# SECTION 01 60 00
# PRODUCT REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

This Section includes administrative and procedural requirements relating to selection of products, materials and equipment for the Work and their delivery, storage, and handling.

### 1.2 RELATED REQUIREMENTS

A. Section 01 14 16, Coordination with SCRRA

B. Section 01 25 00, Substitution Procedures

C. Section 01 64 00, SCRRA Furnished Material and Equipment

D. Section 01 78 36, Warranties and Guarantees

E. Divisions 02 through 34 Sections for specific requirements relating to products and installations.

### 1.3 SAFETY DATA SHEETS (SDS)

A. The Safety Data Sheet is prepared by manufacturers and suppliers of products that contain hazardous materials. Hazardous material is defined as any substance which is a physical, or health hazard, or is included in the Cal-OSHA Director's List of Hazardous Substances, or is listed in Title 22 of the California Code of Regulations, Section 12000, Chemicals Known to the State to Cause Cancer or Reproductive Toxicity (Proposition 65 Substances).

B. No hazardous materials shall be delivered, stored, or used at any work site or facility unless they are properly labeled, tagged or marked, and a copy of the SDS has been provided to the Authority. A copy of any updated SDSs shall be provided to the Authority immediately.

C. The Contractor shall also maintain a file of relevant SDSs at the work site. SDS files shall be kept current; new or updated SDSs shall be added immediately and a copy provided to the Authority.

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete functional installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. The Authority reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," the Authority will make the selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

6. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Section 01 33 00, Submittal Procedures to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements. Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.

2. Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements. Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

3. Basis of Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Section 01 25 00, Substitution Procedures for consideration of an unnamed product by the other named manufacturers.

4. Visual Matching Specification: Where Specifications require matching an established sample, select a product that complies with requirements and matches the Authority's sample. The Authority's decision will be final on whether a proposed product matches.

5. If no product available within the specified category matches and complies with other specified requirements, comply with provisions in Section 01 25 00, Substitution Procedures for proposal of a product.

## 2.2 LISTING OF ELECTRICAL EQUIPMENT

A It is the Contractor's responsibility to ensure that electrical equipment, machinery control panels and electrical components, and field installed devices and components will meet the all applicable codes and regulations of the both local Authority and the State of California, for "listing" of electrical equipment by an accredited laboratory. Applicable provisions of all Underwriter's Laboratory standards, as incorporated under the laws within the State of California, shall apply to the work of this project, except as modified herein, and are hereby made a part of these Specifications to the extent required.

B. The UL listing is acceptable; however, other certifications must be checked for acceptance under the applicable laws and regulations of the State of California and approved by the Authority prior to equipment purchase. Custom built control panels and systems, wherein listing has not been established prior to manufacture, will be accepted only if they are built under the UL self certification labeling procedures. Compliance with, the costs of, and any scheduling impacts associated with the laws, codes and regulations of the state and local jurisdictions are the responsibility of the Contractor and its suppliers.

# PART 3 - EXECUTION

## 3.1 PRODUCT DELIVERY, UNLOADING, STORAGE, AND HANDLING

A. The Contractor shall, at its own expense, deliver, unload, store, handle, and be responsible for all materials, whether furnished by the Authority or by the Contractor. All Authority furnished material, whether unloaded by the Authority or by the Contractor, shall be moved by the Contractor, at its expense, from the point where it is delivered by the Authority to the site of the Work.

B. Deliver, unload, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions. The unloading, storing and hauling of all the Authority’s or the Contractor's material shall be considered as incidental to Contract pricing.

C. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at the Project site, and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation times to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to the Project site in an undamaged condition in the manufacturer's original, sealed container or other packaging system,

complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

5. Track materials shall be handled and stored in accordance with the SCRRA Track Maintenance and Engineering Instructions.

D. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units. Store products with seals and labels intact and legible.

2. Store materials in a manner that will not endanger Project structures and material shall not be placed nor stored within 25 feet of the centerline of any active railroad track.

3. Store products that are subject to damage by the elements under cover in a weather-tight enclosure above ground, or with impervious sheeting allowing for ventilation adequate to prevent condensation. Comply with the product manufacturer's written instructions regarding temperature, humidity, ventilation, and weather-protection requirements for storage.

4. Store loose granular materials on solid flat surfaces in a well drained area. Prevent mixing with foreign matter.

5. Store cementitious products and materials on elevated platforms.

6. Store foam plastic away from exposure to sunlight, except to the extent necessary for a period of installation and concealment.

7. Protect stored products from damage and liquids from freezing.

8. Building materials will be stored in a protected environment safe from sun, rain, and excessive dust. Damaged or excessively dirty Materials will not be permitted to be installed.

9. All electrical and mechanical equipment shall be stored so as to be protected from rain, sun, wind, sand, dust, moisture, etc. The equipment shall be stored on supports off the ground or on a concrete slab with all factory-provided dust and moisture protection left in place until the equipment is installed. Electrical and mechanical equipment shall be maintained in accordance with the manufacturer’s operation and maintenance instructions until the Contractor is relieved of the responsibility by the Authority.

10. When permission to do so is given in writing by the Authority, the Contractor may store materials and erect temporary buildings on Authority property,

provided such property is not required for the Authority's use or is not under lease to other parties.

## PART 4 - MEASUREMENT AND PAYMENT

Work of this Section is considered incidental to Work under other payment items and no separate measurement or payment will be made to the Contractor for Work of this Section.

**END OF SECTION 01 60 00**

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# SECTION 01 64 00
# SCRRA FURNISHED MATERIAL & EQUIPMENT

## PART 1 - GENERAL

### 1.1 SUMMARY

No materials will be furnished by SCRRA or the Authority for the Project.

**END OF SECTION 01 64 00**

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# SECTION 01 71 13
# MOBILIZATION, DEMOBILIZATION AND CONTROLS

## Part 1 - GENERAL

### 1.1 SUMMARY

This Section includes Worksite mobilization of personnel, equipment, supplies, and appurtenances, all in ready and satisfactory working and operational order, which the Contractor intends to use for the Work; for the establishment of all temporary offices and Contractor-owned structures and other temporary facilities necessary to perform the Work; proper safety training of project personnel; and for incidental Work and operations which must be performed prior to beginning Work on the various Contract items. Also included is the demobilization or removal of all personnel, equipment, supplies, appurtenances, Contractor-owned structures, temporary facilities, materials, and debris from the Worksite and restoration of site and surrounding properties, affected by the Contractor's activities, to specified conditions.

This Section also includes Metrolink Right-of-Entry Permit and City of Anaheim Encroachment and Traffic Control Permits.

### 1.2 RELATED REQUIREMENTS

A. Section 01 35 23, OCTA Site Safety Requirements

B. Section 01 35 44, Environmental Safety and Health Program

C. Section 01 56 37, Worksite Security Requirements

D. Section 01 57 19, Temporary Environmental Controls

### 1.3 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Fire Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate the Contractor personnel responsible for management of fire prevention program.

C. Moisture Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.

2. Indicate procedures for discarding water damaged materials, and protocols for mitigating water intrusion into completed Work and replacing water damaged Work.

3. Indicate sequencing of Work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

D. Dust Control Plan: Submit coordination drawing and narrative compliant with SCAQMD Rule 403 that indicates the dust control measures proposed for use, proposed locations, and proposed time frame for their implementation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust control at each phase of work

2. Watering duration and rewatering cycle, if watering is proposed as a dust-control measure

3. Waste handling procedures

4. Other dust-control measures

E. Copy of Executed Caltrans Encroachment Permit

F. Copies of Executed City of Anaheim Encroachment and Traffic Control Permits.

G. Copy of SCRRA right of entry permit

H. Approved safety personnel

I. Approved site specific health and safety plan

## 1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70 and the requirements of jurisdictional authorities.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

## PART 2 - PRODUCTS

### 2.1 TEMPORARY FACILITIES

The Contractor shall provide storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations and shall store combustible materials apart from buildings and structures. Provide portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

### 2.2 FIELD OFFICE FOR THE AUTHORITY

A. The Contractor shall furnish, maintain, and subsequently remove as its property, a field trailer or office area for the Authority. Area provided for Authority use shall be for the exclusive use of Authority representatives and be located on or near the project site. These facilities shall be made available prior to beginning of Work at the site and shall not be removed until substantial completion of Work at the site.

B. The space provided for the Authority use shall be lockable and secure against access from the outside. The trailer or office space provided for use by Authority. personnel shall be not less than 720 square feet. The proportions and ceiling heights of the spaces provided shall be suitable for the purpose intended. Structures shall be weather tight and in It shall be in “like new condition”. No broken windows and holes in exterior or interior walls will be allowed. Wiring shall meet local code requirements. Interior and exterior shall be free of dirt or writing, and habitable. Provide heating/cooling such that an ambient temperature of 72 degrees can be maintained regardless of the outside weather. field office shall be equipped with the following minimum equipment:

1. Three 8 foot by 8 foot minimum enclosed offices within the work area.
2. Entry doors equipped with keyed dead bolt locks. Furnish a minimum of six keys.
3. Windows shall be equipped with shades or blinds suitable to obscure sunlight.
4. Openable windows shall be equipped with insect screens.
5. Internal restroom facility and kitchenette area with running water.
6. Fire extinguisher, Type ABC, 10 lb. size
7. First aid kit sized in accordance with Cal-OSHA requirements
8. Three desks with drawers and three office chairs with casters.
9. Conference table and twelve chairs. This can be folding banquet tables.
10. Three (3) legal size file cabinets with 4 drawers each.
11. (2) tall book shelves and one lockable metal storage floor cabinet.
12. One white board 3’ x 5’ minimum.

C. Utilities and services shall be in accordance with the following:

1. Provide, install, and maintain high speed internet service (minimum of 100 Mbps), office security system, electrical convenience outlets, lighting, heating, ventilating, air conditioning, and toilets. Include 5 data lines with outlets or wireless modem.
2. Provide purified drinking water.

3. Provide daily litter removal from interior spaces, and weekly janitorial service.

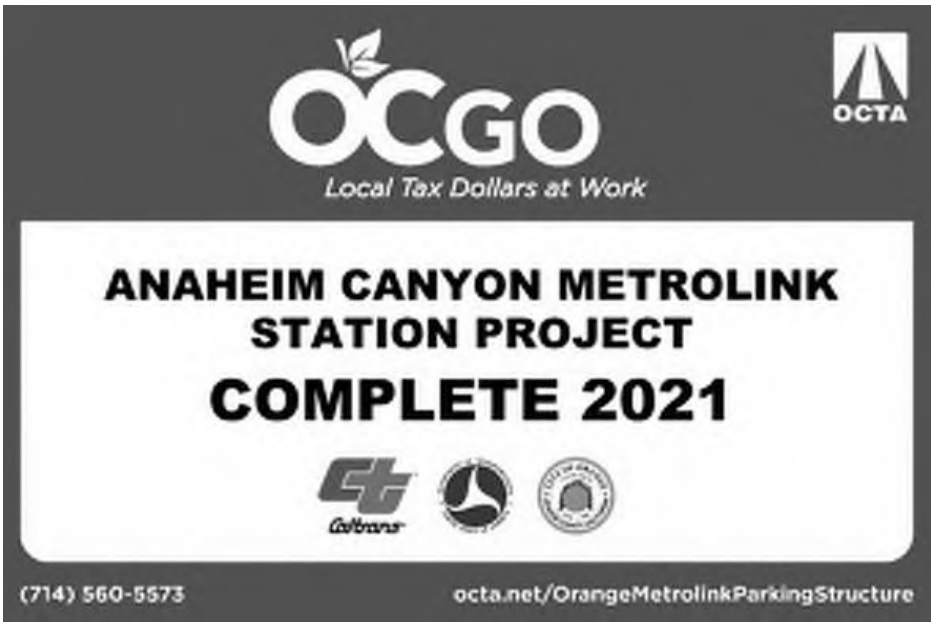
4. Provide and replenish office supplies including scissors, staples, pens, paper, copier ink.

D. The field office shall be readily accessible to street vehicles and have parking spaces for at least four vehicles. Parking space and pedestrian access to the trailer shall be surfaced with an all-weather material.

E. Construction Manager's field office shall remain the property of the Contractor and shall be removed from the site 30 days after written request by the Engineer.

## 2.3 PROJECT SIGN

A. The Project sign shall be one 4' x 8' (32 square foot) aluminum panel sign mounted on two square posts (minimum 2¼" x 2¼") embedded in the ground. Bottom of the sign shall be 7' above ground.
   1. The Contractor (or sign manufacturer) shall engineer the fabrication and installation of sign structure to satisfy all local codes and wind load factors. The Contractor shall verify site conditions prior to design and fabrication.
   2. Design shall be stamped by a Professional Engineer registered in the State of California.
   3. Graphic for the Project sign; and required text and logos will be provided by the Authority. Sample shown below (in black and white) from another Project is shown for general reference of anticipated level of detail for graphics. Actual sign shall be full color.



## PART 3 - EXECUTION

### 3.1 PROTECTION OF EXISTING UTILITIES AND STRUCTURES

A. The Contractor shall maintain all utility facilities placed by the Contractor in temporary locations and all utilities that are shored or supported by the Contractor during construction. The cost of providing and maintaining all necessary or required temporary structures, and of making any necessary repairs, replacements, or similar operations, shall be paid by the Contractor; no separate payment shall be made.

B. The Contract Price includes all costs that may be incurred by the need to remove or relocate existing public utilities or other structures, including public utilities or other structures identified at the time of the Bid due date. It is the Contractor's responsibility to schedule its Work and labor and equipment to minimize the impact of such delays and costs. Accordingly, except as provided in the California Government Code in the case of existing main or trunk line utility facilities, the Contractor agrees that its sole remedy resulting from any unreasonable delay or removal or relocation of such utilities will be an adjustment in accordance with the Change Order provisions of the Contract.

### 3.2 PRESERVATION OF PROPERTY OR PROTECTION OF PROPERTY

A. The Contractor shall be responsible for the protection of public, private, and Authority property adjacent to and within the Work site, and shall be responsible for bearing the cost and performing the repair work necessary to restore or repair damaged areas. The Contractor shall supply all firefighting equipment, supplies, and personnel, and perform all Work required by the laws and regulations pertaining to fire prevention.

