Control Plans.
- H. Prior to start of each work day, perform all necessary work incidental to and commensurate with proper signing, detouring, barricading, etc., required for that particular day's schedule of operations. Do not begin construction until such signing and detouring operations have been completed.
- I. At project completion, replace original striping pattern, unless directed otherwise by City's Representative.
- J. All signs and barricades shall be illuminated or reflectorized when used after sunset. Provide all delineators, cones, barricades or posts used to divert traffic with flashers or other satisfactory illumination if in place during darkness.
- K. Maintain 24-hour emergency service to remove, install, relocate, and maintain warning devices and furnish City's Representative and Police Department with names and telephone numbers of three persons responsible for this emergency service. In the event these persons do not promptly respond when notified by the City's Representative, City's Representative reserves the right to call other forces to accomplish such required emergency service, and Contractor will be held responsible for any and all costs incurred by City.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 57 23  
TEMPORARY STORM WATER POLLUTION CONTROL**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Stormwater Pollution Prevention Plans and pollution prevention during construction.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 74 00: Cleaning and Waste Management

**1.3 Submittals**

- A. Furnish the following submittals

SUBMITTAL	DESCRIPTION	
Stormwater Pollution Prevention Plan (SWPPP)	See Paragraph 1.4 below	

**1.4 Pollution Prevention and Stormwater Pollution Prevention Plan**

- A. This project will disturb an area greater than 0.999 acres. Comply with the current California State Water Control Board (SWRCB) General Construction Activity NPDES Stormwater Permit (General Construction Permit) for all construction disturbing one acre or more of land (including all staging areas, access routes, material storage yards, etc.) Prepare a Stormwater Pollution Prevention Plan (SWPPP) and Monitoring Plan (MP) using site-specific Best Management Practices (BMPs) to prevent impairment to surface water quality from construction site discharges to surface waters.
- B. For purposes of preparing a SWPPP, the project has been determined to have a risk level of 1.
- C. Pay all fines associated with failure to comply with Storm Water Pollution Prevention Plan (SWPPP) requirements of the Santa Ana Regional Water Quality Control Board, except where such fines are assessed due to the sole negligence of City.
- D. Prohibit rain runoff or other water from entering trenches and infiltrating to the groundwater by redirecting surface flows with berms, temporary drains, or other suitable measures. Pump water out of trenches as necessary to control water in excavations.

**1.5 Unit Prices**

- A. The cost for preparation of a SWPPP, compliance with SWPPP requirements, and compliance with storm water pollution prevention best management practices when no SWPPP is available, shall be included in the various bid items set forth in these documents and no additional compensation will be granted therefore.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 61 00  
COMMON PRODUCT REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Basic requirements for all products used in the Work. Products, as used herein, include purchased items for the incorporation into the Work, regardless of whether specifically purchased for the project or taken from Contractor's stock of previously purchased products. The terms product and equipment shall be used interchangeably. Materials are defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of work.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 40 00: Quality Requirements
- C. Section 01 63 00: Product Substitution Procedures
- D. Section 01 65 00: Product Delivery Requirements
- E. Section 01 66 00: Product Storage and Handling Requirements
- F. Section 01 73 00: Execution
- G. Section 01 77 00: Closeout Procedures
- H. Section 16010: General Electrical Requirements

**1.3 Quality Assurance**

- A. If products are furnished which differ from those shown and which require changes to enclosures, mounting and support structures, power and control circuitry or other work to accommodate furnished product, provide changes required at no additional cost to City and of same quality as shown.
- B. Select an option which is compatible with other products or materials where more than one choice is available for Contractor's selection of a product or material.

**1.4 Unit Prices**

- A. Payment for the Work in this section shall be included as part of the lump-sum or unit-price bid for which such Work is appurtenant thereto, and no additional payment will be made specifically for the Work in this Section.

**PART 2 - PRODUCTS**

**2.1 Acceptable Manufacturers**

- A. Products of listed acceptable manufacturers shall meet specifications notwithstanding the fact that manufacturer is "listed". City reserves right to reject submittals and products from "acceptable manufacturers" if they fail to demonstrate compliance with specifications.
- B. Similar items on Project shall be products of same manufacturer.
- C. Equipment furnished shall operate through its full operating range powered by amperages specified or shown on Plans. Equipment requiring a larger amperage

than specified or shown is unacceptable in the absence of a written statement from the City confirming the electrical infrastructure and switchgear can support the increased amperage.

- D. Where plans and specifications are silent regarding specific acceptable manufacturers, acceptable manufacturers shall meet the minimum requirements outlined in Section 01 63 00 for “approved equals.”

## **2.2 Materials and Equipment**

- A. Products shall be new and of current design and manufacture, free from defects and imperfection that might affect serviceability of the product for its intended purpose, unless otherwise stated.
- B. Products or work for which no technical specifications are set forth shall be of the best grade in quality and workmanship obtainable in the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to usual standards for first class products of the kind required, considering the use to which they are to be put. Work shall be in full conformity and harmony with the intent to secure the best standard of products and construction.
- C. Castings shall be sound, clean, free from porosity, cold shots, blisters, holes and defects of any nature that would render them unacceptable. No plugging, filling, brazing or welding of defects will be allowed.
- D. Products and workmanship shall match Contractor's submittals as reviewed by Engineer and/or City's Representative.
- E. Connections and mountings required to install products shall comply with connections and mountings shown in Contract Documents and Submittals on a location-specific basis. Do not assume approval of connections or mountings at one location constitutes approval of same at all locations.
- F. Notify City's Representative in writing at least 15 calendar days before testing of materials is required. Written notice shall include name of supplier along with contact information, address and telephone number for source of material.
- G. Materials and materials sources shall be reviewed by City's Representative at least three days before use of materials in Work.
- H. Conform to federal, state and local regulations governing VOC content, lead content, percentage solids by volume, and other paint and solvent properties.
- I. Corresponding parts of identical products shall be interchangeable.
- J. Materials for a complete paint or sealant system, including primer, finish coats, thinners, cleaners and drying agents, and other additives shall be the end products of one manufacturer to ensure product compatibility and unit responsibility.
- K. Design and fabrication of products shall ensure products withstand stresses and loads which may occur during testing, installation, start-up and normal operation.
- L. Products shall be capable of fulfilling their intended purpose in the environment in which they are installed. Allow for local temperature extremes, climactic conditions and corrosive environments where necessary to ensure proper functioning of furnished products.

- M. Stainless steel inscribed nameplates shall be securely fastened in conspicuous locations for mechanical equipment having moving parts. Show manufacturer's name, year of manufacture, serial number, principal rating data and equipment item number. Nameplates shall be in English and use American measuring units.
- N. All-thread or close nipples are prohibited.
- O. Mating ends of pipe shall match. Mating ends of valves, meters, equipment, and couplings shall match ends of adjacent pipe.
- P. Valves shall be marked to show name of manufacturer, year of manufacture, size of valve, maximum working pressure, and arrow to show direction of flow.
- Q. Valves shall close drip tight at rated pressures.
- R. Valves shall be satisfactory for applications involving valve operation after long periods of inactivity.
- S. Minimum working pressure of valves, couplings and fittings shall equal or exceed class of pipe to which they are attached or 150 psi, whichever is higher.
- T. Electrical equipment shall be built to NEMA and UL standards for NEC Article 505 Classification specified
- U. If products are furnished which differ from those shown and which require changes to enclosures, mounting and support structures, power and control circuitry or other work to accommodate furnished product, provide changes required at no additional cost to City and of same quality as shown.

## **PART 3 - EXECUTION**

### **3.1 Installation**

- A. Furnish mounts, guides, bearing plates, flanges, anchor and attachment bolts and screws, saddles, supports, pads and skids necessary to securely mount products and equipment.
- B. Tighten bolts to manufacturers' specifications using torque wrenches. Unless otherwise directed, use lubricant such as Copperkote or blue Teflon when making up bolts.
- C. Strictly follow manufacturer's instructions and warranty requirements for installation, application, connection, erection, maintenance, operating, cleaning and conditioning of products.
- D. Require manufacturers to furnish technical representative to visit site as needed to provide technical support in resolving field problems associated with manufacturer's product.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01630  
PRODUCT SUBSTITUTION PROCEDURES**

**PART 1 - GENERAL**

**1.1 Scope**

- A. Acceptable manufacturers, accepted alternates, and procedures for seeking product substitutions.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures

**1.3 General Requirements**

- A. Deadline for receipt of Substitution Requests shall be in accordance with General Conditions Article 7 - Substitutions.
- B. Standard Products - Where products are specified by reference standard, any product meeting the standards referenced may be used. Submit information on such products in accordance with the requirements of Section 01 33 00.
- C. Proprietary Products – Where products or processes are specified by trade, patent or proprietary name, said specification, unless marked "no exceptions", or "no substitutions", shall be deemed to be followed by the words "or accepted equal accepted in writing by City's Representative." In such case substitution of similar products as "accepted equals" will be considered under this section.
- D. Selection of Proprietary Product - Where more than one proprietary name is specified, Contractor may provide any one of the products specified. Use only one manufacturer for each specific application throughout the Work notwithstanding that similar materials or equipment of two or more manufacturers or producers may be specified for the same application.
- E. Substitution Request Procedure - Submit a written request on attached form for proposed substitutions to City's Representative prior to deadline for receipt of substitution requests. Submit proposed substitutions relating to a particular subcontract or trade in a single package. No substitution will be considered after the deadline for receipt of substitution requests has expired.
- F. Contractor's Responsibility for Construction Modifications - Drawings have been detailed in compliance with dimensions and International Council of Building Officials (ICBO) Evaluation Report data for products specified. If proposed substitute product is accepted by City's Representative, Contractor shall assume both responsibility for construction modifications and additional costs required by reason of this acceptance. If substitution results in a decrease in cost, potential savings to City may be submitted to City's Representative for consideration.
- G. Systems of Like Manufacture - Where products are specified in groups to be furnished by one manufacturer, no substitution will be considered that is not similarly furnished by one manufacturer. Where Contractor proposes to use a system of equipment other than that shown in the Contract Documents, propose the substitution as a complete system.
- H. No time extension will be allowed for substitution of materials.

**1.4 Submittals**

- A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Substitution Request Form	Submit Substitution Request on form furnished below.	
Contractor's Certification of Performance and Assumption of Liability	Submit Certificate of Performance certifying that the proposed substitution is equal to or better in all respects to the product specified and that the proposed substitution will, in all respects perform the function for which it is intended.	
Certificate of Compliance	Required as needed to substantiate Product Substitutions	
Dimensional Data	Required for Product Substitutions	
Material Samples	Required as needed to substantiate Product Substitutions	
Manufacturer's Statement of Responsibility	Required at City's discretion for Product Substitutions. See form at rear of Section 01 33 00	
Foundry or Test Record Transcripts	Required as needed to substantiate Product Substitutions	
Material List and Ratings	Required as needed to substantiate Product Substitutions	
Names and Addresses of Nearest Local Manufacturer's Representatives	Required for Product Substitutions (Use allotted space on attached Substitution Request Form)	
List of Three Local Product Installations	Names and contact information for three installations within 100 mile radius of project completed in prior three years. Required for Product Substitutions (Use allotted space on attached Substitution Request Form)	
Manufacturer's Service Contract Statement of Qualifications	Required for installations of products which include optional maintenance service contracts.	
Warranty	Furnish warranty equal to or better than warranty required for specified product.	

- B. Determination of Equality - The burden of proof of equality of the substituted item shall be on the Contractor. Acceptance of such substitutions is entirely at the discretion of the City's Representative.
- C. List of Accepted Substitutions - The City will issue to Contractor a list of accepted substitutions. Do not order products proposed for substitution before substitution request is accepted in writing by City's Representative.
- D. Products accepted as "accepted equals" shall, in City's opinion, meet the following requirements:
1. Products shall be of equal quality, substance, function and color to those listed.
  2. Products shall be standard products of a reputable manufacturer having regularly been engaged for five (5) years in manufacture of products furnished.
  3. Products shall have a reputation for assuring long-lasting, trouble-free service.
  4. Factory-authorized, factory-trained and competent service personnel and stocked service parts shall be available within a 150 mile radius of the Work.
  5. Manufacturer shall be capable of certifying compliance with listed reference standards.
- E. City reserves the right to reject product substitutions solely on the basis of maintenance economies of scale available to the City through standardizing on manufacturers and minimizing spare parts inventories.
- F. Denial of Substitution - If, in the opinion of the City's Representative the proposed substitution is not equal to or better in every respect to that of the specified product, or was not submitted for acceptance in the manner outlined above, the Contractor shall furnish the specified products.

- G. Responsibility for Coordinating Substitutions with Construction Trades – Inform all other trades, vendors, and subcontractors of the effects of substitutions on their work or products. Failure to so notify shall not relieve Contractor of his duty to make payments arising from alterations in specified products or methods needed to complete the Work in an approved and acceptable manner.

**1.5 Contractor's Responsibility for Cost of Substitution Reviews**

- A. Pay all costs incurred by City's Representative and City to review Requests for Substitutions.

**1.6 Substitution of "Inferior" Products**

- A. Products not meeting the above requirements shall, for purpose of this contract, be deemed "inferior" even if product's only shortcoming is that Contractor failed to submit a Substitution Request on said product prior to the stipulated deadline.
- B. Substitution of "inferior" products shall not occur except where cost savings are offered to and accepted by the City in the form of a Change Order.

**1.7 Bid Shopping and Reverse Auctions**

- A. Substitutions for products and services of manufacturers or subcontractors listed at time of bid and/or in Contractor's initial Submittal will only be permitted under one or more of the following circumstances:
  - 1. Where Contractor-listed manufacturer or subcontractor has gone out of business.
  - 2. Where Contractor-listed manufacturer or subcontractor has, in City's opinion, failed to perform or no longer possesses both capability and willingness to perform to standard required by Contract Documents.
  - 3. Where Contractor offers a credit to City sufficient in City's opinion to justify accepting the substitution in the form of a Change Order.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

# SUBSTITUTION REQUEST FORM

**TO:** City of Corona, Department of Water and Power  
755 Public Safety Way  
Corona, CA 92880

**PROJECT NAME:** \_\_\_\_\_

**FROM CONTRACTOR:** \_\_\_\_\_

We hereby submit for consideration the following product substitution of specified item for above project:

<u>DRAWING OR SECTION NO.</u>	<u>SHEET NUMBER OR PARAGRAPH</u>	<u>SPECIFIED ITEM</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**PROPOSED SUBSTITUTION:** \_\_\_\_\_

Attach a brief description of the reason for proposed substitution.

Attach complete dimensional information and technical data needed to substantiate product substitution, including ICBO reports and laboratory tests, if applicable.

Include complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation.

Where product substitutions are proposed at multiple locations, submit copies of plans showing in red each location where the product substitution is proposed.

Submit with request all necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance. Differences in quality of materials and construction shall be indicated.

Submit Manufacturer's Statement of Responsibility.

# SUBSTITUTION REQUEST FORM

Fill in Blanks Below:

- A. Does the substitution affect dimensions shown on Drawings?  
Yes \_\_\_ No \_\_\_ If yes, attach copy of plans and clearly indicate changes.
- B. Will the undersigned pay for the changes to the building design, including engineering, detailing and review costs caused by the requested substitution?  
Yes \_\_\_ No \_\_\_
- C. What effect does the substitution have on other trades?  
1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_
- D. What effect does substitution have on applicable code requirements?  
1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_
- E. What is the ICBO Approval Number? \_\_\_\_\_
- F. Differences between proposed substitution and specified item:  
1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_
- G. List three installations where product is in use:  
1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_
- H. Address of Authorized Manufacturer's Representative:  
\_\_\_\_\_  
Representative  
\_\_\_\_\_  
Address  
\_\_\_\_\_  
City/State/Zip Code
- I. Manufacturer's guarantees of the proposed and specified items are:  
Same \_\_\_ Different \_\_\_ (Explain) \_\_\_\_\_  
\_\_\_\_\_
- J. Owner's share of cost savings, if substitution is approved \$ \_\_\_\_\_

**SUBSTITUTION REQUEST FORM**  
**CONTRACTOR'S CERTIFICATION OF PERFORMANCE AND ASSUMPTION OF LIABILITY**  
**FOR EQUAL PERFORMANCE**

I certify that the proposed substitution is equal to or better in all respects to the product specified and that the proposed substitution will, in all respects, perform the function for which it is intended.

For use by Design Engineer:

- Accepted
- Accepted as Noted
- Not Accepted
- Received Too Late

Submitted By:

\_\_\_\_\_  
Signature                      Title

\_\_\_\_\_  
Firm

\_\_\_\_\_  
Address

\_\_\_\_\_  
Telephone                      Date

By \_\_\_\_\_

Date \_\_\_\_\_

Remarks \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Concurrence By:

\_\_\_\_\_  
Owner

Signature must be by person having authority to legally bind his firm to the above terms. Failure to provide legally binding signature will result in retraction of approval.

**END OF SECTION**

**SECTION 01 65 00  
PRODUCT DELIVERY REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Transportation and delivery of products and equipment.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 40 00: Quality Requirements
- C. Section 01 61 00: Common Product Requirements
- D. Section 01 66 00: Product Storage and Handling Requirements

**1.3 References**

- A. Not applicable

**1.4 Product Delivery**

- A. Ship and deliver products to jobsite as follows:
  - 1. Do not ship, accept delivery of or store items on site for which applicable submittals have not been accepted.
  - 2. Before shipping, operate valves, motors, pumps, actuators and mechanical equipment at factory to ensure products are complete and in working condition.
  - 3. Before shipping materials and/or equipment, Contractor shall also be responsible for verification of field dimensions, utility locations and electrical compatibility for items of Work which may require relocation, refitting, or different electrical motors and wiring if field dimensions differ from those shown on Plans.
  - 4. In the event Contractor discovers a conflict during surveying, staking, verification of field dimensions, verification of utility locations or verification of electrical compatibility, he shall bring this matter to the City's attention as soon as conflict is discovered and before materials or equipment are shipped. City will make adjustments to Contract requirements needed to accommodate field conditions, and will pay reasonable costs for upgrades or modifications required to be made at the place of manufacture prior to shipping to accommodate conflicts discovered.
  - 5. City will not pay costs of shipping and returning items to place of manufacture unless:
    - a. City has acted to prevent Contractor from completing surveys, staking, verification of field dimensions, verification of utility locations or verification of electrical compatibility, and Contractor has notified City of this fact in writing before shipping equipment, or
    - b. Changes required are a direct result of buried utility conflicts where said utilities were neither shown on the plans in their approximate location, nor located by Underground Service Alert nor evident from surface features.
  - 6. Deliver or store only products of accepted manufacturers at the site.

7. Transport by means to avoid damage and deliver products to jobsite in manufacturer's original, unbroken, unopened, labeled packaging containers or bundles. Tag or label packages, containers or bundles as needed to identify contents and name of equipment of which contents form a part.
8. All items delivered at the site or to any authorized place of storage may be inspected to satisfy the City's Representative that such items are of the specified quality and workmanship and are in good order and condition at the time of delivery. Be prepared to remove all coverings, containers or crates to permit the City's Representative to conduct an inspection. Should the City's Representative find indication of damage or deficient quality of workmanship, provide the necessary documentation or conduct such tests deemed necessary by the City's Representative to demonstrate compliance.
9. Coordinate with the City and equipment supplier/manufacturer, as necessary, and perform an inventory and inspection to include all necessary unpacking and repacking operations to examine items delivered. Record in writing any apparent defects, damage, or missing portions and provide a copy to the City. For City-furnished products and equipment, the City will make good all deficiencies noted in the inventory and inspection at no cost to Contractor. Once received, Contractor shall be responsible for the City-furnished items the same as for work under the Contract, including proper insurance coverage, except the City will correct any subsequently discovered latent or hidden damage or defects in the City-furnished items that could not be ascertained at the time of delivery and were not caused by the Contractor.
10. Deliver large multi-component assemblies in sections that facilitate field handling and installation.
11. Ship oil-lubricated gearing, bearings and other lubricated components with oil soluble protective coating as described in warranty requirements or recommended by manufacturer. For parts contacting potable water, coating shall be NSF-approved. Coating shall provide protection for one year after final acceptance.
12. Provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage.
13. Provide protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

## **1.5 Equipment Delivery**

- A. Equipment is defined as any mechanical, electrical, or instrumentation devices, and other items with one or more moving parts requiring an electrical, pneumatic, electronic or hydraulic connection.
- B. Adequately and effectively protect all equipment against damage from moisture, dust, handling, or other cause during transport from manufacturer's premises to site. Clearly mark each item or package with the number unique to the specification reference covering the item. Use stiffeners where necessary to maintain shapes and to provide rigidity. Deliver parts of equipment in assembled or sub-assembled units where possible.
- C. Affix to all equipment items and valves a label or tag in a prominent location displaying the assigned equipment number. Mark valves to show name of manufacturer, year of manufacture, size of valve, maximum working pressure, and

arrow to show direction of flow. Equipment item and valves lacking a number shall have a similar tag providing a unique description of the item. Markers shall be of stainless steel or aluminum, affixed to the item in question with stainless steel fasteners or as otherwise approved by the City. Plastic tape labels will not be acceptable.

- D. Securely fasten stainless steel inscribed nameplates in conspicuous locations for mechanical equipment having moving parts. Show manufacturer's name, year of manufacture, serial number, principal rating data and equipment item number. Nameplates shall be in English and use American measuring units.

**1.6 Delivery of Product, Equipment or Material**

The City's personnel or representatives will not accept product, equipment, or material deliveries for the Contractor.

**1.7 Unit Prices**

- A. Payment for the Work in this section shall be included as part of the lump-sum or unit-price bid amount for which such Work is appurtenant thereto.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

**3.1 Warranty Requirements**

- A. Strictly follow manufacturer's instruction and warranty requirements for delivery of products and equipment.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 66 00**  
**PRODUCT STORAGE AND HANDLING REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Handling, storage and protection of products and equipment.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 40 00: Quality Requirements
- C. Section 01 61 00: Common Product Requirements
- D. Section 01 65 00: Product Delivery Requirements

**1.3 References**

- A. Not applicable

**1.4 Product Storage and Handling**

- A. Store products at jobsite as follows:
  - 1. Store products per manufacturer's recommendations, and in a protected area at a temperature between 35 °F and 110 °F.
  - 2. Store products with seals and labels intact and legible.
  - 3. Store products so as to preserve their quality and fitness for the Work. Locate stored products and equipment to be incorporated in the Work to facilitate inspection. Inspect products periodically to assure products are undamaged and are maintained under required conditions. Maintain a log of inspections and make available upon request. Contractor shall be responsible for damage or loss to products until Final Acceptance.
  - 4. Protect products against moisture, weather, temperature extremes, dust, debris, tampering, theft, vandalism, ultraviolet radiation, or damage from improper handling, storage, or exposure. Protect exposed metals from rust and corrosion even for items which may be sandblasted or otherwise cleaned before painting.
  - 5. Store items not designed for outdoor exposure off ground and under cover.
  - 6. Store cementitious materials in weather-tight spaces. Keep free from moisture.
  - 7. Store aggregate in well-drained area to minimize change in moisture content. Prevent contamination by other materials.
  - 8. Store fasteners and connectors in original unopened containers until used.
  - 9. Ventilate materials subject to corrosion or moisture damage to prevent condensation.
  - 10. Any corrosion in evidence prior to final acceptance shall be removed, or the product shall be removed or replaced.
  - 11. Cover plastic and similar brittle items to protect from sun exposure and temperature extremes.
  - 12. Cover stored materials with tarpaulin or other covering to prevent soiling or exposure to weather. Fasten coverings to prevent removal by wind.

13. Store flammable products to conform with City, County, State and Federal safety codes for storage of flammable materials.
14. Cover, plug or cap pipe ends, valve ends and equipment openings with rubber, plastic or canvas to prevent intrusion or contamination.
15. String pipe along right-of-way in a manner to not interfere with free passage of vehicles.
16. Do not store pipe on roadway or parkway of streets.
17. Store items in accordance with requirements of Project Storm Water Pollution Prevention Plan (SWPPP).
18. Notify City in writing if delivered or stored product is damaged. Deliver items with exterior surfaces in perfect unblemished condition. Do not repair damaged products without prior written approval.

B. Handle products as follows:

1. Handle products with care, using proper equipment according to manufacturer's recommendations. Lift large, heavy items only at points designated by manufacturer. Do not drop, drag, bump, bend or handle products in manner that causes abrasions, bruises, cracks, mars, scars, scratches or other damage. Use padded slings and hooks for lifting as needed to prevent damage. Improper handling shall be cause to reject mishandled products.
2. Use rubber or canvas belt slings or pneumatic-tired cradles to lift, lower, or suspend coated pipe, valves and other products. Sling width shall equal or exceed pipe or product diameter. Do not handle coated products using ropes, hooks, chains, calipers or cables. Store such materials on padded skids.
3. Inspect each product item for damage, defects, completeness and correct operation before installing. Notify City in writing if delivered or stored product is damaged. Do not repair damaged products without prior written approval.
4. Before installation, swab joints and interiors of piping materials to remove foreign matter.
5. Clean and protect machined surfaces and shafting from corrosion using proper type and amount of coating as described in warranty requirements to assure protection to one year after final acceptance.
6. Maintain records for City's review of deliveries to show Contractor's order number, purchase order number and equipment number. Include labeling or shipping tag in records.
7. Cover pipe ends, fitting ends, valve ends, and equipment openings with rubber, plastic, or canvas to prevent intrusion or contamination. Close open ends of pipe with tight-fitting caps or plugs to prevent entrance of foreign contaminants into pipe at all times when pipe installation is not in progress. These provisions shall apply during noon hour as well as overnight. Do not use pipeline as a drain for removing water that has infiltrated into trench. Maintain inside of pipe free from foreign materials and in a clean and sanitary condition until final acceptance.

## **1.5 Equipment Storage and Handling**

- A. Equipment is defined as any mechanical, electrical, or instrumentation devices, and other items with one or more moving parts requiring an electrical, pneumatic, electronic or hydraulic connection.

- B. Affix to all equipment items and valves a label or tag in a prominent location displaying the assigned equipment number. Mark valves to show name of manufacturer, year of manufacture, size of valve, maximum working pressure, and arrow to show direction of flow. Equipment item and valves lacking a number shall have a similar tag providing a unique description of the item. Markers shall be of stainless steel or aluminum, affixed to the item in question with stainless steel fasteners or as otherwise approved by the City. Plastic tape labels will not be acceptable.
- C. Securely fasten stainless steel inscribed nameplates in conspicuous locations for mechanical equipment having moving parts. Show manufacturer's name, year of manufacture, serial number, principal rating data and equipment item number. Nameplates shall be in English and use American measuring units.
- D. During the interval between delivery and installation, store all equipment to be incorporated into the Project in a manner to prevent damage or deterioration. Provide environmental controls, such as heaters or protective encapsulation, to ensure against condensation and moisture damage. Motor space heaters shall be operational at all times when motors are stored on site. In the event prolonged (more than 90 days) storage is required for any item of rotative equipment, institute a preventive maintenance program which shall include grease protection of bare metal surfaces, periodic indexing of rotating parts, renewal of grease in bearings and any procedures recommended by the manufacturer. Maintain adequate records to demonstrate full compliance with these requirements. Make all equipment available for inspection by the City.

To insure adequate protection of all electrical and instrumentation equipment and panels and electric motors, store all such equipment in a suitable enclosure designed to protect the equipment from dust and moisture. The Contractor shall be responsible for maintaining the storage facilities and equipment stored therein and making provisions for all utilities required. Provide continuous access to the City for all equipment so stored.

#### **1.6 Unit Prices**

- A. Payment for the Work in this section shall be included as part of the lump-sum or unit-price bid amount for which such Work is appurtenant thereto.

### **PART 2 - PRODUCTS (Not Applicable)**

### **PART 3 - EXECUTION**

#### **3.1 Warranty Requirements**

- A. Strictly follow manufacturer's instruction and warranty requirements for storage and handling of products and equipment.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 71 13  
MOBILIZATION AND DEMOBILIZATION**

**PART 1 - GENERAL**

**1.1 Work Included**

A. Mobilization shall include the acquisition of all temporary easements and permits; moving onto the site of all plant and equipment; furnishing and erecting plants, temporary buildings, and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of the Work. Mobilization shall include, but not be limited to the following principal items:

1. Obtain temporary easements which Contractor may require for construction activities outside of existing easements and/or rights of way secured by City.
2. Obtain all required permits.
3. Move onto the site of all Contractors' plant and equipment required for construction operations.
4. Install and remove temporary project signs.
5. Install temporary construction power, wiring, and lighting facilities.
6. Establish fire protection system.
7. Develop construction water supply as required.
8. Provide field office trailer for the Contractor (at Contractor's option).
9. Provide all on-site communication facilities, including telephones and radios for Contractor's personnel.
10. Provide on-site sanitary facilities and potable water facilities for Contractor's personnel.
11. Arrange for and establish Contractor's storage yard as required. (Contractor is solely responsible for obtaining property owner agreements to use private property for storage or laydown areas per the Contract Documents.)
12. Construct and implement security features and requirements in compliance with the Contract Documents.
13. Possess all OSHA required notices and establishment of safety programs.
14. Arrange for and establish traffic control, as necessary.
15. Submit initial submittals.

The mobilization phase will be deemed complete when all items necessary to conduct field operations are on site and operable.

- B. When using vacant property to park, service and store products, obtain approval from City's Representative. Notify adjacent property owners in writing of this proposed use at least seven calendar days prior to use. Obtain written approval from property owner stating requirements which are a condition of this approval. Conform to setbacks and other conditions required by City or County regulations or permits.
- C. Remove obstructions in right-of-way before starting construction. Where private property, such as parked cars, must be removed prior to construction, notify respective property owners 72 hours in advance of right-of-way clearing to allow them to remove their property.

- D. Remove temporary structures and controls before inspection for Final Completion or when directed. Clean and repair damage caused by installation or use of temporary facilities and controls. Restore existing facilities used during construction to specified or original condition.

**1.2 Related Work**

- A. Section 01 31 13: Access and Coordination
- B. Section 01 33 00: Submittal Procedures
- C. Section 01 74 00: Cleaning and Waste Management
- D. Section 01 77 00: Closeout Procedures

**1.3 Submittals**

- A. Furnish the following submittals:

SUBMITTAL	DESCRIPTION	
Storage Yard	Description of Contractor's proposed methods for dust and noise control in storage areas	
	Property owner's written approval for use of property used as storage yard for Project.	
Project Signs	Layout of project signs.	
Construction Facilities Plan	Layout, equipment, materials and procedures proposed for construction of temporary power, telephone, lighting, heating, water, sanitation, field offices and sheds, storm water management, security, etc.	

The Contractor's site office and other construction facilities shall be of a temporary nature. The Contractor shall be wholly responsible for the security of his site office and laydown area, and for all its plant, materials, equipment and tools at all times.

**1.4 Demobilization**

- A. At the completion of the project, perform the following activities:
  1. Remove all equipment, materials, and temporary facilities installed during mobilization and construction phases of the work.
  2. Remove and properly dispose of all excess or waste materials, debris, rubbish, and temporary facilities from the site, structures and all facilities.
  3. Repair pavement, roads, landscaping, and all other areas affected by construction operations and restore them to original condition or to a minimum condition specified.
  4. Remove spatter, grease, stains, fingerprints, dirt, dust, labels, tags, packing materials, and other foreign items or substances from interior and exterior surfaces, equipment, signs, and lettering.
  5. Repair, patch, and touch up chipped, scratched, dented or otherwise marred surfaces to match specified finish.
  6. Remove paint, clean and restore all equipment and material nameplates, labels and other identification markings.
  7. Clean all slabs, pavements and ground surfaces.
  8. Restore site to its original condition. Demobilization and site restoration at a developed site will include, but not be limited to, regrading of the ground surface disturbed during mobilization and; reconstruction of fences, walls, berms, drains, or other surface features; sweeping of paved areas; repair or

replacement of damaged asphalt pavement; curbs, gutters and sidewalks; and replacement of bushes, trees, or ground cover, which were present prior to commencement of work.

**1.5 Unit Prices**

A. Payment for mobilization, demobilization, including payment for construction, modification, maintenance, removal and restoration associated with access, and storage facilities, will be included in the lump sum bid price for Mobilization/Demobilization.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 73 00  
EXECUTION**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Examination of site before bidding, preparation for construction, and execution of Work.

**1.2 Related Work**

- A. Section 01 32 33: Construction Photographic and Video Documentation
- B. Section 01 33 00: Submittal Procedures
- C. Section 01 40 00: Quality Requirements
- D. Section 01 61 00: Common Product Requirements
- E. Section 01 65 00: Product Delivery Requirements
- F. Section 01 66 00: Product Storage and Handling Requirements
- G. Section 01 73 24: Seismic Restraint
- H. Section 01 74 00: Cleaning and Waste Management
- I. Section 01 75 00: Starting and Adjusting
- J. Section 01 77 00: Closeout Procedures
- K. Section 01 78 36: Product Warranties
- L. Section 01 78 39: Project Record Documents
- M. Section 01 79 00: Demonstration and Training

**1.3 Project/Site Conditions**

- A. Review existing soils reports to ascertain suitability of native soil for backfill before submitting bid. If native soil is found to be unsuitable, provide suitable material for meeting compaction requirements at no additional cost to City.
- B. Items furnished shall be capable of fulfilling their intended purpose in environment in which they are installed. Allow for local temperature extremes, climactic conditions and corrosive environments where necessary to ensure proper functioning of furnished products.
- C. The action of beginning installation, application or erection of any product shall be deemed sufficient evidence that both the Contractor and the installer accept existing field conditions as acceptable for installation, application or erection of that product, except where written notice is given of Contractor or installer's concerns before starting applicable work.

**1.4 Unit Prices**

- A. Payment for the Work in this section shall be included as part of the lump-sum or unit-price bid for which such Work is appurtenant thereto, and no additional payment will be made specifically for the Work in this Section.

**PART 2 - PRODUCTS (Not Applicable)**

**2.1 Materials**

- A. Dissimilar metals, when used in conjunction with each other shall have suitable insulation provided between adjoining surfaces to eliminate direct contact and resultant current. Insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators, washers, or other accepted materials.

## **2.2 Equipment**

- A. Furnish special tools, wrenches and appliances needed to adjust, operate, maintain or repair mechanical equipment supplied.

## **PART 3 - EXECUTION**

### **3.1 Preparation**

- A. Contractor represents he has carefully examined the Contract Documents and the site where the work is to be performed and he has familiarized himself with all local conditions and federal, state, and local laws, ordinances, rules, and regulations that may affect in any manner the performance of the work.
- B. Before shipping materials and/or equipment, verify field dimensions, utility locations and electrical compatibility for items of Work which may require relocation, refitting, or different electrical motors and wiring if field dimensions differ from those shown on Plans.
- C. In the event Contractor discovers a conflict during surveying, staking, verification of field dimensions, verification of utility locations or verification of electrical compatibility, bring this matter to the attention of the City's Representative as soon as conflict is discovered and before materials or equipment are shipped. City will make adjustments to Contract requirements needed to accommodate field conditions, and will pay reasonable costs for upgrades or modifications required to be made at the place of manufacture prior to shipping to accommodate conflicts discovered.
- D. City will not pay costs of shipping and returning items to place of manufacture unless:
  - 1. City has acted to prevent Contractor from completing surveys, staking, verification of field dimensions, verification of utility locations or verification of electrical compatibility, and Contractor has notified City of this fact in writing before shipping equipment, or
  - 2. Changes required are a direct result of buried utility conflicts where said utilities were neither shown on the plans in their approximate location, nor located by Underground Service Alert nor evident from surface features.
- E. Before beginning work, carefully and thoroughly document condition of site and existing improvements using dated photographs as necessary to resolve any disputes that may arise regarding the conditions prior to and subsequent to construction.
- F. Document with photographs the pre-construction condition of the entire construction area and adjacent properties in accordance with Section 01 32 33. In addition to the pre-construction photographic survey, perform periodic photographic survey of the site and adjacent areas (at least twice during construction), and then post-construction.
- G. Submit preconstruction photographs to City's Representative before beginning Work which has the potential to disturb or modify public or private property not owned by City.

- H. Prior to commencement of photography, notify the City in writing of the date and time of the work. The City may provide a designated representative to accompany and oversee coverage of all photography operations.
- I. Submit copies of documentation to City's Representative before beginning any work at the project site. Damage not documented as preexisting before start of construction will be attributed to Contractor's activities in the absence of conclusive evidence to the contrary.
- J. Make available all other photographs for review in settling any disputes that may arise.
- K. The City may, at its option, take additional preconstruction photographs that may be used to settle disputes, but will not be required to make these photographs available to the Contractor.
- L. Carefully lay out work in advance to minimize cutting, channeling, chasing or drilling of structural pads or elements. Review in advance with the City's Representative all cuts, channeling, drilling, or welding required to accommodate mechanical or electrical equipment. Do not begin such work until notified by City's Representative. Repair damage to structures, piping equipment or finishes using skilled workers of appropriate trades.
- M. Relocations or adjustment of existing facilities needed to facilitate construction must be accepted in writing by City's Representative and subsequently relocated or adjusted by the Contractor as directed. If existing items are lost or damaged during construction, replace with new items of equal or better quality.
- N. Perform trimming of existing tree branches and roots required to accommodate construction activities under the direction of a certified arborist.
- O. Make field measurements needed to fabricate and install Work before ordering or beginning work. Make minor changes in alignments and dimensions as needed to remedy or avoid utilities and structural conflicts.
- P. Make available and maintain material safety data sheets (MSDS) at Project site.

### **3.2 Installation / Application / Erection**

- A. Maintain complete set of Contract Documents including shop drawings at jobsite field office or superintendent's truck at all times.
- B. Install products in accordance with the details shown and specified.
- C. Install products in accordance with shop drawings and submittals.
- D. Install products according to manufacturer's installation recommendations and warranty requirements. Strictly follow manufacturer's requirements for installation, application, connection, erection, maintenance, operating, cleaning, conditioning and startup of products. Where conflict exists between Contract Document specifications and the manufacturer's installation recommendations and warranty requirements, bring the matter to the attention of the City's Representative and request a resolution of the conflict. Any additional costs incurred by the Contractor as the result of the City Representative's direction in the resolution of the conflict will be reimbursed as extra work. Any costs incurred by the Contractor, through failure to timely notify the City's Representative of a conflict, shall be borne by the Contractor.
- E. Install products at locations shown on Plans and submittals.

- F. Exposed surfaces shall be finished in appearance. Grind smooth exposed welds. Round or chamfer corners of exposed structural shapes for personnel protection.
- G. Prime and paint exposed surfaces of ferrous products, piping, and conduit except for stainless steel or galvanized or sherardized surfaces or unless otherwise shown. Clean painted surfaces and touch up bare or marred spots with finish to match factory finish.
- H. Paint and coat in workmanlike manner so as to produce an even film of uniform thickness. Pay attention to edges, angles, flanges, corners, crevices, and joints to insure that they have been thoroughly cleaned and that they receive specified thickness of paint or coating. Finished surfaces shall be free from runs, drops, ridges, waves, shiners, laps, brush marks, and variations in color, texture and finish. The hiding shall be so complete that addition of another coat would not increase the hiding. Apply coats so as to produce film of uniform thickness.
- I. Install valves and equipment so as to be easy to operate and service. Where the geometry of manufactured valves and equipment and field conditions bring about a condition where it is difficult or impossible for an average worker to operate or service an installed valve or piece of equipment, notify City's Representative of conflict before installing valve or piece of equipment.
- J. Unless otherwise indicated or specified, install all equipment on concrete bases at least 6 inches high. Anchor baseplates to the concrete base with required anchor bolts. For equipment with grouted bases, fill the space beneath with grout as specified. Grout the equipment base after initial fitting and alignment.
- K. Install Type 316 stainless steel nuts, bolts, and washers on all installations.
- L. Liberally apply anti-seize thread lubricant to the threaded portion of all stainless steel bolts during assembly.

### **3.3 Salvage and Removal of Existing Equipment**

- A. All existing equipment and appurtenances designated to be demolished or removed, and not to be salvaged, shall be the property of the Contractor, removed from the site, and legally disposed of at Contractor's expense. Clean and relocate salvaged items to the plant area designated by the City's Representative. During construction the City's Representative may designate more items to be salvaged whether the items are indicated to be salvaged or not in the Contract Documents.
- B. Furnish all tools, equipment, material, and supplies, and perform all labor required to remove from service, prepare for storage, inventory, package, mark, and deliver to the City any equipment and/or materials designated as salvage in the Plans or Specifications. Prepare and submit a listing of all equipment identified for salvage. After the equipment is removed, revise and resubmit the list to include the date removed, estimated weight, description, and condition of each item.
- C. Use care in loading and delivering material to prevent damage, splitting and breakage of the material. The City's Representative will designate the City receiving party for all salvage material at one of the following locations:
  - 1. City warehouse at Corporation Yard

**END OF SECTION**

**SECTION 01 74 00  
CLEANING AND WASTE MANAGEMENT**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Cleaning during construction, pollution prevention during construction, Stormwater Pollution Prevention Plans, final cleaning on completion of the Work and disposal of waste.

**1.2 Related Work (Not Applicable)**

**1.3 Cleaning During Construction**

- A. Maintain areas covered by Contract, adjacent properties, and public access roads in a neat, safe, clean and sanitary condition to the satisfaction of the agency having jurisdiction over the area. Keep these areas free from waste, debris and rubbish caused by construction. Ensure all employees, representatives, material suppliers and others acting for the Contractor maintain on-site access roads free of mud. Under no circumstances shall vehicles leaving the site track mud off the site onto public right-of-way.
- B. Sweep streets daily using self-loading rear broom motor sweeper with vacuum and spray nozzles to remove any mud or debris tracked from Project site to public streets. If streets are kept clean, a lesser frequency may be accepted by City's Representative.
- C. Treat access roads and parking areas as needed to control dust and prevent tracking of mud onto paved streets.
- D. Conduct cleaning and disposal to comply with local ordinances and antipollution laws. Do not burn or bury rubbish and waste materials on project site. Do not dispose of volatile wastes, such as mineral spirits, oil or paint thinner, in storm or sanitary drains. Do not dispose of wastes into streams or waterways. Dispose of asbestos and lead as required by law.
- E. Obtain written permission from property owner prior to disposing of surplus materials, waste products or debris on private property.
- F. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- G. Wet down dry materials and rubbish, apply dust palliative or modify operations as needed to prevent blowing dust.
- H. Provide containers for collection and disposal of waste materials, debris and rubbish.
- I. Remove trash and rubbish weekly.
- J. Clean public access roads to site. Remove material falling from haul trucks.

**1.4 Engine Emissions**

- A. Comply with all laws, ordinances, rules, regulations, and orders pertaining to air pollution.
- B. Maintain equipment engines in proper tune and operate construction equipment so

as to minimize exhaust emissions. Do not discharge air pollutants (dust, smoke, or other air contaminants) into the atmosphere in such quantities that they will cause a violation of the regulations of any legally constituted authority.

- C. Visible emissions from any engine shall not be as dark as or darker than No. 1 in the Ringleman Chart for a period or periods aggregating more than three (3) minutes per hour per SCAQMD Rule 401 – Visible Emissions.

### **1.5 Portable Engine-Driven Equipment**

- A. Comply with the air quality regulations pertaining to portable engines with rated horsepower of 50 bhp or greater and other applicable portable equipment by meeting the following minimum requirements:
  - 1. The engines or other applicable portable equipment shall have an SCAQMD permit or be registered with CARB.
  - 2. The engines furnished shall satisfy the latest applicable emissions standards, as set forth in Title 13 of the California Code of Regulations (Article 5, Sections 2450-2466) and Title 40 of the Code of Federal Regulations, Part 89.
- B. The engines shall be equipped with a non-resettable elapsed operating time meter. Submit activity reports to regulators as required.
- C. Portable engines and other portable equipment that are permitted with SCAQMD shall meet the following minimum requirements:
  - 1. If any of the Contractor or subcontractor engine or equipment is to be located at City facilities for more than twelve (12) consecutive months, provide the City with all information necessary for City to revise its Title V operating permit. This information shall include, but is not limited to, detailed equipment description, specifications, emissions information, dispersion modeling, permits, registrations, monitoring records, and source tests reports required by the permit for the subject equipment. Submit this information to the City no later than the end of the sixth month the equipment is located at City facilities. If the Contractor fails to provide the specified information in the specified time frame, the Contractor shall bear all fees, costs, and penalties including, but not limited to, filing fees, attorney fees, fees associated to acquire necessary offsets, fees for excessive emissions, etc. associated with City obtaining necessary variances from SCAQMD.

### **1.6 Self-Propelled Diesel Fuel Vehicles**

- A. Pursuant to Title 13 of the California Code, Section 2449(d)(3), ensure all self-propelled diesel-fueled vehicles on the jobsite, 25 horsepower and up and not designed for on-road driving, limit idling to no more than five consecutive minutes, with the following exceptions:
  - 1. idling when queuing;
  - 2. idling to verify the vehicle is in safe operating condition;
  - 3. idling for testing, servicing, repairing, or diagnostic purposes;
  - 4. idling necessary to accomplish work for which the vehicle was designed (such as operating a crane)
  - 5. idling required to bring the machine system to operating temperature; and

6. idling necessary to ensure safe operation of the vehicle.
- B. Phase and schedule polluting construction activities to avoid emission peaks.
- C. Contractor shall be responsible for promptly paying any fines assessed for noncompliance with Title 13 idling limitations for any equipment owned or rented by Contractor or his subcontractors.

### **1.7 Fueling of Engine-Driven Equipment**

- A. Provide responsible personnel in direct control of all vehicle and equipment fueling operations at all times to prevent fuel spills. All fueling must be continually monitored at all times and shall comply with SCAQMD Rule 461, Gasoline Transfer and Dispensing.

### **1.8 Environmental Contamination**

- A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations. Provide equipment and personnel required to perform emergency measures required to contain any spillages and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site and replace with suitable compacted fill and topsoil. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to the river, drainages, or in sanitary or storm sewers. Provide systems for control of atmospheric pollutants. Prevent toxic concentrations of chemicals. Prevent harmful dispersal of pollutants into the atmosphere. Contractor's equipment used during construction shall conform to all current federal, state and local laws, ordinances, regulations and standards.
- B. Provide adequate protection of the site to prevent leaks and spills of fuel, oil, solvents, grease and other chemicals from affecting the ground and pavement. Place plastic sheeting with berms beneath the compressor, welding machines and fuel/oil storage areas. Place absorbent material on the plastic sheeting, remove when saturated, and replace with fresh absorbent material. Closely monitor fueling and equipment servicing to prevent leaks and spills. Store absorbent material for clean-up of spills in a dry condition on the site.

### **1.9 Records of Volatile Organic Compounds**

- A. Maintain usage records of volatile organic compound (VOC) materials according to SCAQMD Rule 109 and pay annual fees according to Rule 301. The usage records shall contain, at the minimum, the following information:
  1. Manufacturer's Name
  2. Product Name/Number
  3. Quantity (in gallons)
  4. VOC Content (in lb/gal)
  5. SCAQMD Rule Number or California Code section

### **1.10 Lead Paint Notification**

- A. If any paints containing Lead or Chromium are to be physically disturbed or made airborne during the progress of the Work by activities such as abrasive blasting,

welding, cutting or torch burning; provide appropriate worker protection in accordance with OSHA Lead in Construction Standard and any other applicable regulations.

- B. Dispose of as hazardous waste all paint removed or disturbed during the progress of the Work or any demolition debris which contains these paints, either of which contains in excess of 5 ppm (mg/l) Lead or Hexavalent Chromium when tested in accordance with the Waste Extraction Test (WET) method of the California Code of Regulations, Title 22. The Contractor shall be responsible for such disposal in accordance with all applicable laws and regulations.

### **1.11 Waterway Protection**

- A. Enforce strict on-site handling rules to keep construction and maintenance materials out of receiving waters, including, but not limited to:
  - 1. Store all reserve fuel supplies only within the confines of a designated construction staging area.
  - 2. Refuel equipment only within designated construction staging area.
  - 3. Regularly inspect all construction vehicles for leaks.
- B. Clearly mark and stake on the ground the construction and staging areas shown on the Plans. Heavy equipment use outside this area shall be prohibited. The construction staging areas must be designed to contain contaminants such as oil, grease, and fuel products, so they do not drain towards receiving waters or storm drain inlets. If heavy-duty construction equipment is stored overnight adjacent to a potential receiving water, drip pans must be placed beneath the machinery engine block and hydraulic systems.
- C. Construct a silt fence around disturbed soil areas and take all measures necessary to prevent erosion and transport of sediment into a waterway. Stockpile excavated material within the construction staging area and cover stockpiles with plastic sheets to prevent erosion.

### **1.12 Fugitive Dust**

- A. Employ dust control measures to City's satisfaction continuously throughout the project duration. Dust control operations shall prevent construction dust from harming or annoying persons living in or occupying buildings near Work. Do not allow fugitive dust to be visible beyond City facilities' property lines.
- B. Use reasonable and typical watering and dust preventative techniques to reduce fugitive dust emissions. Furnish all labor, equipment, and means required (including watering or soil binders) and carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals; or that are causing a nuisance as determined by the City. Wet all unpaved demolition and construction areas as necessary during excavation and construction, and use temporary dust covers to reduce dust emissions and meet SCAQMD Rule 403.
- C. Cover or wet loads of excavated material or rubbish leaving site or of material being imported to prevent blowing dust.

- D. Spread soil binders on site, unpaved roads, and parking areas when needed to control dust and wind-blown particles from causing a nuisance or violating air quality standards.
- E. Submit a dust control plan and obtain the City's approval before beginning work off paved roads or any activity that could stir up dust.

**1.13 Disposal of Excess Materials**

- A. Remove from the site and legally dispose of all materials resulting from demolition work which are not otherwise shown for salvage.
- B. Secure a disposal site and legally dispose of all excess materials not used in backfilling operations.

**1.14 Disposal of Hazardous Wastes**

- A. Within the framework of Federal and State laws, and as prescribed by these rules and laws, dispose of all materials identified as hazardous waste by virtue of rulings of Federal, State or County Regional Environmental Control Agencies.
- B. Employ a qualified testing laboratory to test for hazardous and toxic components in accordance with California Administrative Code of Environmental Health, Title 22 Division 4.
- C. Test results shall include testing laboratory's determination as to whether or not materials to be disposed of comply with limits set forth in Title 22 for both Soluble Threshold Limit Concentrations (STLC) and Total Threshold Limit Concentration (TTLC) values.
- D. Remove, transport, and dispose of products and materials deemed hazardous in strict accordance with Title 22 including items scheduled for demolition as well as paint, spent abrasives, solvents, cleaning compounds and contaminated soils. Provide written notification of intent to dispose of waste to State of California Department of Public Health Services whether sold to a recycling firm or consigned to a hazardous waste hauler.
- E. Obtain from the consignee a receipt for disposition of these materials and provide to the City a certified copy showing amounts and destination or end use.

**1.15 Handling and Disposing of Asbestos Cement Pipe**

- A. Within the framework of Federal and State laws, and as prescribed by these rules and laws, remove and dispose of asbestos cement pipe (ACP) in accordance with all applicable local and state laws. All work involved in the removal, salvage or legal disposal of ACP shall be the responsibility and at the expense of the Contractor.
- B. Properly manifest all scrap ACP and prepare for transport following state and local criteria. Deliver the scrap material to a landfill permitted for disposal of asbestos containing materials.
- C. ACP will be accepted into the landfill if the pipe is intact and if broken edges are encapsulated using approved products and techniques:
  - 1. Small pieces of ACP pipe less than three (3) feet long must have all broken edges encapsulated (sealed) with an approved product and double wrapped

in a durable six (6) millimeter plastic which is properly sealed to prevent expulsion of dust particles.

2. Intact ACP over three (3) feet long does not have to be double wrapped in six (6) millimeter plastic. Any broken edges, however, must be encapsulated with an approved product, Certane 1000 Post Removal Encapsulant or equal.
- D. Each load for disposal at landfill must be accompanied by manifest indicating that ACP was properly disposed on and not the Owner's responsibility. The completed copy of the manifest shall be returned to the Owner after disposal.
- E. Contractor shall adhere to California Code of Regulations, Title 8, Section 1529, which encompasses construction safety orders regarding dusts, fumes, mists, vapors, and gases associated with asbestos.

### **1.16 Final Cleaning**

- A. Restore construction areas to preconstruction conditions after completion of Work and immediately before final inspection.
- B. Restore lines and grades of areas used for earthwork storage.
- C. Clean, sweep, and wash Work and equipment including finishes.
- D. Remove grease, dust, dirt, stains, labels, fingerprints and foreign materials from sight-exposed interior and exterior finished surfaces. Polish surfaces so designated.
- E. Repair, patch and touch up marred surfaces to specified finish to match adjacent surfaces.
- F. Broom-clean paved surfaces.
- G. Rake-clean other surfaces of grounds.
- H. Remove from City's property temporary structures and materials, equipment and appurtenances not required as part of, or appurtenant to, completed Work.
- I. After Work is complete, remove from site loose concrete, lumber, wire, aggregate or rock piles, reinforcing, rubbish, debris and materials not incorporated in Work. Remove excess pointing mortar materials and other debris within pipes.

### **1.17 Unit Prices**

- A. Payment for cleaning will be included in items of Work to which cleaning is appurtenant.
- B. The cost for processing and disposing of hazardous wastes shall be included in the various bid items set forth in these documents and no additional compensation will be granted therefore.

### **PART 2 - PRODUCTS (Not Applicable)**

### **PART 3 - EXECUTION (Not Applicable)**

**END OF SECTION**

**SECTION 01 75 00  
STARTING AND ADJUSTING**

**PART 1 – GENERAL**

**1.1 Work Included**

A. Testing, starting, adjusting and balancing, and commissioning of all systems. Manufacturers' approvals of installation. All commissioning work for the equipment installed under all phases of this contract shall be performed by the Contractor.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 40 00: Quality Requirements
- C. Section 01 73 00: Execution
- D. Section 01 77 00: Closeout Procedures
- E. Section 01 78 23: Operation and Maintenance Data
- F. Section 01 79 00: Demonstration and Training

**1.3 Submittals**

A. Furnish the following submittals before startup or system demonstration.

SUBMITTAL	DESCRIPTION
Equipment and Systems Testing and Startup Plan	Step-by-step description of the materials, equipment, and personnel required; duration of testing and startup operations, list of requirements necessary to meet for a successful operation; and examples of testing signoff forms to be used for the specific equipment and systems to be tested.

**1.4 Testing, Adjusting and Balancing of Systems**

A. General Requirements

1. All materials, equipment, and work included in this contract shall be tested and inspected to prove compliance with the contract requirements. Unless otherwise specified, all costs of testing, including temporary facilities and connections, shall be borne by the Contractor. For the purpose of this section, equipment shall mean any mechanical, electrical, instrumentation, or other device with one or more moving parts or devices requiring an electrical, pneumatic or hydraulic connection.
2. Furnish labor, power tools, equipment, instruments, and services required for and incidental to completing functional testing, performance testing, and operational testing. Furnish all power, ventilation, consumables, utilities, and temporary facilities necessary for tests if permanent systems are not available at the time of testing.
3. Provide competent, experienced technical representatives of equipment manufacturers for assembly, installation, and testing guidance.
4. No tests specified herein shall be applied until the item to be tested has been inspected and approval has been given for the application of such tests.

## B. Installed Equipment Tests and Inspection

1. All equipment shall be tested by the Contractor and the equipment manufacturers' representatives to verify its specified functionality to the satisfaction of the City's Representative or Engineer before any facility is put into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, adjusted, balanced, and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the Work.
2. Prior to receipt of any progress payments in excess of 60 percent of the Contractor's lump sum bid for the Work, submit to the City details of the procedures proposed to adopt for testing and start-up of all equipment to be operated singly and together, excepting when such procedures have been covered in the Specifications.
3. Divide the procedures into three distinct stages; pre-operation checkout, initial operation, and operational tests. Design testing procedures to duplicate, as nearly as possible, all conditions of operation and carefully select procedures to ensure the equipment is not damaged. Once the testing procedures have been reviewed by the City's Representative or Engineer, provide checkout, alignment, adjustment and calibration sign off forms for each item of equipment. The forms will be used in the field by the Contractor and the City's Representative or Engineer jointly to ensure that each item of electrical and mechanical equipment has been properly installed and tested. The Contractor is advised that failure to observe these procedures may place the acceptability of the subject equipment in question.
4. The procedures shall incorporate all requirements of these Specifications. Proceed in a logical, step-wise sequence to ensure all equipment has been properly serviced, aligned, balanced, connected, calibrated, and adjusted prior to operation. Pre-operation checkout procedures shall include, but not necessarily be limited to:
  - a. Test all electrical systems for proper connections.
  - b. Functionally test mechanical and electrical equipment for proper operation after general start-up and testing tasks have been completed.
  - c. Operate valves and gates and check for binding or interference. Check incoming electric power for voltage amplitude and voltage balance. Verify safety equipment is in place. Perform initial checks in the presence of and with the assistance of the manufacturer's representative.
5. Once all affected equipment has been subjected to the required pre-operational checkout procedures and the City's Representative or Engineer has witnessed and has not found deficiencies in that portion of the Work, individual systems may be started and operated under simulated operating conditions to determine as nearly as possible whether the equipment and systems meet the requirements of these Specifications. Perform all load tests and initial operation tests in accordance with the requirements specified in the respective equipment technical specification sections of the Contract Documents.
6. Test media for all systems shall be as specified in the specific equipment specification sections of the Contract Documents. Operate the equipment for

a sufficient period of time to determine machine operating characteristics, including temperatures and vibration; to observe performance characteristics; and to permit initial adjustment of operating controls. Test all equipment and structures to their full-flow rated capacity. When testing requires the availability of auxiliary systems such as power, flushing or cooling water or control air which have not yet been placed in service, provide acceptable substitute sources capable of meeting the requirements of the machine, device or system, at no additional cost to the City. Disposal methods for test media shall be subject to review by the City's Representative.

7. If, under test, any portion of the Work should fail to fulfill the contract requirements and is adjusted, altered, renewed or replaced, tests on that portion when so adjusted, altered, removed or replaced, together with all other portions of the Work as are affected thereby, shall, if so required by the City's Representative, be repeated within reasonable time and in accordance with the specified conditions. Pay to the City all reasonable expenses incurred by the City as a result of repeating such tests.
8. Once initial operation has been completed, recheck all machines for proper alignment. Realign machines, if necessary, and dowel in place. Check all equipment for loose connections, unusual movement or other indications of improper operating characteristics. Correct any deficiencies to the satisfaction of the City's Representative or Engineer. Disassemble and inspect all machines or devices exhibiting unusual or unacceptable operating characteristics. Repair or remove from the site any such machines or devices and replace at no cost to the City.
9. Test results shall be within the tolerances set forth in the detailed specification sections of the Contract Documents. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice. Where, in the case of an otherwise satisfactory installed test, any doubt, dispute, or difference should arise between the City's Representative and the Contractor regarding the test results or the methods or equipment used in the performance of such test, the City's Representative may order the test to be repeated. Costs for repeat testing shall be borne by the Contractor. Where the results of any installed test fail to comply with the contract requirements for such test, then such repeat tests as may be necessary to achieve the contract requirements shall be made by the Contractor at his expense.
10. For all non-submerged motors rated over twenty-five (25) horsepower and their driven devices, collect baseline operating data including amperage and vibration (unfiltered velocity in horizontal, vertical, and axial directions, where possible) and temperature, using a contact-type thermometer, at each bearing. Operate equipment for at least 20 minutes before taking bearing temperatures. Record data for variable speed devices at five (5) speeds, from lowest to highest.

## **1.5 Unit Prices**

- A. Payment for testing, starting, adjusting, and commissioning, including materials, equipment, devices, labor, travel costs, expenses, and maintenance items, required in Contract Documents will be included in the price bid for items of Work for which testing, starting, adjusting, and commissioning is specified.

- B. Payment for services of manufacturer's representatives will be included in the price bid for their products or items to which their products are appurtenant. No additional payment will be made for services or expenses needed for testing, starting, adjusting, and commissioning if duration of services needed to provide complete working system exceeds those expected or exceeds durations stated in writing in correspondence from manufacturer to City, Contractor or other party.

## **PART 2 – PRODUCTS**

### **2.1 Testing Materials**

- A. Provide gages, meters, recorders and monitors as required to supplement or augment the instrumentation system provided under this contract to properly demonstrate all equipment fully satisfies the requirements of the Contract Documents. Specifically select all devices employed for the purpose of measuring the performance of the facility's equipment and systems to provide a level of uncertainty consistent with the variables to be monitored. All instruments shall be recently calibrated. Be prepared at all times to demonstrate, through re-calibration, the uncertainty of all instruments employed for testing purposes. Perform calibration procedures in accordance with applicable standards of ASTM, ISA and IEEE. The adequacy of all gages, meters, recorders and monitors shall be subject to review of the City's Representative.
- B. Unless otherwise specified, provide at no expense to the City, all power, fuel, water, utilities, supplies, testing media, labor and all other necessary items and work required to complete all tests and inspection specified in this section. Provide at no expense to the City temporary heating, ventilating and air conditioning for any areas requiring it in the case where permanent facilities are not complete and operable at the time of installed tests. Maintain temporary facilities until permanent systems are in service.
- C. Provide signoff forms for all installed and operational testing to be accomplished under this contract. Provide sign off forms containing provisions for recording relevant performance data for original testing and not less than three re-tests for each item of mechanical, electrical and instrumentation equipment provided or installed under this contract. Provide separate sections to record values for the pre-operation checkout, initials of representatives of the equipment manufacturers, the Contractor and the Engineer. Sign off forms will include the motor and driven device on the same form and provide the following information, as a minimum:
  - 1. Equipment name
  - 2. Manufacturer
  - 3. Model
  - 4. Serial Number
  - 5. Equipment tag number
  - 6. Diagram showing bearing locations
  - 7. Operating parameters
  - 8. Test equipment
  - 9. Witness signatures
  - 10. Date

- D. Maintain a master file of all equipment sign off sheets, which shall be available for inspection by the City's Representative. Upon completion of testing, furnish the City's Representative with the original and two copies of the sign off sheet for each equipment item.

## **PART 3 – EXECUTION**

### **3.1 Testing**

- A. Proceed with testing on a step-by-step basis in accordance with the Contractor's written testing procedures. The Contractor's testing work shall be accomplished by a skilled team of specialists under the direction of a coordinator whose sole responsibility shall be the orderly, systematic testing of all equipment, systems, structures and the complete facility as a unit. Each individual step in the procedures shall be witnessed by the City's Representative or Engineer.
- B. Operate all equipment and systems during the plant operational testing period, to the greatest extent practicable, at conditions which represent the full range of operating parameters as defined by the Contract Documents.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 77 00  
CLOSEOUT PROCEDURES**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Specific administrative procedures, closeout submittals, and forms to be used at substantial completion and final completion of Work, and project record documents.

**1.2 Related Work**

- A. Section 01 29 73: Schedule of Values
- B. Section 01 33 00: Submittal Procedures
- C. Section 01 40 00: Quality Requirements
- D. Section 01 74 00: Cleaning and Waste Management
- E. Section 01 75 00: Starting and Adjusting
- F. Section 01 78 23: Operation and Maintenance Data
- G. Section 01 78 36: Product Warranties
- H. Section 01 78 39: Project Record Documents
- I. Section 01 79 00: Demonstration and Training

**1.3 Quality Assurance**

- A. Upon completion of contract, Work shall be finished, tested and ready for operation. Work shall fulfill its intended purpose as described in Contract Documents, in submittals, and in manufacturers' literature.
- B. Where connections or disruptions have been made to existing work, repair, reactivate, refill and recharge components, restoring them to preconstruction conditions. Follow procedures of authorities having ownership or jurisdiction for work involving existing utilities and services.

**1.4 Submittals**

- A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Monument Survey	Show record locations of monuments or benchmarks disturbed and reset by Contractor. Monument survey, if required shall be sealed by surveyor licensed to practice in California.	.
Schedule of Materials and Equipment Costs	See Section 01 29 73	
O&M Manuals	See Section 01 78 23	
Warranties	See Section 01 78 36	
Record Drawings	See Section 01 78 39	
System Demonstration Plan	See Section 01 79 00	

**1.5 Unit Prices**

- A. Payment for Work required in Contract Documents will be included in the price bid for items of work for which Work is required.

**PART 2 - PRODUCTS (Not Applicable)**

## **PART 3 - EXECUTION**

### **3.1 Field Quality Control**

- A. Following system demonstration, schedule and attend final inspection and walkthrough with City's Representative. At walkthrough, City's Representative will review City-prepared punch list of items requiring correction with Contractor and present punch list to Contractor within 72 hours of meeting. Address the punch list items promptly.
- B. Should Contractor elect to protest a punch list item rather than address it to City's satisfaction, City reserves the right to withhold up to 150% of the value of the Work, in accordance with Public Contracting Code, as payment sufficient to hire a third party to perform unfinished work until such time as dispute between City and Contractor is resolved in Contractor's favor.
- C. Eleven month warranty inspection shall be conducted prior to release of bonds. Any work failing to comply with Specifications or performance standards stated in manufacturers' submittals or printed promotional literature will at that time be tagged as defective and scheduled for repair. Repair all defective work in strict accordance with the Contract Documents and to the satisfaction of City's Representative.
  - 1. City will establish inspection date and will notify Contractor at least 30 days in advance.
  - 2. Warranty Inspection Report will be prepared by City's Representative and delivered to Contractor. It will set forth the number and type of failures observed and the names of persons making the inspection.
  - 3. Repairs shall proceed promptly. Upon completion of inspection and receipt of Inspection Report, City will establish a date for Contractor to proceed with remedial Work. Delay on the part of the Contractor to proceed with remedial work on schedule shall constitute a breach of this contract. In such case, City may proceed to have defects remedied as outlined in Contract Documents.
  - 4. Costs of warranty inspection and repair shall be borne by Contractor, who shall include an appropriate amount for testing and repair in his bid. No additional allowance will be paid by City for warranty inspection and repairs.

### **3.2 Extra Stock/Spare Parts**

- A. Provide to the City's Representative a list of all spare and replacement parts with individual prices and location where they are available. Prices shall remain in effect for a period of not less than one year after final acceptance.

**END OF SECTION**

**SECTION 01 78 23  
OPERATION AND MAINTENANCE DATA**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Operation and maintenance manual.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 75 00: Starting and Adjusting
- C. Section 01 78 36: Product Warranties
- D. Section 01 79 00: Demonstration and Training

**1.3 Submittals**

- A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Operation and Maintenance Manual	Furnish as described below.	
Equipment Data Sheets	Submit for equipment furnished under each specification section. Include data sheets in Operation and Maintenance Manual. Use attached form and follow format of attached sample Data Sheet to summarize equipment furnished, nameplate data, and equipment manufacturer's maintenance instructions and recommendations.	

**1.4 Operation and Maintenance Manual**

- A. Prepare and submit two (2) copies of Operation and Maintenance Manual containing information itemized and requested in Contract Documents. Contents shall be original and clear, with readable (no faxes) text on reproducible non-colored paper. Deliver 5 copies in D-ring binders tabbed and indexed by specification sections in numerical order as assigned in the Contract Documents. Include table of contents. Label binders with project name, date, and Volume 1 of \_\_\_\_, Volume 2 of \_\_\_\_, and so on. The second electronic copy shall include the original MS Word Version 2010 documents and scanned images in PDF format in 300-dpi minimum resolution saved onto a CD Rom disc and delivered to City in a labeled plastic jewel case.
- B. Provide the following in each manual:
  - 1. Cover page with equipment name, project name, "City of Corona Department of Water and Power", date, and appropriate data.
  - 2. Table of Contents, identified by volume number, including general description of information provided within each tab section.
  - 3. Provide in the following order the set of documentation for each device and product:
    - a. Device data sheets,
    - b. Accepted shop drawing submittals,
    - c. Installation, operation, and maintenance manuals,
    - d. Supplemental drawings and instructions, and
    - e. Site specific diagrams and programming.

- C. Include in each section of the Operation and Maintenance Manual the product and equipment submittals (where required by Contract Documents) which have been returned and stamped "accepted". Provide the following information in the "accepted" submittal or in a supplemental format.
1. List of equipment furnished for Project with manufacturer's:
    - a. name,
    - b. address,
    - c. telephone number,
    - d. e-mail address,
    - e. nearest representative of manufacturer, and
    - f. nearest supplier of manufacturer's equipment and parts.
  2. Manufacturer's identification of equipment furnished, including:
    - a. order number,
    - b. model number, and
    - c. serial number.
  3. Equipment data sheet describing function of equipment.
  4. Tabulation of mechanical specifications, including:
    - a. materials,
    - b. coatings, and
    - c. linings.
  5. Catalog data.
  6. Paper prints of certified equipment drawings or reviewed shop drawing data clearly marked for mechanical, electrical, and instrument equipment furnished, including complete systems of multiple pieces of equipment in final form. Provide electrical and instrumentation schematic record drawings.
  7. Copies of factory test reports.
  8. Copies of field test reports.
  9. Installation or application instructions.
  10. Complete operating and maintenance instructions for each and every item of equipment, setting forth in detail and step-by-step the procedure for:
    - a. starting,
    - b. stopping (including safety precautions and emergency operating shutdown procedures),
    - c. operating under all modes of operation,
    - d. adjusting,
    - e. calibrating,
    - f. trouble-shooting, and
    - g. maintaining the entire system as installed.
  11. Schedule of recommended maintenance intervals.
  12. Overhaul instructions including manufacturer's directions for the:
    - a. disassembly of the equipment,
    - b. inspection of the equipment,
    - c. repair of the equipment,
    - d. reassembly of the equipment,

- e. safety precautions,
  - f. recommended tolerances, and
  - g. special tools required for maintenance and repair.
13. Complete parts list of replaceable parts, their part numbers, and the name and address of their nearest vendor. Provide manufacturer's recommended list of parts for City to stock and any special storage requirements.
  14. For equipment requiring lubrication, the manufacturer's recommended lubricants and lubrication schedule.
  15. For equipment containing integral electrical controls:
    - a. diagrams showing internal and connection wiring,
    - b. logic diagrams,
    - c. wiring diagrams for control panels,
    - d. ladder logic for computer base systems,
    - e. connections between existing systems and new addition, and
    - f. adjustments such as calibrating and set points for relays, and control or alarm contact settings.
  16. List of fuses, lamps, seals, and other expendable equipment and devices. Specify size, type, and ordering description. List name, address, e-mail address, fax number, and telephone number of vendor.
  17. Any special emergency operating instruction and a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.
  18. Exploded views where appropriate.
  19. Photographs of installed equipment.
  20. Copy of manufacturer's equipment guarantees and warranties.
- D. Provide manuals for each piece of equipment including individual components and subsystems of complete assemblies. Line out non-applicable text and illustrations. The section of the manual on operation shall describe the functions and limitations of each component and its relationship to the system of which it is a part. Where several models, options, or styles are described, identify in the manual the items actually provided.
- E. If the manufacturer's standard brochures and manuals are used to describe O&M procedures, modify such brochures and manuals to reflect only the model or series of equipment used on this Project. Cross out neatly, annotate, or eliminate extraneous material. Brochures shall be loose leaf with durable plastic or fiberboard covers. Each sheet shall be reinforced to prevent tearing from continued use, and each brochure shall have the following information clearly printed on its cover:
1. Project name, name of City, and address.
  2. Name and address of City's Representative.
  3. Name and addresses of contractors and subcontractors and department to contact.
  4. Telephone number of contractors, including night and emergency numbers.
  5. Major equipment vendors' names and telephone numbers.

- F. Operation and maintenance manuals specified herein are in addition to any operation, maintenance, or installation instructions required by the Contractor to install, test, and start up equipment.

## **1.5 Contractor Submittals**

- A. Before requesting payment for 80 percent completion point for the total contract, submit two copies of the Operation and Maintenance Manual containing copies of material available at that time.
- B. Within 30 calendar days after review and acceptance by City of two-copy submittal, submit one electronic copy of Operation and Maintenance Manual in PDF format.
- C. Contractor may submit operating and maintenance instructions by individual specification section or in final form according to the above instructions.
- D. If the Contractor chooses to submit the O&M instructions by individual specification section, use the following procedure:
  - 1. Submit two (2) copies of O&M instructions, along with a good quality photocopy of associated Equipment Maintenance Summary sheets, for each specification section for review.
  - 2. Submittals will be returned with a review sheet and comments.
  - 3. Resubmit, if requested by the City's Representative, and retain all copies of approved submittals until all sections have been approved.
  - 4. When all sections have been approved, organize and bind the manuals for all the sections of the contract specifications according to the above instructions and submit one complete set of O&M instructions for final review. Submit separately and unbound the completed original Equipment Maintenance Summary sheets.
  - 5. Final review will be for the organization and binding of a complete set of manuals as specified and will not include review of previously approved material.
  - 6. When the complete set is approved, submit six (6) complete sets to the City's Representative as approved and specified.
- E. If the Contractor chooses to submit the O&M instructions in final form, without previous approval of individual specification sections, use the following procedure:
  - 1. Submit two (2) complete sets of O&M instructions, along with a good quality photocopy of associated Equipment Maintenance Summary sheets, organized and bound according to the above instructions for review. Place Equipment Maintenance Summary sheets with their associated specification sections for review.
  - 2. The set will be returned with review sheets and comments pertaining to the manual organization and binding, as well as the contents.
  - 3. Continue to resubmit the two (2) complete sets of O&M instructions, as requested by the City's Representative, until entirely approved.
  - 4. When the complete set is approved, submit six (6) complete sets to the City's Representative as approved and specified. Submit separately and unbound, the completed original Equipment Maintenance Summary sheets.
- F. Operation and maintenance manuals specified herein are in addition to any operation, maintenance, or installation instructions required by the Contractor to

install, test, and start up equipment. Modify and supplement instructions in O&M Manuals to reflect any field changes or information required by field conditions.