B. Due care shall be exercised to avoid injury to existing improvements or facilities on adjacent property. The Contractor shall provide and install suitable safeguards to preserve and protect properties adjacent to the Work site from injury or damage. If such properties are injured or damaged by reason of the Contractor’s operations, they shall be restored at the Contractor’s sole expense. Damaged properties shall be repaired and restored to a condition as good as when the Contractor entered upon the Work site. The Authority may make or cause to be made such temporary repairs as are necessary to restore to service any damaged property. The cost of such repairs shall be borne solely by the Contractor, and the costs shall be deducted from any payments due or to become due to the Contractor under the Contract.

C. Place steel plates to cover trenches and excavation outside of fenced construction areas at all times that Work is not ongoing. The steel trench plate shall be a minimum of 1 inch thick, with anti-slip coating or treatment and having sufficient bearing surface to support heavily loaded trucks and emergency equipment. The steel traffic plate shall be anchored and have approach ramping against movement.

## 3.3 TEMPORARY UTILITY INSTALLATION

A. Electric Power Service: Provide electric power service and a distribution system of sufficient size, capacity, and power characteristics required for construction operations.

B. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions. Install and operate temporary lighting that fulfills security and protection requirements without operating the entire system and install lighting for the Project identification sign.

## 3.4 STAGING AND LAYDOWN AREAS

A. Staging and laydown areas shall be requested in writing and approved by the Authority. This approval may or may not be granted by the Authority. No equipment may be operated or materials stored or placed for any period of time in unfenced areas closer than 25 feet from live tracks unless an Authority EIC is present. The Contractor shall provide a fence to enclose each laydown or staging area within the right of way. The Contractor shall furnish the Authority with photographs of all staging and laydown areas to document their condition prior to the start of Work.

B. The Contractor shall confine Work site operations to areas permitted by law, ordinances, permits, and the Contract.

C. Refer to SWPPP Compliance requirements specified in the Section for silt fence and other project BMP requirements.

D. The Contractor shall relocate stored products, equipment, and materials that interfere with train operations, public and private utilities, or the visibility at railroad crossings. Materials and equipment shall not be piled, stored, or parked when not in use.

E. As needed for the proper execution of the Work, the Contractor shall coordinate operations and secure additional storage/work areas from the property owners, at no cost to the Authority. The Contractor shall adhere to the noise levels and hours of local ordinances, except as provided and approved in the SSWP in accordance with Section 01 14 00, Work Restrictions.

F. The Contractor shall submit the proposed location of staging areas for the Authority's approval.

G. In addition to site utilization limitations and requirements indicated on Contract Documents, the Contractor shall divide available space equitably among Subcontractors and other entities needing access and space so as to produce the best overall efficiency in performance of the total Work of the Project. The Contractor shall provide temporary parking areas for construction personnel.

H. The Contractor shall schedule deliveries to minimize space and time requirements for storage of Materials and equipment on site, with minimal disruption to the

adjoining site owners and operations. Pick-up and delivery requiring vehicular traffic adjacent to tracks shall be performed only during normal working hours, and as approved by the Authority.

## 3.5 ENCROACHMENT PERMITS AND INSPECTION FEES

A. The Contractor shall be responsible for performing all work necessary to obtain City of Anaheim encroachment permits and traffic control permits for work to be constructed within the La Palma Avenue and Tustin Avenue roadway right-of-way.

B. The Contractor shall also be responsible for scheduling and payment for Agency site inspection as required by the permits.

## 3.6 ACCESS AND CONSTRUCTION ROADS

A. Access to the Work from existing public roads, or along the right-of-way of the Authority shall be arranged for and provided by the Contractor. No payment will be made to the Contractor by the Authority for any work done in constructing, improving, repairing or maintaining any road or structure thereon for use in the performance of the Work. The Authority assumes no responsibility for the condition or maintenance of any road or structure thereon that may be used by the Contractor in performing the Work or in traveling to and from the site of the Work.

B. No off-road vehicle use is allowed beyond project site and designated access routes.

C. Do not drive or park vehicles in areas where catalytic converters could ignite dry vegetation.

D. Existing roads and trails shall be used whenever possible for access to the Work. Construction of new access roads or use of existing roads shall be subject to approval by the appropriate governmental agency, property owner, landowner, and Authority. Temporary access roads shall be rehabilitated upon termination of the use of the road. The roads shall be graded to conform to original topography to the degree possible. Cut slopes shall be reduced to a grade consistent with adjacent topography, protected from erosion, and re-vegetated.

E. The Contractor's haul or service road shall be located so that, upon the completion of the Work, a continuous road, where possible, will remain on the right-of-way throughout the entire length of the project. The Authority will designate the location of the road.

F. Where it is necessary to place a portion of the haul or service road or occupy an area off of the Authority's right-of-way, the Contractor shall obtain written release from owner and tenant for the land involved. At the completion of the project, the area used by the Contractor shall be returned to a condition satisfactory to the landowner and duly constituted environmental agencies.

G. At locations where the right-of-way crosses existing roads, highways, or at other locations where the Contractor's equipment will cross-existing roads or highways, the Contractor shall obtain the necessary approval and permits from the proper agencies for such crossings and detours as may be required. The Contractor shall maintain such crossings and detours in safe condition for passage of traffic; shall provide flag persons and watchmen as required; and shall furnish and maintain temporary drainage structures, guard fences, lights, warning signs, and other facilities necessary to protect traffic. Public access to the Contractor's road shall be controlled by cable barrier or gate that is locked with a series of padlocks including Authority and the Contractor locks. Such gates or barriers are to be maintained in a closed configuration except when in use. This Work shall be considered, as incidental to other items of the Contract, and no direct payment will be made for any costs involved.

H. The Contractor shall provide dust-control treatment that is non-polluting and non-tracking. Reapply treatment as required to minimize dust.

I. Upon completion of the Project, restore access and staging areas to a condition that is equal to or better than that prior to the Contractor entry, and as accepted by the Authority. All residual Materials shall be removed and all areas used shall be bladed smooth upon completion of use. Drainage in all areas affected by the Project shall be restored to a condition that ensures that no water ponds on the Right of Way, and no water is diverted to drain to the track structure. The Contractor shall photograph the project site(s) and submit the photographs to the Authority to demonstrate that staging and access areas have been restored to the pre-construction condition.

J. Fences, walls, signs, and gates affected by the Contractor's access to the Right of Way shall be restored to full serviceability prior to demobilization.

K. Maintain traffic controls, access for fire-fighting equipment and access to fire hydrants. Protect existing site improvements that are to remain, including curbs, pavement, and utilities.

## 3.7 LIMITATION ON THE USE OF HEAVY EQUIPMENT

A. If the Contractor anticipates using any vehicles or equipment over 20,000 pounds (loaded) during the performance of the Work, dimensions and weights of such equipment shall be submitted to the Authority for approval prior to use.

B. Unless expressly permitted elsewhere in the Contract Documents, the Contractor shall not operate construction equipment or vehicles of any kind which, laden or unladen, exceed the maximum weight limits set forth in Division 15 of the California Vehicle Code over completed or existing base, surfacing, pavement, or structures.

## 3.8 HAZARDOUS CHEMICALS, WASTES AND MATERIALS

A. Hazardous chemicals, wastes, and materials are defined as any product, substance, chemical, or material whose nature, quantity or intensity of existence, use, manufacture, disposal, transportation, spill, release, or effect, either by itself or in combination with other chemicals or materials in, on, or about the Work site:

(a) is or becomes potentially injurious to the public health, safety or welfare, environment, or the Project site; (b) is or becomes regulated or monitored by any governmental Authority; or (c) may, according to statutory or common law theory, such as nuisance (public or private), waste, trespass, negligence, strict liability, or tort, be a basis for liability in tort,, or be a basis for liability to third parties.

B. The Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) prohibits employers from knowingly discharging or releasing a chemical or other material known to the State of California to cause concern, birth defects, or other reproductive harm into water or onto land where such chemical passes or probably will pass into any source of drinking water. Notwithstanding any provisions in this Act exempting the Contractor, the Contractor hereby agrees to comply with all provisions of the Act relating to the discharge of hazardous chemicals and materials on the Work site.

C. The Contractor's employees and Subcontractors of any tier shall not discharge such chemicals or materials on the Work site that will result in the discharge of such chemicals, and shall, upon completion of performance of all other duties under this Contract, remove all supplies, materials, and waste remaining on the job site which if exposed, could result in the discharge of such chemicals, materials, and wastes.

D. The Contractor, the Contractor's employees, and Subcontractors of any tier shall also comply with the State of California anti-smoking laws that, in part, prohibit smoking in the workplace and in enclosed areas.

E. Should the Contractor, the Contractor's employees, Subcontractors of any tier, or their employees fail to comply within 24 hours from receipt of written notice of noncompliance from the Authority, or other Authority of competent jurisdiction, or within the time of an abatement period specified by such Authority of competent jurisdiction, whichever period is shorter, the Authority may give notice of default to the Contractor. Failure of the Authority, or other Authority of competent jurisdiction to issue notice to the Contractor shall not relieve the Contractor of its responsibilities under this Section.

## 3.9 PESTICIDES, FUEL OIL, AND GREASE

A. The Contractor shall comply with all local, state, and federal rules and regulations of the Department of Food and Agriculture, the Department of Health, the Department of Industrial Relations, the Department of Toxic Substance Control, and all other agencies that govern the use of pesticides, fuel oil, and grease required in the performance of the Work. Fuel, oil, and grease include any crude oil or any products, byproducts, or fractions thereof.

B. Pesticides include but shall not be limited to herbicides, insecticides, fungicides, rodenticides, germicides, nematocides, bactericides, inhibitors, fumigants, defoliants, desiccants, soil sterilants, and repellents.

C. Any substance or mixture of substances intended for preventing, repelling, mitigating, or destroying weeds, insects, diseases, rodents, or nematodes, and any

substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant, shall be considered as a pesticide.

## 3.10 DISPOSAL OF MATERIALS OUTSIDE THE WORK SITE

A. Unless otherwise stated elsewhere in the Contract Documents, the Contractor shall make its own arrangements for disposing of materials outside the Work site. The Contractor shall obtain written permission or permit from the property owner on whose property the disposal is to be made. Prior to the disposal of any material at the intended location, the Contractor shall submit said written permission or permit to the Authority for approval, together with a written release from the property owner absolving the Authority from any and all responsibility related to the disposal of material on said property.

B. Disposal of all Hazardous Materials shall be done in accordance with all laws and regulations. Copies of a required regulatory documentation, including copies of final manifests, shall be submitted to the Authority.

## 3.11 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Site Enclosure Fence: Before construction operations begin, furnish and install a site enclosure fence in a manner that will prevent people and animals from easily entering the site except by entrance gates.

1. Extent of Fence: As required to enclose the entire Project site or that portion determined sufficient to accommodate construction operations.

2. Maintain security by limiting the number of keys and restricting distribution to authorized personnel. Furnish one set of keys to the Authority.

B. Security Enclosure and Lockup: Install temporary enclosures around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at the end of each work day.

C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

D. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

E. Covered Walkway: Erect protective, covered walkways where identified on the Plans or directed by the Authority for passage of individuals through or immediately adjacent to the Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.

1. Construct covered walkways using scaffold or shoring framing.

2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.

3. Paint and maintain appearance of walkway for duration of the Work.

F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage the fire-prevention program.

1. Prohibit smoking in construction areas.

2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to Contract requirements.

3. Develop and supervise an overall fire prevention and fire protection program for personnel at the Project site. Review needs with the local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip them with suitable nozzles.

5. Equip construction trucks with water and shovels or fire extinguishers.

6. Use shields, protective mats, or other fire prevention equipment during grinding and welding.

## 3.12 PUBLIC SAFETY AND CONVENIENCE

A. The Contractor shall conduct its operations so as to offer the least possible obstruction and inconvenience to the public and shall have under construction no greater length or amount of work than can be prosecuted properly with due regard to the rights of the public. The Contractor shall control temporary noise from construction equipment by using work hour controls and maintenance of muffler systems on machinery.

B. Construction shall be conducted so as to cause as little inconvenience as possible to abutting property owners. Convenient access to driveways, houses and buildings along the line of Work shall be maintained and temporary approaches to crossing or intersecting highways shall be provided and kept in good condition. When the abutting owner's access is to be eliminated and replaced by other access, the existing access shall not be closed until the replacement access facility is available.

C. The Contractor, at its expense, shall provide adequate safeguards, safety devices and protective equipment and take any other needed action both of its own volition and responsibility or that which the Authority may determine is reasonably

necessary to protect property, life, health and public safety in connection with the performance of the Work covered by the Contract.

D. The Contractor shall make all reasonable efforts to maintain good will among landowners, tenants, lessees, and members of the general public and shall not knowingly violate any right of such persons in the performance of the Work covered by the Contract. To this end, the Contractor specifically agrees to not:

1. Leave gates, gaps, or fences open, unattended or insecurely fastened.

2. Use private driveways or roadways without Authority.

3. Use land beyond limits of the right-of-way without Authority

4. Leave trash or debris on the land.

5. Permit the personal misconduct of its employees or any of its Subcontractor's employees.

E. In the event the Contractor's operations cause injury to any persons or damage to public or private property, including above and below ground structures, the Contractor shall immediately contact emergency services for the local Authority and within twenty-four (24) hours, give notification in writing to the Authority of such damage or injury. The Contractor shall be responsible and liable for all damages and injuries.

F. Unless otherwise noted, all construction operations shall preserve existing drainage paths and vehicular and pedestrian access. The Contractor shall also regularly attend to dust, mud, trash, noise, debris, etc., caused by construction operations to prevent a public nuisance.

G. All paved areas, including asphalt concrete berms cut or damaged as a result of construction, shall be replaced with similar materials of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. All temporary and permanent pavements shall conform to the requirements of the affected pavement owner. All pavement that is subject to partial removal shall be neatly saw-cut in straight lines.

H. In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw-cut back and trim the edge of the surface so as to provide a clean, sound, vertical joint before temporary or permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw-cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

I. Where sidewalks have been removed for purposes of construction, or damaged, the Contractor shall place properly protected, suitable temporary sidewalks, promptly after backfilling, and shall maintain them in satisfactory condition until the final restoration thereof has been made.

## 3.13 DISRUPTION MITIGATION

A. The Authority, the SCRRA's Contractors and other railroads will occupy the Work site during the entire construction period for the conduct of the SCRRA's and the railroad's normal operations. The Contactor shall cooperate with the Authority and the railroads, through the Authority, in scheduling operations to minimize conflicts so as to not interfere or impair the normal operation of SCRRA or other railroads.