**1.6 Payment**

- A. An acceptable first submittal O&M information package must be delivered to the City before the Contractor can be paid for more than 80 percent of the purchase value of that equipment and prior to installation of the equipment. Purchase value shall be the net price for the equipment as given on the paid invoice. Progress payments for work in excess of 80 percent completion will not be made until acceptable O&M information has been delivered to the City.

**1.7 Unit Prices**

- A. Payment for operation and maintenance manuals required in Contract Documents will be included in the price bid for items of work for which sections of Operation and Maintenance Manuals are required.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 – EXECUTION (Not Applicable)**

**END OF SECTION**

## EQUIPMENT MAINTENANCE DATA SHEET

<b>PREVENTATIVE MAINTENANCE PROGRAM</b>		<b>EQUIPMENT RECORD NUMBER</b>		
<b>EQUIPMENT DESCRIPTION</b>		<b>ELECTRICAL OR MECHANICAL DATA</b>		
Name: Tag No.:		Nameplate Horsepower:		
Serial No.: Date of Manufacture:		Model:		
Manufacturer: Address:  Phone:		Catalog Number (poly-phase motors): Type:		
		Voltage:	Measured Current:	Nameplate Current:
		Phase:	Overload Relay Setting:	rpm:
Vendor: Address:  Phone:		Local Parts Supplier: Address:  Phone:		
<b>MAINTENANCE AND LUBRICATION WORK TO BE DONE</b>				Frequency*
<b>SPARE PARTS LIST</b>		<b>FUSES/LAMPS/SEALS</b>		
Quantity	Part & Part Number	Qty	Size	Type & Ordering Description
<b>WARRANTY AND OPERATING REQUIREMENTS AND REFERENCE</b>				
For manufacturer's instructions regarding installation, operation, maintenance and troubleshooting of this equipment, see Volume ____, Section ____.				

\*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly; S - Semiannually; A – Annually

**SAMPLE  
EQUIPMENT MAINTENANCE DATA SHEET**

<b>PREVENTATIVE MAINTENANCE PROGRAM</b>		<b>EQUIPMENT RECORD NUMBER</b>		
<b>EQUIPMENT DESCRIPTION</b>		<b>ELECTRICAL OR MECHANICAL DATA</b>		
Name: Influent Pump No. 1 Tag No.: P01-1		Nameplate Horsepower: 15 HP		
Serial No.: 123456ABC Date of Manufacture: April 1, 2010		Model: 140T Frame Serial No. 987654ZY Class F Insulation w/ Space Heater		
Manufacturer: DEF Motors, Inc. Address: 465 Mayfair Avenue Cincinnati, OH 45202 Phone: (365) 453-9089		Catalog Number (poly-phase motors): M36999b Type: TEFC		
		Voltage: 480	Measured Current: 18 amps	Nameplate Current: 20 amps
		Phase: 3	Overload Relay Setting: 25 amps	rpm: 1,800
Vendor: ABC Pump Co. Address: 1234 Richter Avenue Irvine, CA 92604 Phone: (951) 752-0505		Local Parts Supplier: XYZ Mechanical Address: 5678 Main Street Corona, CA 92880 Phone: (951) 752-0505		
<b>MAINTENANCE AND LUBRICATION WORK TO BE DONE</b>				<b>Frequency*</b>
1. Operate valves and check such things as a) bearing temperature, b) changes in running sound, c) suction and discharge gage readings, d) pump discharge rate, and e) general condition of the drive equipment.				D
2. Check packing.				D
3. Check pumping unit for any dust, dirt or debris.				W
4. Lubricate bearing frame and motor bearings (consult manufacturer's instructions for type of grease or oil).				Q
5. Disassemble and change or repair the following: a) impeller, b) shafts, c) shaft sleeve, d) rotary seals, and e) sleeve bearings.				A
<b>SPARE PARTS LIST</b>		<b>FUSES/LAMPS/SEALS</b>		
Quantity	Part & Part Number	Qty	Size	Type & Ordering Description
<b>WARRANTY AND OPERATING REQUIREMENTS AND REFERENCE</b>				
For manufacturer's instructions regarding installation, operation, maintenance and troubleshooting of this equipment, see Volume ____, Section ____.				

\*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly; S - Semiannually; A - Annually

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 78 36  
PRODUCT WARRANTIES**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. Warranties are required for all Work furnished under this contract.
- B. Manufacturer's warranties shall not relieve Contractor of liability required under Contract Documents. Such warranties only shall supplement Contractor's responsibility.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 40 00: Quality Requirements
- C. Section 01 75 00: Starting and Adjusting
- D. Section 01 77 00: Closeout Procedures
- E. Section 02900: Planting

**1.3 Submittals**

- A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Warranty	For equipment bearing manufacturer's warranty in excess of one year, furnish copy of warranty to City with City named as beneficiary.	

**1.4 One-Year Product Warranties**

- A. Warranties shall cover improper assembly or erection, defective workmanship and products, and incorrect or inadequate operation.
- B. Furnish one-year warranty for all Work and manufactured items unless otherwise stated. Warranty shall cover parts, labor, and prompt service for repair of defects, performance failure or damage due to normal wear and tear or due to any cause other than acts of God, or intentional or active and extreme abuse of product. Warranty period shall extend one year beyond final acceptance of completed contract by City.
- C. In addition to manufacturer's standard warranty, furnish services of factory-authorized and factory-trained service technician to promptly provide repair service for mechanical equipment for specified warranty period. Provide this service at no cost to City and include cost of all replacement parts and labor required during that period.
- D. Correct within ten (10) days following receipt of notice thereof from City any defective or imperfect material or workmanship which may be discovered within one (1) year after final acceptance. Make all such corrections of defective or imperfect material or workmanship without extra charge, notwithstanding that it may have been overlooked in previous inspections and estimates and the Work finally accepted by City.

### **1.5 Inspection of Installation by Manufacturer**

- A. In the event manufacturer or supplier of any product has reason to suspect said manufacturer's product has not been installed in accordance with manufacturer's warranty requirements, Manufacturer shall have right to send their factory authorized representative to inspect facility.
- B. In the event manufacturer's factory authorized representative elects to inspect installation, said manufacturer shall promptly notify City in writing of any observed deficiencies in installation procedures which might affect the warranty.
- C. In the event manufacturer elects to forego inspection of installation of his products, said manufacturer shall be precluded from claiming faulty installation by others as relief from honoring furnished warranties.

### **1.6 Eleven-Month Anniversary Warranty Inspection**

- A. Warranty inspection shall be conducted during 11th month following completion of Work.
- B. Locations found in warranty inspection where paving, coating, or paint has peeled, bubbled or cracked, and locations where rusting is evident will be considered a system failure. Repair defective work identified during warranty inspection by removing deteriorating paving, coating or paint system, cleaning surface, and repaving, recoating or repainting with same system. Electrically test repaired painted areas. If area of failure exceeds 25% of total paved, coated or painted surface for pavement, coating or paint system on any structure or surface, remove and recoat entire paving, coating or paint system per original specification.
- C. Repair other failed products found in warranty inspection per warranty requirements.
- D. City shall establish date for warranty inspection and shall notify Contractor at least 30 days in advance. If notification of inspection date does not occur within twelve months after final acceptance, the first anniversary inspection shall be considered to be waived.

### **1.7 Plant Establishment and Maintenance Period**

- A. Comply with the requirements for plant establishment and maintenance as provided in Planting Specification 02900.

### **1.8 City-Furnished Equipment and Materials Warranties**

- A. Product warranties on City-furnished equipment and materials shall be provided by the equipment and materials manufacturers directly to the City.
- B. Contractor is responsible for installing equipment and materials in accordance with the requirements of Specifications Section 01 70 00 – Execution as necessary to maintain product warranties.
- C. Contractor is responsible for correcting and repairing any defects caused by faulty installation during the life of the product warranty.

### **1.9 General Warranty Clauses**

- A. Repair or replace any work that may prove to be defective in workmanship and/or materials within the warranty period, along with any other work which may be

damaged or displaced during performance of the warranty work, all with no additional expense to the City.

- B. Where sections of specifications stipulate a longer warranty period than is stipulated in this section, the longest and most stringent warranty requirement shall apply.
- C. Warranty period shall begin on the earliest of the following two milestones:
  - 1. Date of formal notification of completion, or
  - 2. 31 calendar days after both substantial completion and City taking over beneficial use of project.
- D. Warranties shall cover the following:
  - 1. Parts
  - 2. Labor
  - 3. Diagnostics
  - 4. Servicing
  - 5. Removal or Installation Charges
  - 6. Setup and Reconfiguration of System with Replacement Parts
  - 7. Shipping
- E. Where a part is replaced during warranty period, warranty for replaced part and shipping shall be extended to not less than one year following date of replacement. Warranty for labor shall be unchanged.
- F. Following notification of Contractor of a warranty issue, Contractor or his agent shall have two weeks to inspect and 30 days to remedy defective work. Failure to perform within this stipulated period will result in damages being assessed against Contractor and responsible parties retroactive to date of discovery.

#### **1.10 Unit Prices**

- A. Payment for warranties required in Contract Documents will be included in the price bid for items of work for which warranties are required.

#### **PART 2 - PRODUCTS (Not Applicable)**

#### **PART 3 – EXECUTION (Not Applicable)**

**END OF SECTION**

**THIS SECTION INTENTIONALLY BLANK**

**SECTION 01 78 39  
PROJECT RECORD DOCUMENTS AND PHOTOGRAPHS**

**PART 1 - SCOPE**

**1.1 General Requirements**

- A. Keep one accurate, legible set of record drawings at the site and available for review by City's Representative in Contractor's field office or in superintendent's truck throughout the Project. Record drawings referenced in this Specification and elsewhere in the Contract Documents are commonly referred to as "contractor as-built" drawings. Final project record drawings prepared by the engineer of record will use the "contractor as-built drawings", and information collected during construction by the City, contract inspectors, and others as the basis for preparing the final project record drawings.
- B. Prepare construction photographic and video documentation.

**1.2 Related Work**

- A. Section 01 32 33: Construction Photographic and Video Documentation
- B. Section 01 33 00: Submittal Procedures
- C. Section 01 79 00: Demonstration and Training

**1.3 Submittals**

- A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Record Drawing Prints	One (1) working set of record drawings as created during the course of Work; and One (1) final set of record drawings, certified as to accuracy and signed	.
PDF File of Record Drawings on CD ROM Disc	One (1) copy in labeled plastic jewel case	
Record Drawing Certifications	Submit monthly with progress payment request	
Photograph Digital Files on CD ROM Disc	One (1) copy in labeled plastic jewel case	

**1.4 Record Drawing Requirements**

- A. Provide record drawings on a single set of full-size project black-line prints of the Contract Drawings and other drawings forming a part of the contract, showing installed locations of improvements and all changes made during construction.
- B. Show on record drawings before backfilling trench the locations by key dimensions, depths, elevations of all underground piping, drains, conduit, duct banks, sensor lines, cables, valves, capped ends, branch fittings, pull boxes and other components of the Work whose location differs from that shown on the original Plans or where design is shown schematically and dimensions are not shown on the original Plans. Do not conceal any work until the required record drawing information has been recorded. The City may direct the Contractor to expose concealed work if work was not recorded on the record drawings.
- C. Show all record drawing changes in a contrasting color to the original.
- D. In showing changes in the Work, or added Work, use the same legends used on the Contract Drawings. Show locations and elevations to the same level of accuracy as

the original Contract Documents. Tie dimensions to a permanent point with a two-point tie-down system.

- E. Report changes and deviations promptly to City's Representative.
- F. Incorporate in record drawings addenda, supplementary drawings, working drawings, change orders, responses to requests for information, jobsite memorandums, clarifications, field observations of existing utilities and conditions, informal - no cost changes and corrections requested or accepted by the City's Representative, and any additional details needed for construction of the Work not otherwise shown on the Plans.
- G. Incorporate in record drawings explanatory comments at informal changes where the cause is significant, but not obvious.
- H. Locate by survey and identify on the record drawings any substructures encountered while excavating and subsequently left in place.
- I. Where the Plans are diagrammatic or lacking precise details, produce dimensioned full size sheets as the record drawings. For installations outside of structures, give the locations by coordinates and elevations. Where substructures are encased in concrete, give the outside dimensions of the encasement. The Contractor may submit additional 24" x 36" sheets detailing record work as approved by the City.
- J. Incorporate in record drawings survey notes, field notes and system demonstration logs.
- K. Mark record drawings at the time material and equipment are installed to maintain drawings current with all entries reviewed by City's Representative. Bring record drawings to all progress meetings.
- L. Protect the record drawings from damage or loss.
- M. Clearly show in record drawings all discrepancies between the Contract Documents and the installed Work.
- N. Show actual measured dimensions, not calculated values.
- O. Record information on how to maintain and/or service concealed Work.
- P. Concealed shall mean construction installed underground or in an area which cannot be readily inspected by use of access panels, inspection plates or other removable features.
- Q. Make a record of finalized hydraulic and electrical equipment control settings in the appropriate tables and spaces provided on the record drawings.
- R. For any device requiring hardware to program, provide one programmer for each device at each site.

### **1.5 Photograph Requirements**

- A. Provide construction progress photographs of all work to be buried or hidden including:
  - 1. Irrigation piping, connections, valves, fittings, and equipment;
  - 2. Conduits, duct banks;
  - 3. Reinforced concrete footings, slabs, and foundations with reinforcing steel in place prior to concrete placement; and

4. Other items as directed by City Representative.
- B. Provide construction site, electrical, and irrigation progress photographs taken not less than weekly showing the progress of the Work.
- C. Use digital photography.

### **1.6 Unit Prices**

- A. Payment for record drawings and project photographs required in Contract Documents will be included in the price bid for items of work for which record drawings and photographs are required.
- B. Progress payment requests may be withheld if daily logs, schedule updates, record drawings, or project photographs are damaged, lost or not kept current to satisfaction of City's Representative.

## **PART 2 - PRODUCTS (Not Applicable)**

## **PART 3 - EXECUTION**

### **3.1 General**

- A. Maintain the following in the Contractor's field office or in superintendent's truck in clean, dry, legible condition: Contract Drawings, Specifications, Addenda, accepted Shop Drawings, Samples, photographs, Change Orders, other Modifications of Contract, test records, survey data, Field Orders, and all other documents pertinent to the Contractor's Work, including Work by Subcontractors.
- B. During progress payment request meetings, submit a signed certification stating all record drawings are complete and accurate as of the date of the payment request, and present current record drawing documents for review.
- C. Make documents available at all time for inspection by the City. Do not use record drawings for any other purpose nor remove them from the office without the City's approval.
- D. At the Completion of the Work and after Final Inspection, copy the record drawing information (as installed) data, using red ink, onto a new set of high quality prints. Certify with signature as to the completeness and accuracy of the "as installed" information indicated on the prints. Deliver as a submittal to the City, for review and approval, both the field developed prints and the final signed prints as a condition precedent to the City's final acceptance of Work and release of any retained funds. City will use the final signed record drawings to create reproducible mylar record drawings.
- E. Submit completed project photographs on CD with final record drawings submittal.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

**SECTION 01 79 00  
DEMONSTRATION AND TRAINING**

**PART 1 - GENERAL**

**1.1 Work Included**

- A. System Demonstration and training of City's personnel. Furnish spare parts and maintenance materials.

**1.2 Related Work**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 75 00: Starting and Adjusting
- C. Section 01 78 23: Operation and Maintenance Data

**1.3 Submittals**

- A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
System Demonstration Plan	Submit within 30 calendar days following pre-construction meeting. Outline each test procedure proposed for final testing. Plan shall describe each system to be tested, test methods, test materials, test instruments and recorders, and results to be recorded. In addition to functional testing of each system, system demonstration plan shall include continuous 72-hour demonstration of operation of entire installed system. A shorter demonstration period may be authorized solely by City's Representative if external constraints make a 72-hour test impractical. Procedures shall include demonstration of all modes of operation. Procedures shall incorporate start-up and demonstration procedures recommended by Manufacturers. City may modify proposed procedures as deemed necessary to demonstrate system operation. System demonstration shall include operation of all new equipment through entire operational range.	
System Demonstration Log	Submit for final operations test period.	
Lesson Plan	Submit no less than 30 calendar days prior to scheduled training for City's personnel.	
Spare Parts List	Submit with System Demonstration Plan	

**1.4 Unit Prices**

- A. Payment for system demonstration including materials, equipment, devices, labor, travel costs, expenses, and maintenance items, required in Contract Documents will be included in the price bid for items of work for which systems demonstration and startup is specified.
- B. Payment for costs and expenses of representatives of material and equipment suppliers and subcontractors will be included in the price bid for items of work for which systems demonstration and startup is specified.
- C. Payment for operation and maintenance training required in Contract Documents shall be included in the price bid for items of work for which operation and maintenance training is required.
- D. If it is necessary for any of City's inspectors or representatives to be present for retests or re-inspections of installed facilities, Contractor shall pay all costs on a per

diem rate as established between City and their representative. Said amounts shall be deducted from final payments to Contractor.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 – EXECUTION**

**3.1 System Demonstration**

- A. System demonstration shall conform to accepted demonstration plan.
- B. Notify City's Representative of time and place of system demonstrations 5 working days before they begin.
- C. Arrange for representatives of equipment suppliers and subcontractors to be present as required to successfully demonstrate installed system.
- D. Furnish and install any temporary valves, fittings, bulkheads, taps or other items necessary for system demonstration.
- E. Prior to formal system demonstration, provide test runs as needed and verify all parts are in place and in working order. City's costs for delays during system demonstration due to Contractor's failure to pretest system and verify all products are in place and functional will be back-charged to Contractor.
- F. Perform systems demonstrations in presence of City's Representative who will record results. Start up and operate individual subsystems, pieces of equipment, instruments, etc.
- G. Correct immediately defects and malfunctions disclosed during testing and system demonstration. Replace with new equipment any work that fails to perform its intended function, and cannot be repaired.
- H. Disassemble, inspect, and replace defective components of equipment exhibiting unusual or unacceptable operating characteristics.
- I. Failure to meet specified requirements shall be cause for retesting at the Contractor's expense until the requirements are met. Interruption of a continuous operation test due to equipment malfunction shall be cause to restart the test after repairs.

**3.2 Field Quality Control**

- A. Field testing shall include the following:

ITEM	TEST FOR	TEST STANDARD (ASTM OR OTHER TEST STANDARD)	FREQUENCY	FIRST TEST PAID FOR BY	RETESTS PAID FOR BY
Finished Installation	Installation & Leakage	Visual inspection of finished installation	1 inspection	City	City
	System Demonstration	Demonstrate compliance to Contract Documents and Manufacturer's printed literature using accepted system demonstration plan described above	One 72-hour demonstration without interruption. (If test is interrupted, clock restarts at zero for 72-hour demonstration)	Contractor (City will pay for test water)	Contractor

ITEM	TEST FOR	TEST STANDARD (ASTM OR OTHER TEST STANDARD)	FREQUENCY	FIRST TEST PAID FOR BY	RETESTS PAID FOR BY
	11-month Warranty Inspection	Demonstrate compliance to Contract Documents and Manufacturer's printed literature	1 test	City	Contractor

- B. Provide qualified technicians as necessary to perform tests. In addition, furnish Contractor's own personnel, as needed, to make adjustments or alterations recommended by the equipment manufacturer's representative(s).
- C. Correct all deficiencies found during system demonstration, including malfunctions of equipment or control systems, and leakage.

**3.3 Training of City's Personnel**

- A. Conduct training and instruction program on equipment and system operation for persons designated by City. Furnish services of qualified factory-trained instructors from applicable equipment manufacturers, subject to approval by the City. Include instruction covering basic operation theory, preventive maintenance, routine maintenance and repair, and "hands-on" operation of equipment. If not otherwise specified, base duration of program on complexity of equipment involved. Obtain City's approval of instruction adequacy before terminating program. Consult City to schedule instruction. Provide minimum 10 working days prior notice for training.
- B. Provide approved Operation and Maintenance Manual for specific pieces of equipment or system a minimum of 10 working days prior to training session for that piece of equipment or system.
- C. Provide "hands-on" field training and demonstrations of common corrective maintenance repairs as described in the Contractor's proposed Lesson Plan. Provide tools and equipment to conduct the demonstrations. Submit requests for supplemental assistance and facilities with the proposed Lesson Plan.
- D. As part of training, provide attendees with names, contact persons, telephone numbers and addresses of authorized service centers within 100-mile radius of jobsite for equipment on which training is taking place.
- E. System demonstration testing, final operation testing, and instruction of City's personnel may be performed simultaneously, subject to prior approval of extent of consolidation.
- F. Do not commence training of City personnel until substantial completion of the Work, unless agreed to in writing by the City.
- G. The following training is required:

ITEM	LOCATION	CLASSROOM TRAINING DURATION	FIELD TRAINING DURATION	APPROXIMATE NUMBER OF ATTENDEES
System Overview	On-site	2 hours	2 hours	3-10 people
Irrigation Controllers	On-site	2 hours	2 hours	3-10 people
Lighting and Electrical System	On-site	4 hours	4 hours	3-10 people

### 3.4 Lesson Plan

- A. Include in the Contractor's proposed Lesson Plan, as a minimum, the elements presented in the Outline of Lesson Plan below. Identify specific components and procedures in the proposed Lesson Plan, and tailor it to the City's needs.
- B. Detail specific instruction topics in the Contractor's proposed Lesson Plan. Reference training aids to be utilized in the instruction and attach where applicable to the proposed Lesson Plan. Describe "Hands-On" demonstrations planned for the instruction.
- C. Indicate the estimated duration of each segment of the training Lesson Plan.
- D. Lesson Plan Outline
  1. Equipment Operation
    - a. Describe equipment's operating (process) function.
    - a. Describe equipment's fundamental operating principals and dynamics.
    - b. Identify equipment's mechanical, electrical and electronic components and features.
    - c. Identify all support equipment associated with the operation of subject equipment (i.e., air intake filters, valve actuators, motors).
    - d. Provide standard operating procedures to cover start-up, routine monitoring and shut-down of the equipment.
    - e. Describe emergency procedures, interlocks, and safety items and procedures, such as lock-out/tag-out.
  2. Detailed Component Description
    - a. Identify and describe in detail each component's function.
    - b. Where applicable, group related components into subsystem. Describe subsystem functions and their interaction with other subsystems.
    - c. Identify and describe in detail equipment safeties and control interlocks.
  3. Describe Preventive Maintenance (PM)
    - a. Describe PM inspection procedures required to:
      - (1) Perform an inspection of the equipment in operation.
      - (2) Spot potential trouble symptoms (anticipate breakdowns).
      - (3) Forecast maintenance requirements (predictive maintenance).
    - b. Define the recommended PM intervals for each component.
    - c. Provide lubricant and replacement part recommendations and limitations.
    - d. Describe appropriate cleaning practices and recommended intervals.
  4. Equipment Troubleshooting
    - a. Define recommended systematic troubleshooting procedures.
    - b. Provide component specific troubleshooting checklist.
    - c. Describe applicable equipment testing and diagnostic procedures to facilitate troubleshooting.
  5. Equipment Corrective Maintenance
    - a. Describe recommended equipment preparation requirements.

- b. Identify and describe the use of any special tools required for maintenance of the equipment.
- c. Describe component removal/installation and disassembly/assembly procedures.
- d. Perform at least two "hands-on" demonstrations of common corrective maintenance repairs.
- e. Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
- f. Define recommended torqueing, mounting, calibration and/or alignment procedures and settings, as appropriate.
- g. Describe recommended procedures to check/test equipment following a corrective repair.

### **3.5 Training Aids**

- A. Incorporate training aids as appropriate to assist in the instruction. At a minimum, include text and figure handouts with the training aids.
- B. The Contractor's instructor shall utilize descriptive class handouts during the instruction. Provide good quality reproductions of photocopied class handouts. Provide class handouts during instruction with frequent references made to them. Customized handouts developed especially for the instruction are encouraged. Attach handouts planned for the instruction with the Contractor's proposed Lesson Plan.

**END OF SECTION**

**THIS PAGE INTENTIONALLY BLANK**

## **SECTION 02110**

## **SITE CLEAR AND GRUB AND SELECTIVE DEMOLITION**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

The provisions of the "Standard Specifications for Public Works Construction" shall apply except as modified herein.

#### **1.02. SCOPE OF WORK**

- A. Furnish all material, equipment and labor necessary to perform all clearing and grubbing work complete, including but not limited to, the following:
1. Protection and preservation of all trees as indicated on the Drawings.
  2. Clearing and grubbing of all other vegetation from site work areas.
  3. Saw cutting, removal and disposal of all pavement designated on the plans for removal.
  4. Removal and disposal of all deleterious materials.
  5. Furnishing, developing, applying and providing dust control watering equipment as required for the Work.
  6. Removal and disposal of any additional items not specifically mentioned herein which may be found within the limits of the Work.

#### **1.03 RESPONSIBILITY AND COORDINATION**

- A. Contractor shall secure and maintain all required permits and licenses, and pay all fees necessary to legally complete the work of this Section.
- B. Contractor shall notify utility companies for all utilities to be cut off, modified or relocated, and shall maintain and protect all active utilities.
- C. Contractor shall coordinate all work with the Public Works Department.

#### **1.04 PROTECTION AND SAFETY**

- A. Contractor shall provide signs in necessary places to exclude persons, except those connected with the Work from entering the working area. Contractor is responsible for preventing unauthorized persons from entering the Work area.
- B. The Contractor shall protect the project site and adjacent properties from dirty water, mud and water accumulated due to the Contractor's operations and from rainfall runoff or water that enters the project site from any other source.

### **PART 2 - MATERIALS**

Not applicable.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL REMOVAL WORK**

- A. Removal of selected concrete walkways, concrete ramps and asphalt paving work shall be carefully done to avoid damage to all existing facilities not designated for removal.

#### **3.02 SITE CLEARANCE AND DISPOSAL:**

**Corona City Park Basket Ball Court and Volleyball Court Addition  
SITE CLEAR & GRUB, AND SELECTIVE DEMOLITION: 02110-1**

- A. Clear the sites to be improved of grass, shrubs, weed growth, rubbish and debris, and existing asphalt concrete pavement, concrete slabs, etc., that are to be removed for construction of the improvements shown on the Construction Documents. Roots two (2) inches in diameter and larger, rocks larger than two (2) inches in the greatest dimension, broken masonry, man-made debris and irrigation lines shall be removed to a minimum depth of twelve (12) inches below finished grade.
- B. All deleterious materials shall be disposed of off the site in a legal manner by the Contractor, who shall make all necessary arrangements and pay all related costs.
- C. All miscellaneous inactive underground facilities (e.g., drainage devices, secondary water lines, cables, abandoned oil and water lines, leaching fields, irrigation pipes, wiring, etc.), located twelve (12) inches or more below the finish grade may be abandoned in place or removed as necessary for proper completion of the Work. All miscellaneous active underground facilities that are encountered during the Work shall be protected with written notification designating the exact location of these active underground facilities delivered to the Owner's Representative.

### 3.03 UTILITIES

- A. Inactive or abandoned utilities shall be disconnected, removed, and plugged or capped subject to local governing ordinances and agencies having jurisdiction.
- B. Should the Contractor encounter any existing underground utilities not shown on the Contract Documents, he shall notify at once the Parks and Recreation Department and the Landscape Architect for written determination of proper procedure prior to the continuation of the Work.

### 3.04 DEBRIS BURNING

- A. Burning of debris will not be permitted.

### 3.05 DUST CONTROL

- A. Dust shall be kept to a minimum during site clearing operations by means of wetting the site. After all site clear and grub operations are complete, mechanically sweep all existing roadways that have become soiled due to Contractor's operations.
- B. The lump sum price paid for "Mobilization" shall be considered as full compensation for doing all the work involved and no additional compensation will be allowed thereafter.

END OF SECTION

**PART 1 GENERAL**

1.01 RELATED DOCUMENTS

- A. The work of this section shall conform to the "Standard Specifications for Public Works Construction," latest edition, Section 300, except as modified herein.

1.02 SCOPE OF WORK

- A. Work of this section includes:
  - 1. Furnishing all work and material, appliances, tools, equipment, facilities, transportation, and services necessary for and incidental to performing operations in connection with the installation of landscape irrigation, complete, as shown on the drawings and/or specified herein.
  - 2. Work noted as "N.I.C.," "existing," or "to be supplied and/or installed by others" is not a part of this Section.
  - 3. The work in this section shall be coordinated with all underground utilities and trades responsible for their installation.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. **Operation and Maintenance Data:** Section 01 78 23  
**Project Record Drawings:** Section 01 78 39  
**Planting:** Section 02900

1.04 QUALITY ASSURANCE

- A. **Permits:** Obtain and pay for all permits and inspections required by outside agencies.
- B. **Ordinances and regulations:** Local, municipal, and state laws, and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the Contractor. Anything contained in the Specifications shall not be construed to conflict with any of these rules and regulations or requirements of the same. However, when the Specifications and Drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by these rules and regulations, the provisions of the Specifications and Drawings shall take precedence.
- C. **Protection:** Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site.
- D. **Underwriters' Laboratories:** Electrical wiring, controls, motors, and devices shall be UL listed, and so labeled.
- E. **Installer Qualifications (for solvent and rubber gasket joints):** Each person shall be trained by the manufacturer's representative in techniques for making correct joints prior to performing work on the site.
- F. Work of this Section that is allied with the work of other trades shall be coordinated as necessary.

- G. **Superintendent:** A superintendent satisfactory to the Owner and/or the Owner's Representative shall be present on the site at all times during progress of the Work.
  - 1 The Superintendent shall not be changed, except with the consent of the Owner and/or the Owner's Representative.
  - 2 The Superintendent shall be authorized to represent the Contractor.
- H. **Discrepancies:** When discrepancies exist between Drawings and Specifications, and no specific interpretation is issued prior to bidding, the decision regarding this interpretation will rest with the Landscape Architect. The Contractor will be compelled to act on this decision as directed. In the event the installation deviates from the directions given, it shall be corrected at the Contractor's expense.
- I. **Explanation of Drawings:** Due to the scale of the Drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. Carefully investigate the structural and finished conditions affecting all of this work and plan this work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting and architectural features.
- J. **Manufacturer's Directions:** Manufacturer's directions and detailed drawings shall be followed in all cases where the manufacturers used in this Contract furnish directions covering points not shown in the Drawings and Specifications.
- K. Work called for on the Drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the Specifications.
- L. The Contractor shall not install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in equipment usage or area dimensions exist that might not have been considered in the engineering. Such obstructions or differences shall be brought to the attention of the Landscape Architect, the Owner and/or the Owner's Representative.
  - 1. Contractor to receive written instructions or written approval defining prescribed solutions prior to proceeding with the Work in areas of discrepancy.
  - 2. In the event this notification is not performed, the Contractor shall assume full responsibility for any revision necessary at no cost to the Owner.

1.05 SUBMITTALS

- A. Prior to the installation of any work, prepare a detailed list of each material proposed for use in the project and submit to the Landscape Architect, the Owner and/or the Owner's Representative for approval. Prepare type written material list using the following format: (Double space between each item.)

Item No.	Description	Manufacturer	Model No.
1.	Pressure supply lines	Pac. Western	Sched. 40 PVC
2.	Lawn headRain Bird	1804-B12	
3.	Etc.	Etc.	Etc.

1.06 RECORD DRAWINGS

- A. Prepare and maintain record drawings in accordance with Specification Section 01 78 39

- B. Locate all dimensions from two permanent points; monuments, sidewalks, curbs, or pavements.
- C. **Maintain information daily.** Keep record drawings at the site at all times and available for review by the Landscape Architect, the Owner and/or the Owner's Representative.
  - 1. Updated plans to be reviewed for completeness prior to submittal of payment request.

#### 1.07 ALTERNATE MATERIAL APPROVALS

- A. Substitution of any product, material, or equipment without the prior written approval of the Landscape Architect, the Owner and/or the Owner's Representative will not be permitted.
  - 1. Approval of any item as a Substitution or alternate is for design only.
  - 2. Approval to be based on any specifications, manufacturer's information and samples provided by the Contractor.
  - 3. Contractor shall be responsible for the total performance of any proposed Substitution to equal or surpass the specified element in every respect.
  - 4. If the Substitution proves to be unsatisfactory in the opinion of the Landscape Architect, Contractor shall remove such work and replace it within originally specified item, including installation, as part of the work of this Section.
  - 5. Manufacturer's Warranties shall not relieve Contractor of any liability under the specified guarantee. Such warranties are intended only to supplement the Contractor's guarantee.

#### 1.08 CONTROLLER CHARTS

- A. Do not prepare charts until As-Built Plans have been approved by the Landscape Architect, the Owner and/or the Owner's Representative.
- B. Provide one controller chart for each automatic controller installed.
  - 1. Chart may be a reproduction of the As-Built Plans, if the scale permits fitting the controller door. If photo reduction prints are required, keep reduction to maximum size possible to retain full legibility. In conformance with section 1.06, F.1 of this Specification.
  - 2. Chart shall be a blackline print of the actual system, showing the area covered by that controller.
- C. Identify the area of coverage of each remote control valve, using a distinctly different pastel color, drawn over the entire area of coverage.
- D. Following approval of charts by the Landscape Architect, the Owner and/or the Owner's Representative, the chart shall be hermetically sealed between two layers of twenty (20) mil thick plastic sheets.
- E. Charts must be completed and approved prior to start of the maintenance period.

#### 1.09 OPERATING AND MAINTENANCE MANUALS

- A. Provide operation and maintenance manuals in accordance with Specification Section 01 78 23.

#### 1.10 CHECKLISTS

- A. Deliver a signed and dated checklist to the Landscape Architect, the Owner and/or the Owner's Representative ten (10) days prior to the start of maintenance period.
- B. Use the following format:
  - 1. Plumbing permits: if none required, so note.
  - 2. Material approvals: approved by and date.
  - 3. Pressure line tests: by whom and date.
  - 4. Record drawings: received by and date.
  - 5. Controller charts: received by and date.
  - 6. Materials furnished: received by and date.
  - 7. Operation and maintenance manuals: received by and date.
  - 8. System and equipment operation instruction: received by and date.
  - 9. Manufacturer's warranties if required: received by and date.
  - 10. Written guarantee: received by and date.
  - 11. Lowering of heads in lawn areas: approved by and date.

#### 1.11 GUARANTEE

- A. Guarantee the irrigation system to provide service as designed and installed for a period of one (1) year from date of final acceptance by the Landscape Architect, the Owner and/or the Owner's Representative.
- B. Correct all problems which develop in the system due to faulty materials or workmanship during the guarantee period.
- C. Repair or replace such work as directed by the Landscape Architect, the Owner and/or the Owner's Representative.
- D. Make repairs and replacements within forty-eight (48) hours when notified.
- E. Provide a written guarantee for each segment of the project stating the date of completion and defining the guarantee period.
- F. The Owner reserves the right to make temporary repairs during the guarantee period as necessary to keep systems in operating condition without voiding the Contractor's guarantee, nor relieving the Contractor of his responsibilities.

#### 1.12 PRODUCT HANDLING

- A. **Storage:**
  - 1. Store materials at a location as outlined in these specifications.
  - 2. Coordinate the storage of materials in such a manner to avoid interference with other construction and non-construction activities.
- B. **Protection:**
  - 1. It shall be the Contractor's responsibility to protect all materials from theft or loss.
  - 2. Protect all materials to prevent intrusion of dirt and moisture.
  - 3. Protect the installed work and materials of other trades.

## PART 2 MATERIALS

### 2.01 GENERAL PIPING

- A. Pressure supply line from point of connection through backflow prevention unit: as per local code.
- B. All pressure supply lines under vehicular paving to be installed with a PVC schedule 80 sleeve, the sleeve shall be a minimum of twice the irrigation line diameter and shall extend a minimum of twelve inches (12") beyond such pavement.
- C. Pressure supply lines four inches (4") in diameter and larger PVC-class 200.
- D. Pressure supply lines two inches (2"), two and one-half inches (2-1/2"), and three (3") in diameter downstream of backflow prevention units: class 315 PVC
- E. Pressure supply lines one and one-half (1-1/2) inches and smaller in diameter down stream of backflow prevention unit: schedule 40 PVC.
- F. Non-pressure lines: class 200 PVC.

### 2.02 COPPER PIPE AND FITTINGS

- A. **Pipe:** Type K, hard tempered.
- B. **Fittings:** wrought copper, solder joint type.
- C. **Joints:** Joints shall be soldered with silver solder, forty-five percent (45%) silver, fifteen percent (15%) copper, sixteen percent (16%) zinc, twenty-four percent (24%) cadmium, solidus at 1125° F. and liquidus at 1145° F.

### 2.03 BRASS PIPE AND FITTINGS

- A. Brass pipe shall be eighty-five percent (85%) red brass, American National Standard Institute (ANSI), Schedule 40 screwed pipe.
- B. Fittings shall be medium brass, screwed one hundred twenty-five (125) pound class.

### 2.04 PLASTIC PIPE

- A. Identification markings:
  - 1. Identify all pipe with the following indelible markings:
    - Manufacturer's name
    - Nominal pipe size
    - Schedule of class
    - Pressure rating psi.
    - NSF (National Sanitation Foundation) seal of approval
    - Date of extrusion
- B. Pipe (solvent weld type): manufacture from virgin polyvinyl chloride compound in accord with ASTM D1784 or ASTM D2241, cell classification 12454B; hydrostatic design stress rating not less than 2,000 psi.

- C. Fittings: standard weight, Schedule 40, injection molded PVC. Comply with ASTM D1784, cell classification 13454B.
  - 1. Threads (where required): injection molded type.
  - 2. Tees and ells: side gated.
- D. Threaded nipples: standard weight, Schedule 80 with molded threads.

#### 2.05 JOINT CEMENT AND PRIMER

- A. Non-pressure plastic pipe and fittings shall be cemented using a 100% active solvent, blue in color.
- B. Pressure plastic pipe and fittings shall be coated with a primer and then with a 100% active solvent.
- C. Both primer and solvent shall be similar in all respects to that manufactured by Christy's or approved equal.

#### 2.06 ELECTRICAL WIRING AND SERVICE

##### A. High Voltage

- 1. Service to automatic controllers shall be provided by others. However, Irrigation Contractor shall provide final hookup to equipment.
- 2. Electrical equipment installed outside building shall be NEMA 4 type.
- 3. All connections between electrical services and equipment shall be in PVC coated rigid galvanized electrical conduit, with conduit and wiring size as requires.
- 4. Electrical requirements to automatic controllers - (120v), to be complete every respect to National Electrical Code (NEC), ready for use in accordance with manufacturer's requirements. Provide separate power shut-off switch at panel for each controller. All wiring in PVC coated galvanized conduit and fittings from source provided under the electrical section. No running threads accepted; use nipples. Conduit system shall be 660 volt insulation, NEC standard annealed copper wire and shall be minimum AWG #12 TW or RW. Protect each controller by a code approved ground connection. Supply to be 120 volts, 60 cycle, single phase, one (1) amp. Use only galvanized steel fasteners in securing controllers in position. Install new controller as detailed on drawings.

##### B. Low Voltage

- 1. Connections between controller and remote control valves shall be made with direct burial AWG-UF, 600 volt wire, insulation thickness 3/64 inch, utilizing low density high molecular weight polyethylene insulation.
- 2. Splices, where permitted, shall be waterproofed using Rain Bird, Pen-Tite Connectors or fusible heat shrink tubing, and house in a box. Refer to Section 3.11, paragraph C.
- 3. Wire sizing shall be according to Manufacturer's recommendations, in no case less than no. 10 and shall be sized upward accordingly by using the equivalent circuit length wiring method.
- 4. Ground wires shall be white in color.

#### 2.07 WATER SERVICE

- A. Water service to be provided by the Contractor at locations shown on drawings.

## 2.08 BALL VALVES AND GATE VALVES

- A. Ball Valves – two inches (2”) in diameter and smaller, (unless otherwise noted on Drawings): ASTM B62 brass body, one hundred fifty (150) pound saturated steam rated; with screwed joints; non-rising stem; screwed bonnet, solid disc. Provide with handwheel.
- B. Gate Valves – two and one-half inches (2-1/2”) and larger in diameter (unless otherwise noted on Drawings): ASTM A126 Class B, iron body one hundred fifty (150) pound O.W.G. with flanged joints, non-rising stem, bolted bonnet, and double disc, equipped with operating nut, or as otherwise approved.

## 2.09 QUICK COUPLING VALVES

- A. Two piece type brass body, one hundred fifty (150) pound class, with one inch (1”) female threads opening at base, permitting operation with a special connecting device (coupler) designed for this purpose.
  - 1. Coupler threads: lug type.
  - 1. Hinge cover: Provide with rubber-like vinyl cover.

## 2.10 CHECK VALVES

- A. Swing check valve, two inches (2”) and smaller on non-pressure lines: bronze or plastic construction, 100 pound S.W.P. female i.p.s. (N.I.C.)
- B. Swing check valves, two and one-half inches (2-1/2”) and larger on pressure lines: cast iron, one hundred (150) pound class with no-slam feature. (N.I.C.)
- C. Antidrain valve: plastic construction, with soft composition disc, stainless steel internal parts, and with spring tension adjustable from 4 psi to 15 psi

## 2.11 BACKFLOW PREVENTION UNITS

- A. Backflow preventer: designed to operate on a “reduced pressure” principle; equipped with gate valves and field test cocks.
- B. Pressure vacuum relief, inlet and discharge gate valves, and field test cocks.
- C. Wye strainers at backflow prevention units shall be 85% red brass, American National Standard Institute (ANSI), with 40 mesh monel screen.

## 2.12 AUTOMATIC CONTROLLER

- A. Type: fully automatic operation, capable of operating the number of stations and remote control valves indicated on drawings.

## 2.13 REMOTE CONTROL VALVES

- A. As per drawings.

## 2.14 TREE IRRIGATORS

- A. Provide assemblies as indicated on Drawings, including vents and filters.

## 2.15 SMALL LAWN SPRINKLER HEADS

- A. Sprinkler shall be similar in all respects to type noted in legend on drawing.
- B. Body shall be equipped with built-in check valve.

#### 2.16 ROTARY SPRINKLER HEADS

- A. As per Drawings.

#### 2.17 DRIPLINE

- A. As per Drawings.

#### 2.18 VALVE BOXES

- A. Valve boxes shall be fabricated from a durable plastic material resistant to weather, sunlight and chemical action of soils. They shall be purple in color. The cover shall be secured with a stainless steel bolt mechanism. The cover shall be capable of sustaining a load of 1500 psi. Valve box extensions shall be by the same manufacturer as the valve box. All valve boxes shall be as manufactured by Ametek, Carson, or an approved equal.
  - 1. Quick coupling valve boxes shall be round. The cover shall be heat branded with the letters "QCV", two inches (2") high.
  - 2. Gate valve boxes shall be round. The cover shall be heat branded with the letters "BV", two inches (2") high.
  - 3. Remote control valve boxes shall be 12" x 18". The cover shall be heat branded with the letters "RCV" and the valve number in characters two inches (2") high.
  - 4. Splice boxes shall be 12" x 18". The cover shall be heat branded with the letters "SB", two inches (2") high.
  - 5. Valve boxes for moisture sensing stations shall be 12" x 18". The cover shall be heat branded with the letter "MSS", two inches (2") high.
- B. Traffic area boxes: concrete with cast iron lid designed for vehicular traffic use.

#### 2.19 OPERATING AND MAINTENANCE TOOLS

- A. Deliver the following items to the Owner when work is completed and prior to final acceptance of work.
  - 1. Two (2) wrenches for disassembly and adjustment of each type of sprinkler head.
  - 2. Two (2) keys for each automatic controller.
  - 3. Six (6) couplers and matching hose swivels with globe valves.
  - 4. Four (2) keys for opening valve boxes.

### **PART 3 EXECUTION**

#### 3.01 UTILITY SERVICES

- A. Contractor shall connect to existing water services at locations indicated on the drawing and make any minor changes in location necessary due to actual site conditions as a part of this contract
- B. Connect to existing electrical service. Make minor changes in locations as necessary due to actual site conditions as part of this work.

### 3.02 SITE REVIEWS

- A. Before any work commences, a conference shall be held with the Landscape Architect, the Owner, the Owner's Representative and Contractor regarding general requirements of this work.
- B. **Contractor's responsibility:**
  - 1. Notify the Landscape Architect, the Owner and/or the Owner's Representative for the following reviews, with forty-eight (48) hours minimum notice:
    - a. Pressure supply line installation and testing.
    - b. Systems layout.
    - c. Coverage tests.
    - d. Final review.
  - 2. Provide "walkie-talkie" equipment and/or personnel to maintain communication from review area to automatic controllers.
  - 3. Provide up-to-date as-built drawings at each review.
  - 4. In the event Contractor schedules any review and the system is not fully ready, record drawings are not current, and/or required corrective work has not been completed, the Contractor shall be responsible for reimbursing the Landscape Architect, the Owner and/or the Owner's Representative at an hourly rate, plus all travel expenses. No further reviews will be conducted until this charge is paid.
- C. Examine surfaces for conditions that will adversely affect execution, permanence and quality of work.
  - 1. Verify that grading has been completed and the work of this section can properly proceed.
  - 2. Exercise extreme care in excavating and working near existing utilities. Contractor is responsible for damages to utilities that are caused by his operations or neglect. Check existing utility drawings for locations.
- D. Notify the Owner and/or the Owner's Representative in writing, describing unacceptable conditions.
- E. Do not proceed with work until unacceptable site conditions are corrected or existing utilities are located.

### 3.03 LAYOUT

- A. All piping or equipment shown diagrammatically on drawing outside of planting areas shall be installed inside planting areas whenever possible.
- B. Lay out each sprinkler head and make any minor adjustments required due to differences between actual site conditions and the drawings. Minor adjustments shall be maintained within the original design intent. Protect in place all existing trees and shrubs.
- C. Lay out each system using staking method as approved by Owner and/or the Owner's Representative. Maintain and protect approved staking layout.

### 3.04 TRENCHING

- A. Excavate trenches to required depths. Follow approved layout for each system.

- B. Trench bottom shall be flat to insure piping is supported continuously on an even grade.
- C. Where lines occur under paved areas, consider dimension to be below the subgrade.
- D. Provide minimum coverage as follows:
  - 1. Pressure supply lines two and one-half inches (2½") and smaller in diameter: eighteen (18) inches
  - 2. Pressure supply lines larger than two and one-half (2½") inches in diameter: twenty-four (24) inches
  - 3. Non-pressure lines: twelve (12) inches
  - 4. Control wire: eighteen (18) inches
  - 5. Flow Sensor Wires: eighteen (18) inches laterally from any electrical wires by eighteen (18) inches deep.

### 3.05 LINE CLEARANCES

- A. Provide not less than four 4 inches clearance between each line and not less than six (6) inches clearance between lines of other trades, unless otherwise noted.
- B. Do not install parallel lines directly over any other line.
- C. Non-pressure headers for sub-injected system may be installed in same trench.

### 3.06 BACKFILLING

- A. **Initial backfill:** clean, fine granular material as approved by the Soils Engineer.
- B. Compact trench backfill to a dry density equal to adjacent undisturbed soil. Restore to adjacent grade, free of dips, depressions, humps or other irregularities.
  - 1. Where acceptable soils exist, the Soils Engineer may authorize flooding in lieu of tamping.
  - 2. Compaction by truck or other vehicle is not permitted.
- C. Replace and restore all surfaces to original condition with new sod unless plans show hardscape or alternative landscape improvements.

### 3.07 INSTALLATION

- A. All plastic pipe and fittings shall be installed in complete accord with manufacturer instructions for same.
- B. Provide concrete thrust blocks at each change of direction and at all terminal points of all rubber gasket piping. Block in accordance with pipe manufacturer's instructions.
- C. Steel pipe protective covering (buried only):
  - 1. Clean all pipe and fitting surfaces, removing all foreign substances and film.
  - 2. Coat all surfaces with adhesive primer.
  - 3. Wrap pipe, conduit and fittings with three layers of polyvinyl chloride tape. Overlap each layer approximately two-thirds (2/3) of the width of tape without stretching.
    - a. Total wrap thickness not less than ten (10) mil over all surfaces, with no voids.

- D. Install backflow assemblies in shrub areas at minimum height permitted by local code.
- E. Routing of pressure supply lines as indicated on drawings is diagrammatic. Install lines (and various assemblies) to conform to details on Construction Drawings.
- F. Install all specified assemblies in accordance with the drawings.
- G. **Plastic pipe and threaded fittings:** Assemble using Teflon tape applied to male threads only.
- H. Tape all open ends of pipe during installation to prevent entry of any foreign matter into the system.
- I. **Quick coupling valves:** Unless otherwise indicated, locate valves within eighteen (18) inches of hardscape.
- J. **Sprinkler heads:**
  - 1. Shrub heads shall be installed as noted on Drawings, four (4) inches minimum from hardscape.
  - 2. Elevate full heads in lawn areas to a minimum of three (3) inches above grade.
  - 3. Elevate heads along curbs, walks, paving, etc. one-half (½) inch above grade in lawn areas.
  - 4. Lower raised heads within ten (10) days after notification by the City.

### 3.08 EXISTING PAVEMENT

- A. Piping under existing pavements may be installed by jacking, boring, or by hydraulic driving, except as otherwise specified or directed.
- B. All pipes under pavement surface to be installed a minimum of twenty-four (24) inches below asphalt concrete paving with a six (6) inch bedding and a six (6) inch cover of sand backfill.
- C. Secure City's permission, building permits and conform to other requirements prior to cutting or breaking existing pavements.
- D. Make completely clean cuts using power saws, at approved locations only.
- E. Replace and restore all surfaces to original condition, including grade and landscaping.
  - 1. Restoration work shall match the original work in every respect, including type, strength, texture and finish.

### 3.09 NEW PAVED AREAS

- A. Coordinate installation of piping and wires under paved areas with General Contractor.
- B. All pipes under pavement surface to be installed a minimum of twenty-four (24) inches below asphalt concrete paving with a six (6) inch bedding and a six (6) inch cover of sand backfill.
- C. If the only piping installed is over twenty (20) feet long, pressure testing is required for that section at the time of installation. Upon completion of piping installation, the entire system must be tested.

D. All wire under paved areas shall be continuous.

### 3.10 VALVE BOXES

- A. Provide at all locations indicated; eighteen (18) inches minimum from hardscape.
- B. Fill area under box with minimum of three (3) cubic feet of pea gravel before box is installed.

### 3.11 LOW VOLTAGE WIRING

- A. Place wiring in the same trench and along the same routing as the pressure supply lines unless otherwise approved.
  - 1. Install wiring prior to main line whenever possible.
  - 2. When more than one wire is placed in a trench, tape wires together at a maximum twelve (12) feet on center.
- B. Provide a 12 inch expansion loop at each connection and directional change.
- C. Use a continuous wire between controller and remote control valves.
  - 1. Except as otherwise approved, do not splice wire at any point.
  - 2. All approved splices shall be enclosed in an acceptable box.
- D. Each controller shall be provided with separate ground wire.

### 3.12 SYSTEM FLUSHING

- A. After all sprinkler pipe lines and risers are in place and connected, and prior to installation of sprinkler heads, thoroughly flush all lines with a full head of water.
- B. Do not install sprinkler heads until lines have been flushed to the satisfaction of the Landscape Architect, the Owner and/or the Owner's Representative.

### 3.13 SYSTEM ADJUSTMENTS

- A. **Valves:** Adjust flow control for proper operation.
- B. **Heads:** Adjust for alignment and coverage.
- C. If it is determined that coverage can be improved by a nozzle change, make such changes or arrange with the manufacturer to have changes made, as part of the work of this Section.
  - 1. Make changes prior to starting any planting.

### 3.14 PRESSURE TEST

- A. Provide all equipment necessary to test systems, including force pump.
- B. Perform all hydrostatic tests in the presence of the Landscape Architect, the Owner and/or the Owner's Representative plus the City's Inspector.
- C. Test all pressure supply lines under hydrostatic pressure of one hundred fifty pounds per square inch (150 psi) for a period of four (4) hours, unless otherwise approved.

- D. Do not backfill over any line more than is necessary for testing, until it have been inspected, tested and approved.
- E. Do not install remote control valves, quick couplers or any other valve assembly until testing is completed and approved.

### 3.15 COVERAGE TESTS

- A. Perform coverage tests after sprinkler system is completed, but prior to any planting, in the presence of the Landscape Architect, the Owner, the Owner's Representative plus the City's Inspector.
- B. Test system to assure that all lawn planting areas shall be watered completely and covered uniformly.
- C. Make all necessary adjustments, including realignment of heads, to provide required coverage as directed by the Landscape Architect, the Owner, the Owner's Representative plus the City's Inspector.

### 3.16 EXISTING TREES

- A. Where it is necessary to excavate adjacent to existing trees, use all possible care to avoid injury to trees and tree roots.
  - 1. Excavation in areas where two inch (2") and larger roots occur shall be done by hand.
  - 2. Roots two inches (2") and larger in diameter, except directly in the path of pipe or conduit, shall be tunneled under and shall be heavily wrapped in burlap, to prevent scarring or excessive drying.
  - 3. Where a ditching machine is run close to trees having roots smaller than two inches (2") in diameter, the wall of the trench adjacent to the tree shall be hand trimmed. Making clean cuts through.
  - 4. Roots one inch (1") and larger in diameter shall be painted with coats of Tree Seal, or approved equal.
  - 5. Trenches adjacent to trees should be closed within twenty-four (24) hours. Where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas.

### 3.17 OPERATING INSTRUCTIONS

- A. Train the City's Representative maintenance personnel in proper operation of all major equipment, including recommended winterization procedures.
- B. Provide this training at the City's convenience.
- C. Submit written evidence that training has been successfully completed.

### 3.18 CLEANUP

- A. Upon completion of the work, restore ground surfaces to required elevations and remove excess materials, debris and equipment from the site to satisfaction of the Owner and/or the Owner's Representative.

## **END OF SECTION -02441 IRRIGATION**

**PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

- A. The work of this section shall conform to the "Standard Specifications for Public Works Construction", latest edition, except as modified herein.

**1.02 SCOPE OF WORK**

- A. Work of this Section includes all materials, labor and equipment necessary to provide and install the Site Amenities as shown on the drawings, as reasonably implied or as specified herein. The equipment shall be assembled on site as per manufacturer's recommendations and this section. All work and equipment provided shall be subject to approval of the Owner's Representative. The contractor shall be responsible for site improvements, electrical, plumbing, engineering, permits and approvals through the Health department.

**1.03 RELATED WORK SPECIFIED ELSEWHERE**

- A. Concrete - Section 03300

**1.04 SUBMITTALS**

- A. Contractor shall submit a complete list of materials along with manufacturer's catalog data for all materials proposed for use in the work at the pre-construction conference. Proposals for substitution of those materials specified herein shall be submitted and reviewed.
- B. Manufacturer's Product Data: Submit four (4) copies of manufacturer's literature for each item of site furnishings.
- C. Shop Drawings: Manufacturer's shop Drawings shall be provided for all prefabricated items. Shop Drawings, which show complete details, shall be furnished in quadruplicate for all items requiring shop fabrication.

**1.05 GUARANTEE & LIABILITY INSURANCES**

- A. Manufacturer shall guarantee all materials and workmanship for a period of one (1) year exclusive of vandalism. Manufacturer will be required to provide product liability insurance coverage in the minimum amount of \$1,000,000 per incident. Manufacturer or his representative shall inspect all installation work and provide written certification that equipment has been installed in accordance with the manufacturer's specifications.
- B. Each Manufacturer will be required to provide complete installation drawings including specifications and a replacement parts list for all products.
- C. Contractor shall provide a written guarantee on his firm's letterhead for all materials and workmanship for a period of one (1) year exclusive of vandalism. Written guarantee shall be submitted to the City at the final inspection prior to final acceptance of the work.

## 1.06 PROPOSED SUBSTITUTIONS

- A. Products proposed for substitutions as “equals” to those specified are subject to the approval of the City. If at the time proposed equals are delivered to the site, it is determined by the City that they are not equal to those specified, they shall be removed and products as specified shall be provided by the Contractor at no additional cost to the City.

## 1.07 LOCATION INSPECTION

- A. No equipment or apparatus or foundations for same shall be placed until location stakes have been inspected for recommended approval by the Landscape Architect and/or Parks Inspector.

## **PART 2 - PRODUCTS**

### 2.01 SHADE STRUCTURE

- A. 12x12 prefabricated shelter model 12M as manufactured by Icon Shelter Systems inc. 1455 Lincoln Ave. Holland MI. 49423 (616) 748-0985, or Approved Equal

### 2.02 BASKETBALL EQUIPMENT AND FURNISHINGS

- A. Single Basketball backboard, pole, net and post – Shall be LA Steelcraft model 1244-09-OTAOBM-600N with post pad. Or approved equal. Install per manufacturer's recommendations, plans and details. Available from: LA Steelcraft 1-800-371-2438.
- B. Double Basketball backboard, pole, net and post – Shall be LA Steelcraft model 12046-09-OTAOBM-600N with post pad. Or approved equal. Install per manufacturer's recommendations, plans and details. Available from: LA Steelcraft 1-800-371-2438.

### 2.03 VOLLEYBALL EQUIPMENT AND FURNISHINGS

- C. Volleyball net and posts – Shall be LA Steelcraft model NBC-32 and APG-4. Or approved equal. Install per manufacturer's recommendations, plans and details. Available from: LA Steelcraft 1-800-371-2438.

### 2.07 DRINKING FOUNTAIN

- A. Shall be Haws, model #3150/ Hilo Double. Finish to be exposed aggregate. Or County approved equal. Install per manufacturer's recommendations, plans and details. Available from: Western Safety Associates (951) 371-8685.

### 2.09 PARK BENCHES AND TABLES

- A. Shall be Quick Crete Round Picnic table Model #QR42FC, Color to be natural concrete with medium sandblast finish Or approved equal. Install per manufacturer's recommendations, plans and details. Anti graffiti coating to be applied at factory. Available from: Quick Crete Products (951) 737-6240.

### 2.14 TRASH RECEPTACLES

- A. Shall be Quick Crete Palm Waste Container. Model #QS-PS2532W-D. Color to be Corona City Park Basket Ball Court and Volleyball Court Addition

natural concrete with medium sandblast finish. Steel top model "D" to be powder coated green. Ameritone #RAL-5014. "The City of Corona" is to be recessed on two (2) sides. A steel cable is to be provided as a security cable. Three (3) evenly spaced drainage grooves are to be cut at the bottom of the receptacle from drain hole to outside edge. Or County approved equal. Install per manufacturer's recommendations, plans and details. Available from: Quick Crete Products (951) 737-6240. Anti graffiti coating to be applied at factory.

### **PART 3 - EXECUTION**

#### **3.01 LAYOUT**

- A. Contractor shall stake/mark locations for all slabs and foundations and shall obtain the acceptance of their location from Owner's Representative prior to commencing any digging. Locations shall be adjusted to provide minimum clear distances required from all edges of slabs, trees, irrigation heads, or other obstructions.

#### **3.02 CONCRETE WORK**

- A. All concrete foundation work shall be performed in accordance with the Standard Specifications, Section 201. Contractor shall obtain the acceptance of all forming from the Owner's Representative prior to pouring any concrete. Foundations holes shall be inspected and accepted by the Owner's Representative prior to pouring concrete.

#### **3.04 SITE FURNISHINGS**

- A. All Site Furnishings shall be installed plumb, at a height above the finish surface as recommended by the manufacturer. Minimum footing size shall conform to the manufacturer's recommendations. All Footings shall be installed prior to placement of concrete slabs, where they occur.
- B. After installation of benches and other items that are bolted together, excess bolt length shall be cut off and ground smooth and the nut shall be tack welded to the bolt.
- C. Install drinking fountains per manufacturer's recommendation and as shown on the drawings. Water service lines are to be pressure rated tubing to withstand 200 psi.

#### **3.05 CLEAN-UP**

- A. Contractor shall clean up and legally dispose of all unused materials, excess soil, and debris at regular intervals throughout the duration of the work, and as directed by the Owner's Representative.

END OF SECTION 02461

**PART 1 GENERAL****1.1 GENERAL DESCRIPTION**

A. Textured acrylic surfacing for concrete tennis courts and similar play areas.

**1.2 RELATED SECTIONS****A. Related Work**

1. Concrete pavement 03300

**B. References**

1. American Concrete Institute (ACI)
2. United States Tennis Association (USTA)
3. International Tennis Federation (ITF)
4. American Sport Builders Association (ASBA)

**1.3 QUALITY ASSURANCE**

- A. Surfacing shall conform to the guidelines of the ASBA for planarity.
- B. Concrete shall have a vapor barrier in accordance with ASTM E-1745.
- C. Concrete mixes shall be placed with a maximum water/cement ratio of .45.
- D. Curing compounds should not be used unless the curing compound manufacturer specifically states the surface may be coated with water based acrylic coatings.
- E. All surface coatings products shall be supplied by a single manufacturer.
- F. The contractor shall record the batch number of each product used on the site and maintain it through the warranty period.
- G. The contractor shall provide the inspector, upon request, an estimate of the volume of each product to be used on the site.
- H. The installer shall be an authorized applicator of the specified system.
- I. The manufacturer's representative shall be available to help resolve material questions. Contact Bob Deller 775-560-6659.
- J. Concrete shall be cured a minimum of 28 days prior to applying plexipave system.

#### 1.4 SUBMITTALS

- A. Manufacturer specifications for components, color chart and installation instructions.
- B. Authorized Applicator certificate from the surface system manufacturer.
- A. ITF classification certificate for the system to be installed.
- B. Reference list from the installer of at least 5 projects of similar scope done in each of the past 3 years.
- C. Current Material Safety Data Sheets (MSDS).
- D. Product substitution: If other than the product specified, the contractor shall submit at least 7 days prior to the bid date a complete type written list of proposed substitutions with sufficient data, drawings, samples and literature to demonstrate to the owners satisfaction that the proposed substitution is of equal quality and utility to that originally specified. Information must include a QUV test of at least 1000 hours illustrating the UV stability of the system. Test method similar to ASTM G53. The color system shall have an ITF pace rating in Category 2. Under no circumstances will systems from multiple manufacturers be considered.

#### 1.5 MATERIAL HANDLING AND STORAGE

- A. Store materials in accordance with manufacturer specifications and MSDS.
- B. Deliver product to the site in original unopened containers with proper labels attached.
- C. All surfacing materials shall be non flammable.

#### 1.6 GUARANTEE

- A. Provide a guarantee against defects in the materials and workmanship for a period of one year from the date of substantial completion.

#### 1.7 INSTALLER QUALIFICATIONS

- A. Installer shall be regularly engaged in construction and surfacing of acrylic tennis courts, play courts or similar surfaces.
- B. Installer shall be an Authorized Applicator of the specified surface system.
- C. Installer shall be a builder member of the ASBA.

#### 1.8 MANUFACTURER QUALIFICATIONS

- A. System manufacturer shall provide documentation that the surface to be installed has been classified by the ITF as a medium pace surface.

- B. System manufacturer shall be a US owned company.
- C. System manufacturer shall be a member of the ASBA.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. California Products Corp., Andover, MA. 01810 / Plexipave System [www.plexipave.com](http://www.plexipave.com)
- B. Substitutions: Submit requests at least 7 days prior to the bid date with a complete type written list of proposed substitutions with sufficient data, drawings, samples and literature to demonstrate to the owners satisfaction that the proposed substitution is of equal quality and utility to the specified product. Information must include a QUV test of at least 1000 hours illustrating the UV stability of the system. The system shall have an ITF pace rating in Category 2. Under no circumstance may the final color surface contain silica sand added at the job site.

### 2.2 MATERIALS

- A. Patching Mix (California Court Patch Binder) - for use in patching cracks, holes, depressions and other surface imperfections.
- B. Crack Filler (Plexipave Crack Filler) - for use in filling fine cracks.
- C. Concrete Preparer is a specially formulated acid heat for use in neutralizing the concrete in preparation for the Plexipave System.
- D. Adhesion Primer – (California TiCoat) is a two component water based epoxy primer for uncoated concrete surfaces.
- E. Acrylic Filler Course (California Acrylic Resurfacer) – for use as a filler for new or existing concrete surfaces. The 100% acrylic filler shall be blended with approved silica sand at the job site.
- F. Acrylic Color Playing Surface (Plexichrome/Plexipave Color Base) – for use as the finish color and texture. Plexichrome and Plexipave Color Base are blended at the job site to achieve the correct surface texture. \*Factory Fortified Plexipave may be used as an alternative material.
- G. Line Paint (California Line Paint) – for use as the line marking on the court/play surface.
- H. Water – for use in dilution/mixing shall be clean and potable.

### 2.3 MATERIAL SPECIFICATIONS

- A. Court Patch Binder – 100% acrylic resin blended with Portland Cement and silica sand.
  - 1) Percent solids by weight (minimum)      46%
  - 2) Weight    8.7-8.9 lbs./gallon

B. Plexipave Crack Filler – 100% acrylic resin heavily filled with sand.

- 1) Percent solids by weight (minimum) 85%
- 2) Percent solids by weight (minimum) 15 lbs./gallon

C. Concrete Preparer – Phosphoric Acid based surface treatment

- 1) Percent solids by weight (minimum) 25.5%
- 2) Weight 9.5-9.6 lbs./gallon

D. California TiCoat – 2 component epoxy primer

- 1) Percent solids by weight (minimum) 34.6-34.8%
- 2) Weight 8.55-8.70 lbs./gallon

E. California Acrylic Resurfacer – 100% acrylic resin (no vinyl copolymerization constituent). The product shall contain not less than 3.5% attapulgite.

- 1) Percent solids by weight (minimum) 26.7%
- 2) Weight 8.7-8.9 lbs./gallon

F. Plexichrome – 100% acrylic resin (no vinyl copolymerization constituent) with selected light fast pigments. Green shall contain not less than 8% chrome oxide.

- 1) Percent solids by weight (minimum) 36.5%
- 2) Weight 10.0-10.2 lbs./gallon

G. Plexipave Color Base – 100% acrylic resin containing no vinyl copolymerization constituent. Contains not more than 63% rounded silica sand.

- 1) Percent solids by weight (minimum) 74%
- 2) Weight 13.1-14.1 lbs./gallon

H. California Line Paint – 100% acrylic resin containing no alkyds or vinyl constituents. Texturing shall be rounded silica sand.

- 1) Percent solids by weight (minimum) 60.5%
- 2) Weight 12-12.3 lbs./gallon

All surfacing materials shall be non-flammable and have a VOC content of not less than 100g./ltr. Measured by EPA method 24.

Local sands are not acceptable in the color playing surface. Sands must be incorporated at the manufacturing location to insure quality and stability.

## PART 3 EXECUTION

### 3.1 LIMITATIONS

- A. Do not install when rainfall is imminent or extremely high humidity prevents drying.
- B. Do not apply unless surface and air temperature are 50°F and rising.
- C. Do not apply if surface temperature is in excess of 140°F.
- E. Concrete shall be cured a minimum of 28 days prior to applying plexipave system.
- F. Concrete shall have a vapor barrier in accordance with ASTM E-1745.
- G. Curing compounds should not be used unless the curing compound manufacturer specifically states the surface may be coated with water based acrylic coatings.

### 3.2 PREPARATION FOR ACRYLIC COLOR PLAYING SYSTEM

- A. Clean surfaces of loose dirt, oil, grease, leaves, and other debris in strict accordance with manufacturer's directions. Pressure washing will be necessary to adequately clean areas to be coated. Any areas previously showing algae growth shall be treated with Clorox or approved product to kill the organisms and then be properly rinsed.
- B. Holes and cracks: Cracks and holes shall be cleaned and a suitable soil sterilant, as approved by the owner, shall be applied to kill all vegetation 14 days prior to use of **Court Patch Binder** according to manufacturer's specifications.
- C. Depression: Depressions holding enough water to cover a five cent piece shall be filled with Court Patch Binder Patching Mix. 3 gallons of Court Patch Binder, 100 lbs. 60-80 silica sand, 1 gallon Dry Portland Cement (Type I). **This step shall be accomplished prior to the squeegee application of Acrylic Resurfacer.** The contractor shall flood all the courts and then allow draining. Define and mark all areas holding enough water to cover a nickel. After defined areas are dry, prime with tack coat mixture of 2 parts water/1 part Court Patch Binder. Allow tack coat to dry completely. Spread Court Patch Binder mix true to grade using a straight edge (never a squeegee) for strike off. Steel trowel or wood float the patch so that the texture matches the surrounding area. Never add water to mix. Light misting on surface and edges to feather in is allowed as needed to maintain work ability. Allow to dry thoroughly and cure.

NO WORK FROM THIS STAGE ON SHALL COMMENCE UNTIL AN INSPECTOR HAS ACCEPTED THE SURFACE.

D. Acid Treatment: Concrete Preparer shall be applied to all uncoated concrete surfaces at the rate of .01 to .012 gallon per square yard. Dilute 1 gallon of Concrete Preparer with 4 gallons of potable water. Apply liberally to the surface and spread with a soft hair push broom. After the surface has dried remove any dust or latent material.

E. Primer: California Ti Coat shall be applied to all uncoated concrete surface prior to application of filler materials. Apply at an application rate of .025-.03 gallon per square yard.

1. Mix component A with Component B at a ratio of 1:1. Let stand for 20-30 minutes prior to use.

2. Apply with a short nap phenolic core roller.
3. Allow the Ti Coat to dry for approximately 1-3 hours until the surface is slightly tacky to the touch. In no case shall the surface be left overnight before receiving an application of Acrylic Resurfacer.

F. Filler Course. (Acrylic Resurfacer): On the properly applied Ti Coat the filler course shall be applied to the clean underlying surface in one application to obtain a total quantity of not less than .06 gallon per square yard based on the material prior to any dilution. Acrylic Resurfacer may be used to pre-coat depression and crack/hole repairs to achieve better planarity prior to filler course application.

1. Over a properly repaired surface of concrete on existing courts, apply one coat of Acrylic Resurfacer according to the following mix:

Acrylic Resurfacer	55 gallons
Water	20 - 40 gallons
Sand	600-800 pounds / 60-80 mesh
Liquid Yield	112-138 gallons

On new concrete, two coats of Acrylic Resurfacer may be used to properly fill all voids in the asphalt surface. Use clean, dry 50-60 mesh sand and clean, potable water to make mixes. The quantity of sand and water in the above mix may be adjusted within above limits to complement the roughness and temperature of the surface.

2. Mix the ingredients thoroughly using accepted mixing devices and use a 70 Durometer rubber bladed squeegee to apply each coat of Acrylic Resurfacer as required.

3. Allow the application of Acrylic Resurfacer to dry thoroughly. Scrape off all ridges and rough spots prior to any subsequent application of Acrylic Resurfacer or subsequent cushion or color surface system.

### 3.3 APPLICATION OF ACRYLIC COLOR PLAYING SURFACE

- A. All areas to be color coated shall be clean, free from sand, clay, grease, dust, salt or other foreign matters. The Contractor shall obtain the Engineer's approval, prior to applying any surface treatment.

- B. Blend color base and Plexichrome with a mechanical mixer to achieve a uniform Fortified Plexipave mixture. The mix shall be:

Color Base	30 gallons
Plexichrome	20 gallons
Water	20 gallons

- C. Application shall be made by 50 durometer rubber faced squeegees. The Fortified Plexipave mixture should be poured on to the court surface and spread to a uniform thickness in a regular pattern.

- D. A total of 3 applications of Fortified Plexipave shall be made to achieve a total application rate of not less than .15 gal./sy. No application should be made until the previous application is thoroughly dry.

### 3.4 LINE PAINTING

- A. Line shall be 2" wide unless otherwise noted on the drawings. Lines shall be carefully laid out in accordance with ASBA and USTA guidelines. The area to be marked shall be taped to insure a crisp line. The California Line Paint shall have a texture similar to the surrounding play surface. Application shall be made by brush or roller at the rate of 150-200 sq./gal. (3/4 gal. per tennis court).

### 3.5 PROTECTION

- A. Erect temporary barriers to protect coatings during drying and curing.
- B. Lock gates to prevent use until acceptance by the owner's representative.

### 3.6 CLEAN UP

- A. Remove all containers, surplus materials and debris. Dispose of materials in accordance with local, state and Federal regulations.
- B. Leave site in a clean and orderly condition.

END OF SECTION

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

The provisions of the “Standard Specifications for Public Work Construction,” latest edition, shall apply except as modified herein.