B. The Contractor shall develop and submit for the Authority's approval a Disruption Mitigation Plan that identifies and establishes criteria for the performance of the Work that requires coordination and sequencing based on the operational requirements of SCRRA and the other railroads, and to allow the free flow of public traffic within the public rights-of-way. The Contractor shall incorporate operational data and information and requirements given by SCRRA, other railroads, and local municipal transportation agencies in developing the Disruption Mitigation Plan, and in planning and scheduling its work to prevent interruption or impairment of the normal operations of SCRRA, the other railroads, and public traffic. The Contractor shall avoid disruptions to the normal operations of SCRRA, other railroads, and public traffic, and shall plan, schedule, coordinate and construct the Work in such a way as to accommodate the normal operations of SCRRA, other railroads, and public traffic.

C. Upon the completion of each day's Work, the Contractor shall make the railroad tracks and facilities suitable for the passage of trains. The operation of trains over portions of the Work not completed will be in accordance with the FRA requirements. The operation of trains over such Work will not constitute Beneficial Occupancy.

## 3.14 OPERATION, TERMINATION, AND REMOVAL

A. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with a temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of the Contractor. The Authority reserves the right to take possession of Project identification signs.

2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where an area is intended for landscape development, remove soil and aggregate fill that do not comply with the requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt, other petrochemical compounds, and other substances that might impair the growth of plant materials or lawns. Repair

or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

A. The measurement and payment for mobilization, maintenance, utilization, and demobilization of required facilities, personnel, materials and equipment under this Section shall be measured by the unit or fraction thereof furnished and completed in accordance with the Contract Documents and as measured by the Engineer. The quantities as contained on the Schedule of Quantities and Prices, or approved schedule of values, as applicable, as derived from the Plans will be used as the basis for this measurement.

B. No Separate Measurement or Payment will be made for Metrolink Right-of-Entrey Permitting, City of Anaheim Encroachment Permits, City of Anaheim Traffic Control Plans, or scheduling and payment for Agency site inspection as required by the permits. This work and associated costs shell be considered incidental to the Contract Prices paid for Mobilization and Demobilization measured and paid under this Section and work items under other Sections that require permitting.

### 4.02 PAYMENT

A. The Contract price paid for Mobilization and Demobilization shall be full compensation for furnishing all labor, materials, tools, equipment, supplies, supervision, Field Office for the Authority, and incidentals necessary for work as necessary to mobilize, maintain, utilize, and demobilize the facilities, personnel, materials and equipment as described in this Section.

B. The Contract Prices for Mobilization and Demobilization will be paid as follows:

1. When 10 percent of the Awarded Contract Price(s) is earned (excluding mobilization) and the Contractor's Baseline Schedule has been approved, 50 percent of the amount bid for mobilization will be paid.

2. When 30 percent of the Awarded Contract Price(s) is earned, excluding mobilization, 95 percent of the amount bid for mobilization will be paid.

3. When 50 percent of the Awarded Contract Price(s) is earned, excluding mobilization, 100 percent of the amount bid for mobilization will be paid.

4. 100 percent of the amount bid for demobilization will be paid after the Authority has determined that the project work is complete in accordance with the Contract and technical specifications, and the Contractor has left the wok site in a clean and acceptable condition.

**END OF SECTION 01 71 13**

# SECTION 01 71 23
# FIELD ENGINEERING

## PART 1 - GENERAL

### 1.1 SUMMARY

This Section includes general administrative and procedural requirements for field engineering and surveying for the Work including, establishing and maintaining baselines, design lines, grades and field control points as required for construction layout survey. The Work of this Section also includes field survey of existing track and bridge alignments and grade to verify final layout, point of switch stations, alignment, and grade for new turnouts and bridges and other structures.

### 1.2 RELATED REQUIREMENTS

A. Section 01 77 19, Project Closeout

B. Section 01 78 39, Project Record Documents

### 1.3 SUBMITTALS

A. Submit for the Authority's approval the name and professional history of the land surveying firm designated by the Contractor as its Project Surveyor. The Project Surveyor or professional engineer selected must be a current California State licensed land surveyor and have a minimum of five years of verifiable experience performing field surveys of railroad, track, and bridge alignments and related office engineering.

B. On request, the Contractor shall submit to the Authority all documentation that verifies the accuracy of the survey work.

C. Certificates and Site Drawings: Prior to Completion and when requested by the Authority, submit a certificate and site drawing signed by, a Land Surveyor, or Professional Engineer, certifying that the location and elevation of improvements are in conformance with Contract Documents.

D. The Contractor shall submit a complete copy of the baseline survey field notes and final survey layout. The layout will include data and offset calculations.

### 1.4 QUALITY CONTROL

A. The Contractor shall maintain a complete and accurate log of control and survey work as it progresses.

B. The Authority reserves the right to check the Contractor's survey measurements and calculations. Whether the Authority exercises this right or not, the requirement for accuracy will not be waived.

C. On completion of construction and major site improvements, the Contractor shall prepare a final certified survey illustrating dimensions, locations, angles, and elevations of the construction and the Work site.

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

**PART 3 - EXECUTION**

## 3.1 EXAMINATION

The Contractor shall verify locations of survey control points prior to starting any Work on the Project site. The Contractor shall immediately notify the Authority of any discrepancies discovered.

## 3.2 SURVEY REFERENCE POINTS

A. The Contractor shall locate and protect survey controls, survey monuments and reference points and preserve permanent reference points during construction.

B. The Contractor shall report to the Authority the loss or destruction of any reference points or relocation required because of changes in grades or other reasons.

C. The Contractor shall replace dislocated survey control points based on the original survey control, and shall make no changes without prior written notice to and approval by the Authority.

## 3.3 FIELD ENGINEERING

A. Identification: The Authority will identify existing benchmarks, control points, and property corners. Control datum for the survey is indicated on the Drawings.

B. The Contractor shall locate existing permanent benchmarks, control points, and similar reference points before beginning the Work and preserve and protect permanent benchmarks and control points during construction operations. The Contractor shall not change or relocate existing benchmarks or control points without prior written approval of the Authority. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to the Authority before proceeding and upon approval shall replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on the Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for the type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

## 3.4 CONSTRUCTION LAYOUT

A. Before proceeding to lay out the Work, the Contractor shall verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, the Contractor shall notify the Authority promptly.

B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices in accordance with the following:

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of the Project. Establish limits on use of the Project site.

2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

3. Inform installers of lines and levels to which they must comply.

4. Check the location, line and grade of every major element as the Work progresses. Notify the Authority when deviations from required lines or grades exceed allowable tolerances. Such notification shall include a thorough explanation of the problem, and a proposed plan and schedule for remedying the deviation. Remedial work shall not proceed without the Authority's concurrence of the remediation plan.

5. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record any deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by the Authority.

F. The contractor shall stake out location of the railroad warning devices and provide horizontal and vertical control survey sheet prepared by a registered surveyor and tied to the project survey control for grade crossings. This service is necessary to coordinate street geometry and curb return layouts with railroad signal contractor.

G. The contractor shall stake out location for the placement of the railroad signal foundations and signal houses (to be constructed by Metrolink under a separate contract). Both of these items are based on the placement of insulated joints and constructed alignment of the track centerline. Contractor shall coordinate with the Metrolink signal construction contractor for the required scheduling for construction of these items and for and verification of proposed location of the associated signal equipment prior to performing the survey stake out.

## 3.5 SURVEYS AND RECORDS

A. Working from lines and grades established by baseline surveys as shown in relation to the Work, the Contractor shall establish and maintain bench marks and other dependable markers to set lines and levels for Work on site as needed to locate each element of the Project.

B. The Contractor shall calculate and measure required dimensions as shown on the Contract Drawings (within recognized tolerances if not otherwise indicated) and immediately notify the Authority of any discrepancies. The Contractor shall use written rather than scaled dimensions. Where both dimensions relative to track and absolute dimensions (e.g. coordinates, elevations) are given, the dimensions relative to the track shall govern unless otherwise directed by the Authority.

C. The Contractor shall inform tradesmen performing the Work of marked lines and grades provided for their use in layout work.

D. The Contractor shall provide a complete copy of baseline survey field notes and final layout to the Authority prior to starting construction.

E. In areas scheduled for excavation or embankment, the Contractor shall be responsible for a baseline cross-section survey suitable to document or verify actual topography prior to the start of Work. No adjustments will be made to earthwork quantities by means other than a sealed before-and-after survey, suitable to calculate volume based on average end areas, measured in either cut or fill areas. Load counts, truck weights, work duration, representative area deviations from bid schedule quantities, or other means of estimating earthwork volume will not be accepted, except for use in determining progress payments.

F. The basis for dimensioning railroad track is the centerline between the rails and elevation of the top surface of the rail unless noted otherwise in the plans or the Specifications or by the Authority. On curved track with super-elevation, the elevation specified is that of the low rail (inside of curve) unless noted otherwise in the plans or the Specifications or by the Authority.

## PART 4 - MEASUREMENT AND PAYMENT

Work of this Section is considered incidental to Work under other payment items and no separate measurement or payment will be made to the Contractor for Work of this Section.

**END OF SECTION 01 71 23**

# SECTION 01 74 19
# CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

## PART 1 - GENERAL

### 1.1 SUMMARY

This Section includes administrative and procedural requirements for salvaging nonhazardous demolition and construction waste, recycling nonhazardous demolition waste and disposing of nonhazardous demolition and construction waste.

### 1.2 RELATED REQUIREMENTS

A. Section 01 57 19, Temporary Environmental Controls

B. Section 31 11 50, Demolition, Cutting and Patching, for disposition of waste resulting from site clearing and removal of above- and below-grade improvements

### 1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

### 1.4 PERFORMANCE REQUIREMENTS

A. Facilitate recycling and salvage of materials to achieve maximum rates for salvage/recycling by weight of total non-hazardous solid waste generated. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators.

B. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials, including paper, cardboard, plastic, polystyrene packaging and wood crates.

## 1.5 SUBMITTALS

A. Within 14 days of the Notice to Proceed, submit a Waste Management Plan according to ASTM E 1609, the requirements of the jurisdiction having Authority, and requirements in this Section. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use the same units of measure throughout the waste management plan. List each type of waste and whether it will be salvaged, recycled, or disposed of in a landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

B. Waste Reduction Progress Reports: Submit a report concurrent with each Application for Payment. The report shall cover the period of the application for payment. Include the following information:

1. Material category
2. Generation point of waste
3. Total quantity of waste, in tons
4. Quantity of waste salvaged, both estimated and actual, in tons
5. Quantity of waste recycled, both estimated and actual, in tons
6. Total quantity of waste recovered (salvaged plus recycled), in tons
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste

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

**PART 3 - EXECUTION**

## 3.1 PLAN IMPLEMENTATION

A. Provide handling, containers, storage, signage, transportation, and other items as required to implement the waste management plan during the entire duration of the Contract.

B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities. Designate specific areas on the Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

## 3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at the Project site to the maximum extent practical, according to the approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from the Project site. Include a list of acceptable and unacceptable materials at each container and bin.

2. Inspect containers and bins for contamination and remove contaminated materials (if found).

3. Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

4. Stockpile materials away from the construction area. Do not store within the drip line of remaining trees.

5. Store components off the ground, and protect them from the weather.

6. Remove recyclable waste from Authority property and transport to a recycling receiver or processor.

## 3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from the Project site and legally dispose of them in a landfill or in another manner acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from the Authority's property and legally dispose of them.

## PART 4 – MEASUREMENT AND PAYMENT

Work of this Section is considered incidental to Work under other payment items and no separate measurement or payment will be made to the Contractor for Work of this Section.

**END OF SECTION 01 74 19**

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# SECTION 01 77 00
# SUBSTANTIAL COMPLETION

## PART 1 - GENERAL

### 1.1 SUMMARY

This Section addresses administrative and procedural requirements for Substantial Completion and beneficial occupancy.

### 1.2 RELATED REQUIREMENTS

A. Section 01 32 33, Photographic Documentation

B. Section 01 77 19, Project Closeout

C. Section 01 78 23, Operation and Maintenance Data

D. Section 01 78 36, Warranties and Guarantees

E. Section 01 78 39, Project Record Documents

### 1.3 SUBSTANTIAL COMPLETION SUBMITTALS

A. The Contractor shall prepare and submit the following a minimum of 14 days prior to requesting inspection for determining the date of Substantial Completion.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction granting the Authority unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Specifications Sections, including Project record documents, all QC Material testing and special inspection results, Final As-Built Schedule, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information, warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

3. Prepare and submit a schedule of maintenance material submittal items, including the name and quantity of each item and the name and number of the related Specification Section that identifies tools, spare parts, extra materials, and similar items, to be delivered to the location designated by the Authority.

4. Submit test/adjust/balance records.

5. Submit changeover information related to the Authority's occupancy, use, operation, and maintenance.

## 1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. The Contractor shall complete the following prior to requesting Substantial Completion;

1. Provide a Final As-Built Schedule that is approved by the Authority.

2. Advise the Authority of pending insurance changeover requirements.

3. Make the final changeover of permanent locks and deliver keys to the Authority. Advise the Authority of the changeover in security provisions.

4. Complete the start-up and testing of systems and equipment.

5. Perform preventive maintenance on equipment used prior to Substantial Completion.

6. Instruct the Authority's personnel in the operation, adjustment, and maintenance of products, equipment, and systems.

7. Advise the Authority of the changeover in utilities.

8. Terminate and remove temporary facilities from the Project site, along with mockups, construction tools, and similar elements.

9. Complete final cleaning requirements, including areas adjacent to the project site such as streets, curbs, gutters, swales and other drainage facilities. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

10. Deliver tools, spare parts, extra materials, and similar items to the location designated by the Authority. Label with manufacturer's name and model number where applicable.

B. The Contractor shall submit a written request for inspection to determine Substantial Completion a minimum of 14 days prior to the date the work will be completed and ready for final inspection and tests. On receipt of such request, the Authority will either proceed with the inspection or notify the Contractor of unfulfilled requirements. The Authority will prepare the Certificate of Substantial Completion and a Final Punchlist for Final Completion after inspection, or will notify the Contractor of outstanding items that must be completed or corrected before the certificate will be issued.

C. The date of Substantial completion of the Work as allowed by the Contract Documents, is the date certified by the Authority when work is sufficiently complete, in accordance with Part A above and the Contract Documents, so the Authority may occupy or use the Work, or a designated part or portion thereof, for the use for which it is intended.