1.02 SCOPE

Work of this Section includes all material, equipment, and labor necessary for and incidental to completing all Landscape Planting work as indicated on the Drawings, or as reasonably implied, or as designated herein, including, but not limited to, the following:

- Soil testing approvals.
- Weed abatement.
- Soil preparation.
- Finish grading.
- Preparation of all planting holes.
- Furnishing and installing Palm Trees as indicated.
- Hydroseeding indicated turf area.
- Furnishing and installation of all required fertilizers, planting backfill materials, top dressing and miscellaneous materials.
- Staking and tying trees.
- Providing plant establishment (30 days).
- Providing landscape maintenance (90 days).
- Clean-up and weeding of all landscape areas.
- One year guarantee.

1.03 RELATED WORK SPECIFIED ELSEWHERE

Irrigation system:                      Section 02441

1.04                      QUALITY ASSURANCE

- A.     The Contractor shall provide at least one person who shall be present at all times during execution of this portion of the work, who shall be thoroughly familiar with the type of materials being installed and the proper materials and methods for their installations, and who shall direct all work performed under this Section.
  
- B.     All plants and planting material shall meet or exceed the specifications of Federal, State and County laws requiring inspection for plant disease and insect control.

- C. Quality and size shall conform with the current edition of "Horticultural Standards" for number one grade nursery stock as adopted by the American Association of Nurserymen, and California Department of Agriculture regulations.
- D. The Applicator of all weed control materials shall be licensed by the State of California as a Pest Control Operator and a Pest control Advisor in addition to any subcontractor licenses that are required.
- E. All materials and methods used for Weed Abatement must conform to Federal, State, and Local Regulations.

#### 1.05 APPROVALS

All irrigation system work shall be inspected for recommended approval by the Landscape Architect and/or the Owner's Representative prior to start of any work in this section.

#### 1.06 TESTING

- A. An Agricultural Soil Suitability Report for all planting areas shall be obtained by the Contractor, after completion of rough grading, and prior to start of soil preparation work. The Contractor, at his own expense, shall submit at least four (4) site soil samples to a Soil Laboratory recommended by the Landscape Architect. Samples are to be taken from the top six inches (6") of soil in areas to receive planting. All test results and recommendations shall be provided to the Landscape Architect and/or the City. The requirements for fertilization and amendments as specified herein, may be modified as necessary prior to start of work in this section.

#### 1.07 SUBMITTALS

- A. Materials lists: Within twenty (20) days after award of the Contract, submit a complete list of all materials proposed to be furnished and installed under this Section, demonstrating complete conformance with the requirements specified.
  - (1) Materials list shall include the weed control materials and quantities per acre intended for use in controlling the weed types prevalent and expected on the site, as supplied by the Pest Control Advisor. Pest Control Advisor shall furnish the Landscape Contractor and Landscape Architect data to demonstrate the compatibility of the weed control materials and methods with the intended plant and seed varieties.
- B. Certificates: Deliver all certificates to the Landscape Architect upon delivery to job site. Include:
  - (1) Quantity of commercial fertilizers used.
  - (2) Quantity of soil amendments.
  - (3) Quantity of seed.

## 1.08 PRODUCT HANDLING

### A. Delivery and Storage:

- (1) Deliver all items to the job site in their original containers with all labels intact and legible at time of Landscape Architect's review.
- (2) Immediately remove from the site all plants which are not true to name, and all materials which do not comply with the specified requirements.
- (3) Use all means necessary to protect plant materials before, during, and after installation and to protect the work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the recommended approval of the Landscape Architect and at no additional cost to the City.

## 1.09 RESPONSIBILITY AND COORDINATION DURING WEED ABATEMENT

A. During Weed Abatement procedures, the Landscape Contractor is responsible for the erection of all signs and barriers required to prevent intrusion into the treated areas and to notify the public.

B. No material or methods used for Weed Abatement shall affect the landscape planting or hydroseed germination. No material or method shall render the job site unusable for more than ten (10) days from date of application.

## **PART 2 - MATERIALS**

All materials shall conform to the requirements of Section 212 of the Standard Specifications, except as modified herein.

2.01 NOT USED.

### 2.02 NON-SELECTIVE HERBICIDES

Non-selective contact herbicide and/or non-selective systemic herbicides (as recommended by the Pest Control Advisor).

### 2.03 SELECTIVE HERBICIDES

Selective pre-emergent herbicides (as recommended by the Pest Control Advisor).

### 2.04 Soil Conditioners and Fertilizers:

Soil conditioners may include any or all of the conditioners herein specified and shall be applied at rates indicated on the plans or as determined by the Agronomical Soils Report.

A. Shavings: Nitrogen stabilized organic amendments derived from redwood sawdust, fir sawdust or finely ground bark of fir or pine containing the following physical properties:

<u>Percent Passing</u>	<u>Sieve Size</u>
95 - 100	6.33 mm (1/4 inch)
80 - 100	2.38 mm (No. 8, 8 mesh)
0 - 30	500 Micron (No. 35, 32 mesh)

Nitrogen Content - Dry weight 0.56% - 0.84%

Iron Content - Minimum 0.08% dilute acid soluble Fe. on dry weight basis.

Soluble Salts - 2.5 millimhos/centimeter at 25 degrees C. as determined by maximum saturation extract method.

Ash - (Dry weight) 0 - 6.0%

B. Contractor shall submit proof of Synagro's Soil Conditioner compost product use or approved equal, by providing a sample, the most recent lab analysis as provided by Synagro, Inc. and copies of invoices which identify the organic amendment by name and lists total quantity purchased in cubic-yards. Substitutions for Soil Conditioner must be requested in writing and approved in writing by the project landscape architect 30 days prior to use. The organic amendment shall have (at a minimum) the following properties:

1. Total Nitrogen 1.0%
2. Phosphorus 2.0%
3. Potassium: 0.2%
4. Carbon to nitrogen ratio: <25 to 1
5. Ece (millimho/cm): <5.0; based on pre leaching with equal volume of water
6. Screen Analysis: 95% to pass a 1/2 inch screen; 5% at 3/4 inch minus.
7. Bulk density: 1000 to 1100 pounds per cubic yard
8. Total iron: 1.5%

C. Gypsum: To be agricultural grade gypsum and shall conform to Section 212-1.2 of Standard Specifications for Public Works Construction, Latest Edition.

## 2.05 PLANTING TABLETS:

Fertilizer planting tablets shall be tightly compressed commercial grade planting tablets have a 12-8-8 formula, weighing 7 grams each, as "Gro-Power" planter tablets or equal. The planting tablets shall be delivered to the site in the original, unopened containers, bearing the manufacturer's guaranteed analysis. Any damaged tablets will not be accepted.

## 2.06 PLANT MATERIALS

A. Nomenclature: The scientific and common names of plants herein specified conform to industry standards. (Refer to list of plant materials on Drawings).

B. Labeling: Each group of plant materials delivered to the site shall be clearly labeled as to species and variety and nursery source.

C. Quality and Size:

(1) Plants shall be in accordance with the California State Department of Agriculture's regulation for nursery inspections, rules and grading. All plants shall have normal habit of growth and shall be sound, healthy, vigorous, and free of insect infestations, plant diseases, sun scalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements. All plants shall have normally well-developed branch system, with vigorous and fibrous root systems which are not root or pot bound. In the event of disagreement as to condition of the plants furnished by the Contractor in containers will be determined by removal of earth from the roots of not less than two plants or more than 2% of the total number of plants of each species or variety. Where container grown plants are from several sources, the roots of not less than two plants of each species or variety from each source will be inspected. In case the sample plants reviewed are found to be defective, the Landscape Architect and the City may judge acceptability. Any plants rendered unsuitable for planting because of this review will be considered as samples and will be provided at the expense of the Contractor.

(2) The size of the plants will correspond with that normally expected for species and variety of commercially available nursery stock, or as specified in the special Conditions and Drawings. The minimum acceptable size of all plants measured before pruning with the branches in normal position, shall conform with the measurements, if any, specified on the Drawings in the list of plants to be furnished. Plants larger in size than specified may be used with the recommended approval of the Landscape Architect, but the use of larger plants will make no change in contract price. If the use of larger plants is recommended for approval, the ball of earth or spread of roots for each plant shall be increased proportionately.

#### 2.07 RELOCATED EXISTING PALM TREE:

A. Procurement: Existing.

B. Refer to City of Corona Palm tree relocation detail and specifications standard plan number 819 as shown on the plans.

#### 2.8 HYDROSEEDING AND HYDROMULCHING MATERIALS

A. Water: General precautions should be observed when drawing water from sources other than domestic water supply.

Seed: Turf or Groundcover seed as specified on plans.

- B. Mulch Fiber: Conweb '2000' or equal, shall be produced from cellulose such as wood pulp or similar organic materials and shall be of such character that it will disperse into a uniform slurry when mixed with water. The fiber shall be of such character that when used in the applied mixture, an absorbent or porous mat, but not a membrane will result on the surface of the ground. Materials which inhibit germination or growth shall not be present in the mixture.
- C. Binding Agent: Ecology Controls M-Binder or equal. Dry powder organic concentrate.  
Available from: Robinson Fertilizer Company (714) 632-9710.
- D. Commercial Fertilizer: Gro-Power Hi-Nitrogen, 14-4-9  
Chemical Analysis: Nitrogen 14% Phosphate 4%, Potash 9%, Sulfur 3%, Humus 30%, Humic acids 6%, Gro-Power bacterial "stimulator" included.  
Physical Properties: Each bead contains the same 14-14-9(S) formulation in addition to humus and humic acids - a water soluble biodegradable binder is used to insure fast breakdown.  
Available from: Gro-Power (213) 245-6849 or (714) 750-3830.

## 2.8 MULCH

Nitrolized Wood Shavings (Organic Wood Base Products) - shall be Type I, as specified in the "Standard Specifications for Public Works Construction," latest edition, Section 212-1.2.4.

## 2.9 TREE SUPPORTS

- A. Tree ties shall be "CINCH-TIE" black rubber ties, and shall be uniform throughout the project. Or, City approved equal.
- B. Tree support stakes shall be minimum two inches (2") diameter lodge pole pine, copper naphthenate treated, ten feet (10') length.

## **PART 3 - EXECUTION**

Installation shall conform to the requirements of Section 308 of the "Standard Specifications," except as modified herein.

### 3.01 GENERAL

Prior to the start of work of this Section, all trash and deleterious materials on the surface of the ground shall be removed and legally disposed of.

### 3.02 WEED ABATEMENT

- A. Prior to the installation of the irrigation system, all weed growth shall be removed within the areas designated to be cleared and grubbed. Refer to plans for limit of work.
  - (1) If in the opinion of the Pest Control Advisor, perennial grasses and weed existing in the planting areas will require control prior to removal, spray these areas per Pest Control Adviser's recommendations. Allow herbicide to kill all weeds. Rake or hoe off all dead weeds to a depth of

one to two inches (1" to 2") below the surface of the soil. Physically remove all weeds from the site.

B. Upon completion of the irrigation system and rototilling of soil amendments into the soil and immediately preceding the installation of plant material, perform weed abatement as follows, and per Pest Control Advisors recommendation.

- (1) Apply Sulfate of Ammonia at the rate of five pounds (5 lbs.) per one thousand square feet (1,000 sq. ft.) to all planting areas.
- (2) Irrigate area for fourteen (14) consecutive days, to germinate existing weed seeds.
- (3) Apply by spray a non-selective herbicide to eradicate all existing weeds. Do not irrigate for seven (7) days after application.
- (4) Remove weeds after herbicide has had time to sufficiently kill. Remove all dead weeds by rake or hoe to a depth of one to two inches (1" to 2") below the surface of the soil. Remove all weed residue and top growth and dispose of in a legal manner.
- (5) Plant all plant material and immediately apply a selective pre-emergent herbicide per Adviser's recommendations.

### 3.03 SOIL PREPARATION AND FINE GRADING

A. Planting Areas:

To all planting areas, uniformly broadcast soil amendments and thoroughly incorporate to minimum six inch (6") depth by means of a rototiller or equal.

Soil Amendments are to be distributing at the following rates per one thousand square feet (1000 sq. ft.):

3 cu. yds. Soil conditioner per 1000 square feet  
200 lbs. 5-3-1 commercial fertilizer  
10 lbs. Iron Sulfate\*  
50 lbs. Agricultural Gypsum

(Mix to be used for bidding purposes only, to be verified with Agronomical Soils Test.) \*Care shall be taken when using or handling Iron Sulfate to avoid contact with cement.

B. Finish Grade:

1. After approximate finished grades have been established, all soil areas shall be compacted and settled by application of heavy irrigation to a minimum depth of twelve inches (12").

### 3.04 FINAL GRADES

- A. After the foregoing specified deep watering, minor modifications to grade may be required to establish the final grade. These areas shall not be worked until the moisture content has been reduced to a point where working it will not destroy soil structure.
- B. Finish grading shall ensure proper drainage of the site.
- C. Finished earth berm surfaces shall be smooth and even between contours; shapes shall be to the satisfaction of the Landscape Architect.
- D. All areas shall be graded so the final grades will be one inch (1") below adjacent paved areas, sidewalks, valve boxes, clean-outs, drains, manholes, etc.
- E. Surface drainage shall be away from all building foundations.
- F. Eliminate all erosion scars.
- G. The contractor shall request a review by the Landscape Architect for recommended approval of the final grades and elevations before beginning planting operations.

### 3.05 RELOCATED PALM TREE INSTALLATION

- A. All planting pits shall be a minimum of 50% larger than the rootball. Backfill shall be 100% washed plaster sand.
- B. Trees shall be planted perpendicular to grade and plumbed for accuracy. They are to be planted at grade with the exception of when roots have grown above the original planting position. When this occurs, trees are to be planted below grade up to, but not to exceed, 3' of trunk. The sand backfill shall be applied in layers and jetted with water and the use of a high pressure nozzle and hose. At least 80% compaction is required in the planting pits of all palm tree genus. Eighty percent (80%) compaction may be achieved with the assistance of pneumatic tampers. Any adjustments necessary to straighten palms due to poor compacting shall be made by the Contractor at no charge to the owner within 12 months after final acceptance of the project.
- C. Apply 6-8 lbs. Of Gro-Power, Controlled Released Fertilizer (12-8-8) per cubic yard of backfill at time of planting.

### 3.06 HYDROSEEDED TURF AND GROUND COVER INSTALLATION

- A. Grade smooth all surfaces to be seeded. Soil surface shall be three-quarters inch (3/4") below adjacent pavement after settling. Roll lightly and fill in all soil depressions. All areas shall slope to drain.
- B. Soil shall be level, smooth and moist prior to hydroseeding.
- C. The seed bed shall be reviewed by the Landscape Architect to determine its suitability prior to planting. The Contractor shall obtain such recommended approval prior to seeding grass. No seeding shall be performed until all other

construction operations have been completed, except by authorization of the Landscape Architect.

- D. Mixing of hydromulch slurry shall be performed in a tank with a built-in continuous agitation and recirculation system of sufficient operating capacity to produce a homogeneous slurry of mulch fiber, binding agent, fertilizer and water as specified in this Section 2.09, in the designated unit proportions:

1.	Mulch Fiber	2,000 lbs. per acre
2.	Seed Mix	As specified in the Section 2.08
3.	Binding Agent	100 lbs. per acre
4.	Fertilizer-Gro-Power Hi-Nitrogen	250 lbs. per acre
5.	Water	3,000 gallons per acre

- E. With agitation system operating at part speed, water shall be added to the tank, good recirculation shall be established. Materials shall be added in such a manner that they are uniformly blended into the following sequence.

When tank is 1/3 filled with water:

Add binding agent, 1/2 acre requirement  
Add 3 - 50 lbs. bales of fiber  
Add seed, 1/2 acre requirement  
Add fertilizer, 1/2 acre requirement

When the tank is 1/2 filled with water:

Agitate mixture at full speed.

Before tank is 3/4 filled with water:

Add 7 - 50 lbs. bales of fiber.

As tank becomes filled with water:

Add remaining requirements.

Slurry distribution should begin immediately.

- F. Area to be hydroseeded shall be moistened to a depth of six inches (6") just prior to application.
- G. Application: Hydromulched slurry shall be applied under high pressure, evenly and result in uniform coat on all areas to be treated. Care shall be exercised to assure that plants in place are not subjected to the indirect force of an application. Slurry shall be immediately removed from walks, structures, etc. that are inadvertently sprayed.

### 3.07 WATERING

- A. Apply water to all planted areas during operations and thereafter, until acceptance of the work.

- B. Immediately after planting, apply water to each shrub by means of a hose. Apply water in a moderate stream in the planting hole until the material about the roots are completely saturated from the bottom of the hole to the top of the ground.
- C. Apply water in sufficient quantities and as often as seasonal conditions require to keep the planted areas sufficiently moist at all times, well below the root system of grass and plants.
- D. All turf and groundcover areas shall be kept damp at all times and irrigation should be adjusted accordingly. This normally would involve four (4) to six (six) watering periods daily, each watering period (ON) regulated to just dampen the mulch without creating run off.
- E. Intervals between irrigation (OFF) sequence should be judged by the length of the time mulch remains damp. Once the mulch begins to dry out, the water (ON) sequence should be repeated.

### 3.08 ESTABLISHMENT AND MAINTENANCE PERIOD

The Contractor shall continuously maintain all areas involved in this contract during the progress of the work and during the establishment and maintenance period until final acceptance of the work by the City.

- A. Plant establishment period: The contractual establishment period shall be for no less than thirty (30) continuous calendar days. The contractual establishment period begins on the first day after all planting in this project is completed and accepted and the planted areas are brought to a neat, clean and weed free condition.
  - (1) Any day upon which no work will be required, as determined by the Landscape Architect, will be credited as one of the plant establishment working days regardless of whether or not the Contractor performs plant establishment work.
  - (2) Any day when the Contractor fails to adequately maintain plantings, replace unsuitable plants or do weed control or other work, as determined necessary by the Landscape Architect, will not be credited as one of the plant establishment working days.
  - (3) In order to carry out the plant establishment work, the Contractor shall furnish sufficient men and adequate equipment to perform the work during the plant establishment period.
  - (4) Improper maintenance or possible poor condition of any planting at the termination of the scheduled establishment period may cause postponement of the final acceptance of Plant Establishment. Contractor shall bear all costs for extension of the Plant Establishment period.

B. Plant Maintenance Period:

The contractual maintenance period shall be no less than ninety (90) continuous calendar days and, shall begin at the acceptance of the Plant Establishment Period.

- (1) All areas shall be kept free of debris, and all planted areas shall be weeded at intervals of not more than ten (10) days. Watering, trimming, fertilization, spraying and pest control, as may be required, shall be Included in the maintenance period. Maintenance shall include gopher control.
- (2) Post fertilize all turf areas at the end of every 30 days (of maintenance) at the rate of five pounds (5 lbs.) per one thousand square feet (1,000 sq. ft.) using ammonium sulfate, evenly applied and thoroughly watered in. Post fertilize all groundcover areas at the end of every thirty (30) days (of maintenance) at the rate of thirty pounds (30 lbs.) per one thousand square feet (1,000 sq. ft.) using 5-3-1 Gro-Power. For the final feeding of all areas, use 12-8-8 Gro-Power Controlled Release Nitrogen at the rate of thirty pounds (30 lbs.) per one thousand square feet (1,000 sq. ft.).
- (3) Mowing of turf will commence when turf grass has reached a height of two inches (2"). The height of cut will be one and one-half inches to two inches (1 ½" to 2'). Mowing will be at least weekly after the first cut. Turf must be well established and free of bare spots and weeds to the satisfaction of the Landscape Architect prior to final acceptance by the City. Excess grass clippings, as determined by the Landscape Architect, shall be picked up and removed from the site and premises.
- (4) The Contractor shall maintain the irrigation systems in a like new operating condition; adjusting head heights and spray arcs as necessary. The Contractor is responsible for proper watering of all planting areas, for providing any necessary supplemental water as may be required, and shall replace any material damaged due to improper moisture.
- (5) During the maintenance period, the Contractor shall be responsible for maintaining adequate protection for all planting areas. Any damaged areas shall be repaired and any plant materials replaced at the Contractor's expense.
- (6) The contractor's maintenance period will be extended past sixty (60) days, if these provisions are not filled.

### 3.11 GUARANTEE AND REPLACEMENT

- A. All plant material installed under the contract shall be guaranteed against any and all poor inadequate or inferior materials and/or workmanship for a period of one (1) year. Any plant found to be dead or in poor condition due to such faulty

materials or workmanship, as determined by the Landscape Architect, shall be replaced by the Contractor at his expense.

- B. All palms shall be guaranteed by the contractor for twenty-four (24) months after final acceptance of the project. Contractor liability shall cover cost of labor, equipment, and materials to replace trees of similar size during the covered period.
- C. Any material found to be dead, missing, or in poor condition during the establishment period shall be replaced immediately. The Landscape Architect shall be the judge as to the condition of material. Material to be replaced within the guarantee period shall be replaced by the contractor within fifteen (15) days of written notification by the City.
- D. Replacement shall be made to the same specifications required for original plantings within five (5) working days after written notification.
- E. Material and Labor involved in the replacing of material shall be supplied by the Landscape Contractor at no additional cost to the City.

### 3.12 REVIEWS

- A. Normal progress reviews shall be requested from the Landscape Architect at least forty-eight (48) hours in advance of an anticipated inspection. A review will be made by the Landscape Architect on each of the steps listed below. The Contractor will not be permitted to initiate the succeeding steps of work until he has received written recommendation of approval to proceed by the Landscape Architect.
  - (1) Immediately prior to the commencement of the work on this Section.
  - (2) Spotting of palm, and minor adjustments prior to planting.
  - (3) Preparation of areas to mulch and turf installation.
  - (4) Final review, start of establishment period.
  - (5) After thirty (30) day plant establishment.
  - (6) Final acceptance of project/ninety (90) day maintenance.

END OF SECTION 02900

**PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

- A. The provisions of the "Standard Specifications for Public Works Construction," latest edition, Section 302-6, shall apply except as modified herein.

**1.02 SCOPE OF WORK**

- A. Work of this Section includes all materials, labor and equipment necessary for and incidental to completing the Concrete Formwork, as shown on the Drawings, as reasonably implied, or as specified herein, including, but not limited to, the following:
  - 1. Forms for all concrete.
  - 2. Shoring and bracing.
  - 3. Setting of embedded items.
  - 4. Removal of forms.

**1.03 RELATED WORK SPECIFIED ELSEWHERE**

- A. Concrete - Section 03300
- B. Concrete Reinforcement - Section 03200

**1.04 STANDARDS**

- A. Materials and workmanship shall conform to the requirements of all applicable building codes, except that requirements specified herein shall govern where they exceed those in the Building Code. Refer and comply with the provisions of the following codes, specifications and standards, except as otherwise shown or specified:
  - 1. American Concrete Institute, ACI 347, "Recommended Practice for Concrete Formwork."

**1.05 QUALITY ASSURANCE**

- A. Provide all openings in concrete formwork to accommodate work of other trades; accurately determine size and location of openings, recesses, etc., from trades providing or requiring such items; place items required for incorporating into concrete accurately and securely supported on forms.
- B. Base form and false work design on required values of live and dead loads, weight of moving equipment on formwork, height of concrete drop, foundation pressures, stresses, lateral stability and other safety factors required during construction.
- C. Materials used in formwork may not be reused except for use in other forms, without the Landscape Architect's recommended approval.

- D. Contractor shall verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces. Report to the Landscape Architect all conditions, which prevent proper execution of this work.
- E. Use various form types as specified below. Refer to Concrete Section 03300 and use form materials for best results. All forms shall have a smooth straight upper edge and shall be free of any warping.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- A. All materials shall conform to Section 204 of the Standard Specifications except as modified herein.

### **2.02 FORM COATINGS**

- A. Non-grain-rising and non-staining type that will not leave residue on surface of concrete or adversely affect bonding to concrete of paint, plaster, mortar or other applied materials. Coatings containing mineral oils or other non-drying ingredients will not be permitted. Submit manufacturer's data.

### **2.03 LUMBER**

- A. Lumber shall be "Construction Grade" Douglas Fir.

### **2.04 PLYWOOD**

- A. Plywood shall be of grade Exterior B-B. All plywood shall be at least 5/8" thick, and edge sealed. Plywood for forming exposed concrete shall be Plyform.

### **2.05 METAL FORMS**

- A. Removable metal forms shall be of proper gauges and sizes, carefully aligned and fitted. Removable metal forms shall be properly reconditioned for use, clean, free from dents, bends, rust, oil or other coatings, and shall receive the recommended approval of the Landscape Architect prior to installation.

### **2.06 FORM TIES**

- A. Prefabricated rod, flat band or wire type, or threaded internal disconnecting type of sufficient tensile strength to resist all imposed loads of fresh concrete and with external holding devices of adequate bearing area. Ties shall permit tightening and spreading of forms and leave no metal closer than one and one-half inches (1 ½") from surfaces.

### **2.07 FORM TYPES**

- A. Use Plywood or Metal Forms as specified above for exposed surfaces.
- B. Use Boards or Plywood as specified above for concealed surfaces.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

Corona City Park Basket Ball Court and Volleyball Court Addition CONCRETE FORMWORK – 03100-2

- A. Build forms to exact shapes, sizes, lines and dimensions as required to obtain accurate alignment, locations and grades, and level and plumb work. Provide for openings, offsets, keyways, recesses, chamfers, blocking, joint screeds, anchorages and other required features.
- B. Use metal spreaders to provide accurate spreading of forms and positive tying of forms together.
- C. Provide for recesses, rebates, drips and profiles as detailed.
- D. Forms shall be of materials and construction adequate to safely support all loads, so that no sagging, leakage or displacement occurs during and after pouring of concrete.
- E. Form joints shall not show in exposed concrete.
- F. Clean-outs and Cleaning - Provide temporary openings in wall and column forms for cleaning and inspection. Prior to pouring, clean all forms and surfaces to receive concrete.
- G. Provide 3/8" x 3/8" chamfer strips for exposed corners unless otherwise indicated. Use eight feet (8') long plywood for exposed surfaces.
- H. Fabricate form for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
- I. Forms shall be set with the upper edge of the board true to line and grade and shall be staked rigidly in place with stakes set not more than four feet (4') apart.
- J. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt and all other debris just before concrete is placed. Re-tighten forms during and after concrete placement if required to eliminate mortar leaks.
- K. Clean and repair surfaces for forms to be reused in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form-coating compound material to concrete contact form surfaces.
- L. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove pins and tighten form to close joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces. Forms are to be inspected prior to pouring concrete.

### 3.02 FORM COATINGS

- A. Coat the contact surfaces of forms with a form-coating compound before reinforcement is placed. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compound.
  - B. Thin form-coating compounds only with thinning agent of any type, and in amount, and under conditions of the form-coating compound manufacturer's directions. Do not allow
- Corona City Park Basket Ball Court and Volleyball Court Addition CONCRETE FORMWORK – 03100-3

excess form-coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

### 3.03 REGLETS & REBATES

- A. Each affected trade required to fasten work to the structure, or to insert therein any piping, conduit, duct, box bolt, anchor, insert or other rough hardware, shall set such items securely and accurately in the forms. Be responsible for any and all changes in such piping, box, bolt, anchor, inserts and other rough hardware after they have been set in the forms.
- B. Conduits and pipes in concrete slabs will be permitted to be embedded therein under the following conditions:
  - 1. Conduit or pipe diameter shall not exceed one-third (1/3) of the slab thickness, minimum spacing of conduit or pipe shall be three (3) diameters; there shall be a minimum separation of one inch (1") from parallel reinforcing steel and conduit. Minimum concrete coverage over conduits and pipes shall be one inch (1"). No crossovers will be permitted except as specifically detailed. No reinforcing steel shall be bent or displaced to permit passage of conduit or pipe. No conduit or pipe shall be placed in slabs four and one-half inches (4 ½") and less in thickness, unless specifically detailed or specifically authorized by the Landscape Architect.
- C. Build into forms special features as the character and requirements of work dictate.
- D. Place pouring strips in the forms wherever horizontal construction joints are made in exposed concrete. Place pouring strips level and place concrete flush with the top of the pouring strip. After cleaning concrete surfaces and just ahead of placing of subsequent concrete, tighten form ties to conceal shrinkage.
- E. Carefully check with other trades before completing forms and placing concrete to determine all embedded items are in place in the forms. Set miscellaneous anchors, bolts, ties, dowels, plates, etc. necessary to complete the work as detailed. Embed no wood blocks other than treated built-in blocks or nailing blocks in concrete.

### 3.04 FORM REMOVAL

- A. Remove forms only when concrete has developed sufficient strength to sustain its own weight and super-imposed loads.

END OF SECTION 03100

**PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

- A. The provisions of the "Standard Specifications for Public Works Construction," latest edition, Section 302-6, shall apply except as modified herein.

**1.02 SCOPE OF WORK**

- A. Work of this Section includes all materials, labor and equipment necessary for and incidental to completing the Concrete Formwork, as shown on the Drawings, as reasonably implied, or as specified herein, including, but not limited to, the following:
  - 1. Forms for all concrete.
  - 2. Shoring and bracing.
  - 3. Setting of embedded items.
  - 4. Removal of forms.

**1.03 RELATED WORK SPECIFIED ELSEWHERE**

- A. Concrete - Section 03300
- B. Concrete Reinforcement - Section 03200

**1.04 STANDARDS**

- A. Materials and workmanship shall conform to the requirements of all applicable building codes, except that requirements specified herein shall govern where they exceed those in the Building Code. Refer and comply with the provisions of the following codes, specifications and standards, except as otherwise shown or specified:
  - 1. American Concrete Institute, ACI 347, "Recommended Practice for Concrete Formwork."

**1.05 QUALITY ASSURANCE**

- A. Provide all openings in concrete formwork to accommodate work of other trades; accurately determine size and location of openings, recesses, etc., from trades providing or requiring such items; place items required for incorporating into concrete accurately and securely supported on forms.
- B. Base form and false work design on required values of live and dead loads, weight of moving equipment on formwork, height of concrete drop, foundation pressures, stresses, lateral stability and other safety factors required during construction.
- C. Materials used in formwork may not be reused except for use in other forms, without the Landscape Architect's recommended approval.

- D. Contractor shall verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces. Report to the Landscape Architect all conditions, which prevent proper execution of this work.
- E. Use various form types as specified below. Refer to Concrete Section 03300 and use form materials for best results. All forms shall have a smooth straight upper edge and shall be free of any warping.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- A. All materials shall conform to Section 204 of the Standard Specifications except as modified herein.

### **2.02 FORM COATINGS**

- A. Non-grain-rising and non-staining type that will not leave residue on surface of concrete or adversely affect bonding to concrete of paint, plaster, mortar or other applied materials. Coatings containing mineral oils or other non-drying ingredients will not be permitted. Submit manufacturer's data.

### **2.03 LUMBER**

- A. Lumber shall be "Construction Grade" Douglas Fir.

### **2.04 PLYWOOD**

- A. Plywood shall be of grade Exterior B-B. All plywood shall be at least 5/8" thick, and edge sealed. Plywood for forming exposed concrete shall be Plyform.

### **2.05 METAL FORMS**

- A. Removable metal forms shall be of proper gauges and sizes, carefully aligned and fitted. Removable metal forms shall be properly reconditioned for use, clean, free from dents, bends, rust, oil or other coatings, and shall receive the recommended approval of the Landscape Architect prior to installation.

### **2.06 FORM TIES**

- A. Prefabricated rod, flat band or wire type, or threaded internal disconnecting type of sufficient tensile strength to resist all imposed loads of fresh concrete and with external holding devices of adequate bearing area. Ties shall permit tightening and spreading of forms and leave no metal closer than one and one-half inches (1 ½") from surfaces.

### **2.07 FORM TYPES**

- A. Use Plywood or Metal Forms as specified above for exposed surfaces.
- B. Use Boards or Plywood as specified above for concealed surfaces.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

Corona City Park Basket Ball Court and Volleyball Court Addition CONCRETE FORMWORK – 03100-2

- A. Build forms to exact shapes, sizes, lines and dimensions as required to obtain accurate alignment, locations and grades, and level and plumb work. Provide for openings, offsets, keyways, recesses, chamfers, blocking, joint screeds, anchorages and other required features.
- B. Use metal spreaders to provide accurate spreading of forms and positive tying of forms together.
- C. Provide for recesses, rebates, drips and profiles as detailed.
- D. Forms shall be of materials and construction adequate to safely support all loads, so that no sagging, leakage or displacement occurs during and after pouring of concrete.
- E. Form joints shall not show in exposed concrete.
- F. Clean-outs and Cleaning - Provide temporary openings in wall and column forms for cleaning and inspection. Prior to pouring, clean all forms and surfaces to receive concrete.
- G. Provide 3/8" x 3/8" chamfer strips for exposed corners unless otherwise indicated. Use eight feet (8') long plywood for exposed surfaces.
- H. Fabricate form for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
- I. Forms shall be set with the upper edge of the board true to line and grade and shall be staked rigidly in place with stakes set not more than four feet (4') apart.
- J. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt and all other debris just before concrete is placed. Re-tighten forms during and after concrete placement if required to eliminate mortar leaks.
- K. Clean and repair surfaces for forms to be reused in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form-coating compound material to concrete contact form surfaces.
- L. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove pins and tighten form to close joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces. Forms are to be inspected prior to pouring concrete.

### 3.02 FORM COATINGS

- A. Coat the contact surfaces of forms with a form-coating compound before reinforcement is placed. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compound.
  - B. Thin form-coating compounds only with thinning agent of any type, and in amount, and under conditions of the form-coating compound manufacturer's directions. Do not allow
- Corona City Park Basket Ball Court and Volleyball Court Addition CONCRETE FORMWORK – 03100-3

excess form-coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

### 3.03 REGLETS & REBATES

- A. Each affected trade required to fasten work to the structure, or to insert therein any piping, conduit, duct, box bolt, anchor, insert or other rough hardware, shall set such items securely and accurately in the forms. Be responsible for any and all changes in such piping, box, bolt, anchor, inserts and other rough hardware after they have been set in the forms.
- B. Conduits and pipes in concrete slabs will be permitted to be embedded therein under the following conditions:
  - 1. Conduit or pipe diameter shall not exceed one-third ( $1/3$ ) of the slab thickness, minimum spacing of conduit or pipe shall be three (3) diameters; there shall be a minimum separation of one inch (1") from parallel reinforcing steel and conduit. Minimum concrete coverage over conduits and pipes shall be one inch (1"). No crossovers will be permitted except as specifically detailed. No reinforcing steel shall be bent or displaced to permit passage of conduit or pipe. No conduit or pipe shall be placed in slabs four and one-half inches ( $4 \frac{1}{2}$ ") and less in thickness, unless specifically detailed or specifically authorized by the Landscape Architect.
- C. Build into forms special features as the character and requirements of work dictate.
- D. Place pouring strips in the forms wherever horizontal construction joints are made in exposed concrete. Place pouring strips level and place concrete flush with the top of the pouring strip. After cleaning concrete surfaces and just ahead of placing of subsequent concrete, tighten form ties to conceal shrinkage.
- E. Carefully check with other trades before completing forms and placing concrete to determine all embedded items are in place in the forms. Set miscellaneous anchors, bolts, ties, dowels, plates, etc. necessary to complete the work as detailed. Embed no wood blocks other than treated built-in blocks or nailing blocks in concrete.

### 3.04 FORM REMOVAL

- A. Remove forms only when concrete has developed sufficient strength to sustain its own weight and super-imposed loads.

END OF SECTION 03100

**PART 1 - GENERAL**

## 1.01 RELATED DOCUMENTS

- A. The provisions of the "Standard Specifications for Public Works Construction," latest edition, section 201-2, shall except as modified herein.

## 1.02 SCOPE OF WORK

- A. Work of this Section includes all material, equipment, and labor necessary for and incidental to completing all Concrete Reinforcement, as shown on the Drawings, as reasonably implied, or as specified herein, including, but not limited to, the following:
  - 1. Reinforcing steel.
  - 2. Control during concrete placement.

## 1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete - Section 03300
- B. Concrete Unit Masonry - Section 04200

## 1.04 STANDARDS

- A. Materials and workmanship shall conform to requirements of all applicable building codes, except that requirements specified herein shall govern where they exceed those in the Building Code. Refer and comply with the provisions of the following codes, specifications and standards, except as otherwise shown or specified:
  - 1. American Concrete Institute, ACI 318, "Building Code Requirements for Reinforced Concrete."
  - 2. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
  - 3. American Concrete Institute, ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures."
  - 4. American Welding Society, AWS D12.1, "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction."

## 1.05 INSPECTION

- A. Contractor shall notify the City and Landscape Architect prior to pouring of concrete in order to inspect placement of all reinforcement.