## 1.5 BENEFICIAL OCCUPANCY

A. Section 01 14 00, Work Restrictions identifies requirements relating to Worksite access by the Contractor, Authority, and other third parties. In addition to those requirements, the Authority shall have the right to take Beneficial Occupancy of any portion of the Work. The Authority may at any time notify the Contractor in writing that it intends to take Beneficial Occupancy of any portion of the Work that is not otherwise complete. At the time of taking Beneficial Occupancy, the Contractor and the Authority shall make an inspection of that portion of the Work to determine its status of completion and shall prepare a list of the Work items remaining to be completed. During Beneficial Occupancy, the Authority shall allow the Contractor reasonable access to complete or correct items on the list and to complete the Work, but they shall have no tenancy. However, a failure of the Authority to list any item of Work shall not relieve the Contractor of responsibility for complying with the terms of the Contract. The Authority's possession or use shall not be deemed an acceptance of any Work under the Contract.

B. Beneficial Occupancy shall not be deemed an acceptance of the Work. While the Authority is in such possession, the Contractor shall be relieved of the responsibility for maintenance, loss, or damage to that portion of the Work for which the Authority has taken Beneficial Occupancy other than that resulting from the Contractor's act or omission, negligence willful misconduct, or breach of warranty. If such possession or use by the Authority unreasonably delays progress of the Work or causes additional expense to the Contractor, an adjustment may be made in the compensation or time to perform the Work, in accordance with Contract Change Order Procedures.

# PART 2 – PRODUCTS

## 2.1 SPARE PARTS AND MAINTENANCE MATERIALS

Provide products, spare parts, maintenance and extra materials in quantities specified in Section 01 78 23, Operation and Maintenance Data and individual Specification Sections.

# PART 3 - EXECUTION

## 3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning Procedures: Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project, or for a designated portion of the Project:

1. Clean the Project site, yard, and grounds in areas disturbed by construction activities—including landscape development areas—of rubbish, waste material, litter, and other foreign substances.

2. Sweep paved areas broom-clean. Remove petrochemical spills, stains, and other foreign deposits.

3. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

4. Remove tools, construction equipment, machinery, and surplus material from the Project site.

5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

6. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

7. Sweep concrete floors broom-clean in unoccupied spaces.

8. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to the manufacturer's recommendations if visible soil or stains remain.

9. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.

10. Remove labels that are not permanent.

11. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

12. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

13. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

14. Clean ducts, blowers, and coils if units were operated without filters during construction, or if they display contamination with particulate matter on inspection.

15. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

## 3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to their specified condition.

C. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

D. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

E. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

F. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

G. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

## PART 4 - MEASUREMENT AND PAYMENT

Work of this Section is considered incidental to Work under other payment items and no separate measurement or payment will be made to the Contractor for Work of this Section.

**END OF SECTION 01 77 00**

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# SECTION 01 77 19
# PROJECT CLOSEOUT

## PART 1 - GENERAL

### 1.1 SUMMARY

This Section specifies procedures and requirements for Contract close out, including but not limited to final submittals, final acceptance, all required financial and legal documentation, and release of final payment to the Contractor at completion of the Contract Work.

### 1.2 RELATED REQUIREMENTS

A. Section 01 77 00, Substantial Completion

B. Section 01 78 36, Warranties and Guarantees

C. Section 01 78 39, Project Record Documents

### 1.3 FINAL COMPLETION SUBMITTALS

Submittals Prior to Final Completion: Before requesting final completion, the Contractor shall submit the following:

A. Summary:

1. Request Substantial Completion per Section 01 77 00.
2. Provide final contract status report.
3. Submit final contract cost and schedule summary.

B. Closeout:

1. Submit Certificate of Final Acceptance for Authority approval.
2. Submit Notice of Final Completion.
3. Submit Authority confirmation indicating that all inspections are complete.
4. Submit Request for Final Acceptance.
5. Submit Final Release.
6. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with Contract insurance requirements.

C. Compliance:

1. Consent of the surety to final payment.
2. Provide all required Contract Compliance documents.
3. Provide all required Labor Compliance documents in accordance with General Conditions.

D. Financial:

1. Submit Request for Release of Retention / the Contractor Final Release.
2. Submit Release of Retention Invoice.
3. Final liquidated damages settlement statement, if applicable.
4. Application for Final Payment shall include the following documentation:
   a. Lien Releases from all Subcontractors and vendors that have filed preliminary notice of liens.
   b. Certificate – "All Claims Resolved"
   c. Certificate – "No Claims for all Subcontractors and vendors that have filed preliminary notice of liens".
   d. Certificate – "Warranties/Guarantees in Effect"

E. Construction:

1. Submit final quantities log.
2. Address and provide Authority documentation of completion of Punchlist items.
3. Provide documentation of permit sign-off by third party agencies, as required and provide Certificates of Release from jurisdictional authorities.
4. Final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion (or when the Authority took possession of and assumed responsibility for corresponding elements of Work), if applicable.
5. Provide final report for Material testing and special inspections.
6. As-Built Drawings.
7. As-Built Schedule.
8. Provide Warranties and Guarantees.
9. Maintenance and Operations Manuals
10. Certificate of Insurance: For continuing coverage if specified in Contract Documents.
11. Schedule of Maintenance Material Items for maintenance material submittal items specified in other Sections.

## 1.4 ACCEPTANCE OF THE WORK AND CLOSEOUT

When the Contractor determines that the Work is fully completed, the Contractor shall submit the Authority a written Request for Acceptance of Work. Within 30 Days after receipt of the Contractor's Request for Acceptance of Work, the Authority shall review all requirements of the Work and either: (1) reject the Contractor's Request for Acceptance of Work, specifying defective or uncompleted Work items, or (2) accept the Work as complete by issuing to the Contractor a Certificate of Final Acceptance and approving the

final payment.

If the Authority rejects the Contractor's Request for Acceptance of Work, the Contractor shall promptly remedy the defective or uncompleted Work items. Thereafter, the Contractor shall again give Authority a written Request for Acceptance of Work. The foregoing procedure shall apply successively thereafter until Authority has issued the Contractor a Certificate of Final Acceptance.

Authority reserves the right to direct any and all Punch List work prior to completion of Work or Final Acceptance. Notwithstanding any other provision of this Contract that could be interpreted to the contrary (including in Contract Documents of higher precedence), it shall be the Contractor's continuing responsibility to complete and deliver every portion, and the integrated whole, of the Work in accordance with all of the requirements of the Contract. The issuance of a Certificate of Substantial Completion by Authority shall not be construed to relieve the Contractor of this responsibility, or any part thereof. If, after the issuance of a Certificate of Substantial Completion, the Authority discovers any deficiency, or item not completed or otherwise requiring correction or remedial action, whether or not the item appears on any Punchlist or other list of clean up items, Authority may direct the work to be performed and the Contractor shall correct the deficiency, complete the item or otherwise remedy the condition to bring it into full compliance with the Contract prior to Final Completion and Authority's acceptance of the Work.

**PARTS 2 - PRODUCTS** (Not used)

**PART 3 – EXECUTION** (Not used)

**PART 4 – MEASUREMENT AND PAYMENT**

Work of this Section is considered incidental to Work under other payment items and no separate measurement or payment will be made to the Contractor for Work of this Section.

**END OF SECTION 01 77 19**

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# SECTION 01 78 23
# OPERATION AND MAINTENANCE DATA

## PART 1 - GENERAL

### 1.1 SUMMARY

This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

A. Product maintenance manuals

### 1.2 RELATED REQUIREMENTS

A. Section 01 33 00, Submittal Procedures

### 1.3 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content, formatted and organized as required by this Section.

1. The Authority will approve the contents of operations and maintenance submittals.

2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file: Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to the Authority.

2. Name each indexed document file in the composite electronic index with the applicable item name. Include a complete, electronically linked operation and maintenance directory. Enable inserted reviewer comments on draft submittals.

3. Submit six paper copies and include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. The Authority will return three copies.

C. Initial Manual Submittal: Submit a draft copy for Authority approval of each manual at least 30 days before commencing demonstration and training. The Authority will comment on whether the general scope and content of the manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion, and at least 21 days before commencing demonstrations and training. The Authority will return copies with their comments.

E. Correct or revise each manual to comply with the Authority's comments. Submit copies of each corrected manual within 15 days of receipt of the Authority's comments, and prior to commencing demonstration and training.

## 1.4 QUALITY ASSURANCE

In preparation of operation and maintenance data, use personnel thoroughly trained and experienced in the operation and maintenance of the equipment or systems involved. Where manuals require written instructions, provide technical writing that clearly communicates essential data. Where maintenance manuals require drawings or diagrams, prepare drawings clearly, in an understandable format. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by those representatives and prepare manuals.

# PART 2 - PRODUCTS

## 2.1 PRODUCT MAINTENANCE MANUAL CONTENT

A. Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. List each product included in the manual, identified by product name and arranged to match the manual’s table of contents. For each product, list the name, address, and telephone number of the Installer or supplier and the maintenance service agent, and cross-reference the Specification Section number and title in the Project manual and drawing or schedule designation or identifier (where applicable). Data may be taken directly from manufacturer’s standard catalogs. Information shall be edited or marked to show only conditions pertinent to this Contract. This information shall also be scanned in .tif or .pdf format at a suitable resolution so that it is legible when printed.

C. Product Information: Include the following, as applicable:

1. Product name and model number
2. Manufacturer's name
3. Color, pattern, and texture
4. Material and chemical composition
5. Reordering information for specially manufactured products

D. Maintenance Procedures: Include the manufacturer's written recommendations, as well as the following:

1. Inspection procedures
2. Types of cleaning agents to be used, and methods of cleaning
3. A list of cleaning agents and methods of cleaning that could be detrimental to the product
4. The schedule for servicing, lubrication, routine cleaning and maintenance
5. Repair instructions

E. Repair Materials and Sources: Manufacturer's recommended special maintenance tools and list of spare parts and recommended stock quantities for one year of routine maintenance. Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect the validity of warranties or bonds. Include the procedures to follow and the notifications required for warranty claims.

**PART 3 – EXECUTION** (Not Used)

**PART 4 – MEASUREMENT AND PAYMENT**

Work of this Section is considered incidental to Work under other payment items and no separate measurement or payment will be made to the Contractor for Work of this Section.

**END OF SECTION 01 78 23**

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# SECTION 01 78 36
# WARRANTIES AND GUARANTEES

## PART 1 -GENERAL

### 1.1 SUMMARY

This Section includes administrative and procedural requirements for all warranties and guarantees necessary for Contract closeout.

### 1.2 RELATED REQUIREMENTS

A. Section 01 33 00, Submittal Procedures

B. Section 01 60 00, Product Requirements

C. Section 01 77 00, Substantial Completion

### 1.3 SUBMITTAL OF WARRANTIES AND GUARANTEES

A. Compile five copies of each required warrantee and guarantee properly executed by the Contractor, or by the Contractor and Subcontractor, Supplier, or manufacturer. Collect and assemble all written warranties and guarantees into binders, and deliver the binders to the Authority for final review and acceptance. Prior to submission, verify that documents are in proper form, contain all required information, and are properly signed.

B. Organize the warranty documents into an orderly sequence based on the table of contents of the Specifications and CSI Master Format 04 and the table of contents of the Project manual.

1. Bind warranties and guarantees in heavy-duty, commercial quality, three-slant ring, vinyl-covered, loose-leaf binders, with clear front and spine to receive inserts, thickness as necessary to accommodate the contents, and sized to receive 8½-by-11-inch paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark each tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of the Installer.

3. Include on a separate typed sheet (if the information is not contained in warranty or guarantee form) a description of the product or installation, and the name, address, telephone number, and responsible person for the applicable installer, supplier, and manufacturer.

4. Identify each binder on the front and spine with the typed or printed title "WARRANTIES AND GUARANTEES," the Project name, and the name of the Contractor. If more than one volume of warranties and guarantees is produced, identify the volume number of each binder.

5. Warranty Electronic File: Scan warranties and bonds and assemble the complete warranty and bond submittal package into a single indexed electronic PDF file, with links enabling navigation to each item. Provide a bookmarked table of contents at the beginning of the document.

C. Provide additional copies of each warranty and include in the operation and maintenance manuals as required in Section 01 78 23, Operations and Maintenance Data.

D. Special Project Warranty and Manufacturer's Guarantee Forms: Forms for Special Project warranties and for manufacturer's guarantees are included at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor or the Contractor and Subcontractor, Supplier, or manufacturer. Submit a draft to the Authority though the Engineer for approval prior to final execution.

1. Refer to Specifications for specific content requirements and particular requirements for submittal of special Project warranties.

2. Prepare standard product warranties and product guarantees, excepting manufacturer's standard printed warranties and guarantees, on the Contractor's, Subcontractor's, Material Supplier's, or manufacturer's own letterhead, and addressed to the Authority.

3. Warranty and guarantee letters shall be signed by all responsible parties, and by the Contractor in every case, with modifications only as approved by the Authority to suit the conditions pertaining to the warranty or guarantee.

E. Manufacturer's Guarantee Forms: Manufacturer's guarantee forms may be used in lieu of special Project forms included at the end of the Section. Manufacturer's guarantee forms shall contain appropriate terms and identification, ready for execution by the required parties.

1. If proposed terms and conditions restrict guarantee coverage or require actions by the Authority beyond those specified, submit a draft of the guarantee to the Authority through the Engineer for review and acceptance before performance of the Work.

2. In other cases, submit a draft of the guarantee to the Authority for approval prior to final execution of the guarantee.

F. Signatures: The warranty and guarantee documents should be signed by persons authorized to sign warranties and guarantees, on behalf of the entity providing the warranty or guarantee. The Contractor shall co-sign all warranties, except the manufacturers' printed guarantees.

## 1.4 TIME OF WARRANTY AND GUARANTEE SUBMITTALS

A. Time of Submittal: Submit written warranties on request of the Authority for designated portions of the Work where commencement of warranties on other than

the date of Substantial Completion is indicated, or when delay in submittal of warranties might limit the Authority's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by the Authority during the construction period by separate agreement with the Contractor.

C. Preliminary Submittal: Unless otherwise specified, obtain preliminary copies of warranties and guarantees within 14 days of completion of an applicable item of Work. Prepare and submit preliminary copies for review as specified herein.