## 1.06 TESTING

- A. Tests will be conducted as required by the City and in accordance with Section 201-2.5 of the Standard Specifications.

**PART 2 - PRODUCTS**

## 2.01 REINFORCING STEEL BARS

- A. Shall be deformed steel bars conforming to ASTM A615 and UBC Standard 26-4 and shall be Grade 40 or Grade 60. Refer to Section 201-2.2 of the Standard Specifications.

#### 2.02 WELDED WIRE FABRIC

- A. Conform to ASTM A185 and Standard Specifications, Section 201-2.4.

#### 2.03 TIE WIRE

- A. Annealed Steel, 16-gauge minimum, galvanized where concrete is exposed.

#### 2.04 SUPPORTS FOR REINFORCING

- A. All supports for work exposed to view or weather shall be galvanized steel, or plastic-coated units so that finished surfaces will not be marred nor stained; supports shall be suitably sized and spaced for proper load distribution on earth or membrane so that membrane is not perforated and rebar does not sag. Use no supports of wood or other cellulose material.

### **PART 3 - EXECUTION**

#### 3.01 GENERAL

- A. All work shall conform to the requirements of Section 303-1.7 of the Standard Specifications.
- B. Coordinate with other trades and expedite materials and labor to avoid omissions and delay in job progress.
- C. Clean reinforcement of loose mill scale, oil or other foreign coatings that might destroy or reduce bond prior to placement of concrete grout.

#### 3.02 FABRICATION AND DELIVERY

- A. Fabricate bars of indicated size and accurately form to shapes and lengths indicated and required, by methods not injurious to materials. Do not heat reinforcement for bending. Bars with bends or offsets not conforming to Drawings will be rejected.
- B. Bundle reinforcement and tag with suitable identification to facilitate sorting and placing and sufficient supply of proper reinforcement at site to avoid delays; transport and store at site as not to damage material.

#### 3.03 SECURING IN PLACE

- A. Accurately place reinforcement and securely wire tie in precise position at points where bars cross. Tie stirrups to bars at both top and bottom. Bend wire ties away from forms. Use galvanized wire ties in exterior walls, beams, columns, and slabs. Support horizontal bars in strict accordance with the "Manual of Standard Practice," latest edition, published by concrete Reinforcing Steel Institute.
- B. Maintain proper placement of all reinforcement during entire pouring or grouting operation.

### 3.04 PLACING REINFORCING BARS

- A. Splice reinforcement as indicated on the Drawings and as specified herein. Avoid splices at critical connection and stress points. Lap as indicated or necessary to develop full strength or stress of bars. Stagger top splices and in horizontal wall reinforcement separate at least ten feet (10') longitudinally in alternate bars of opposite tiers. Extend stubs and dowel required to receive and engage subsequent work a sufficient length to develop full strength of bar or as indicated. Place dowel and stub bar in forms, and maintain placement during pouring of concrete or grout.
- B. Where reinforcement is interrupted by sleeves and openings, provide additional bars as indicated on the Drawings.
- C. When necessary, perform welding of reinforcing bars in accordance with "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections for Reinforced Concrete Construction" (AWSD12.1).

### 3.05 PLACING FABRIC REINFORCEMENT

- A. Roll out, straighten, cut to required size, and lay reasonably flat in place. Lap fabric one full mesh at sides and ends; securely wire together and to other reinforcement at frequent intervals.

### 3.06 CLEARANCES

- A. Exercise particular care to maintain proper distance and clearance between parallel bars and between bars and forms. Provide metal spreaders and spacers to hold steel in position as necessary. Use metal or plastic chairs to support reinforcing steel and mesh in concrete placed on earth and in footings. Transverse steel bars with hangers, or in another manner, as necessary.
- B. Minimum clear distances between reinforcing steel and face of concrete shall be as indicated on the Drawings, or as follows:
  - 1. Concrete footings formed against earth 3"
  - 2. Concrete in forms with exposed faced in contact with earth 2"
  - 3. Walls As detailed
  - 4. Slabs Centered

END OF SECTION 03200

**PART 1 - GENERAL**

## 1.01 RELATED DOCUMENTS

- A. The provisions of the "Standard Specifications for Public Works Construction," latest edition, Section 201-2, shall except as modified herein.

## 1.02 SCOPE OF WORK

- A. Work of this Section includes all material, equipment, and labor necessary for and incidental to completing all Concrete Work, as shown on the Drawings, as reasonably implied, or as specified herein, including, but not limited to, the following:

1. Exterior walks and slabs as shown on Drawings.
2. Mowing curbs.
3. Cast-in-place concrete.
4. Miscellaneous concrete items.
5. Setting of items to be inserted into concrete.
6. Cement, finish, joints, sawcutting, and patching.
7. Curing.
8. Testing.

## 1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Irrigation System - Section 02441
- B. Site Amenities - Section 02461
- C. Concrete Formwork - Section 03100
- D. Concrete Reinforcement - Section 03200

## 1.04 STANDARDS

- A. Testing, materials, and workmanship shall conform to the requirements of all applicable building codes, except that requirements specified herein shall govern where they exceed those in the Building Code.

## 1.05 SUBMITTALS

- A. Contractor shall submit the design mix for each type of concrete to be used for approval, prior to any use on the site.

## 1.06 SMOOTHNESS TOLERANCE

- A. Cement finish surfaces shall be of such smoothness and evenness that they shall contact the entire length of a ten foot (10') straight edge laid in any direction, with an allowable tolerance of one-eighth inch (1/8"). Any operations necessary to achieve this result shall be performed by the Contractor at no additional cost to the City.

- B. No patching will be permitted to correct defective work; defective Sections shall be removed to the nearest scoreline or construction joint and replaced. No extension of time will be allowed for correcting defective work.

#### 1.07 INSPECTIONS

- A. Inspections will be required. Contractor shall call for inspection a minimum of forty-eight (48) hours (two working days) prior to need.
- B. The Contractor shall call for inspection upon completion of each of the following specific phases of construction, each prior to pour:
  - 1. All form work placement/construction.
  - 2. All footing excavation.
  - 3. Subgrade preparation.
  - 4. Steel reinforcing placement.
- C. Any work covered prior to inspection shall be opened to view by the Contractor at his expense.

#### 1.08 TESTING

- A. All testing shall be as required by the "Standard Specifications."

### **PART 2 - PRODUCTS**

#### 2.01 GENERAL

- A. All materials shall conform to Section 201-1.2 of the "Standard Specifications."

#### 2.02 CONCRETE

- A. Concrete shall be a minimum five (5 1/2) sack mix, with a maximum four inch (4") slump, 3,250 pounds per square inch ultimate compressive strength at twenty-eight (28) days and shall conform to Concrete Class Use Table, Section 201-1, of the Standard Specifications. No admixtures will be allowed.

#### 2.03 GROUT

- A. Grout shall be a minimum six (6) sack mix, with a maximum four inch (10") slump, 2,000 pounds per square inch ultimate compressive strength at twenty-eight (28) days and shall conform to Concrete Class Use Table, Section 201-1, of the Standard Specifications. No admixtures will be allowed

#### 2.04 REINFORCING STEEL

- A. Shall be in accordance with Section 03200, Concrete Reinforcement and per Section 201-2 of the "Standard Specifications."

## 2.05 EXPANSION JOINTS

- A. Expansion joint material shall be "Flexcell" as manufactured by Celotex Corporation, conforming to ASTM Standard D1751-61, "Fleximastic," conforming to ASTM D1190, or approved equal. Only one type of material is to be used throughout the job.

## 2.06 CRACK CONTROL JOINTS

- A. Shall be as shown on the Drawings and details. Submit samples of performed materials for approval of the City.

## 2.07 CONCRETE CURING COMPOUND

- A. Shall be Type 1 - in conformance with Section 201-4 of the "Standard Specifications."

## 2.08 FORM LUMBER

- A. Shall be Douglas Fir, construction grade or better, in conformance with Section 303-1.3 of the "Standard Specifications," and Section 03100, Concrete Formwork.

## 2.09 EMBOSSED SKINS AND COMPANION PRODUCTS

- A. Lithotex Pavecrafters / LM Scofield Company (or equal) for embossed skin, Lithochrome Color Hardener and Lithochrome Antiquing Release. To include LM Scofield Company Integral Color as illustrated on the plans. To be installed in areas designated on the hardscape plans.

## **PART 3 - EXECUTION**

### 3.01 GENERAL

- A. All work shall conform to the requirements of Section 303 of the "Standard Specifications."
- B. The Contractor shall provide copies of all load tickets for all transit-mixed concrete delivered to the site.
- C. All concrete slabs shall slope to drain. Depressions in the slab surface that hold water ("bird baths") will not be acceptable.
- D. Install concrete and cement finish work true to lines, dimensions and grades.
- E. Protect all finished concrete from graffiti. The Contractor shall provide watchmen as required to insure a graffiti-free surface. Patching of concrete surfaces will not be permitted. Whole sections must be removed and replaced. A graffitied finish will not be acceptable.
- F. Remove and replace all defective concrete and defective cement finish work. All concrete with cracks over one-sixteenth inch (1/16") in width or cracks with more than one-sixteenth inch (1/16") vertical separation shall be deemed unacceptable and the full panel shall be removed and replaced at the Contractor's sole expense.
- G. Patching is unacceptable and will not be allowed.

- H. No advertising impression, stamp, or mark of any description will be permitted on surface of concrete or cement finish.
- I. Concrete shall be poured prior to 11:00 a.m. Contractor is to guarantee curing of concrete, free of graffiti.

### 3.02 PLACING CONCRETE

- A. Before placing of any concrete, thoroughly clean all forms, washout with water and make tight. Transport, place and spread concrete in a manner to prevent segregation of aggregate. Reinforcing shall be supported by metal or plastic chairs; concrete supports shall not be used. Refer to Sections 303-1.7 and 303-1.8 of the "Standard Specifications."

### 3.03 CEMENT FINISH

- A. Exterior slabs and walks-non-slip, uniform light broom surface, transverse to direction of slab, unless otherwise shown on the plans. Finish cast-in-place walls as designated on details.

### 3.04 CURING

- A. Initial curing shall be moist curing or moisture cover curing, and shall continue for at least 168 cumulative hours (not necessarily consecutive), during which the concrete has been exposed to air temperatures above 50 degrees F. Avoid rapid drying and the end of the curing period.
- B. Use water that is free of impurities, which could etch or discolor concrete surfaces.
- C. Do not use liquid membrane curing compounds on surfaces which are to be covered with a coating material applied directly to the concrete or with a covering material bonded to the concrete, such as other concrete, liquid floor hardener, water-proofing, damp-proof flooring, painting, and other coatings and finish materials, unless otherwise acceptable to the inspector.

### 3.05 COORDINATION

- A. All site furnishings, benches, drinking fountains, light poles, etc. shall be set in cured footings prior to placing concrete slabs. All foundations shall cure at least fourteen (14) days prior to placing concrete slabs.

END OF SECTION 03300

## SECTION 260501

### GENERAL ELECTRICAL REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. This Section includes the general requirements for Division 26 - Electrical.
  - 1. Division 1 and the General Conditions apply to all work of this section.
  - 2. Division 26 supplements the applicable requirements of other Divisions.
- B. The Work includes all labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this division, complete, as shown on the drawings and/or specified herein.
  - 1. Examine all divisions for related work required to be included as work under this division.
- C. Owner-furnished items: Pick up Owner-furnished items and handle, deliver, install, and make all final connections.
  - 1. Assume responsibility for the items when consigned at the storage facility in accord with requirements of the Contract Documents.

##### 1.02 REFERENCES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.
- B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:
  - 1. ANSI American National Standards Institute
  - 2. ASTM American Society for Testing and Materials
  - 3. IEEE Institute of Electrical and Electronics Engineers
  - 4. NEC National Electrical Code (NFPA 70)
  - 5. NEMA National Electrical Manufacturers Association
  - 6. NFPA National Fire Protection Association
  - 7. UL Underwriters Laboratories, Inc.

##### 1.03 QUALITY ASSURANCE

- A. Regulation: All the electrical equipment and materials, including their installation, shall conform to the following latest applicable codes and standards:
  - 1. National Electrical Code (NEC).
  - 2. California State Fire Marshal.

3. Occupational Safety and Health Act (OSHA).
4. Requirements of Serving Utility Companies.
5. Local Codes and Ordinances.
6. Requirements of the California Division of the State (DSA).
7. California Administrative Code, Title 8, Chapter 4, Industrial Safety Orders.
8. California Administrative Code, Title 24.
9. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply.

B. Contractor's Expense: Obtain and pay for all required bonds, insurance, licenses, and pay for all taxes, fees and utility charges required for the electrical work.

#### 1.04 SUBMITTALS

A. Submit all of the items described in Paragraphs 1, 2, and 3 (below) as a single submittal. Partial submittals will not be accepted. Contractor shall review submittals for conformance with Contract Documents, and make necessary revisions. Contractor shall also verify dimensions of equipment and be satisfied as to fit and that they comply with all code requirements relating to adequacy and clear working space. Submit the following in accordance with Division 1, with the additional electrical systems-related document requirements and additional number of copy sets as specified below:

1. Detailed shop drawings and associated product data/material lists (also see applicable technical specification sections following for additional requirements), six submittal document sets, for:

- a. Un-metered service pedestal
- b. Lighting control equipment

2. Contractor shall submit shop drawings sealed by a Structural Engineer registered in the State of California to demonstrate compliance with the following requirement:

Confirm that electrical equipment has been seismically-braced and anchored to resist a horizontal force (including a simultaneous vertical force of one-third the horizontal values shown) acting in any direction using the following criteria:

Fixed equipment on grade:	33% of operating weight.
Fixed equipment on structure:	33% of operating weight.
Emergency power equipment* on grade:	50% of operating weight.
Emergency power equipment* on structure:	75% of operating weight.

\*Note: Also applicable to communications equipment.

For flexibly-mounted equipment, use twice the above values.

3. Product data/material lists (also see applicable technical specification sections following for additional requirements), at least six submittal document sets, for:

- a. Raceways
- b. Underground duct and fittings
- c. Precast concrete pullboxes
- d. Building wire and cable
- e. Grounding components
- f. Supporting devices

- g. Nameplates and identification markers/labels
- h. Overcurrent protective devices
- i. Lighting system control equipment and devices

4. Substitutions

Catalog numbers and specific brands or trade names followed by designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, safety, and appearance to those specified may be accepted, subject to the following provisions:

- a. All substitutions must be submitted in writing to the Owner. Contractor shall submit to the Owner a typewritten list containing a description of each proposed substitute material or equipment.
  - b. The Owner will accept, in writing, proposed substitutions that are, in the Owner's opinion, equal in quality, utility and appearance to the material or equipment specified. Such acceptance shall not relieve Contractor from complying with the requirements of the Drawings and the Specifications.
  - c. Contractor shall be responsible for all costs of any changes resulting from Contractor's proposed substitutions which affect other parts of the Work or the work of separate Contractors.
    - 1) Contractor also agrees to compensate the Owner for time and expenses spent reviewing substitutions.
  - d. The decision of the Owner shall be final.
5. Submit protective device coordination and short circuit calculations conducted and documented to demonstrate: (1) selective coordination, and (2) that electrical equipment and protective devices proposed provide adequate interrupting and withstand capability. The written calculation procedures and tabulated results shall be bound and submitted - six submittal document sets. Section 26 0573 "Protective Device Coordination and Short Circuit Study", is applicable as included in these Specifications.
6. Submit test results (also see applicable technical specification sections following for additional requirements), six submittal document sets, for:
- a. Ground fault protection coordination
7. Submit operating, maintenance and instructional data (also see applicable technical specification sections following for additional requirements), six submittal document sets, for:
- a. Un-metered service pedestal
8. Instruction Materials (also see applicable technical specification sections following for additional requirements), six submittal document sets, for:
- a. Provide prior to the time of the personnel instruction period, instruction manuals associated with all systems listed above.

- b. Include the following information, as a minimum, in each copy of the instruction manual:
  - 1) Manufacturers' names and addresses.
  - 2) Serial numbers of items furnished.
  - 3) Catalog cuts, exploded views and brochures, complete with technical and performance data for all equipment, marked to indicate actual items furnished and the intended use.
  - 4) Recommended maintenance procedures.

B. Project record documents:

- 1. Mark Record Documents daily to indicate all changes made in the field.
  - a. In addition to general requirements of Record Documents, indicate on Project Record Drawings all changes of equipment locations and ratings, fuse sizes, trip sizes and settings on magnetic-only circuit breakers.
  - b. Alterations in raceway runs and sizes, changes in wire sizes, circuit designations, installation details, one line diagrams, control diagrams and schedules.
- 2. Use green to indicate deletions and red to indicate additions.
  - a. Use the same symbols and follow as much as possible the same drafting procedures used on the Contract Drawings.
- 3. Locate conduit stubbed-out for future use, underground feeder conduits, and feeder pull box locations using building lines by indicating on the Project Record Drawings.

1.05 OPERATING AND MAINTENANCE MANUALS

- A. Prepare and submit Operating and Maintenance Manuals, two document sets. In addition to the requirements specified in Division 1 (also see technical specification sections following for additional requirements), include the following information for equipment items:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers and replacement parts.
  - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and, as required, summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  - 4. Servicing instructions and lubrication charts and schedules.

1.06 QUALITY ASSURANCE

- A. As a minimum Specification requirement, all materials and methods shall comply with

applicable governing codes.

B. Material and equipment substitution.

1. Equipment other than that specified will be accepted only when written approval is given by the Owner, in accordance with Division 1.
2. The Contractor shall be held responsible for all physical changes in piping, equipment, etc. resulting from equipment substitution and likewise bear any increased cost of other trades in making said substitution. Approval by the Owner of equipment other than that specified does not relieve the Contractor of this responsibility.

1.07 OWNER'S INSTRUCTIONS

- A. Prior to completion of the contract, and at the Owner's convenience, instruct verbally and demonstrate to the Owner's personnel, the operation of the systems as listed in Part 1 above.

1.08 SYSTEM STARTUP

- A. Do not energize or place electrical equipment in service until all relevant parties have been duly notified and are present or have waived their rights to be present. Where equipment to be placed in service involves service or connection from another contractor of the Owner, notify the Owner in writing when the equipment will be ready. Notify the Owner's Representative two weeks in advance of the date the various times of equipment will be complete.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Site verification of conditions: Contractor shall survey the entire project site and become thoroughly familiar with actual existing conditions. The intent of the work is shown on the drawings and described hereinafter. By the act of participation in the pre-bid conference and site inspection tour specified in the applicable Division 1 section, the Contractor shall be deemed to have made such a study and examination and to accept all conditions present at the site. No request for additional payment shall be considered as valid, due to failure to allow for conditions which may exist.
- B. Electrical work shown: Electrical drawings are generally diagrammatic. Verify equipment sizes with shop drawings and manufacturers' data and coordinate location layout with other trades. Report immediately to the Owner any conflicts in the drawings and specifications with any code or between the electrical work and the work of other trades. No work shall be commenced where a conflict exists prior to receiving proper instructions. Any work or materials shown on the drawings and not mentioned in this division, or vice-versa, shall be executed the same as if specifically mentioned by both. Notify the Owner of any changes of location requirements prior to installation.

3.02 SEISMIC BRACING

- A. Contractor shall be responsible for anchors and connections of electrical work to building structure to prevent damage as a result of earthquake, including manufactured equipment,

the connection and integrity of shop-fabricated and field-fabricated materials and equipment. All building equipment and connections therefore shall be designed to resist seismic forces in conformance with Title 24 of the California Administrative Code.

Contractor shall submit shop drawings sealed by a Structural Engineer registered in the State of California to demonstrate compliance with the following requirements:

1. Electrical equipment: For requirements, see Part 1 above.
2. Raceway: All raceway shall be supported and braced per SMACNA "Guidelines for Seismic Restraint Systems and Plumbing Piping Systems." (See Table 23-P of Title 24 for limitations.)

### 3.03 DEMOLITION, ALTERATION AND EXTENSION WORK

- A. Provide and perform demolition, alteration, extension, preparatory and miscellaneous work as indicated.
- B. Existing Conditions: Make a detailed survey of the existing conditions pertaining to the work. Check the locations of all existing structures equipment, wiring, etc. include all demolition, alteration and extension work in bid.

### 3.04 SERVICE INTERRUPTIONS

- A. Coordinate with the Owner any interruption of services necessary to accomplish the work.

### 3.05 FIELD QUALITY CONTROL

- A. Site Tests:
  1. Perform all necessary tests required to ascertain that the electrical system has been properly installed, that the power supply to each item of equipment is correct, and that the system is free of grounds, ground faults, and open circuits, that all motors are rotating in the proper directions, and such other tests and adjustments as may be required for the proper completion and operation of the electrical system.
  2. If, during the course of testing, it is found that system imbalance is in excess of 20%, rearrange single-pole branch circuits in lighting and receptacle panels to bring system balance within 20% on all phases. Record all such changes on the panelboard schedule and submit a summary of changes to the Owner's Representative.

### 3.06 CLEANING

- A. Clean exterior surfaces of equipment and remove all dirt, cement, plaster and other debris. Protect interior of equipment from dirt during construction and clean thoroughly before energizing.
- B. Clean-out cracks, corners and surfaces on equipment to be painted, remove grease and oil spots so that paint may be applied without further preparation.
- C. Locate underground conduit stubbed-out for future use, underground feeder conduits, and feeder pull box locations, using building lines by indicating on the Project Record Drawings.

END OF SECTION

## SECTION 260519

### LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. This Section includes wire and cable systems rated 600 volts and less:
  - 1. Building wire and cable.
  - 2. Underground feeder and branch circuit cable.
  - 3. Wiring connectors and connection accessories.
- B. Cabling requirements in this Section may be supplemented in other sections of these specifications.
- C. Related Sections:
  - 1. General electrical requirements: Section 260501.

##### 1.02 REFERENCES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.
- B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:
  - 1. ANSI American National Standards Institute
  - 2. ASTM American Society for Testing and Materials.
  - 3. Institute of Electrical and Electronics Engineers.
    - IEEE Standard 82 Test Procedures for Impulse Voltage Tests on Insulated Conductors.
  - 4. NEC National Electrical Code (NFPA 70).
  - 5. NECA National Electrical Contractors Association: "Standard of Installation."
  - 6. National Electrical Manufacturers Association/Insulated Cable Engineers Association
    - NEMA/ICEA WC-5 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
    - NEMA/ICEA WC-7 Cross-Linked Thermosetting Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
    - NEMA/ICEA WC-8 Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

7. NFPA National Fire Protection Association

8. Underwriters Laboratories, Inc.

UL 4 Armored Cable

UL 62 Flexible Cord and Fixture Wire.

UL 486A Wire Connectors and Wiring Lugs for Use with Copper Conductors

UL 486B Wire Connectors for Use with Aluminum Conductors

UL 83 Thermoplastic-Insulated Wires and Cables.

UL 854 Service Entrance Cables.

### 1.03 SUBMITTALS

A. General: Submit the following in accordance with the Conditions of the Contract and Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."

B. Samples: Provide samples upon specific request.

C. Product Data: Submit product data giving complete description for sizes employed, material types, and electrical ratings.

D. Certificates:

1. Labels of Underwriters' Laboratories, Inc., fixed to each item of material.

2. If materials are by manufacturers other than those specified submit certification that material meets applicable Underwriters' Laboratories, Inc. Standards.

3. Submit in accordance with Section 260501.

### 1.04 QUALITY ASSURANCE

A. Qualifications of Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.

B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."

C. NEMA and UL Compliance: Products shall comply with applicable requirements of NEMA and UL standards. Provide products and components listed and labeled by UL.

D. NECA Installation Standards: Perform work in accordance with NECA "Standard of Installation."

E. Source Quality Control: Quality control testing shall meet applicable Underwriters' Laboratories Inc. Standards.

### 1.05 DELIVERY, STORAGE AND HANDLING

A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section

260501, "General Electrical Requirements."

- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.
- C. Deliver wire and cable to the project in full unbroken cartons or reels marked with conductor size, insulation type, and Underwriters' Laboratories, Inc. label.
- D. Handle wire and cable in a manner to prevent damage to conductor, insulation and identifying markings.

#### 1.06 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of wiring system prior to rough-in.
- C. Wire and cable routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

Subject to compliance with requirements, provide products by the following, or equal:

A. Wire and cable:

Triangle  
Anaconda  
General Cable Corporation

B. Connectors:

AMP  
Buchanan  
Burndy  
3M Company  
O-Z/Gedney  
Thomas & Betts

C. Insulating Tapes: 3M Company

D. Wire Ties:

Ideal  
Thomas and Betts ("Ty-Rap")  
Panduit

E. Pulling Compound: Ideal ("Yellow 77").

#### 2.02 MATERIALS

- A. General: Provide wire and cable suitable for the temperature, conditions, and location where installed, except as otherwise indicated.
  - 1. Conductor: Copper. Provide solid conductor for No. 10 AWG and smaller. Provide stranded conductors for sizes No. 8 and larger.
    - a. Use stranded conductors:
      - 1) At motors and other applications where subject to vibration.
      - 2) For control circuits.
  - 2. Minimum Size Conductor: No. 12 AWG, except as otherwise indicated.
    - a. Control circuits: No. 14 AWG.
  - 3. Insulation voltage rating: 600 volts.
- B. Building wire and cable:
  - 1. Description: Single conductor insulated wire.
  - 2. Insulation: ANSI/NFPA 70:
    - a. Type THHN/THWN, rated 75 degrees C.
    - b. Type XHHW, rated 90 degrees C.
- C. Connectors:
  - 1. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.
- D. Pull Cord: 1/8" polypropylene or nylon.

## PART 3 - EXECUTION

### 3.01 WIRING METHOD

- A. General:
  - 1. Use insulation types suitable for the temperature, moisture and elements to which exposed.
    - a. Minimum 75°C temperature rated insulation on conductors, except as otherwise indicated.
      - 1) Use minimum 90°C temperature rated insulation on conductors in conduits exposed on roof, or where required due to ambient temperature.
  - 2. Equipment grounding conductors:

- a. Provide where required by the National Electrical Code, and where indicated. Where conductor size is not indicated, provide size as required by the National Electrical Code.
  - b. Provide for:
    - 1) All branch circuit wiring.
    - 2) All feeders and motor branch circuits
    - 3) All nonmetallic conduits.
    - 4) All flexible metal conduits exceeding 72 inches in length.
- B. Wire and cable connections:
- 1. Connector types:
    - a. No. 10 AWG wire and smaller: Spring-type connectors. All terminations shall be made on device terminals or on terminal blocks.
      - 1) Maximum number of conductors in a connection: 3.
    - b. No. 8 AWG wire and larger: Compression- or pressure-type solderless connectors and terminal lugs. Wrap connection with electrical insulating tape, half-lapped to produce a dielectric value equal to or greater than wire insulation.
  - 2. Provide connector sealing packs for splices that require complete protection from dampness and water where indicated.
  - 3. Splices in feeders and mains may only be made where designated on the drawings and where prior approval is obtained from Owner.
  - 4. Location of splices and terminations shall be limited to accessible locations such as outlet boxes, pull boxes, junction boxes, panelboard boxes, and splice boxes.
  - 5. Insulate taps and splices equal to insulation of adjoining conductor.
  - 6. Splice or tap permitted only on conductors that are a component part of a single circuit properly protected by approved methods.

### 3.02 PREPARATION

- A. Examine the system in which the wire is to be installed for defects in equipment and installation which may cause damage to the wire.
- B. Examine wires to be jointed, tapped, spliced, terminated, and their connecting devices for defects which may affect the mechanical and electrical integrity of the connection.
- C. Check conduit systems for damage and loose connections, replace damaged sections. Make sure that the inside of conduit is free of dirt and moisture.

1. Completely and thoroughly swab raceway before installing wire.
  2. Pull mandrel, one size smaller than the conduit, through entire length of all underground conduits prior to conductor installation.
- D. Do not start work until defects have been corrected and until authorization to proceed has been obtained from Owner's Representative.

### 3.03 INSTALLATION

- A. Install wire, cable, and connectors in compliance with the NEC.
- B. Install products in accordance with manufacturers instructions.
- C. Install all wire in raceway.
- D. When pulling conductors do not exceed manufacturer's recommended values.
- E. Use polypropylene or nylon ropes for pulling conductors.
- F. Do not bend wire less than the manufacturer's recommended minimum bending radius.
- G. Coordinate cable installation with other work.
- H. Protect exposed cable from damage.
- I. Use suitable cable fittings and connectors.
- J. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound where necessary.
- K. Use pulling means including fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.
- L. Keep conductor splices to a minimum.
- M. Clean conductor surfaces before installing connectors.
- N. Tape uninsulated conductors and connectors with electrical insulating tape to 150 percent of insulation rating of conductor.
- O. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced.
- P. Use splice and tap connectors which are compatible with conductor material.
- Q. Provide adequate length of conductors within electrical enclosures and neatly train the conductors to terminal points with no excess. Make terminations so there is no bare conductor at the terminal.
- R. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque-tightening values. Where manufacturer's torquing

requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A.

- S. Circuits of multiple phases passing through enclosures shall have phases grouped (bundled together) to reduce the reactance effect.
- T. Arrange conductors in switchboards, panelboards, gutters, boxes, control cabinets and terminal cabinets neatly and lace with black T & B "Ty-Raps" ties.
- U. Connect control circuits as indicated and in accordance with the wiring diagrams furnished by the equipment manufacturer. Control conductors shall be color coded or identified with the provision of non-deteriorating type wire markers.
- V. Consistently color code wiring continuous throughout the work:
  - 1. Color code secondary service, feeder, and branch circuit conductors with insulation/jacket (factory-applied) color for phase identification as follows:

	-- System Voltage --	
<u>Phase</u>	<u>208Y/120</u>	<u>480Y/277</u>
A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

- 2. Select consistent wiring color code for switch legs, travelers, and special systems.
- 3. For conductors No. 6 AWG or larger, permanent plastic colored tape may be used to mark conductor in lieu of color-coded insulation/jacket. Tape shall cover not less than 2 inches of conductor insulation within enclosures.

### 3.04 IDENTIFICATION

- A. In addition to requirements in Section 260553, the following are applicable:
  - 1. At all switchboard terminations, provide each feeder circuit with a permanent plastic name tag indicating the load fed.
  - 2. Feeders: Identify with the corresponding circuit designation at over-current device and load ends, at all splices and in pull boxes.
  - 3. Branch Circuits: Identify with the corresponding circuit designation at the over-current device and at all splices and devices.
  - 4. Control Wires: Identify with the indicated number and/or letter designation at all terminal points and connections.
  - 5. Conductors Terminated by Others: Indicate location of opposite end of conductor, i.e., Pull Box-Room 101.
  - 6. For identification of conductors use plastic coated self-sticking markers such as Thomas & Betts E-Z Code.

7. Circuit Designation is construed to mean panel designation and circuit number, i.e., LA-13.

### 3.05 FIELD QUALITY CONTROL

#### A. Prior to energizing:

1. Inspect wire and cable for physical damage and proper connection.
  - a. Confirm that field-connections made by others in equipment furnished by others are mechanically and electrically sound prior to energization.
2. Confirm electrical continuity and absence of short circuits for all wire and cable with the use of a megohm meter.
  - a. Obtain values for phase-to-phase, phase-to-neutral, and phase-to-ground.
3. Confirm required insulation resistance as follows:
  - a. Perform insulation resistance test for all 600 volt insulated conductors No. 8 AWG and larger.
  - b. Use a 500 volt megger.
  - c. Obtain and record values for insulation resistance to ground and for insulation resistance between each conductor and every other conductor in the same conduit.
  - d. Conductors not complying with the following minimum values of insulation resistance are to be replaced and retested until satisfactory.

<u>Conductor Rated Amperes:</u>	<u>Minimum Insulation Resistance, Ohms:</u>
31 through 50	500,000
51 through 100	250,000
101 through 200	100,000
201 through 400	50,000

- e. Perform tests after conductors have been installed, but before terminal connections have been made. Take readings for each test after the voltage has been applied continuously for one minute.
- f. Perform tests according to manufacturer's recommendations.
- g. Test results shall be in accordance with manufacturer's recommendations.
- h. Correct defects revealed by above tests.

#### B. Subsequent to wire and cable hook-ups:

1. Energize circuits and demonstrate proper functioning. Correct malfunctioning units,

and retest to demonstrate compliance.

END OF SECTION

## SECTION 260526

### GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

A. This Section includes basic materials and methods for grounding and bonding electrical systems and equipment. Grounding requirements specified in this Section may be supplemented in other sections of these Specifications.

1. Grounding electrodes and conductors.
2. Equipment grounding conductors.
3. Bonding.

##### B. System Requirements

1. Electrical continuity to ground metal raceways and enclosures which are isolated from the equipment ground due to use of conduit or fittings which are nonmetallic (non-conducting), shall be established by providing by a green insulated grounding conductor of approved size within each raceway which shall connect to the isolated metallic raceways or enclosures at supply side. (If bare grounding conductors were specified, connect to enclosure on raceway at both ends.)
2. Cold water or other utility piping systems alone are not to be used as grounding electrodes due to the use of insulating couplings and nonmetallic pipe in such installation. All grounding electrodes shall be "Made Electrodes" as specified herein.
3. Non-current-carrying metal parts of all high voltage, conduit systems, supports, cabinets and enclosures shall be permanently and effectively grounded.
4. Metallic or semi-conducting shields and lead sheaths of all cables operating at high voltage shall be permanently and effectively grounded at each splice and termination.

##### C. Related Sections

1. General electrical requirements: Section 260501.

##### 1.02 REFERENCES

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:

1. American National Standards Institute.

ANSI C2 National Electrical Safety Code.

2. American Society for Testing and Materials.

ASTM B3 Soft or Annealed Copper Wire.

ASTM 33 Standard Specification for Soft or Annealed Copper Wire for Electrical Purposes.

ASTM B8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

3. Institute of Electrical and Electronics Engineers.

IEEE 81 Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.

4. Lightning Protection Code (NFPA 78).

5. NEC National Electrical Code (NFPA 70).

6. NEMA National Electrical Manufacturers Association.

7. NFPA National Fire Protection Association

8. Underwriters Laboratories, Inc.

UL 467 Electrical Grounding and Bonding Equipment.

UL 486A Wire Connectors and Grounding Lugs for Use With Copper Conductors.

UL 96 Lightning Protection Components.

### 1.03 SUBMITTALS

A. In addition to this Section, the submittal requirements of Section 260501, "General Electrical Requirements" are applicable.

B. Product Data: Provide data for grounding electrodes and connections.

C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

D. Operating, Maintenance, and Instructional Data: Manufacturers' written operating, maintenance, and installation instructions, including directions for storage and protection, handling, examination, and preparation. Include specific instructions for preparation and installation of exothermic connectors.

1. In addition, include copies of this data in Operating and Maintenance Manuals submitted, see Section 260501.

### 1.04 QUALITY ASSURANCE

A. Qualifications of Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.

B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."

C. NEMA and UL Compliance: Products shall comply with applicable requirements of NEMA

and UL standards for grounding and bonding materials and systems. Provide products and components listed and labeled by UL.

- D. NECA Installation Standards: Perform work in accordance with NECA "Standard of Installation."
- E. Source Quality Control: Quality control testing shall meet applicable Underwriters' Laboratories Inc. Standards.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.

#### 1.06 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown prior to commencing the work.

#### 1.07 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of grounding electrodes.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

Subject to compliance with requirements, provide products by the following, or equal:

Anixter Brothers  
Blackburn  
Burndy  
A.B. Chance Co.  
Erico Products (CADWELD)  
Joslyn  
Kearney-National  
O-Z/Gedney  
Thomas & Betts

#### 2.02 GROUNDING AND BONDING PRODUCTS

- A. Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.
- B. Conductor Materials: Copper.

#### 2.03 WIRE AND CABLE CONDUCTORS

- A. General: Comply with the following, except as otherwise indicated:

- B. Equipment Grounding Conductor: Green insulated copper.
- C. Grounding Electrode Conductor: Stranded copper cable.
- D. Bare Copper Conductors: Conform to the following:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Assembly of Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.

#### 2.04 MISCELLANEOUS CONDUCTORS

- A. Ground Bus: Bare annealed copper bars of rectangular cross section, minimum 1/4 inch x 3 inch x 12 inch drilled and tapped every 2 inches on center for two hole lugs.
- B. Braided Bonding Jumpers: Copper tape, braided No. 30 gauge bare copper wire, terminated with copper ferrules.
- C. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

#### 2.05 CONNECTOR PRODUCTS

- A. General: Listed and labeled as grounding connectors for the materials used.
- B. Pressure Connectors: High-conductivity plated units.
- C. Bolted Clamps: Heavy-duty units listed for the application.
- D. Exothermic Welded Connections: Provided in kit form and selected for the specific types, sizes, and combinations of conductors and other items to be connected.