D. Final Submittal: Submit fully executed copies of warranties and guarantees within seven days of the date of Substantial Completion, but not later than three days prior to the date of application for final payment.

E. Date of Warranties and Guarantees: Unless otherwise directed, the commencement date for warranty and guarantee periods shall be the date of Substantial Completion and acceptance of such Work. For warranties for Work accepted before or after the date of Substantial Completion such as beneficial occupancy, the commencement date will be the date of acceptance of such Work.

## 1.5 WARRANTIES AND GUARANTEES

A. All warranties, manufacturer's guarantees, and other requirements in accordance with Article 38 - Warranty of the Contract Agreement shall name OCTA as the beneficiary. For equipment, products, or components thereof bearing a manufacturer's warranty of guarantee that extends for a period of time beyond the Contractor's warranty and guarantee, so state in the warranty or guarantee.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties shall not relieve the Contractor of warranty on the Work that incorporates the products, nor shall they relieve suppliers, manufacturers, and installers required to countersign special warranties with the Contractor.

C. Related Damages and Losses: When correcting warranted Work that has been found defective, remove and replace other Work that has been damaged as a result of such defect or that must be removed and replaced to provide access for correction of the warranted Work.

D. Reinstatement of Warranty: When Work covered by a warranty has been found defective and has been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty, with an equitable adjustment for depreciation.

E. Replacement Cost: Upon determination that Work covered by a warranty has been found to be defective, replace or reconstruct the Work to a condition acceptable to the Authority, complying with applicable requirements of the Contract Documents. The Contractor shall be responsible for all costs for replacing or reconstructing defective Work, regardless of whether the Authority has benefited from use of the Work through a portion of its anticipated useful service life.

F. Authority Recourse: Written warranties made to the Authority are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under law; nor shall warranty periods be interpreted as limitations on time in which the Authority can enforce such other duties, obligation, rights, or remedies.

G. Rejection of Warranties: The Authority reserves the right to reject warranties and disallow the use of products with warranties in conflict with Contract Document requirements.

H. Warranty as Condition of Acceptance: The Authority reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required until evidence is presented that those required to counter-sign such commitments are willing to do so.

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

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

**PART 4 - MEASUREMENT AND PAYMENT**

Work of this Section is considered incidental to Work under other payment items and no separate measurement or payment will be made to the Contractor for Work of this Section.

**END OF SECTION 01 78 36**

**WARRANTY/GUARANTEE**

FOR_____WORK

We, the undersigned, do hereby warranty and guarantee that the parts of the Work described above which we have furnished and/or installed for the Authority are in accordance with the Contract Documents, and that all said Work as installed will fulfill or exceed all of the Warranty and Guarantee requirements. We agree to repair or replace Work installed by us, together with any adjacent Work that is displaced or damaged by the warranted work that proves to be defective in workmanship, material, or operation within a period of one year from the date of final acceptance by the Authority or from the Date of Certificate of Substantial Completion, whichever is earlier. Ordinary wear and tear and unusual neglect or abuse are excepted.

In the event of our failure to comply with the above-mentioned conditions within a reasonable time period determined by the Authority, after notification in writing, we, the undersigned, all collectively and separately, hereby authorize the Authority to have said defective Work repaired and/or replaced and made good, and agree to pay to the Authority upon demand all monies that the Authority may expend in making good said defective Work, including all collection costs and reasonable attorney fees.

_____
(Subcontractor, Sub Subcontractor, Manufacturer, or Supplier)

By_____

Title_____

State License No._____Date_____

_____
(Contractor)

By_____

State License No._____Date_____

Local Representative. For maintenance, repair, or replacement service, contact:

Name:_____

Address:_____

Phone Number:_____

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# SECTION 01 78 39
# PROJECT RECORD DOCUMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

This Section addresses administrative and procedural requirements for preparing project As-Built drawings, specifications, product data and other miscellaneous documents submitted as required by the Contract.

### 1.2 RELATED REQUIREMENTS

A. Section 01 33 00, Submittal Procedures

B. Section 01 77 00, Substantial Completion

C. Section 01 77 19, Project Closeout

## PART 2 - PRODUCTS

### 2.1 AS-BUILT DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require the individual or entity who obtained the record data, whether the individual or entity is an Installer, Subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints as follows:

a. Provide complete information on concealed elements that would be difficult to identify or measure and record later.

b. Accurately record information in an acceptable drawing technique.

c. Record data as soon as possible after obtaining it.

d. Record and check the markup before enclosing concealed installations.

e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes and revisions to details shown on Drawings. The lines shall be located on the drawings dimensionally from a fixed point,

such as a street-curb line, centerline, permanent structure, or an exposed part of a structure.

b. Depths of foundations and piles below grade

c. Locations and depths of underground utilities including horizontal and vertical location of underground utilities affected by the Work. This includes new utilities installed and utilities found and left in place.

d. Revisions to routing of piping and conduits

e. Changes made by Change Order or Change Directive

f. Changes made following the Authority's written orders

g. Details not on the original Contract Drawings

h. Field records for variable and concealed conditions

i. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up prints. Record new information and details that are recognized to be of importance to the Authority, but that were not shown on either the Contract Drawings or on shop drawings. Record changes on whichever drawing is most capable of showing the “field” condition fully and accurately; and when shop drawings are used for As-Built drawings.

4. Mark the As-Built set with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from the original Drawings.

6. Note Construction Change Directive numbers, RFI numbers, option numbers, Change Order numbers, and similar identification, where applicable.

7. Each drawing sheet, marked or unmarked, shall be stamped “As-Built” in red ink.

8. As-Built drawings shall require approval by the Resident Engineer.

9. As-Built Drawings: Submit two complete sets of marked-up record prints and a complete PDF electronic file. Include each drawing, whether or not changes and additional information were recorded.

## 2.2 AS-BUILT SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation whenever the installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Provide detailed information on concealed products and equipment installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

3. Record the name of the manufacturer, supplier, and Installer, and include other information necessary to provide a record of the selections made.

4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.

5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit As-Built Specifications as paper copy and scanned PDF electronic files of the marked-up paper copy of the Specifications.

## 2.3 AS-BUILT CONSTRUCTION SCHEDULE

The most current approved construction schedule shall be marked in red pencil or ink showing all deviations occurring since the schedule was approved. Submit the final "As-Built" Project Schedule as paper copy and a scanned PDF electronic file of the marked-up paper copy of the final Project Schedule.

## 2.4 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation whenever the installation varies substantially from that indicated in the Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Include significant changes in the product delivered to the Project site, and changes in the manufacturer's written instructions for installation.

3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as paper copy and scanned PDF electronic file(s) of the marked-up paper copy of the Product Data. Include a record Product Data directory organized by Specification Section number and title, electronically linked to each item of the record Product Data.

## 2.5 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance

of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy and scanned PDF electronic file(s) of marked-up miscellaneous record submittals. Include a miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of the miscellaneous record submittals.

## 2.6 SUBMITTAL TITLE

Label each document "PROJECT AS-BUILT" in two-inch-high printed letters or a height appropriate to document.

## PART 3 – EXECUTION

## 3.1 RECORDING AND MAINTENANCE

A. The monthly progress payment application will not be processed by the Authority until the Contractor is found by the Authority to have completely and accurately recorded all as-built information for Work performed through the period of the progress payment application.

B. Store record documents and Samples in the field office in files and racks apart from the Contract Documents used for construction. Do not use As-Built documents for construction purposes and maintain documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to As-Built documents for the Authority’s reference during normal working hours.

## PART 4 - MEASUREMENT AND PAYMENT

## 4.1 BASIS OF PAYMENT

A. Work of this Section is considered incidental to Work under other payment items and no separate measurement or payment will be made to the Contractor for Work of this Section. As-Built drawings and photographs will be reviewed each month and the monthly progress payment will only be approved and processed if the Contractor is found by the Authority to be in conformance with the requirements of this Section.

B. If the Contractor does not provide both the As-Built Summary and Record Documents for Authority review, the Contractor’s final pay request or other applicable progress payment request may be withheld until proper as-built and record documents are provided.

**END OF SECTION 01 78 39**

# OCTA ANAHEIM CANYON METROLINK STATION IMPROVEMENTS PROJECT

## IFB 0-2193

## Volume 2

## CONTRACT TECHNICAL SPECIFICATIONS


**November 27, 2019**

# OCTA ANAHEIM CANYON METROLINK STATION IMPROVEMENTS PROJECT

## CONTRACT TECHNICAL SPECIFICATIONS

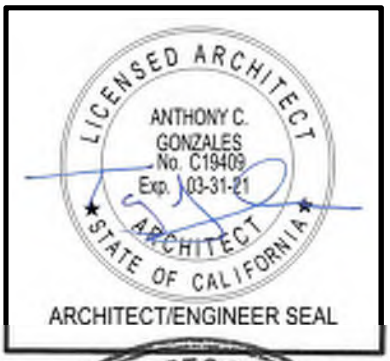
The specifications provided herein have been prepared under the direction of the following Registered Persons:

**GENERAL, CIVIL, AND TRACK**

Chris Coffman — 11/27/2019
Chris Coffman — Date


**ARCHITECTURE**

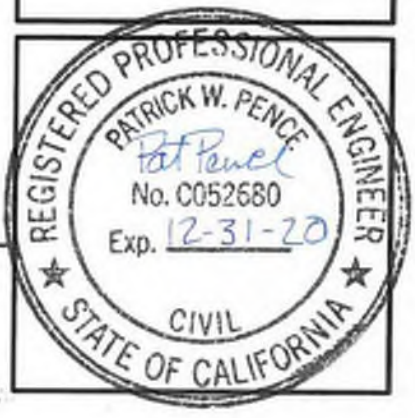
Tony Gonzales — 12-09-2019
Tony Gonzales — Date




**STRUCTURAL**

Pat Pence — 12-13-19
Pat Pence — Date

(Sections 03 21 00, 03 31 00, 05 12 23, 05 55 00 31 20 00 and 34 80 22)



# SECTION 03 21 00

# REINFORCING STEEL

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section Includes:

1. Reinforcing steel bar requirements for concrete construction.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 01 - General Requirements.

2. Section 03 31 00 – Structural Concrete

### 1.02 REFERENCES

A. American Concrete Institute (ACI):

1. SP 66, ACI Detailing Manual.

2. 318, Building Code Requirements for Structural Concrete.

B. ASTM International (ASTM):

1. A1064, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

2. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

3. A706, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

C. American Welding Society (AWS):

1. D1.4, Structural Welding Code - Reinforcing Steel.

D. Concrete Reinforcing Steel Institute (CRSI):

1. Manual of Standard Practice.

E. California Department of Transportation Standard Specifications (Current Edition).

F. American Railway Engineering and Maintenance-of-Way Association (AREMA)

1. Chapter 8 – Concrete Structures and Foundations.

## 1.03 SUBMITTALS

A. Shop Drawings:

1. See Division 01 for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:

a. Acknowledgement that products submitted meet requirements of standards referenced.

b. Manufacturer's installation instructions.

c. Mill certificates for all reinforcing.

d. Manufacturer and type of proprietary rebar mechanical splices.

e. Manufacturer and type of rebar adhesive anchor including installation instructions.

3. “Buy America” Certificate of Compliance

4. Qualifications of welding operators, including Qualification Certificates conforming to AWS D1.4.

5. Provide Task Hazard Safety Analysis and required safety plan as part of the Site Specific Health and Safety Plan

6. Welding processes and procedures.

7. Rebar number, sizes, spacing, dimensions, configurations, locations, mark numbers, lap splice lengths and locations, concrete cover and rebar supports.

8. Sufficient rebar details to permit installation of reinforcing.

9. Rebar details in accordance with ACI SP 66.

10. Locations where proprietary rebar mechanical splices are required or proposed for use.

11. Shop Drawings shall be in sufficient detail to permit installation of reinforcing without reference to Contract Plans.

a. Shop Drawings shall not be prepared by reproducing the plans and details indicated on the Contract Plans but shall consist of completely redrawn plans and details as necessary to indicate complete fabrication and installation of all reinforcing steel.

## 1.04 QUALITY ASSURANCE

A. Qualifications:

1. Welding operators, processes and procedures shall be qualified in accordance with AWS D1.4.

2. Welding operators must have been qualified during the previous 12 months prior to commencement of welding.

## 1.05 DELIVERY, STORAGE, AND HANDLING

A. Support and store all reinforcing above ground.

B. Ship to jobsite with attached plastic or metal tags with permanent mark numbers which match the Shop Drawing mark numbers.

# PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURES

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Rebar adhesive anchors:

a. HIT-HY150 System by HILTI FASTENING SYSTEMS, INC.

b. Epcon Adhesive Anchoring System by ITW Ramset/Red Head.

c. Power-Fast by Powers Fastening, Inc.

d. Or substantially equivalent product approved in writing by OCTA.

2. Rebar mechanical splices:

a. Lenton Rebar Splicing by Erico, Inc.

b. Richmond dowel bar splicer system by Richmond Screw and Anchor Co., Inc.

c. Bar-Grip Systems by Barsplice Products, Inc.

d. Or substantially equivalent product approved in writing by OCTA.

B. Submit request for substitution in accordance with Division 01.

## 2.02 MATERIALS

A. Reinforcing Bars: ASTM A615, grade 60, deformed.

B. Reinforcing Bars to be Welded: ASTM A706.

C. Welded Wire Reinforcement: ASTM A1064.

D. Smooth Dowel Bars: ASTM A615, grade 60 with metal end cap to allow longitudinal movement equal to joint width plus 1 inch.

E. Proprietary Rebar Mechanical Splices: To develop in tension and compression a minimum of 125 percent of the yield strength of the rebars being spliced.

F. Welding Electrodes:

1. E90 meeting requirements of AWS D1.4.

G. Rebar Adhesive Anchors:

1. Manufactured for the specific purpose of embedding and developing 125 percent of the yield strength of rebars in hardened concrete.