#### 2.06 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel with high-strength steel core and electrolytic-grade copper outer sheath, molten-welded to core. Size: 3/4 inch in diameter by 10 feet in length.
- B. Plate Electrodes: Copper plates, minimum 0.10 inch thick, size as indicated.

#### 2.07 TEST (GROUND) WELLS

- A. Precast concrete, 12" round x 18" deep open bottom valve box, with cast iron solid cover plate marked "GROUND."

### PART 3 - EXECUTION

#### 3.01 APPLICATION

- A. Equipment Grounding Conductor Application:

Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated.

1. Install separate insulated equipment grounding conductors with circuit conductors for the following in addition to those locations where required by Code:

a. Feeders and branch circuits.

B. Underground conductors: Soft bare stranded copper, except as otherwise indicated.

1. Install minimum 4/0 AWG soft stranded copper buried ground loop cable as shown on drawings at least 3 feet below finished grade and minimum 3 feet from building.

C. Signal and Communications System: Provide #4 AWG minimum green insulated copper conductor in raceway from the grounding electrode system to each terminal cabinet or central equipment location.

D. Separately Derived Systems: Grounding shall be provided in accordance with the NEC, including Article 250.

E. Metal Poles Supporting Outdoor Lighting Fixtures: Ground pole to a grounding electrode as indicated in addition to separate equipment grounding conductor run with supply branch circuit.

F. Service Entrance:

1. Grounding Conductor: Shall be sized in accordance with National Electrical Code to connect these items to the building bus in the service main equipment.

2. Equipment Bonding Jumper: Shall be sized in accordance with the National Electrical Code and be conducted on the supply side of the service main equipment.

3. Grounding Electrode: Bond together the following items to establish the electric service grounding electrode, unless otherwise indicated:

a. Minimum 20 feet number 3/0 AWG copper conductor encased in concrete footing or grade beam to contact with earth in two opposite directions.

b. Building domestic water service entrance piping on house side of meter; provide bonding jumper across meter.

c. Structural steel building framework.

G. Flexible metal and liquid-tight conduit: Provide equipment grounding conductors.

H. Rigid nonmetallic conduit: Provide equipment grounding conductors

### 3.02 INSTALLATION

General: Ground electrical systems and equipment in accordance with NEC requirements except where the drawings or specifications exceed NEC requirements.

A. Ground Rods: Locate a minimum of one-rod length from each other and at least the same

distance from any other grounding electrode. Interconnect ground rods with bare copper conductors buried at least 24 inches below grade. Connect bare copper cable ground conductors to ground rods by means of exothermic welds except as otherwise indicated. Make these connections without damaging the copper coating or exposing the steel. Use 3/4 inch diameter by 10 foot long ground rods except as otherwise indicated. Drive rods until tops are 6 inches below finished floor or final grade except as otherwise indicated.

- B. Metallic Water Service Pipe: Provide insulated copper ground conductors, sized as indicated, in conduit from the building main service equipment, or the ground bus, to main metallic water service entrances to the building. Connect ground conductors to the main metallic water service pipes by means of ground clamps. Where a dielectric main water fitting is installed, connect the ground conductor to the street side of the fitting. Do not install a grounding jumper around dielectric fittings. Bond the ground conductor conduit to the conductor at each end.
- C. Braided-Type Bonding Jumpers: Install to connect ground clamps on water meter piping to bypass water meters electrically. Use elsewhere for flexible bonding and grounding connections.
- D. Route grounding conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.
- E. Test Wells: Locate as indicated, and fabricate in accordance with details indicated.
- F. Fences and Gates: See grounding details on the construction drawing for building and fence grounding requirements and details.
  - 1. Use flexible copper braid for bonding the gates of chain link fences.
- G. Cable Shields: Ground shields of any shielded power cable or signal cable at each splice or termination in accordance with recommendations of the splice or termination manufacturer.

### 3.03 CONNECTIONS

- A. General: Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible. Make connections with clean bare metal at points of contact.
- B. Exothermic Welded Connections: Use for connections to structural steel and for underground connections except those at test wells. Install at connections to ground rods and plate electrodes. Comply with manufacturer's written recommendations. Do not alter molds. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure-type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare copper grounding conductor to the ground bus in the housing. Bond electrically non-continuous conduits at both entrances and exits with grounding bushings and bare copper grounding conductors.

- D. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A and UL 486B.
- E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.
- F. Compression-Type Connections: Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor.
- G. Moisture Protection: Where insulated ground conductors are connected to ground rods or ground buses, insulate the entire area of the connection and seal against moisture penetration of the insulation and cable.
- H. Ground Bus Assembly: Make connections to the ground bus assembly in the following manner:
  - 1. Bond cable to two hole lug using exothermic welding process.
  - 2. Bolt two hole lugs to ground bus assembly.

### 3.04 UNDERGROUND DISTRIBUTION SYSTEM GROUNDING

- A. Grounding System: Ground non-current-carrying metallic items associated with pad-mounted equipment by connecting them to bare underground copper cable and grounding electrodes arranged as indicated.

### 3.05 FIELD QUALITY CONTROL

- A. Test all ground fault interrupter (GFI) receptacles and circuit breakers for proper connection and operation with methods and instruments prescribed by the manufacturer.
- B. Tests: Subject the completed grounding system to a megger test at each location where a maximum ground resistance level is specified, at service disconnect enclosure ground terminal, and at ground test wells. Measure ground resistance without the soil being moistened by any other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the two-point method in accordance with Section 9.03 of IEEE 81.
- C. Ground/resistance maximum values shall be as follows:
  - 1. Equipment rated 500 kVA and less: 10 Ohms.
  - 2. Equipment rated 500 kVA to 1000 kVA: 5 Ohms.
  - 3. Equipment rated over 1000 kVA: 3 Ohms.
  - 4. Unfenced substations and pad-mounted equipment: 5 Ohms.

5. Manhole and handhole grounds: 10 Ohms.
  6. Grounded secondary distribution system neutral and non-current carrying parts associated with distribution systems and grounds not otherwise covered: 25 ohms.
- D. Deficiencies: Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Where measures are directed that exceed those indicated, the provisions of the Contract covering the changes shall apply.
- E. Report: Prepare test reports, certified by the testing organization, of the ground resistance and device function tests at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
1. Provide copies of reports of all grounding system tests for inclusion in Operation and Maintenance Manuals and for review by the Owner.

END OF SECTION

## SECTION 260529

### HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

A. This Section Includes:

1. Hangers, straps, clamps, steel channel, and fastening hardware for supporting and anchoring electrical work.

B. Related Sections:

1. General electrical requirements: Section 260501.

##### 1.02 REFERENCES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

- B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:

1. ANSI American National Standards Institute
2. ASTM American Society for Testing and Materials
3. IEEE Institute of Electrical and Electronics Engineers
4. NEC National Electrical Code (NFPA 70)
5. NEMA National Electrical Manufacturers Association
6. NFPA National Fire Protection Association
7. UL Underwriters Laboratories, Inc.
8. NECA National Electrical Contractors Association ("Standard of Installation")
9. SMACNA Sheet Metal Air Conditioning Contractors National Association

##### 1.03 SUBMITTALS

- A. In addition to this Section, the submittal requirements of Section 260501, "General Electrical Requirements" are applicable.
- B. Product Data: Provide manufacturer's catalog data for supporting devices and fastening systems.

- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instruction for storage, handling, protection, examination, preparation, installation, and starting of Product.

#### 1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70, "National Electrical Code."
- B. Furnish products listed and classified by Underwriter's Laboratories, Inc. as suitable for purpose specified and shown.

#### 1.05 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
- B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."
- C. NEMA and UL Compliance: Products shall comply with applicable requirements of NEMA and UL standards. Provide products and components listed and labeled by UL.
- D. NECA Installation Standards: Perform work in accordance with NECA "Standard of Installation."
- E. Source Quality Control: Quality control testing shall meet applicable Underwriters' Laboratories Inc. Standards.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.

#### 1.07 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown prior to commencing the work.
- B. Verify supporting device requirements prior to rough-in.
- C. Electrical work is shown on Drawings in approximate locations unless dimensioned. Provide supporting devices as required to complete the electrical work.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by the following, or equal:
  - 1. Anchors:

Acherman-Johnson Corp.  
B-Line  
Hilti  
Phillips Drill Co.  
Rawl Products Co.

2. Conduit Sealing Bushings: O-Z/Gedney.

## 2.02 MATERIAL AND FABRICATION

- A. Coatings: Supports, support hardware, and fasteners shall be protected with zinc coating. Products for use outdoors shall be hot-dip galvanized.
- B. Manufactured supporting devices:
  - 1. Fasteners: Types, materials, and construction features as follows:
    - a. Epoxy grouted anchors: 316SS Type.
  - 2. Concrete Inserts: 316 Stainless Steel.
  - 3. Conduit sealing bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

## PART 3 - EXECUTION

### 3.01 INSTALLATION, GENERAL

- A. Provide supporting devices to fasten electrical components securely and permanently to the building or structure in accordance with NEC requirements. Install products in accordance with manufacturer's instructions.
- B. Coordinate with the building structural, mechanical, and other systems, and with other electrical installation.
- C. Fastening: Fasten electrical items and their supporting hardware securely to the building structure. Electrical items include, but are not limited to: raceway, cables, cable tray, busway, transformers, panelboards, enclosed switches and motor controllers, control components, boxes, and cabinets.
  - 1. Ensure that the load applied to any fastener does not exceed 25 percent of the proof test load. Use vibration- and shock-resistant fasteners for attachments to concrete slabs.
  - 2. Holes cut to a depth of more than 1-1/2 inches in reinforced concrete beams, or to a depth of more than 3/4 inch in concrete shall not cut reinforcing bars. Fill holes that are not used.
  - 3. Fastening methods:
    - a. Concrete or solid masonry: Epoxy grouted anchors,

- b. Steel: Machine screws or welded steel studs.
- D. Conductors in vertical raceways: Provide support for wire and cable in riser pull boxes in accordance with NEC Article 300.

### 3.02 INSTALLATION, ADDITIONAL REQUIREMENTS FOR RACEWAYS

- A. General: Comply with the NEC and with the following requirements:
1. Conform to manufacturer’s recommendations for selection and installation of supports.
  2. The strength of the support, including attachment to the building or structure, shall be adequate to carry present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 pounds, provide additional strength until there is a minimum of 200 pounds safety allowance in the strength of each support.
    - a. Raceway shall be supported and braced per SMACNA “Guidelines for Seismic Restraint Systems and Plumbing Piping Systems.” (See Footnotes 12 and 13 of Table 23-P of Title 24 for limitations.)
  3. Support spacing: Maximum spacing shall be as allowed by the NEC.
    - a. Additional support required at unsupported boxes and access fittings: Support exposed and concealed raceway within 1 foot of an unsupported boxes and access fittings. In horizontal runs, this support may be omitted where box or access fitting is independently supported and raceway termination is not made with chase nipples or threadless box connectors.
    - b. Additional support required for vertical runs: Arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on the raceway terminals. Provide riser clamps for conduit at floor lines.

### 3.03 INSTALLATION, ADDITION REQUIREMENTS FOR EQUIPMENT AND ENCLOSURES

- A. Support electrical equipment and enclosures as required to produce, as a minimum, the same structural safety factors as specified for raceway supports.
1. Provide metal channel racks for mounting equipment, devices, and enclosures including, but not limited to: transformers, panelboards, enclosed switches and motor controllers, control components, pull- and junction-boxes, and cabinets.
  2. Electrical equipment shall be seismically-braced and anchored to resist a horizontal force (including a simultaneous vertical force of one-third the horizontal values shown) acting in any direction using the following criteria:

Fixed equipment on grade:	33% of operating weight.
Fixed equipment on structure:	33% of operating weight.
Emergency power equipment* on grade:	50% of operating weight.
Emergency power equipment* on structure:	75% of operating weight.

\*Note: Also applicable to communications equipment.

For flexibly-mounted equipment, use twice the above values.

3. The anchorage of electrical equipment required for elevator drives, emergency generator, emergency motor loads, fire pumps and emergency lighting shall be designed in accordance with Section 2312 of the Uniform Building Code for a lateral force based on a "Cp" value.

#### 3.04 FIELD QUALITY CONTROL

- A. Preparation for tests: Provide all jacks, jigs, fixtures, and calibrated indicating scales required for accurate, reliable testing. Obtain the Owner's Representative and Structural Engineer's approval before transmitting loads to the structure.
  1. Test to 90 percent of rated proof load for fasteners. If fastener fails test, revise all similar fastener installations and re-test until satisfactory results are achieved.
- B. Tests: Test pull-out resistance of one of each type, size, and anchorage material for the following fastener types:
  1. Epoxy anchors, 316SS.

#### 3.05 CLEANING

- A. Clean surfaces to be painted.

END OF SECTION

## SECTION 260533

### RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section includes provision of a mechanically- and electrically-complete conduit system including:
  - 1. Rigid metal conduit.
  - 2. Rigid nonmetallic conduit.
  - 3. Fittings and conduit bodies; accessories.
- B. Related Sections:
  - 1. General electrical requirements: Section 260501.

##### 1.02 REFERENCES

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:

##### A. American National Standards Institute

- ANSI C80.1 Specification for Rigid Steel Conduit, Zinc-Coated.
- ANSI C80.3 Specification for Electrical Metallic Tubing, Zinc-Coated.
- ANSI C80.5 Rigid Aluminum Conduit.
- ANSI/NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

##### B. American Society for Testing and Materials.

- ASTM 123 Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.

##### C. IEEE Institute of Electrical and Electronics Engineers.

##### D. NEC National Electrical Code (NFPA 70).

##### E. NECA National Electrical Contractors Association: "Standard of Installation."

##### F. National Electrical Manufacturers Association

- NEMA RN 1 PVC Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

- NEMA TC 2 Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- NEMA TC 3 PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- NEMA TC 6 PVC and ABS Plastic Utilities Duct for Underground Installation.
- NEMA TC 9 Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.

G. NFPA National Fire Protection Association

H. Underwriters Laboratories, Inc.

- UL 1 Flexible Metal Electrical Conduit
- UL 6 Rigid Metal Electrical Conduit.
- UL 94 Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
- UL 360 Liquidtight Flexible Steel Conduit, Electrical.
- UL 514B Fittings for Conduit and Outlet Boxes.
- UL 651 Rigid Nonmetallic Electrical Conduit.
- UL 797 Electrical Metallic Tubing.
- UL 1242 Intermediate Metal Conduit

1.03 SUBMITTALS

- A. General: Submit the following in accordance with the Conditions of the Contract and Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Product data: For all raceway products.
- C. Contractor shall be responsible for anchors and connections of electrical work to building structure to prevent damage as a result of earthquake, including the connection and integrity of field-fabricated materials and equipment. All building connections therefore shall be designed to resist seismic forces in conformance with Title 24 of the California Administrative Code.

Contractor shall submit shop drawings sealed by a Structural Engineer registered in the State of California to demonstrate compliance with the following requirement:

All raceway shall be supported and braced per SMACNA "Guidelines for Seismic Restraint Systems and Plumbing Piping Systems." (See Footnotes 12 and 13 of Table 23-P of Title 24 for limitations.)

- D. Samples: Provide samples upon specific request
- E. Installation instructions: Manufacturer's written installation instructions for nonmetallic raceway products. Include instructions for storage, handling, protection, examination, and preparation of Product.
- F. Project Record Documents: Accurately record actual routing of conduits larger than 2 inches.
- G. Substitutions: If materials are by manufacturers other than those specified, submit product data giving complete description for sizes employed, material types, and installation methods.

H. Certificates:

1. Labels of Underwriters' Laboratories, Inc. affixed to each item of material.
2. If materials are by manufacturers other than those specified, submit certification what material meets applicable Underwriters' Laboratories, Inc. Standards.

1.04 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
- B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."
- C. NEMA and UL Compliance: Products shall comply with applicable requirements of NEMA and UL standards. Provide products and components listed and labeled by UL.
- D. NECA Installation Standards: Perform work in accordance with NECA "Standard of Installation".
- E. Source Quality Control: Quality control testing shall meet applicable Underwriters' Laboratories Inc. Standards.

1.05 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

1.06 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

1.07 SEQUENCING AND SCHEDULING

- A. Coordinate with other Work:

1. Install conduits before concrete is placed, and in advance of masonry work.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

Subject to compliance with requirements, provide products by the following, or equal:

#### A. Conduit Bodies:

Adalet-PLM  
Appleton Electric  
Carlson  
Crouse Hinds  
Killark Manufacturing  
OZ/Gedney  
Spring City Electrical Mfg.

### 2.02 METAL CONDUIT AND TUBING

- A. PVC coated rigid metal conduit: PVC coated steel, hot-dipped galvanized including the threads, with an outer coating of zinc bichromate, complete with one coupling and one end thread protector, manufactured in accordance with ANSI C80.1 and UL 6.
  1. Threaded, hot-dipped galvanized fittings manufactured in accordance with ANSI C80.4.
  2. Provide galvanized rigid steel conduit and fittings with polyvinyl chloride (PVC) coating of nominal .020 inch (20 mil ) thickness conforming to NEMA Standard No. RN-1, Type A, Robroy Industries, OCAL, or equal.

### 2.03 NONMETALLIC CONDUIT AND DUCTS

- A. Rigid Nonmetallic Conduit: Polyvinyl chloride (PVC) heavy-wall conduit, with tapered sleeve couplings, rated and labeled for use with 90°C rated conductors, manufactured in accordance with ANSI C33.91.
  1. Cemented type fittings of the same manufacturer as the conduit.
  2. NEMA TC 2 and UL 651, Schedule 40.
- B. PVC Conduit and Tubing Fittings
  1. NEMA TC 3. Match to conduit or conduit/tubing type and material.
- C. Underground PVC and ABS Plastic Utilities Duct
  1. NEMA TC-6, Type I for encased burial in concrete, Type II for direct burial.
- D. PVC and ABS Plastic Utilities Duct Fittings
  1. NEMA TC 9-1. Match to duct type and material.

E. Liquidtight Flexible Nonmetallic Conduit and Fittings

1. UL 1660. Fittings shall be specifically approved for use with this raceway.

F. Conduit, Tubing, and Duct Accessories

1. Types, sizes, and materials complying with manufacturer's published product information. Mate and match accessories with raceway.

2.04 CONDUIT BODIES

A. General

1. Types, shapes, and sizes as required to suit individual applications and NEC requirements. Provide matching gasketed covers secured with corrosion-resistant screws.

B. PVC Coated Metallic Conduit and Tubing

1. Use PVC coated rigid metal conduit bodies. Use bodies with threaded hubs for threaded raceways.

2.05 ACCESSORIES

- A. General: Reducers, bushings, washers, etc., shall be cadmium plated malleable iron of the shape and dimension best suited for the application.

- B. End bells: Hot-dipped galvanized, threaded malleable iron, O-Z/Gedney Type THS, or equal.

C. Bushings:

1. 1-1/4" and smaller: High-impact thermo-setting phenolic, 150°C, O-Z/Gedney Type "A", or equal.
2. 1-1/2" and larger: Hot-dipped galvanized with thermosetting phenolic insulation, 150°C, O-Z/Gedney Type "B", or equal.

D. Locknuts:

1. 1-1/2" and smaller: Zinc plated heavy stock steel, O-Z/Gedney, or equal.
2. 2" and larger: Cadmium plated malleable iron, O-Z/Gedney, or equal.

- E. Hubs: Cadmium plated malleable iron, tapered threads, neoprene "O" ring, insulated throat, O-Z/Gedney, or equal.

- F. Expansion Fittings: Hot-dipped galvanized malleable iron with bonding jumpers.

1. Linear: O-Z/Gedney Type AX and TX, or equal.
2. Linear, with deflection: O-Z/Gedney Type AXDX, or equal.

G. Escutcheons: Chrome plated sectional floor and ceiling plates, Crane No. 10, or equal.

## PART 3 - EXECUTION

### 3.01 WIRING METHOD

A. General: The wiring method shall be as follows, except as otherwise noted.

B. Exterior:

1. Exposed: PVC coated rigid metal conduit bodies.
2. Concealed: PVC coated rigid metal conduit bodies.
  - a. In or under slab on grade: Nonmetallic conduit, Schedule 40 PVC. Conduit leaving the slab (including exposed conduit riser) shall be rigid steel conduit.
3. Underground, single run: Rigid nonmetallic conduit. Use Schedule 40 PVC. Provide concrete encasement as indicated.
4. Underground, grouped: Rigid nonmetallic conduit. Use Schedule 40 PVC. Provide concrete encasement as indicated.

### 3.02 INSTALLATION

A. General Requirements:

1. Install electrical raceways in accordance with manufacturer's written installation instructions, applicable requirements of NEC, and as follows.
  - a. Minimum size: 3/4 inch unless otherwise indicated.
  - b. Size conduits as indicated on the drawings and as required by the NEC for the number and sizes of wires to be installed into the conduit.
  - c. Make conduit field cuts square with saw and ream out to full size. Shoulder conduits in couplings. Remove burrs, and swab inside conduits before conductors are pulled in.
  - d. Make all conduit joints mechanically tight, electrically continuous, and watertight. Pitch conduits in a manner to avoid creating moisture traps.
  - e. Install minimum 3/16" polypropylene pull cords from end-to-end in all empty raceways, tagged with the identification of service intended and location of opposite end. Leave at least 24 inches of pull cord at each end.
  - f. Restore wall, ceiling, and floor penetrations to the requirements of the Authority Having Jurisdiction.
  - g. Provide supports for raceways as specified in Section 260529, Supporting Devices.

- 1) All raceway shall be supported and braced per SMACNA "Guidelines for Seismic Restraint Systems and Plumbing Piping Systems." (See Footnotes 12 and 13 of Table 23-P of Title 24 for limitations.)
  - h. Communications/Signal System Raceways 2-Inch Trade Size and Smaller: In addition to the above requirements, install raceways 2-inch and smaller trade size in maximum lengths at 150 feet and with a maximum of two, 90-degree bends or equivalent. Install pull or junction boxes where necessary to comply with these requirements.
  - i. Provide code sized green grounding conductor in all non-metallic conduit.
2. Perform excavating, trenching, backfillings, and compacting as shown, and as specified in the section in Division 2 which prescribes excavation, backfilling and compacting for utilities. Minimum cover for runs below finished grade outside buildings: 24 inches except where noted.
  3. Complete installation of electrical raceways before starting installation of conductors within raceways.
    - a. Protect inside of conduit from dirt and rubbish during construction by capping all openings with plastic caps intended for the purpose. Cap or plug conduits with standard manufactured accessories as soon as the conduits have been permanently installed in place.
  4. Make bends and offsets so the inside diameter is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.
    - a. Make no bends with a radius less than 12 times the diameter of the cable it contains nor more than 90 degrees. Make field bends with tools designed for conduit bending. Heating of metallic conduit to facilitate bending is not permitted.
    - b. Bends and offsets in 1" and smaller conduits may be done with approved bending devices. Do not install conduits which have had their walls crushed and deformed and their surface finish damaged due to bending.
    - c. Run conduits parallel to and at right angles to building lines.
    - d. Where space conditions prohibit the use of standard ells, elbows, and conduits, use cast ferrous alloy fittings of such forms and dimensions as best required for application.
- B. Other Requirements:
1. Cap conduits indicated to be stubbed-out underground using glued on PVC caps intended for this purpose.
  2. Terminations:
    - a. Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where

terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.

- b. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.
  - c. At switchboards, manholes and floor standing distribution panelboards, provide insulated throat bushings or bell ends on all non-metallic conduit entries and bushings on all metallic conduit entries.
  - d. Install insulated throat threaded hubs on conduits entering enclosures without threaded hubs.
  - e. Install end bells on conduits stubbed through slabs and foundations into electrical enclosures.
3. Install raceway sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL- listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:
- a. Where conduits enter or leave hazardous locations.
  - b. Where conduits pass from warm locations to cold locations, such as the boundaries of refrigerated spaces and air-conditioned spaces.
  - c. Where required by the NEC.
5. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used six (6) inches above the floor. Where equipment connections are not made under this contract, install screwdriver-operated threaded flush plugs flush with floor.
- a. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so that curved portion of bends is not visible above the finished slab.
6. PVC Coated Rigid Steel Conduit:
- a. Do not store conduit in direct sunlight.
  - b. Use pipe straps, no pipe wrenches or channel wrenches, when tightening connections to avoid damaging PVC coating.
  - c. Patch all gouges or cuts in the PVC coating after installing conduit. Use manufacturer's recommended patching paste. Build up area to be patched to full mil thickness of coating and feather out paste on sides of damaged area a minimum of 1/2-inch to provide a completely bonded seal.

- d. Field bend conduit with shoes for a mechanical bender sized specifically for PVC coated conduit.
  - e. Bends used in or below concrete slabs shall be, rigid steel type elbows, use for all stub-ups with flush floor coupling at transitions.
7. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings except as otherwise indicated.

### 3.03 FIELD QUALITY CONTROL

- A. Examine surfaces to which conduits are to be secured for:
  - 1. Defects which will adversely affect the execution and quality of work.
  - 2. Deviations from allowable tolerances for the building material.
- B. Test Mandrel:
  - 1. Swab and pull mandrel, 1/4" smaller in diameter than the conduit, through the entire length.
  - 2. If any obstructions are encountered, locate and replace the obstructed area. Then retest the duct bank system.
- C. Do not start work until defects and deviations are corrected.

### 3.04 CLEANING

- A. Upon completion of installations of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.
- B. Upon completion of conduits and before pulling wire, all conduits will be mandreled and sponged to ensure they are clean and free from burrs.

### 3.05 PROTECTION OF FINISHED WORK

- A. Protect inside of conduit from dirt and rubbish during construction by capping all openings with plastic caps intended for the purpose.
- B. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

END OF SECTION

## SECTION 260543

### UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

###### A. Section includes:

1. Ducts.
2. Ductbanks.
3. Precast concrete pullboxes.

###### B. Related Sections: The following sections contain requirements that relate to this Section:

1. General electrical requirements: Section 260501.

##### 1.02 REFERENCES

###### A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Division 1 Specification Sections, apply to this and the other sections of Division 26.

###### B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:

1. American Association of State Highway and Transportation Officials

AASHTO H 20

2. American National Standards Institute.

ANSI C2 National Electrical Safety Code.

ANSI C80.1 Specification for Rigid Steel Conduit, Zinc-Coated.

ANSI/NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

3. American Society for Testing and Materials.

ASTM C 478 Specification for Precast Reinforced Concrete Manhole Sections.

ASTM C 891 Practice for Installation of Underground Precast Concrete Utility Structures.

ASTM 123 Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.

4. Federal Specification [from General Services Administration]

FS RR-F-621 Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole.

5. IEEE Institute of Electrical and Electronics Engineers.
6. NEC National Electrical Code (NFPA 70).
7. National Electrical Manufacturers Association.

NEMA RN 1 PVC Externally-Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

NEMA TC 6 PVC and ABS Plastic Utilities Duct for Underground Installation.

NEMA TC 8 Extra-Strength PVC Plastic Utilities Duct for Underground Installation.

NEMA TC 9 Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.

8. NFPA National Fire Protection Association

9. Underwriters Laboratories, Inc.

UL 651 Schedule 40 and 80 PVC Conduit.

### 1.03 SUBMITTALS

- A. In addition to this Section, the submittal requirements of Section 260501, "General Electrical Requirements" are applicable.
- B. Shop Drawings: Indicate dimensions, reinforcement, size and locations of openings, and accessory locations for pullboxes.
- C. Product Data: Provide for conduit and pullbox accessories.
- D. Manufacturer's Instructions: Include instructions for storage, handling, protections, examination, preparation, and installation.

### 1.04 DEFINITIONS

Duct: The general term for electrical conduit and other raceway, either metallic or nonmetallic, specified for use underground, embedded in earth or concrete.

Duct Bank: A group of two or more ducts in a continuous run between two points.

Handhole: A below-the-surface enclosure in connection with ducts into which people reach, but do not enter, for the purpose of installing, operating, or maintaining equipment or wiring.

### 1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of exact routing of ductbank.
- B. Accurately record actual locations of each pullbox and handhole.

### 1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with a minimum of three years documented experience.

## 1.07 QUALITY ASSURANCE

- A. Electrical component standard: Components and installation shall comply with NFPA 70, "National Electrical Code."
- B. NEMA compliance: Comply with applicable requirements of NEMA standards pertaining to conduits and ducts.
- C. UL compliance and labeling: Comply with applicable requirements of UL standards pertaining to electrical ductbank systems. Provide ductbank products and components listed and labeled by UL, ETL, or CSA.
- D. Test Mandrel:
  - 1. Swab and pull mandrel, 1/4" smaller in diameter than the conduit, through the entire length.
  - 2. If any obstructions are encountered, locate and replace the obstructed area. Then retest the duct bank system.

## 1.08 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

## 1.09 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of duct bank prior to excavation for rough-in.
- C. Verify locations of pullboxes and handholes prior to excavating for installation.
- D. Duct bank routing is shown on Drawings in approximate locations unless dimensions are indicated. Route as required to complete duct system.
- E. Pullbox and handhole locations are shown on Drawings in approximate locations unless dimensions are indicated. Route as required to complete duct system.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

A. Manufacturers:

Subject to compliance with requirements, provide products by the following, or equal:

1. Metal Conduit and Fittings: Triangle, Pittsburgh, Robroy, Spang, Steel City, NEPCO.
2. Nonmetallic Conduit and Fittings: Carlon, or equal.

B. Rigid Nonmetallic Conduit: Polyvinyl chloride (PVC) heavy-wall conduit, with tapered sleeve couplings, rated and labeled for use with 90°C rated conductors, manufactured in accordance with ANSI C33.91.

1. Cemented type fittings of the same manufacturer as the conduit.
2. NEMA TC 2 and UL 651, Schedule 40.

C. PVC Coated Rigid Metal Conduit: PVC Coated, Hot-dipped galvanized steel including the threads, with an outer coating of zinc bichromate, complete with one coupling and one end thread protector, manufactured in accordance with ANSI C80.1 and UL 6.

1. Threaded, hot-dipped galvanized fittings manufactured in accordance with ANSI C80.4.
2. Provide galvanized rigid steel conduit and fittings with polyvinyl chloride (PVC) coating of nominal .020 inch (20 mil ) thickness conforming to NEMA Standard No. RN-1, Type A.

D. Underground PVC and ABS Plastic Utilities Duct

1. NEMA TC-6, Type I for encased burial in concrete, Type II for direct burial.

E. PVC and ABS Plastic Utilities Duct Fittings

1. NEMA TC 9-1. Match to duct type and material.

F. Duct Accessories

1. Types, sizes, and materials complying with manufacturer's published product information. Mate and match accessories with raceway.

G. Precast Concrete Pullboxes

1. Concrete pullboxes shall be Parkway or Traffic type, as required by location use. Pre-cast in sections with cover marked "Electric" or "Telephone" and with brass hexhead screws. Traffic type shall be constructed for H-20 loading. Acceptable manufacturers: Brooks, Jensen or Quickset.

H. Cable Tags

1. Shall be 2" diameter, black anodized aluminum with 3/16" diameter hole. Lettering shall be 5/32" machine engraved and coated with clear lacquer. Include the following information:

- a. Feeder designation and size.
- b. Phase designation, tag "A," "B," or "C" as required.
- c. Manufacturer's name.
- d. System voltage.
- e. Date cable first energized.

## PART 3 - EXECUTION

### 3.01 WIRING METHOD

#### A. Wiring Method shall be as follows:

1. Exposed: OCAL, unless otherwise indicated.
2. Concealed: OCAL, unless otherwise indicated.
  - a. In or under slab on grade: Nonmetallic conduit, Schedule 40 PVC unless otherwise indicated. Conduit leaving the slab (including exposed conduit riser) shall be rigid steel conduit.
3. Underground, single run: Rigid nonmetallic conduit. Use Schedule 40 PVC unless otherwise indicated. Provide concrete encasement as indicated. Conduit leaving the slab (including exposed conduit riser) shall be rigid steel conduit.
4. Underground, grouped: Rigid nonmetallic conduit. Use Schedule 40 PVC unless otherwise indicated. Provide concrete encasement as indicated. Conduit leaving the slab (including exposed conduit riser) shall be rigid steel conduit.

### 3.02 INSTALLATION

#### A. Exercise care in excavating, trenching and working near existing utilities.

##### Trenching and Backfill:

1. Contractor shall trench underground duct path and manhole location with utmost care in order to avoid existing underground facilities. Trench size shall be kept to a minimum. No oversized trench shall be made unnecessarily.
2. All trench excavations by the Contractor shall be backfilled by same in accordance with this specification.
3. All material excavated during underground electrical work is not pre-qualified for backfill.
4. All fill must be placed in layers not exceeding 8 inches in depth and hand tamped or machine compacted to at least 95 percent of its maximum dry density as computed by the ASTM method of performing a compaction test (D-1557-70).
5. All compacted fill will be under continuous inspection by the Inspector. Compaction tests will be arranged for by the Inspector in cooperation with the Contractor.
6. Puddling or water-flooding for settling backfill will not be permitted except in landscaped areas. The addition of water shall be limited to achieving optimum

moisture content for tamp procedures.

7. Where Contractor trenches crosses any finished road (paved or gravel), he shall be responsible for restoring the road to its original condition. Repaving shall be with the same surrounding material and to a quality equal or exceeding its surround.
8. Do not backfill for a period of at least 24 hours after pouring concrete. Upon receipt of the Inspector's approval proceed with backfill. Backfill with 1 sack slump concrete and repair of surface to be completed within 24 hours of approval. Provide wet sand backfill in landscape areas.
9. Survey slope of trenches and ducts between terminations to provide drainage. No pockets shall be permitted.

B. Underground Duct with Concrete Encasement:

1. Underground ductbanks lines shall be constructed of individual conduits encased in concrete. Conduit shall be of Schedule 40 PVC. The kind of conduit used shall not be mixed in any one duct bank. PVC ducts shall not be smaller than 2 inches in diameter unless otherwise indicated. The concrete encasement surrounding the bank shall be rectangular in cross-section and shall provide at least 3 inches of concrete outer encasement for ducts. Conduit shall be separated by a minimum concrete thickness of 3 inches.
2. The top of the concrete envelope shall not be less than 24 inches below grade, except that under roads and pavement it shall be not less than 36 inches below grade.
3. Ductbanks shall have a continuous slope downward toward manholes with a pitch of not less than 1.5 inches in 100 feet. Except at conduit risers, changes in direction of runs exceeding a total of 10 degrees, either vertically or horizontally, shall be accomplished by long sweep bends having a minimum radius of curvature of 25 feet. Sweep bends may be made of one or more curved or straight sections or combinations thereof. Manufactured bends shall have a minimum radius of 24 inches for use with conduits of less than 3 inches in diameter and a minimum radius of 48 inches for ducts of 3 inches in diameter and larger.
4. PVC conduits shall terminate in end-bells where duct lines enter pullboxes or manholes. Separators shall be of precast concrete, high-impact polystyrene, steel, or any combination of these. The joints of the conduits shall be staggered by rows and layers so as to provide a duct line having maximum strength.
5. During construction, partially completed duct lines shall be protected from the entrance of debris such as mud, sand, concrete and dirt by means of suitable conduit. As each section of a duct line is completed, a testing mandrel not less than 12 inches long with a diameter 1/4 inch less than the size of the conduit shall be drawn through each conduit, after which a brush having the diameter of the duct and having stiff bristles shall be drawn through the conduit until it is clear of all particles of earth, sand, or gravel. Conduit plugs shall then be immediately installed.
6. Locate spacers no greater than 5 ft. center to center, along entire length of ductbank.
7. Duct couplings may be placed side by side horizontally, but staggered at least 6 in.

vertically.

8. Make conduit joints in accordance with manufacturer's recommendations. In the absence of specific recommendations, make the joints as follows:
  - a. Brush a plastic solvent cement on the inside of the coupling and on the outside of the duct ends.
  - b. Slip duct and fitting together with a quick one-quarter turn to set the joints.
9. Follow ductbank sections on the drawings for size, arrangement and spacing of ducts.
10. Secure ducts and spacers to prevent movement during placement of concrete.
11. Concrete; in accordance with requirements of the following:
  - a. Provide #4 rebar dowels at each concrete joint/pour transition. A minimum of 8' long #4 rebar dowel, one (1) per conduit in ductbank.
  - b. Provide rebar and tie-downs to prevent conduits from floating to top of concrete during curing.
  - c. Make ductbank construction monolithic top to bottom and side to side.
  - d. Do not exceed the outside dimension of the completed ductbank by more than 1 inch in the vertical or 4 inches in the horizontal from dimensions indicated.
  - e. Use plastic film to retain moisture for proper curing.
12. Ductbank concrete may be poured without forming, provided trench walls are firm and will not cave in during installation. Unless noted otherwise, encase the raceway on all sides with a minimum of 3 inches of concrete.
13. Where conduits are stubbed out for future connection, stop concrete 12 inches from end of conduit. Provide a waterproof cap on the end of the conduit.
14. The top of the concrete ductbank shall be as shown on the drawings, or as otherwise required by code and as required to coordinate with other underground obstructions.