## 2.03 ACCESSORIES

A. Metal Chairs, Runners, Bolsters, Spacers, Hangers, and Other Rebar Supports:

1. Plastic-coated tips in contact with forms.

2. Plastic coating meeting requirements of CRSI Manual of Standard Practice.

B. Protective plastic caps at mechanical splices.

## 2.04 FABRICATION

A. Tolerances:

1. Sheared lengths: +1 inch.

2. Overall dimensions of stirrups, ties and spirals: +1/2 inches.

3. All other bends: +0 inch, -1/2 inches.

B. Minimum diameter of bends measured on the inside of the rebar to be as indicated in ACI 318 Paragraph 7.2.

C. Ship rebars to jobsite with attached plastic or metal tags.

1. Place on each tag the mark number of the rebar corresponding to the mark number indicated on the Shop Drawing.

2. Mark numbers on tags to be so placed that the numbers cannot be removed.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. Tolerances:

1. Rebar placement:

a. Clear distance to formed surfaces: +1/4 inches.

b. Minimum spacing between bars: -1/4 inches.

c. Top bars in slabs and beams:

1) Members 8 inches deep or less: +1/4 inches.

2) Members between 8 inches and 2 feet deep: -1/4 inches, +1/2 inches.

3) Members more than 2 feet deep: -1/4 inches, +1 inches.

d. Crosswise of members: Spaced evenly within +1 inches.

e. Lengthwise of members: +2 inches.

2. Minimum clear distances between rebars:

a. Beams, walls and slabs: Distance equal to rebar diameter or 1 inch, whichever is greater.

b. Columns: Distance equal to 1-1/2 times the rebar diameter or 1-1/2 inches, whichever is greater.

c. Beam and slab rebars shall be threaded through the column vertical rebars without displacing the column vertical rebars and still maintaining the clear distances required for the beam and slab rebars.

B. Minimum concrete protective covering for reinforcement: As shown on Plans.

C. Minimum concrete protective covering for reinforcement, unless indicated otherwise on Plans:

1. Three (3) inches for concrete cast against earth, 2 inches all other locations.

D. Unless indicated otherwise on Plans, provide splice lengths for reinforcing as follows:

1. For rebars: Class B splice meeting the requirements of Paragraph 12.15 of ACI 318.

2. For welded wire reinforcement:

a. Splice lap length measured between outermost cross wires of each fabric sheet shall not be less than one (1) spacing of cross wires plus 2 inches, nor less than 1.5 x development length nor less than 6 inches.

b. Development length shall be as required for the yield strength of the welded wire reinforcement in accordance with Paragraph 12.8 of ACI 318.

3. Provide splices of reinforcing not specifically indicated or specified subject to approval of Engineer.

a. Mechanical proprietary splice connectors may only be used when approved or indicated on the Contract Plans.

E. Reinforcing Steel Splices:

1. Splices of reinforcing bars shall consist of lap splices, service splices, or ultimate butt splices.

2. Splicing of reinforcing bars will not be permitted at a location designated on the plans as a "No-Splice Zone."

3. At the option of the Contractor, reinforcing bars may be continuous at locations where splices are shown on the plans.

4. The location of splices, except where shown on the plans, shall be determined by the Contractor using available commercial lengths where practicable.

5. Unless otherwise shown on the plans, splices in adjacent reinforcing bars at any particular section shall be staggered.

a. The minimum distance between staggered lap splices or mechanical lap splices shall be the same as the length required for a lap splice in the largest bar.

b. The minimum distance between staggered butt splices shall be 2 feet, measured between the midpoints of the splices along a line which is centered between the axes of the adjacent bars.

6. Lap Splicing Requirements:

a. Splices made by lapping shall consist of placing reinforcing bars in contact and wiring them together, maintaining the alignment of the bars and the minimum clearances.

b. Should the Contractor elect to use a butt welded or mechanical splice at a location not designated on the plans as requiring a service or ultimate butt splice, this splice shall conform to the testing requirements for service splice.

c. Reinforcing bars shall not be spliced by lapping at locations where the concrete section is not sufficient to provide a minimum clear distance of 2 inches between the splice and the nearest adjacent bar.

d. The clearance to the surface of the concrete specified on the Plans shall not be reduced.

7. Service Splicing and Ultimate Butt Splicing Requirements:

a. Service splices and ultimate butt splices shall be either butt welded or mechanical splices, shall be used at the locations shown on the plans, and shall conform to the requirements of these Specifications and the Plans.

8. Mechanical Splices:

a. Mechanical splices shall not be used for any reinforcing steel in the “Ultimate Splice Zone” as indicated on the Plans.

b. Any mechanical splices proposed by the Contractor shall be submitted for review and approval by the Engineer prior to reinforcing steel fabrication.

c. Only mechanical splices prequalified by the Transportation Laboratory of the California Department of Transportation shall be allowed.

d. Submittal of proposed mechanical splices shall include:

1) The type or series identification of the splice material including tracking information for traceability.

2) The bar grade and size number to be spliced.

3) A copy of the manufacturer's product literature giving complete data on the splice material and installation procedures.

4) A statement that the splicing systems and materials used in conformance with the manufacturer's installation procedures will develop the required tensile strengths, based on the nominal bar area, and will conform to the total slip requirements and the other requirements in the California Department of Transportation Standard Specifications.

5) A statement that the splice material conforms to the type of mechanical splice in the California Department of Transportation current prequalified list.

9. Butt Welded Splices:

a. Except for resistance butt welds, butt welded splices of reinforcing bars shall be complete joint penetration butt welds conforming to the requirements in AWS D 1.4, and these Specifications.

b. Welders and welding procedures shall be qualified in conformance with the requirements in AWS D 1.4.

c. Only the joint details and dimensions as shown in Figure 3.2, "Direct Butt Joints," of AWS D 1.4, shall be used for making complete joint penetration butt welds of bar reinforcement.

1) Split pipe backing shall not be used.

d. Butt welds shall be made with multiple weld passes using a stringer bead without an appreciable weaving motion.

1) The maximum stringer bead width shall be 2.5 times the diameter of the electrode and slagging shall be performed between each weld pass.

2) Weld reinforcement shall not exceed 0.16 inches in convexity.

e. Electrodes used for welding shall meet the minimum Charpy V-notch impact requirement of 27°J at -4 degrees.

f. All bars to be welded shall conform to the requirements of ASTM A706.

g. In the event that any of the specified preheat, interpass, and post weld cooling temperatures are not met, all weld and heat affected zone metal shall be removed and the splice rewelded.

h. Welding shall be protected from air currents, drafts, and precipitation to prevent loss of heat or loss of arc shielding.

1) The method of protecting the welding area from loss of heat or loss of arc shielding shall be subject to approval by the Engineer.

i. Reinforcing bars shall not be direct butt spliced by thermite welding.

j. Procedures to be used in making welded splices in reinforcing bars, and welders employed to make splices in reinforcing bars, shall be qualified by tests performed by the Contractor on sample splices of the type to be used, before making splices to be used in the work.

10. Resistance Butt Welding:

a. Shop produced resistance butt welds shall be produced by a fabricator who is approved by the Transportation Laboratory of the California Department of Transportation.

b. Before manufacturing hoops using resistance butt welding, the Contractor shall submit to the Engineer the manufacturer's Quality Control (QC) manual for the fabrication of hoops.

1) As a minimum, the QC manual shall include the following:

a) The pre-production procedures for the qualification of material and equipment.

b) The methods and frequencies for performing QC procedures during production.

c) The calibration procedures and calibration frequency for all equipment.

d) The Welding Procedure Specification (WPS) for resistance welding.

e) The method for identifying and tracking lots.

11. Service Splice and Ultimate Butt Splice Testing Requirement:

a. Testing and reporting of test results for Service and Ultimate Butt Splices shall conform to the California Department of Transportation Standard Specification, Section 52 Reinforcement.

F. Placing Rebars:

1. Assure that reinforcement at time concrete is placed is free of mud, oil or other materials that may affect or reduce bond.

2. Reinforcement with rust, mill scale or a combination of both will be accepted as being satisfactory without cleaning or brushing provided dimensions and weights including heights of deformations on a cleaned sample is not less than required by applicable ASTM Specification that governs for the rebar supplied.

3. Rebar support:

    a. Support rebars and fasten together to prevent displacement by construction loads or placing of concrete.

        1) Locate and support reinforcement with bar supports to maintain minimum concrete cover.

        2) Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

    b. On ground, provide supporting concrete blocks to support reinforcing steel.

    c. Over formwork, provide plastic-coated metal chairs, runners, bolsters, spacers, hangers and other rebar support.

        1) Only tips in contact with the forms need to be plastic coated.

4. Support rebars over cardboard void forms by means of concrete supports which will not puncture or damage the void forms during construction nor impair the strength of the concrete members in any way.

5. Where parallel horizontal reinforcement in beams is indicated to be placed in two or more layers, rebars in the upper layers shall be placed directly above rebars in the bottom layer with clear distance between layers to be 1 inches.

    a. Place spacer rebars at 3 feet maximum centers to maintain the required 1 inches clear distance between layers.

6. Extend reinforcement to within 2 inches of concrete perimeter edges.

    a. If perimeter edge is formed by earth, extend reinforcement to within 3 inches of the edge.

7. To assure proper placement, furnish templates for all column/pier vertical bars and dowels.

8. Do not bend reinforcement after embedding in hardened concrete unless approved by Engineer.

    a. Do not bend reinforcing by means of heat.

9. Do not tack weld reinforcing.

10. Embed rebars into hardened concrete utilizing adhesive anchor system specifically manufactured for such installation:

    a. Drill hole in concrete with diameter and depth as required to develop 125 percent of the yield strength of the bar according to manufacturer's requirements.

    b. Clean holes per manufacturer's recommendations.

    c. Place adhesive in drilled hole.

    d. Insert rebar into hole and adhesive in accordance with manufacturer's instructions.

## 3.02 FIELD QUALITY CONTROL

A. Reinforcement Congestion and Interferences:

1. Notify Engineer whenever the specified clearances between rebars cannot be met.

2. Do not place any concrete until the Engineer submits a solution to rebar congestion problem.

3. Rebars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items.

4. If rebars are moved more than one bar diameter, obtain Engineer's approval of resulting arrangement of rebars.

5. No cutting of rebars shall be done without written approval of Engineer.

B. Employ a testing laboratory to perform and report following:

1. Review and approve Contractor proposed welding procedures and processes for conformance with AWS D1.4.

2. Qualify welders in accord with AWS D1.4.

3. Test three (3) samples of each bar size and each type of weld in accord with AWS D1.4.

    a. The tensile strength of each test shall be not less than 125 percent of the required yield strength of the rebar tested.

4. Conduct nondestructive field tests (radiographic or magnetic particle) on not less than one (1) random sample for each 10 welds.

a. In addition, if any welds are found defective, test five (5) previous welds performed by same welder.

5. Visually inspect each weld for presence of cracks, undercuts, inadequate size and other visible defects.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT AND PAYMENT

A. Reinforcing Steel shall be considered incidental structural concrete or other Contract work items requiring reinforcing steel. No separate measurement or payment will be made for reinforcing steel.

B. Furnishing all tie wires, blocks, chairs and other supporting devices shall be considered incidental and no separate payment will be made therefore.

C. Furnishing and testing sample splices, radiographic examinations performed by the Contractor and furnishing access facilities for inspection and non-destructive testing by the Engineer shall be considered incidental and no additional compensation will be allowed therefore.

**END OF SECTION**

# SECTION 03 31 00

# STRUCTURAL CONCRETE

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section Includes:

1. Cast-in-place concrete and grout.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Section 03 21 00 – Reinforcing Steel.

### 1.02 REFERENCES

A. American Railway Engineering and Maintenance-of-Way Association (AREMA)

1. Chapter 8 – Concrete Structures and Foundations

B. American Concrete Institute (ACI):

1. 116R, Cement and Concrete Terminology.
2. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
3. 212.3R, Chemical Admixtures for Concrete.
4. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
5. 304.2R, Placing Concrete by Pumping Methods.
6. 305R, Hot Weather Concreting.
7. 306R, Cold Weather Concreting.
8. 318, Building Code Requirements for Structural Concrete.
9. 347R, Recommended Practice for Concrete Formwork.

C. ASTM International (ASTM):

1. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.

2. C33, Standard Specification for Concrete Aggregates.

3. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

4. C94, Standard Specification for Ready-Mixed Concrete.

5. C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.

6. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.

7. C150, Standard Specification for Portland Cement.

8. C157, Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete.

9. C172, Standard Practice for Sampling Freshly Mixed Concrete.

10. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

11. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

12. C260, Standard Specification for Air-Entraining Admixtures for Concrete.

13. C289, Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).

14. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

15. C494, Standard Specification for Chemical Admixtures for Concrete.

16. C578, standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

17. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

18. C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for use in Construction and Criteria for Testing Agency Evaluation.

19. C1240, Standard Specification for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout.

20. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

21. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

22. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

23. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

D. Corps of Engineers (COE):

1. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).

E. Standard Specifications for Public Works Construction, SSPWC (Current Edition).

## 1.03 DEFINITIONS

A. Per ACI 116R except as modified herein:

1. Concrete fill: Non-structural concrete.

2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.

3. Exposed concrete: Exposed to view after construction is complete.

4. Indicated: Indicated by Contract Documents.

5. Nonexposed concrete: Not exposed to view after construction is complete.

6. Required: Required by Contract Documents.

7. Specified strength: Specified compressive strength at 28 days.

8. Submitted: Submitted to Engineer.

## 1.04 SUBMITTALS

A. Testing Laboratory Certification

1. Testing Laboratory Certifications

B. Shop Drawings:

1. See Division 01 for requirements for the mechanics and administration of the submittal process.

2. Concrete mix designs proposed for use.

    a. Concrete mix design submittal to include the following information:

        1) Sieve analysis and source of fine and coarse aggregates.

        2) Test for aggregate organic impurities.

        3) Test for deleterious aggregate per ASTM C289.

        4) Proportioning of all materials.

        5) Type of cement with mill certificate for cement.

        6) Type of fly ash with certificate of conformance to Specification requirements.

        7) Slump.

        8) Air content.

        9) Brand, type, ACI or ASTM designation, and quantity of each admixture proposed for use.

        10) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.

        11) Shrinkage test results.

        12) Standard deviation value for concrete production facility.

3. Product technical data including:

    a. Acknowledgement that products submitted meet requirements of standards referenced.

    b. Manufacturer's installation instructions.

    c. Manufacturers and types:

        1) Joint fillers.

        2) Curing agents.

        3) Bonding and patching mortar.

        4) Construction joint bonding adhesive.

5) Non-shrink grout with cure/seal compound.

4. Reinforcing steel:

a. Per Specification Section 03 21 00.

## 1.05 QUALITY ASSURANCE

A. Quality Assurance:

1. Concrete testing agency:

a. Contractor must employ at its own expense the services of a California certified testing laboratory to:

1) Perform materials evaluation.

2) Design concrete mixes.

b. Concrete testing agency to meet requirements of ASTM E329.

2. Do not begin concrete production until proposed concrete mix design has been approved by Engineer.

a. Approval of concrete mix design by Engineer does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.

3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.

a. Do not use revised concrete mixes until submitted to and approved by Engineer.

4. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.

B. Qualifications:

1. Ready mixed concrete batch plant certified by National Ready Mixed Concrete Association (NRMCA).

2. Formwork, shoring and reshoring for slabs and beams except where cast on ground to be designed by a professional engineer currently registered in the state of California.

## 1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage of Material:

1. Cement and fly ash:

    a. Store in moistureproof, weathertight enclosures.

    b. Do not use if caked or lumpy.

2. Aggregate:

    a. Store to prevent segregation and contamination with other sizes or foreign materials.

    b. Obtain samples for testing from aggregates at point of batching.

    c. Do not use frozen or partially frozen aggregates.

    d. Do not use bottom 6 inches of stockpiles in contact with ground.

    e. Allow sand to drain until moisture content is uniform prior to use.

3. Admixtures:

    a. Protect from contamination, evaporation, freezing, or damage.

    b. Maintain within temperature range recommended by manufacturer.

    c. Completely mix solutions and suspensions prior to use.

4. Reinforcing steel: Support and store all rebars above ground.

B. Delivery:

1. Concrete:

    a. Prepare a delivery ticket for each load for ready-mixed concrete.

    b. Truck operator shall hand ticket to Engineer at the time of delivery.

    c. Ticket to show:

        1) Mix identification mark.

        2) Quantity delivered.

        3) Amount of each material in batch.

        4) Outdoor temp in the shade.

        5) Time at which cement was added.

        6) Numerical sequence of the delivery.

7) Amount of water added.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:

1. Nonshrink, nonmetallic grout:
    a. Sika "SikaGrout 212."
    b. Euclid Chemial "NS Grout."
    c. BASF Admixtures, Inc. "Masterflow 713."
    d. Or substantially equivalent product approved in writing by OCTA
2. Epoxy grout:
    a. BASF Admixtures, Inc. "Brutem MPG."
    b. Euclid Chemical Company, "E3-G."
    c. Fosroc, "Conbextra EPHF".
    d. Or substantially equivalent product approved in writing by OCTA
3. Expansion joint fillers:
    a. Permaglaze Co.
    b. Rubatex Corp.
    c. Williams Products, Inc.
    d. Or substantially equivalent product approved in writing by OCTA
4. Form coating:
    a. Richmond "Rich Cote."
    b. Industrial Lubricants "Nox-Crete Form Coating."
    c. Euclid Chemical "Eucoslip VOX."
    d. Or substantially equivalent product approved in writing by OCTA
5. Prefabricated forms:

a. Simplex "Industrial Steel Frame Forms."

b. Symons "Steel Ply."

c. Universal "Uniform."

d. Or substantially equivalent product approved in writing by OCTA

6. Bonding agent:

a. Euclid Chemical Co.

b. BASF Admixtures, Inc.

c. L & M Construction Chemicals Inc.

d. Or substantially equivalent product approved in writing by OCTA

7. Calcium nitrate:

a. Grace Concrete Products.

1) DCI.

2) DCI'S.

b. Euclid Chemical Company.

1) Eucon BCN.

2) Eucon CIA.

c. Or substantially equivalent product approved in writing by OCTA

8. Microsilica (Silica Fume):

a. Grace Concrete Products "Force 10,000 D".

b. Euclid Chemical Company "Eucon MSA".

c. Or substantially equivalent product approved in writing by OCTA

B. Submit request for substitutions in accordance with Division 01.

## 2.02 MATERIALS

A. Portland Cement: Conform to ASTM C150 Type II, III or V.

B. Fly Ash:

1. ASTM C618, Class F or Class C.

2. Non-Staining.

    a. Hardened concrete containing fly ash to be uniform light gray color.

3. Maximum loss on ignition: 4 percent.

4. Compatible with other concrete ingredients.

5. Obtain proposed fly ash from a source approved by the State Highway Department in the State of California for use in concrete for bridges. A list of pre-approved products may be obtained from the following website: http://www.dot.ca.gov/hq/esc/approved_products_list/

C. Admixtures:

1. Air entraining admixtures: ASTM C260.

2. Water reducing, retarding, and accelerating admixtures:

    a. ASTM C494 Type A through E.

    b. Conform to provisions of ACI 212.3R.

    c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Engineer and at no cost to OCTA.

    d. Follow manufacturer's instructions.

    e. Use chloride free admixtures only.

3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:

    f. 0.10 all concrete.

4. Do not use calcium chloride.

5. Pozzolanic admixtures: ASTM C618.

6. Calcium nitrate: ASTM C494 Type C.

7. Microsilica: ASTM C1240.

8. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.

D. Water: Potable, clean, free of oils, acids and organic matter.

E. Aggregates:

1. Normal weight concrete: ASTM C33, except as modified below.
2. Fine aggregate:
    a. Clean natural sand.
    b. No manufactured or artificial sand.
3. Coarse aggregate:
    c. Crushed rock, natural gravel, or other inert granular material.
    d. Maximum amount of clay or shale particles: 1 percent.
4. Gradation of coarse aggregate:
    e. Lean concrete and concrete topping: Size #7 or #8.
    f. All other concrete: Size #57 or #67.

F. Concrete Grout:

1. Nonshrink nonmetallic grout:
    a. Nonmetallic, noncorrosive, nonstaining, premixed with only water to be added.
    b. Grout to produce a positive but controlled expansion.
    c. Mass expansion not to be created by gas liberation.
    d. Minimum compressive strength of non-shrink grout at 28 days: 6500 psi.
    e. In accordance with COE CRD-C621.
2. Epoxy grout:
    f. 3-component epoxy resin system.
        1) Two liquid epoxy components.
        2) One inert aggregate filler component.
    g. Each component packaged separately for mixing at jobsite.
    h. Minimum compressive strength of epoxy grout shall be as specified in the Plans.

G. Forms:

1. Prefabricated or job built.

2. Wood forms:

    a. New 5/8 or 3/4 inches 5-ply structural plywood of concrete form grade.

    b. Built-in-place or prefabricated type panel.

    c. 4 x 8 feet sheets for built-in-place type except where smaller pieces will cover entire area.

    d. When approved, plywood may be reused.

3. Metal forms:

    e. Metal forms excluding aluminum may be used.

    f. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.

4. Chamfer strips: Clear white pine, surface against concrete planed.

5. Form ties:

    g. Removable end, permanently embedded body type with cones on outer ends not requiring auxiliary spreaders.

    h. Cone diameter: 3/4 inches minimum to 1 inch maximum.

    i. Embedded portion 1-1/2” minimum back from concrete face.

    j. If not provided with threaded ends, constructed for breaking off ends without damage to concrete.

    k. Provide ties with built-in waterstops at all walls that will be in contact with process liquid during plant operation.

6. Form release: Nonstaining and shall not prevent bonding of future finishes to concrete surface.

H. Membrane Curing Compound:

1. ASTM C309, Type I-D.

2. Resin based, dissipates upon exposure to UV light.

3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.

4. Curing compounds used in water treatment plant construction to be nontoxic and taste and odor free.

I. Bonding Agent:

1. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.

2. Euclid Chemical Co. "Flex-Con."

3. BASF Admixtures, Inc. "Acryl-Set."

4. L & M Construction Chemicals "Everbond."

5. Thoro System Products "Acryl 60."

6. Or substantially equivalent product approved in writing by OCTA

J. Expansion Joint Filler:

1. In contact with water or sewage:

a. Closed cell neoprene.

b. ASTM D1056, Class SC (oil resistant and medium swell) of 2 to 5 psi compression deflection (Grade SCE41).

2. Exterior walking surfaces:

c. Asphalt expansion joint filler.

d. ASTM D994.

3. Other use:

e. Fiber expansion joint filler.

f. ASTM D1751.

K. Bead Board

1. The bead board panels shall be a minimum of two (2) inch thick, four (4) feet wide, and 8 feet long and shall meet the requirements of ASTM C578.

2. Bead board coat: A suitable and compatible bonding material for permanently adhering.

## 2.03 CONCRETE MIXES

A. General:

1. All concrete to be ready mixed concrete conforming to ASTM C94.

2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.

3. All concrete to be normal weight concrete.

B. Strength:

1. Provide specified strength and type of concrete for each use in structure(s) as follows:

| Type of Construction | Concrete Class* | Maximum Slump (Inches) |
|---|---|---|
| Street Surface Improvements | | |
| Concrete Pavement (not integral with curb) | 565-C-3250 | 4” |
| Curb, Integral Curb and Pavement, Gutter, Walk, Alley Aprons, Extruded Curb & Gutter | 565-C-3250 | 4” |
| Sewer and Storm Drainage Facilities | | |
| Pipe Collars, Beam Support for Pipe, Pre-Cast Manhole Components, Catch Basins, Sidewalk Culverts | 565-C-3250 | 4” |
| Pipe Bedding and Encasement, Anchors and Thrust Blocks, Wall Support for Pipe | 520-C-2500 | 4” |
| Tunnel and Trench Backfill | 520-C-2500 | 4” |
| Reinforced Structures | | |
| Bridges, Buildings, Retaining Walls | 650-CW-4000 | 4” |
| Cast-In-Place Piles | 650-CW-4000 | 4” |
| Channel and Boxes | 650-CW-4000 | 4” |
| Walls and Deck | 650-CW-4000 | 4” |
| Miscellaneous | | |
| Street Light and Traffic Signal Foundations, Survey Monuments | 565-C-3250 | 4” |
| Fence and Guard Post Foundations | 565-C-3250 | 4” |
| Coarse Masonry Grout | 610-E-2000G | 10” |

*Refer to SSPWC Section 201 for designation.

C. Air Entrainment:

1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

| MAX AGGREGATE SIZE | TOTAL AIR CONTENT PERCENT |
|---|---|
| 1 inch or 3/4 inches | 5 to 7 |

2. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.

D. Slump - 4 inches maximum, 1 inch minimum:

1. Measured at point of discharge of the concrete into the concrete construction member.

2. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.

3. Pumped concrete:

a. Provide additional water at batch plant to allow for slump loss due to pumping.

b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified above.

4. Determine slump per ASTM C143.

E. Selection of Proportions:

1. General:

a. Proportion ingredients to:

1) Produce proper workability, durability, strength, and other required properties.

2) Prevent segregation and collection of excessive free water on surface.

2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

| SPECIFIED STRENGTH | MINIMUM CEMENT, LB/CY MAXIMUM AGGREGATE SIZE 1/2” | 3/4” | 1” | MAXIMUM WATER CEMENT RATIO BY WEIGHT |
|---|---|---|---|---|
| 4000 | 650 | 650 | 650 | 0.45 |

3. Substitution of fly ash: Maximum of 25 percent by weight of cement at rate of 1 lb fly ash for 1 lb of cement.

4. Sand cement grout:

    a. Three parts sand.

    b. One part Portland cement.

    c. Entrained air: Six percent plus or minus one percent.

    d. Sufficient water for required workability.

    e. Minimum 28-day compressive strength: 3,000 psi.

5. Normal weight concrete:

    a. Proportion mixture to provide desired characteristics using one of methods described below:

        1) Method 1 (Trial Mix): Per ACI 318, Chapter 5, except as modified herein.

            a) Air content within range specified above.

            b) Record and report temperature of trial mixes.

            c) Proportion trial mixes per ACI 211.1.

        2) Method 2 (Field Experience): Per ACI 318, Chapter 5, except as modified herein:

            a) Field test records must be acceptable to Engineer to use this method.

            b) Test records shall represent materials, proportions and conditions similar to those specified.

6. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Paragraph 5.3 of ACI 318 using the standard deviation of the proposed concrete production facility as described in Paragraph 5.3.1 of ACI 318.

F. Allowable Shrinkage: 0.048 percent per ASTM C157.

G. For Brackish or Salt Water Locations:

1. Calcium nitrate shall be added at a quantity of 5 gal per cubic yard.

    a. Calcium nitrite solution shall contain 30 percent solids and shall provide 15 lbs per cubic yard chloride protection.

    b. Mix shall also include 7 percent, by weight of cement microsilica.

2. Proposed admixture alternates must be approved by the OCTA prior to their use.

    a. Any proposed substitution shall include:

        1) Documentation as to the corrosion protection mechanism.

        2) Test data documenting the stated level of protection offered.

        3) Documentation that the proposed alternate meets a service life of 100 years as calculated using Fick's Second Law of Physics.

    b. All models shall use a reference diffusion coefficient of 2.81.

3. The Contractor may perform trial mixes prior to the delivery in order to adjust the desired air content, set time, and slump.

## PART 3 - EXECUTION

### 3.01 FORMING AND PLACING CONCRETE

A. Formwork:

1. Contractor is responsible for design and erection of formwork.

2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.

    a. Allowable tolerances: As recommended in ACI 347R.

3. Chamfer strips: Place ¾” chamfer strips in forms to produce ¾” wide beveled edges on permanently exposed corners of members.

4. Clean and adjust forms prior to concrete placement.

5. Tighten forms to prevent mortar leakage.

6. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.

B. Construction, Expansion, and Contraction Joints:

1. Provide at locations indicated.

2. Locate construction joints in beams and girders as shown in the Plans.

3. Install construction joints perpendicular to main reinforcement with all reinforcement continued across construction joints.

4. At least 48 hours shall elapse between placing of adjoining concrete construction.

5. Thoroughly clean and remove all laitance and loose and foreign particles from construction joints.

6. Before new concrete is placed, existing concrete surfaces must be roughened to ¼" amplitude and coat all construction joints with an approved bonding adhesive used and applied in accordance with manufacturer's instructions.

C. Embedments:

1. Set and build in anchorage devices and other embedded items required for other work that is attached to, or supported by concrete.

2. Use setting diagrams, templates and instructions for locating and setting.

3. Secure waterstops in correct position using hog rings or grommets spaced along the length of the waterstop and wire tie to adjacent reinforcing steel.

D. Placing Concrete:

1. Do not place concrete until subgrade compaction reports have been approved by OCTA and the City of Anaheim per Section 31 20 00 Earthwork.