#### C. Connections to Existing Ducts

1. Where connections to existing duct lines are indicated, excavate the lines to the maximum depth necessary. Cut off the lines and remove loose concrete from the conduits before installing new concrete encased ducts. Provide a reinforced concrete collar, poured monolithically with the new duct line, to take the shear at the joint of the duct lines. Remove existing cables which constitute interference with the work.

#### D. Precast pullboxes shall be of sizes required.

##### 1. Pullboxes:

- a. Precast concrete assembly shall be set on 6 inches of level, 95 percent

compacted, crushed rock fill, 3/4" to 1" size, extending 12" beyond the manhole on each side. Granular fill shall be compacted by a minimum of four passes with a plate type vibrator. Drain line and accessories shall be installed as indicated.

- b. Excavate, backfill, and compact in accordance with Section 022XX. Utilize dirt removed to level and restore landscape a minimum of 6 feet around box.
- c. Seal section joints with sealing compound furnished by the manufacturer.
- d. Apply two coats of asphalt paint to cover frames.
- e. Restore landscape to original condition.
- f. Place duct and conduit entries not less than 24" above floor. Provide end bells at all duct entrances. Terminate each metal conduit with insulated bushing having grounding terminal.
- g. Dampproof exterior walls and tops of structure below grade with two coats of bituminous coating. Use A.C. Horn Company "Dehydratine" No. 4, Sonneborn Sons, Inc. "Hydrocide 648," Toch Brothers "RIW Marine Cement Semi-Mastic," or equal.
- h. Identify all power and signal cables by tagging in all pullboxes. Tie securely to cables with nylon cord.
- i. Install cables in conformance with NEC requirements.

END OF SECTION

## SECTION 260553

### IDENTIFICATION FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

A. This Section includes:

1. Equipment labels and signs.
2. Identification labeling for raceways, cables, and conductors.
3. Buried electrical line warnings.
4. Warning and caution signs
5. Operational instruction signs.

B. Electrical identification requirements in this Section may be supplemented in other sections of these specifications.

C. Related Sections:

1. General electrical requirements: Section 260501.
2. Color coding of conductors for phase identification: Section 260519.
3. Refer to other Division 26 sections for additional specific electrical identification associated with specific items.

##### 1.02 REFERENCES

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:

1. ANSI American National Standards Institute.
2. ASTM American Society for Testing and Materials.
3. IEEE Institute of Electrical and Electronics Engineers.
4. NEC National Electrical Code (NFPA 70).
5. NEMA National Electrical Manufacturers Association.
6. NFPA National Fire Protection Association
7. UL Underwriters Laboratories, Inc.

##### 1.03 SUBMITTALS

A. In addition to this Section, the submittal requirements of Section 260501, "General Electrical Requirements" are applicable.

B. Product Data: Provide catalog data for nameplates, labels, and markers.

- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

#### 1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

#### 1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record actual labeling and identification of electrical equipment, components, and wiring.

#### 1.06 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
- B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."
- C. NEMA and UL Compliance: Products shall comply with applicable requirements of NEMA and UL standards. Provide products and components listed and labeled by UL.
- D. NECA Installation Standards: Perform work in accordance with NECA "Standard of Installation."
- E. Source Quality Control: Quality control testing shall meet applicable Underwriters' Laboratories Inc. Standards.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.

#### 1.08 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown prior to commencing the work.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by the following:

1. Brady
2. Ideal Industries
3. Markal
4. Panduit
5. Thomas & Betts

## 2.02 ELECTRICAL IDENTIFICATION PRODUCTS

- A. Adhesive Marking Labels for Raceway: Pre- printed, flexible, self-adhesive labels with legend indicating voltage and service (Emergency, Power, Lighting, Air Conditioning, Voice and Data Communications, Control, Fire Alarm and Detection, Public Address (Paging), Electronic Security).
- B. Label Size, as follows:
  1. Raceways 1-Inch and Smaller: 1-1/8 inches high by 4 inches long.
  2. Raceways Larger than 1-Inch: 1-1/8 inches high by 8 inches long.
- C. Color: Black legend on orange background.
- D. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.
- E. Pretensioned Flexible Wraparound Colored Plastic Sleeves for Raceway and Cable Identification: Flexible acrylic bands sized to suit the raceway diameter and arranged to stay in place by pre- tensioned gripping action when coiled around the raceway or cable.
- F. Underground Line Marking Tape: Permanent, bright-colored, continuous-printed, plastic tape compounded for direct-burial service not less than 6 inches wide by 4 mils thick. Printed legend indicative of general type of underground line below.
- G. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self- adhesive, wraparound, cable/conductor markers with Preprinted numbers and letter.
- H. Aluminum, Wraparound, Cable Marker Bands: Bands cut from 0.014- inch thick, aluminum sheet, fitted with slots or ears for securing permanently around wire or cable jacket or around groups of conductors. Provide for legend application with stamped letters or numbers.
- I. Plasticized Card Stock Tags: Vinyl cloth with preprinted and field-printed legends to suit the application. Orange background, except as otherwise indicated, with eyelet for fastener.
- J. Aluminum-Faced Card Stock Tags: Weather-resistant, 18-point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inches thick, and laminated with moisture-resistant acrylic adhesive. Pre-print legend to suit the application, and punch for tie fastener.
- K. Brass or Aluminum Tags: Metal tags with tamped legend, punched for fastener. Dimensions: 2 inches by 2 inches by 19 gauge.
- L. Engraved, plastic-laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square inches, or 8

inches in length; 1/8-inch thick for larger sizes. Engraved legend in white letter on black face and punched for mechanical fasteners.

- M. Exterior Metal-Backed Butyrate Warning and Caution Signs: Weather-resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gauge, galvanized steel backing, with colors, legend, and size appropriate to the location. Provide 1/4-inch grommets in corners for mounting.
- N. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.
- O. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from minus 50 deg F to 350 deg F. Provide ties in specified colors when used for color coding.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

#### A. General:

- 1. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.
- 2. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC.
- 3. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

#### B. Identify electrical equipment and enclosures, including but not limited to the following:

##### 1. General

- a. Un-metered service pedestal
- b. Control devices, such as pushbutton- or rotary-selection stations
- c. Contactors
- d. Lighting system relay cabinets
- e. Pull-, junction-, and splice-boxes
- f. Terminal boxes and cabinets

#### C. Identify underground electrical lines:

#### D. Identify electrical circuits:

- E. Identify Junction, Pull, and Connection Boxes: Code-required caution sign for boxes shall be pressure-sensitive, self-adhesive label indicating system voltage in black, preprinted on orange background. Install on outside of box cover. Also label box covers with identity of contained circuit. Use pressure-sensitive plastic labels at exposed location and similar labels or plasticized card stock tags at concealed boxes.

- F. Underground Electrical Line Identification: During trench backfilling, for exterior underground power, signal, and communications lines, install continuous underground plastic line marker, located directly above line at 6 to 8 inches below finished grade. Where multiple line installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches; install a single line marker.
- G. Conductor Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductor throughout the project secondary electrical system as follows:

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

- H. Use conductors with color factory-applied the entire length of the conductors except as follow:
  1. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
    - a. Apply colored, pressure-sensitive plastic tape in half- lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two lap of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.
    - b. In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and paced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.
  - I. Power Circuit Identification: Securely fasten identifying metal tags or aluminum wraparound marker bands to cables, feeders, and power circuit in vault, pull boxes, junction boxes, manhole, and switchboard rooms with 1/4-inch steel letter and number tamps with legend to correspond with designations on Drawings. If metal tags are provided, attach them with approximately 55-lb test monofilament line or one-piece self-locking nylon cable ties.
- J. Tag or label conductors as follows:
  1. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.
  2. Multiple Circuits: Where multiple branch circuits or control wiring or communications / signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home run) label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by means of coded color of conductor insulation. For control and communication / signal wiring, use color coding or wire / cable marking tape at termination and at intermediate location where conductors appear in wiring

boxes, troughs, and control cabinet. Use consistent letter / number conductor designation throughout on wire / cable marking tape.

3. Match identification markings with designations used in panelboards, shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installation.

K. Apply warning, caution, and instruction signs and stencils as follows:

1. Install warning, caution, or instruction signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic laminated instruction signs with approved legend where instruction or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.
2. Permanently mount signs with cadmium plated steel screws or nickel-plated brass bolts.

L. Install equipment/system circuit/device identification as follows:

1. Apply equipment identification labels of engraved plastic-laminate (fastened with self-tapping or threaded screws) on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with a minimum of 1/4-inch-high lettering on 1-1/2-inch-high label (2-inch-high where two lines are required), white lettering in black field. Adhesive letters are not acceptable. Text shall match terminology and numbering shown, if provided. For emergency systems, the background field shall be red and include the word, "EMERGENCY." Apply label for each unit of the following categories of electrical equipment:
  - a. Panelboards, electrical cabinets, and enclosures.
  - b. Pushbutton stations.
  - c. Contactors.
    - 1) Include voltage, continuous current, horsepower or interrupting current, and whether "mechanically-held" or "electrically-held."
  - d. Control devices.
  - e. Lighting system relay cabinets.

- M. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm / signal components, where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

- N. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

END OF SECTION

## SECTION 262413

### SWITCHBOARDS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

###### A. This Section Includes:

1. Distribution switchboards, front-accessible, indoor-type, rated 600 volts and below.

###### B. Related Sections:

1. General electrical requirements: Section 260501.

##### 1.02 REFERENCES

- A. Drawings and general provisions of the Contract, including General- and Supplementary-Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

- B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:

1. American National Standards Institute

ANSI C12 Code for Electricity Metering  
ANSI C39.1 Electrical Analog Indicating Instruments  
ANSI C57.13 Requirements for Instrument Transformers

2. ASTM American Society for Testing and Materials
3. IEEE Institute of Electrical and Electronics Engineers
4. NEC National Electrical Code (NFPA 70)
5. NECA National Electrical Contractors Association "Standard of Installation"
6. National Electrical Manufacturers Association

NEMA AB 1 Molded Case Circuit Breakers  
NEMA KS 1 Enclosed and Miscellaneous Equipment Switches (600 Volts Maximum)  
NEMA PB 2 Dead Front Distribution Switchboards  
NEMA PB 2.1 General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Switchboards Rated 600 Volts or Less  
NEMA 260 Safety Labels for Padmounted Switchgear and Transformers Sited in Public Areas

7. NFPA National Fire Protection Association
8. Underwriters Laboratories, Inc.

UL 486A Wire Connectors and Wiring Lugs for Use with Copper Conductors  
UL 486B Wire Connectors for Use with Aluminum Conductors  
UL 891 Deadfront Electrical Switchboards

### 1.03 SUBMITTALS

- A. General: Submit the following in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Shop Drawings: Include layouts showing cabinet dimensions, conduit entrances, electrical ratings, bussing connections, single line diagrams, device locations and ratings, and cable termination provisions.
- C. Product Data: Submit for each type of product specified.
- D. Operating, Maintenance, and Instructional Data: Manufacturers' written operating, maintenance, and installation instructions, including directions for storage and protection, handling, examination, and preparation.
  - 1. In addition, include copies of this data in Operating and Maintenance Manuals submitted, see Section 260501.
- E. Samples: Provide samples upon specific request.
- F. Certificates:
  - 1. Labels of UL listing, fixed to each item of material.
    - a. Label of UL listing for service entrance use, where applicable, affixed to material.

### 1.04 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
- B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."
- C. NEMA and UL Compliance: Products shall comply with applicable requirements of NEMA and UL standards. Provide products and components listed and labeled by UL.
- D. NECA Installation Standards: Perform work in accordance with NECA "Standard of Installation."
- E. Source Quality Control: Quality control testing shall meet applicable Underwriters' Laboratories Inc. Standards.

### 1.05 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.

## 1.06 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown prior to commencing the work.

## 1.07 EXTRA MATERIALS

- A. Furnish 3 of each type and size of fuse installed.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. Siemens
- B. General Electric
- C. Square D
- D. Cutler-Hammer

### 2.02 MATERIALS

- A. Main Switchboard:

- 1. Furnish and install a NEMA 3RX, 304 SS, totally enclosed, dead front, safety type switchboard designed for voltage and service ampacity as indicated on drawings and mounted on 18" thick concrete pad.

- B. Provide a switchboard consisting of the required number of vertical sections bolted together to form one metal enclosed, rigid switchboard with the following features:

- 1. The sides, top and rear covered with removable screw-on code gauge steel plates.
- 2. Include all protective devices and equipment as listed on drawings with necessary interconnections.
- 3. Silver or tin plated copper bus.
- 4. Bus bars mounted on supports of high impact nontracking insulation material braced to withstand mechanical forces exerted during 100,000 amp RMS symmetrical short circuit conditions, or as required by serving utility.

- C. Chemically clean steel surfaces and treat to aid bonding between paint and metal surfaces. Provide high tensile strength hardware on conductors and suitable protective finish.

- D. Provide full length copper ground bus. Secure a ground bus to each vertical section of structures and extend it the entire length of the switchboard.

- E. Provide switchboard with adequate lifting means, capable of being rolled or moved into installation position and bolted directly to the floor without the use of floor sills.

- F. Use A-B-C type bus arrangement - left-to-right, top-to-bottom and front-to-rear throughout. Bus within 2" of backing needs to be protected by tape or other means. Switchboard shall be entirely accessible from the front, including cable and bus connections, unless specifically noted otherwise.
- G. Provide group mounted, quick-break protective devices with bar connection straps, with device line and load connections accessible from the front. Where "spaces" are scheduled furnish entire bus except device connecting straps. Provide full height wiring gutter covers for quick access to wiring terminals.
- H. The switchboard frame work shall be made of formed steel angles securely bolted or riveted together. Adjacent to each switch unit provide a lamacoid plastic name plate engraved with proper circuit designation, screw-on type only.
- I. At top of switchboard and supported on the frame, there shall be provided a pull box for termination of the conduits to the board. It shall not be less than 18" in height and shall be built as an integral part of the switchboard. The front of the pull box shall be removable and the bottom shall consist of ebonized asbestos panels drilled for cables and bussing. The entire exterior of the switchboard and pull box enclosures shall be painted with prime coat and finished smooth with 2 coats of gray enamel, ASA 33.
- J. Switches over 600 ampere capacity shall be bolted pressure contact type of capacity and number of poles indicated and equipped with Bussmann Hi-Cap, current limiting fuses only.
- K. Switches 600 ampere and below shall be quick-make, quick-break of capacity and number of poles indicated.
- L. Switches 600 amperes and below shall be equipped with rejection type fuse clips to accept only high capacity type fuses. Furnish current limiting type fuses.
- M. Main busses shall be silver or tin plated copper sized on the basis of a current density to hold temperature rise to 50 degrees C above 40 degrees C ambient. The bus structure shall be braced to withstand the mechanical forces exerted during a fault as shown on the drawings.
- N. The switchboard shall bear the label of approval of the Underwriter's Laboratories and shall be built to NEMA and IEEE standards. Seven copies of shop drawings of the proposed board shall be furnished to comply with these specifications.
- O. Circuit breakers:
  - 1. Resettable, quick-make, quick-break, bolt-in place type, trip-free, with separate trip position from on and of positions.
  - 2. Multiple pole breakers with common trip and one operation handle.
  - 3. Do not provide handle ties.
  - 4. Wire with sequence phasing.
- P. Furnish record drawings providing the following information;

1. Complete rating.
  2. Short circuit withstand-ability of bus and Lowest rated device.
  3. Overall outline dimensions including space available for conduits.
  4. Circuit schedule showing circuit number
  5. Device description
  6. Feeder circuit identification
  7. Conductor ratings and one-line diagram with each circuit device numbered.
- Q. Provide switchboards meeting U.L. Standard #UL891 and NEMA Standard PB-2. The U.L. label shall appear on all switchboard sections which contain U.L. listed devices.
- R. Provide ground fault protection on each main devices, rated 480/277 ground wye, 1000 amps or larger, as follows:
1. U.L. listed ground sensor relay system equal to General Electric GSR. Provide ground break components for each system with coordinated ground sensor (CR) and integral test winding. Provide with solid state relay to operate shunt trip circuit on the switch and monitor panel.
  2. Use time relay with the following features:
    - a. Continuously adjustable current pick-up settings of 100 to 1200 amperes.
    - b. Continuously adjustable time delay setting from instantaneous (.03 seconds) to one second.
    - c. Memory function to recognize and initiate tripping on intermittent ground faults.
  3. Install panel which:
    - a. Indicates relay operation.
    - b. Provides means for testing the system with or without interruption of electrical service.
    - c. Does not permit the ground fault system to be inadvertently left in an inactive or "off" state.
  4. Use ground sensor for zero sequence arrangement on the main service entrance devices.
- S. Provisions for padlocking the circuit breakers or disconnect in the "on" and "off" positions.
- T. Provide full rated bussing (no cascading).

### PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Carefully measure and lay out exact locations of switchboards in conference with Owner.
- B. Assure that panelboards may be installed without adversely affecting the integrity and appearance of the building structure and with the clearances required by the National Electrical Code.

### 3.02 INSTALLATION

- A. Install switchboard sections plumb and in straight horizontal alignment, securely fasten to one another, and anchor to floor slab with adequate concrete inserts and 5/8-inch bolts.
- B. Install distribution switchboards on concrete foundations in accordance with other sections of the specifications.
- C. Terminate service and feeder conduits only in the switchboard section containing the lugs or device to which they are to be connected.
- D. Provide switchboards of the types and ratings scheduled where indicated.
- E. Provide supports to the building structure, independent of raceways.
- F. Install switchboards so that highest disconnecting breaker or switch handle is at a maximum of 6 feet 6 inches above finished floor.
- G. Provide identification:
  - 1. For switchboard circuits: Engraved, lamacoid plastic nameplate, white with black letters, giving circuit numbers and equipment identification.
  - 2. All nameplates to be stainless steel screw-on types, no cement.

### 3.03 FIELD QUALITY CONTROL

- A. Perform manufacturer's recommended field test prior to energization.
- B. Provide copies of test results to Owner.

### 3.04 LABELING AND IDENTIFICATION

- A. Provide engraved plastic nameplates on all switchboards not shown as existing on the single line diagram, unless otherwise noted.
- B. Provide equipment and circuit designation on nameplates with minimum letter and plate sizes as indicated.
- C. Provide engraved plastic nameplates with 1/4-inch minimum height letters indicating circuit designation at branch overcurrent devices in switchboards.

- D. Secure nameplates with at least two stainless steel screws or stainless steel rivets. Cementing and adhesive installation not acceptable.

END OF SECTION

## SECTION 262416

### PANELBOARDS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

###### A. This Section Includes:

1. Branch circuit and distribution panelboards, both circuit breaker- and fused switch-type, rated 600 volts and below.

###### B. Related Sections:

1. General electrical requirements: Section 260501.

##### 1.02 REFERENCES

- ###### A. Drawings and general provisions of the Contract, including General- and Supplementary- Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

- ###### B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:

1. ANSI American National Standards Institute
2. ASTM American Society for Testing and Materials
3. IEEE Institute of Electrical and Electronics Engineers
4. NEC National Electrical Code (NFPA 70)
5. NECA National Electrical Contractors Association "Standard of Installation"
6. National Electrical Manufacturers Association

NEMA AB 1 Molded Case Circuit Breakers

NEMA ICS 2 Industrial Control Devices, Controllers, and Assemblies

NEMA PB 1 Panelboards

NEMA PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less

7. NFPA National Fire Protection Association

8. Underwriters Laboratories, Inc.

UL 50 Cabinets and Boxes

UL 67 Panelboards

##### 1.03 SUBMITTALS

- ###### A. General: Submit the following in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."

- ###### B. Shop Drawings: Include layouts showing cabinet dimensions, conduit entrances, electrical ratings, bussing connections, single line diagrams, device locations and ratings, and cable

termination provisions.

- C. Product Data: Submit for each type of product specified.
- D. Operating, Maintenance, and Instructional Data: Manufacturers' written operating, maintenance, and installation instructions, including directions for storage and protection, handling, examination, and preparation.
  - 1. In addition, include copies of this data in Operating and Maintenance Manuals submitted, see Section 260501.
- E. Samples: Provide samples upon specific request.
- F. Certificates:
  - 1. Labels of UL listing, fixed to each item of material.
    - a. Label of UL listing for service entrance use, where applicable, affixed to material.

#### 1.04 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
- B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."
- C. NEMA and UL Compliance: Products shall comply with applicable requirements of NEMA and UL standards. Provide products and components listed and labeled by UL.
- D. NECA Installation Standards: Perform work in accordance with NECA "Standard of Installation."
- E. Source Quality Control: Quality control testing shall meet applicable Underwriters' Laboratories Inc. Standards.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.

#### 1.06 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown prior to commencing the work.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Siemens
- B. General Electric
- C. Square D
- D. Cutler-Hammer

## 2.02 MATERIALS

### A. Branch circuit panelboards:

1. Provide factory assembled, enclosed panelboards in dead front cabinets, with doors, surfaced mounted or recessed as indicated, not less than 20" wide and 5-3/4" deep. Height will depend on the number of breakers and spaces.
2. Where a control compartment is indicated, provide an integral compartment with a separate hinged lockable door held with captive screws.
3. Provide feeder terminal lugs for both main lugs only and main breakers rated for use with copper or aluminum conductors.
4. Provide three phase, 4 wire, solid neutral design with sequence bussing, full capacity neutral and full length copper bussing including areas indicated as space only. Bussing shall be braced for maximum available fault.
5. Provide copper neutral bus where neutral bus is indicated. Neutral bus shall be sized for minimum twice the current carrying capacity of line bus.
6. Key all door locks alike. Provide a type written directory of circuit index card holder mounted behind the door in framed card slot with plastic see through window.
7. Provide full size copper equipment ground bus.
8. All breakers shall be bolt-on type molded case. No tie handle is accepted for multi-pole breaker.
9. Provide pad lock off devices on all breakers serving appliances, motor operated equipment, HVAC equipment and other circuit as indicated on panel schedules.
10. 120/208V, 3 Phase, 4 Wire Panelboards: General Electric Co. type NLAB, Square D Co. type NQOB, or Cutler-Hammer type POW-R-LINE1.
11. 277/480V, 3 Phase, 4 Wire Panelboards: General Electric Co. type NHB, Square D Co. type NEHB, ITE, Inc. type NHB, Sylvania Co. type NH1B or Cutler-Hammer type POW-R-LINE2.
12. All equipment shall be listed to meet or exceed the available fault current indicated on drawings.
13. Provide main lugs only unless scheduled otherwise.
14. Construct in accordance with U.L. and NEMA Standards.

B. Distribution Panelboards:

1. Provide circuit breaker type distribution panelboards with fully rated copper bus, lockable molded case breakers for mains and feeders. Provide nameplates for all circuit breakers.
2. Busing shall be braced to withstand maximum available fault current indicated on drawings.
3. Provide copper neutral bus where indicated. Neutral bus shall be sized for minimum twice the current carrying capacity of line bus.
4. Provide full size copper ground bus adequate for number of grounded circuits.
5. General Electric Co. type NCP and type CCB, or Square D Co. types HCN and HCM, or Cutler-Hammer type POW-R-LINE3 and POW-R-LINE4B.

C. Circuit breakers:

1. Resettable, quick-make, quick-break, bolt-in place type, trip-free, with separate trip position from on and off positions.
2. Multiple pole breakers with common trip and one operation handle.
3. Do not provide handle ties.
4. Wire with sequence phasing.
5. Circuit breakers shall be rated to meet or exceed the available fault current indicated on drawings.
6. Circuit breaker lug sizes shall be provided to accommodate wire sizes indicated on plans.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Carefully measure and lay out exact locations of panelboards in conference with Owner.
- B. Assure that panelboards may be installed without adversely affecting the integrity and appearance of the building structure and with the clearances required by the National Electrical Code.

3.02 INSTALLATION

- A. Provide panelboards of the types and ratings scheduled where indicated.
- B. Provide flush or surface mounted types where indicated and scheduled.
  1. Provide multi-section cabinets as required and scheduled.

2. Provide 2 keys for each panelboard.
- C. Provide supports to the building structure, independent of raceways.
- D. Install tops of cabinets at 6 feet 6 inches above finished floor.
- E. Install panelboards in cabinets, centered in door openings.
- F. Secure panelboards to building structure to withstand wire pulling strains.
- G. Secure surface mounted panelboards to wood studs or channel material spanning metal studs.
- H. Do not use toggle bolts.
- I. Provide identification:
  1. For panelboards: Engraved, lamacoid plastic nameplate, white with black letters, giving panelboard designation, voltage, phase, wire and ampacity.
  2. For branch circuit panelboards: Neatly typewritten circuit directory in cardholder inside panelboard door. Identify rooms served using room numbers corresponding to those finally established at the project.
  3. Secure nameplates with at least two stainless steel screws or stainless steel rivets. Cementing and adhesive installation not acceptable.

### 3.03 FIELD QUALITY CONTROL

- A. Perform manufacturer's recommended field test prior to energization.
- B. Provide copies of test results to Owner.

END OF SECTION

## SECTION 262801

### LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES

#### PART 1 - GENERAL

##### 1.01 SUMMARY

###### A. This Section Includes:

1. Circuit breakers and fuses, rated 600 volts and below.
  - a. Also included: enclosed circuit breakers for independent mounting.

###### B. Related Sections:

1. General electrical requirements: Section 260501.

##### 1.02 REFERENCES

###### A. Drawings and general provisions of the Contract, including General- and Supplementary- Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

###### B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:

1. ANSI American National Standards Institute
2. ASTM American Society for Testing and Materials
3. Institute of Electrical and Electronics Engineers

IEEE 242 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems

4. NEC National Electrical Code (NFPA 70)
5. NECA National Electrical Contractors Association "Standard of Installation"
6. National Electrical Manufacturers Association

NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA AB 1 Molded-Case Circuit Breakers

NEMA FU 1 Low Voltage Cartridge Fuses

NEMA KS 1 Enclosed Switches

7. NFPA National Fire Protection Association
8. UL Underwriters Laboratories, Inc.

UL 98 Enclosed and Dead-Front Switches

UL 198C High-Interrupting-Capacity Fuses, Current-Limiting Type Fuses

UL 198E Class R Fuses

UL 198F Plug Fuses

UL 486A Wire Connectors and Wiring Lugs for Use with Copper Conductors

UL 486B Wire Connectors for Use with Aluminum Conductors

UL 489	Molded-Case Circuit Breakers and Circuit Breaker Enclosures
UL 943	Ground-Fault Circuit Interrupters
UL 977	Fused Power-Circuit Devices

### 1.03 SUBMITTALS

- A. General: Submit the following in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Shop Drawings: Submit shop drawings and or brochures to include but not limited to minimum melting and total clearing time charts for all fuses.
- C. Product Data: Submit for each type of product specified. Include manufacturer's bulletins, and minimum melting and total clearing time charts for each type of fuse.
- D. Operating, Maintenance, and Instructional Data: Manufacturers' written operating, maintenance, and installation instructions, including directions for storage and protection, handling, examination, and preparation.
  - 1. In addition, include copies of this data in Operating and Maintenance Manuals submitted, see Section 260501.
- E. Samples: Provide samples upon specific request.
- F. Certificates:
  - 1. Labels of UL listing, fixed to each item of material.

### 1.04 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
- B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."
- C. NEMA and UL Compliance: Products shall comply with applicable requirements of NEMA and UL standards. Provide products and components listed and labeled by UL.
- D. NECA Installation Standards: Perform work in accordance with NECA "Standard of Installation."
- E. Source Quality Control: Quality control testing shall meet applicable Underwriters' Laboratories Inc. Standards.

### 1.05 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.

## 1.06 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown prior to commencing the work.

## 1.07 COORDINATION

- A. For equipment furnished by the Owner, or under other Divisions: Size fuses in accordance with the National Electrical Code.

## 1.08 EXTRA MATERIALS

- A. Furnish 3 of each type and size of fuse installed.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Circuit Breakers:
  - 1. General Electric Co.
  - 2. Square D Co.
  - 3. Cutler-Hammer

- B. Fuses:
  - 1. Bussmann only.

### 2.02 MATERIALS AND FABRICATION

- A. Circuit Breakers:
  - 1. Circuit Breakers: Molded case, quick-make, quick-break, thermal-magnetic, trip-free with individual inverse time tripping mechanism on each pole. Terminal lugs rated for copper and aluminum conductors. Minimum 10,000 amperes interrupting capacity, RMS symmetrical short circuit rating shall be required. All breakers shall meet or exceed the maximum available fault current as indicated on single line diagram.
    - a. Use magnetic-only circuit breakers for motor applications.
    - b. Provide Class A (5ma sensitivity) breakers where GFI type breakers are required.
    - c. Provide "HACR" type circuit breakers for HVAC loads. Ratings shall be as indicated on the drawings.
    - d. No tie handle on multi-pole circuit breaker is accepted.
    - e. Provide ambient compensated type breaker where the breaker is installed in the ambient in excess of 40 degrees C (104 degrees F).

- B. Fuses:

1. Class RK1:
  - a. 250V; LPN-RK, Lowpeak
  - b. 600V; LPS-RK
2. Class L: KRP-C, Hi-Cap
3. Or as otherwise shown on the drawings.

## PART 3 - EXECUTION

### 3.01 APPLICATION

#### A. Types: Mains, Feeders and Branch Circuits.

1. 600 Amps and Below: Dual-element construction (current limiting, time-delay and high interrupting capacity) providing thermal protection for both fuse and fuseholder. Interrupting rating shall be 300,000 amperes RMS symmetrical and peak let-thru current and energy let-thru values shall not exceed the values established by Underwriters' Laboratories Standard for Class RK-1 fuses. Fuses shall be Bussmann "Low Peak Yellow™" in color and shall be Bussmann Low-Peak Dual Element Fuses, types LPN-RK (250 volts) or LPS-RK (600 volts). The fuses shall have separate overload and short-circuit elements. The fuses shall incorporate a spring activated thermal overload element having a 284 degree Fahrenheit melting point alloy and shall be independent of the short-circuit clearing chamber. Fuses shall be "Low Peak Yellow™". CAUTION labels to alert the end user of the engineered level of protection of the electrical equipment, shall be field installed by the electrical contractor. They shall be marked with the proper fuse rating, per the specifications, and placed in a conspicuous location on the enclosure. These labels are available with the spare fuse cabinet (SFC) and are also available upon request from Bussmann.

#### B. Provide Class RK1 fuses for lighting loads, 0-600 amps:

1. For other ballasts and control circuits - Type KTK.

#### C. Special Applications:

1. All other ballast-controlled lighting fixtures shall be protected by Bussmann fuses type KTK or FNQ with holders HEB, HPF, or HPS. They shall have individual protection on the line side of the ballast. Fuse and holder shall be mounted in a location convenient for changing fuses. Holder shall be mounted in protected location or be an in-line waterproof holder. Size and type of fuse to be recommended by the ballast manufacturer or as indicated on plans.

### 3.02 INSTALLATION

#### A. Set adjustable circuit breakers with trips as indicated.

#### B. Provide separate neutral conductors for circuits protected by GFI breakers.

#### C. Provide Class RK1 fuses for lighting loads, 0-600 amps:

1. For other ballasts and control circuits - Type KTK.

- D. Fuses shall be shipped separately. Any fuses shipped installed in equipment, shall be replaced by contractor with new fuses as specified above prior to energization at no additional expense to Owner. All fuses shall be stored in moisture free packaging at job site and shall be installed immediately prior to energization of the circuit in which it is applied.

### 3.03 LABELING AND IDENTIFICATION

- A. Provide engraved plastic nameplates with 1/4-inch minimum height letters indicating:
  - 1. Circuit designation at branch overcurrent devices in distribution panelboards, switchboards and motor control centers.
  - 2. Circuit designation of panel or device controlled on circuit breakers, individually enclosed.
- B. Secure nameplates with at least two stainless steel screws or stainless steel rivets. Cementing and adhesive installation not acceptable.

END OF SECTION

## SECTION 265610

### EXTERIOR LIGHTING CONTROLS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

A. This Section includes lighting controls for exterior application, including:

1. Exterior lighting system-associated control devices:

a. Lighting contactors.

B. Related Sections:

1. General electrical requirements: Section 260501.

##### 1.02 REFERENCES

A. Drawings and general provisions of the Contract, including General- and Supplementary-Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

B. In addition, the products covered in this Section, except as noted, shall be designed, manufactured, and tested in accordance with the latest revisions of the applicable standards of:

1. American National Standards Institute

ANSI C78.377      Specifications for the Chromacity of Solid State Lighting Products  
ANSI C82.SSI1      Power Supply  
ANSI C82.77-2002      Harmonic Emission Limits – Related Power Quality Requirements for Lighting

2. ASTM American Society for Testing and Materials

3. Certified Ballasts Manufacturers Association

Lamp and ballast combinations safety and performance standards.

4. IEEE Institute of Electrical and Electronics Engineers

5. NEC National Electrical Code (NFPA 70)

6. NECA National Electrical Contractors Association "Standard of Installation"

7. National Electrical Manufacturers Association

NEMA WD 6 Wiring Devices - Dimensional Requirements

8. NFPA National Fire Protection Association

9. National Life Safety Code (NFPA 101)

10. Underwriters Laboratories, Inc

UL 57      Fixtures, Electric Lighting.

UL 924      Emergency Lighting and Power Equipment

- UL 1570 Fixtures, Fluorescent Lighting.
- UL 1752 Fixtures, High Intensity Discharge Lighting.
- UL 1571 Fixtures, Incandescent Lighting.
- UL 935 Ballast, Fluorescent Lamps.
- UL 1029 Ballast, High Intensity Discharge Lighting.

### 1.03 SUBMITTALS

A. General: Submit the following in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."

1. Product data, shop drawings, instructions for installation and calibration, operating and maintenance instruction, and reports, shall employ the terminology, classifications, and methods prescribed by the Illuminating Engineering Society (IESNA) - see IES Lighting Handbook, latest edition - except as otherwise indicated, for the lighting system specified.

B. Product Data: Submit for each type of product specified.

When data that describes more than one type, size, model, or item is submitted, clearly mark the data to indicate which type, size, model, or item is being provided. Data shall be sufficient to show conformance to specified requirements. Include for:

1. Exterior lighting system-associated control devices:
  - a. Lighting contactors.

C. Operating, Maintenance, and Instructional Data: Manufacturers' written operating, maintenance, and installation instructions, including directions for storage and protection, handling, examination, and preparation.

1. In addition, include copies of this data in Operating and Maintenance Manuals submitted, see Section 260501.

D. Certificates:

1. Labels of UL listing, fixed to each item of material.

E. Field Test Reports: Submit test results of field tests herein specified.

### 1.04 QUALITY ASSURANCE

A. Qualifications of Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.

B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."

C. NEMA and UL Compliance: Products shall comply with applicable requirements of NEMA and UL standards. Provide products and components listed and labeled by UL.

D. NECA Installation Standards: Perform work in accordance with NECA "Standard of Installation."

- E. Source Quality Control: Quality control testing shall meet applicable Underwriters' Laboratories Inc. Standards.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, protect, and handle products to site in accordance with the General- and Supplementary Conditions, Division 1 Specification Sections, and Section 260501, "General Electrical Requirements."
- B. Store and protect product in accordance with manufacturer's instructions, and in a manner to prevent damage from the elements, personnel, equipment, and moisture.

#### 1.06 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Verify that field measurements are as shown prior to commencing the work.

### PART 2 - PRODUCTS

#### 2.01 LIGHTING CONTACTOR

- A. General: NEMA ICS 2. Electrically operated, electrically held contactor rated as indicated. Contactor shall have silver alloy double-break contacts and coil clearing contacts and shall require no arcing contacts.

### PART 3 - EXECUTION

#### 3.01 GROUNDING

- A. Ground noncurrent-carrying parts of equipment including metal poles as specified in Section 260526, "Underground Electrical Work." Where the copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

#### 3.03 EARTHWORK

- A. Provide all necessary trenching, backfilling and reconditioning of surfaces for all electrical work.

#### 3.04 FIELD TESTS

- A. General: The Contractor shall provide electric power required for field tests.
- B. Operating Test: Upon completion of installation, conduct an operating test to show that the equipment operates in accordance with the requirements of this specification section.
- C. Insulation Resistance Test and Circuit Identification / Labeling: Perform as specified in Section 260519, Wire and Cable, both before and after connection of fixtures and equipment.

END OF SECTION