2. Place concrete in compliance with ACI 304R and ACI 304.2R.

3. Place in a continuous operation within planned joints or sections.

4. Begin placement when work of other trades affecting concrete is completed.

5. Place concrete by methods which prevent aggregate segregation.

6. Do not allow concrete to free fall more than 4 feet.

7. Where free fall of concrete will exceed 4 feet, place concrete by means of tremie pipe or chute.

E. Consolidation: Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.

F. Protection:

1. Protect concrete from physical damage or reduced strength due to weather extremes.

2. In cold weather comply with ACI 306R except as modified herein.

a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.

b. Minimum concrete temperature at the time of mixing:

| OUTDOOR TEMPERATURE AT PLACEMENT (IN SHADE) | CONCRETE TEMPERATURE AT MIXING |
|---|---|
| Below 30˚ F | 70˚ F |
| Between 30˚-45˚ F | 60˚ F |
| Above 45˚ F | 50˚ F |

c. Do not place heated concrete that is warmer than 80 DegF.

d. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50˚ F for 7 days or 70˚ F for 3 days.

e. Do not allow concrete to cool suddenly.

3. In hot weather comply with ACI 305R except as modified herein.

a. At air temperature of 90˚ F and above, keep concrete as cool as possible during placement and curing.

b. Do not allow concrete temperature to exceed 90˚ F at placement.

c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.

d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 lbs/sf/hr as determined from ACI 305R, Figure 2.1.5.

G. Curing:

1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.

2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.

3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.

4. Provide curing for minimum of 7 days.

5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.

6. In hot weather follow curing procedures outlined in ACI 305R.

7. In cold weather follow curing procedures outlined in ACI 306R.

8. If forms are removed before 7 days have elapsed, finish curing of formed surfaces by one of above methods for the remainder of the curing period.

9. Curing vertical surfaces with a curing compound:

    a. Cover vertical surfaces with a minimum of two coats of the curing compound.

    b. Allow the preceding coat to completely dry prior to applying the next coat.

    c. Apply the first coat of curing compound immediately after form removal.

    d. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.

    e. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.

H. Form Removal:

10. Remove forms after concrete has hardened sufficiently to resist damage from removal operations or lack of support but no sooner than 3 days after placement of concrete.

## 3.02 CONCRETE FINISHES

A. Surfaces Exposed to View:

1. Provide a smooth finish for exposed concrete surfaces.

2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.

3. Fill tie holes with nonshrink nonmetallic grout.

B. Surfaces Not Exposed to View:

4. Patch voids, air pockets and honeycomb areas with cement grout.

5. Fill tie holes with nonshrink nonmetallic grout.

C. Troweled Finish:

1. Float finish surface.

D. Broom Finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.

## 3.03 GROUT

A. Preparation:

1. Nonshrinking nonmetallic grout:

a. Clean concrete surface to receive grout.

b. Saturate concrete with water for 24 hours prior to grouting.

2. Epoxy grout: Apply only to clean, dry, roughened, sound surface.

B. Application:

1. Nonshrinking nonmetallic grout:

a. Mix in a mechanical mixer.

b. Use no more water than necessary to produce flowable grout.

c. Place in accordance with manufacturer's instructions.

d. Completely fill all spaces and cavities below the bottom of baseplates.

e. Provide forms where baseplates and bedplates do not confine grout.

f. Where exposed to view, finish grout edges smooth.

g. Except where a slope is indicated on Plans, finish edges flush at the baseplate, bedplate, member, or piece of equipment.

h. Protect against rapid moisture loss by covering with wet rags or polyethylene sheets.

i. Wet cure grout for seven (7) days, minimum.

2. Epoxy grout:

    a. Mix and place in accordance with manufacturer's instructions.

    b. Completely fill all cavities and spaces around dowels and anchors without voids.

    c. Obtain manufacturer's field technical assistance as required to ensure proper placement.

## 3.04 FIELD QUALITY CONTROL

A. OCTA will approve a concrete testing agency selected by the Contractor that meets ASTM C1077-12 criteria and requirements. The Contractor is responsible to provide for services of the concrete testing agency to perform testing of concrete placed during construction.

1. Contractor to cooperate with OCTA in obtaining and testing samples.

B. Tests During Construction:

1. Strength test - procedure:

    a. Three cylinders, 6 inches dia. x 12 inches high, will be taken from each sample per ASTM C172 and ASTM C31.

    b. Cylinders will be tested per ASTM C39:

        1) One at 7 days.

        2) Two at 28 days.

2. Strength test - frequency:

    a. Not less than one test each day concrete placed.

    b. Not less than one test for each 50 cy or major fraction thereof placed in one day.

    c. Not less than one test for each type of concrete poured.

    d. Not less than one test for each concrete structure exceeding 2 cy volume.

3. Slump test:

    a. Per ASTM C143.

    b. Determined for each strength test sample.

    c. Additional slump tests may be taken.

4. Air content:

    d. Per ASTM C231, ASTM C173, and ASTM C138.

    e. Determined for each strength test sample.

5. Temperature: Determined for each strength test sample.

C. Evaluation of Tests:

1. Strength test results:

    a. Average of 28-day strength of two cylinders from each sample.

        1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testings, strength of remaining cylinder will be test result.

        2) If both cylinders show any of above defects, test will be discarded.

D. Acceptance of Concrete:

1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:

    a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.

    b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 psi.

2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Engineer.

    a. Perform additional tests and corrective measures at no additional cost to OCTA.

## 3.05 SCHEDULES

A. Form Types:

1. Surfaces exposed to view:

    a. Prefabricated or job-built wood forms.

    b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.

    c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.

d. Construct forms sufficiently tight to prevent leakage of mortar.

2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.

3. Other types of forms may be used:

a. For surfaces not restricted to plywood or lined forms.

b. As backing for form lining.

B. Grout:

1. Nonshrinking nonmetallic grout: General use.

2. Epoxy grout:

a. Grouting of dowels and anchor bolts into existing concrete.

b. Other uses indicated on Plans.

C. Concrete Finishes:

1. Unformed surfaces:

a. Use following finishes as applicable, unless otherwise indicated:

1) Troweled finish: All unformed surfaces.

2) Broom finish: All walking surfaces.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

A. Structural Concrete will be measured by the unit or fraction thereof furnished and completed in accordance with the Contract Documents and as measured by the Engineer. The quantities as contained on the Schedule of Quantities and Prices, or approved schedule of values, as applicable, as derived from the Plans will be used as the basis for this measurement.

B. Structural Concrete will be measured by the neat line dimensions shown on the Plans or such other dimensions as may be ordered by the Engineer. No deduction will be made for the volume occupied by bar reinforcing steel or other embedded steel items.

C. Nonshrink Nonmetallic Grout incidental to work under other payment items and no separate measurement and payment will be made to the Contractor for Nonshrink Nonmetallic Grout.

D. Concrete and Concrete Aggregate Testing for field quality control conducted by the certified testing agency approved by OCTA is considered incidental to work under other payment items under this Section and no separate measurement and payment will be made to the Contractor.

## 4.02 PAYMENT

A. Structural Concrete furnished and completed in accordance with the Contract Documents will be paid for at the Contract Unit Price, as listed on the Schedule of Quantities and Prices. This price shall include full compensation for furnishing all labor, Materials, tools, equipment, supplies, supervision, and incidentals, and doing all work, as shown on the Plans, and as specified in these Specifications, and as directed by the Engineer.

B. The contract Unit Price for Structural Concrete shall include full compensation for all forming and shoring, reinforcing steel, joints, joint filler, joint seals, waterstops, Graffiti Resistant Coating, and curing compound necessary for constructing the concrete work complete-in-place.

C. Concrete and Concrete Aggregate Testing shall be considered incidental to work requiring structural concrete.

**END OF SECTION**

# SECTION 03 40 00

# PRECAST CONCRETE

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. Work involves furnishing all labor, materials and equipment necessary and incidental to constructing precast concrete and consists of furnishing transportation, labor, materials, and equipment for the manufacture and installation of precast concrete units.

B. Sections include but are not necessarily limited to:

1. Division 01 - General Requirements
2. Section 03 21 00 - Reinforcing Steel
3. Section 03 31 00 – Structural Concrete
4. Section 09 96 23 –Graffiti Resistant Coating
5. Section 31 11 00 - Site Clearing
6. Section 31 11 50 - Demolition, Cutting and Patching.
7. Section 31 20 00 - Earthwork
8. Section 31 50 00 - Excavation Support
9. Section 32 31 13 - Chain Link Fencing and Gates
10. Section 32 32 16 – Gravity Walls
11. Section 34 11 27 - Sub-Ballast and Aggregate Base

### 1.2 REFERENCES

A. ASTM International (ASTM):

1. ASTM A123/A123M - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
2. ASTM A153/A153M - Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
3. ASTM A615 - Specification for Plain Carbon Steel Bars for Concrete Reinforcement
4. ASTM A706 - Specification for Low Alloy Deformed and Plain Bars for Concrete Reinforcement

5. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field

6. ASTM C33 - Specification for Concrete Aggregates

7. ASTM C39/C39M - Test Method for Compressive Strength of Cylindrical Concrete Specimens

8. ASTM C150 - Specification for Portland Cement

9. ASTM C877 - Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections

10. ASTM C1913 - Specification for Precast Concrete Water and Wastewater Structures

B. Precast/Prestressed Concrete Institute (PCI):

1. PCI MNL 116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products

C. State of California, Department of Transportation (Caltrans):

1. California Test 521 - Compressive Strength of Molded Concrete Cylinders (Equivalent to ASTM C39/C39M)

2. California Test 540 - Making, Handling and Storing Concrete Compressive Test Specimens in the Field (Equivalent to ASTM C31/C31M)

D. American Welding Society (AWS):

1. AWS D1.1 - Structural Welding Code – Steel

2. AWS D1.4 - Structural Welding Code – Reinforcing Steel

## 1.3 SUBMITTALS

A. The Contractor shall verify the existing ground elevations at the site before preparing the working drawings. The working drawings shall contain all information required for the proper construction of the system at each location including existing ground line at face of wall as verified at the site and any required revisions or additions to drainage systems or other facilities.

B. Shop Drawings: Before manufacture of precast concrete units, submit shop drawings prepared by a California registered civil engineer to the Engineer for approval. These drawings shall show the dimensions and calculations for the work and shall include complete details of the methods, materials and equipment the Contractor proposes to use. These drawings shall also show lift and support points.

1. Shop drawings shall be 11" x 17" in size, and each drawing and calculation

sheet shall include the OCTA the contract number, full name of the structure as shown on the contract plans, and Project stationing. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

C. Submit the following at least thirty (30) days prior to construction for approval:

1. Product Data

a. Submit manufacturer's product data of manufactured products and accessories. Include manufacturer's detailed drawings and dimensions when applicable.

b. Supply a Certificate of Compliance conforming to the provisions in the Caltrans Standard Specifications, Section 6-1.07, "Certificates of Compliance," stating the supplied material meets the respective index criteria set forth by OCTA, as measured in accordance with all test methods and standards specified in the Standard Specifications, these special provisions, and the approved working drawings.

2. Mix Designs

a. Mix designs shall be submitted for each class of concrete on the job and shall show names and brands of all materials, proportions, slump, strength, gradation of coarse and fine aggregates, admixtures, amount of water, and the like. The proposed location where the mix will be used on job, (i.e. bridge footings, station concrete, culvert concrete, bridge columns, and the like) shall be clearly indicated at the top of all proposed mix design sheets.

b. Each mix design submittal, for concrete designated by strength, shall be accompanied by certified test data or trial batch test reports in accordance with the requirements of these Specifications.

3. Laboratory Test Reports

a. Laboratory test reports shall show the name of testing agency, date of testing, types of tests performed and shall be signed by a principal of the testing agency who is a registered civil or structural engineer in the State of California. Laboratory tests shall not be older than eight months and shall certify that the test materials meet the specified standards.

b. Laboratory test reports for concrete mix designs shall clearly identify each material or mix number of each mix tested to verify the correlation between the tested mix designs and the proposed mix designs.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Pre-formed flexible joint sealing compound: Subject to compliance with the Contract Documents, the following manufacturers are acceptable for joint sealing material between sections of precast reinforced concrete box culverts where water tightness is not required:

1. RAM-NEK.
2. BIDCO C-56.
3. Or equal.

B. Reinforcing Steel: Comply with applicable requirements of Section 03 21 00 – Reinforcing Steel.

C. Portland Cement Concrete:

1. Comply with applicable requirements of Section 03 05 15 - Portland Cement Concrete. Provide class of concrete as indicated on the approved Contract Drawings issued for construction.

D. Anchors, Lift Devices, and Accessories: Provide concrete inserts, reglets, anchors, brackets, and fasteners as indicated or required for fabrication and installation work. All items shall be galvanized in accordance with ASTM A153/A153M or ASTM A123/A123M, as applicable. Contractor shall select the lift devices, and shall be responsible for their performance and for any damage resulting from the use of faulty or inferior devices. Lift devices shall not be visible on exposed faces of precast members.

E. Reinforced Concrete Drainage structures including inlets and headwalls:

1. Precast Drainage structures shall conform to ASTM C913.
2. All Work shall conform to the provisions of Section 03 30 00 - Cast-In-Place Concrete.

F. Graffiti Resistant coatings shall be per Specification Section 09 96 23.

### 2.2 FABRICATION

A. Requirements and Standards

1. Manufacture precast concrete units in accordance with PCI MNL-116, and applicable requirements of ACI 318/318R, Chapter 16.

2. Forms shall be accurately constructed to produce members to dimension, shape, configuration, and profile indicated. When not otherwise indicated, construct forms to produce smooth concrete.

3. Concrete reinforcement, lifting reinforcement, and concrete inserts and anchorage devices shall be placed and secured against movement as required.

4. Concrete shall be placed and consolidated to shape, configuration, and dimensions indicated.

5. Members shall be moist cured in accordance with curing requirements specified in PCI MNL-116. Minimum curing period for combined initial curing and secondary curing shall be seven Days or until the specified strength of concrete is attained.

B. Markings:

1. Provide permanent markings in precast units to identify pick-up points and orientation in the structure, conforming with the markings indicated on Shop Drawings. Imprint the date of casting on each precast unit where it will not show in the finished structure.

C. Fractured Fin Finish on Precast Panels

Where shown on the Contract Drawings, provide a fractured fin finish to the precast panels. Fin dimensions shall be as shown on the Contract Drawings. Fins on panels shall line up along the height of the wall.

## 2.3 QUALITY CONTROL

A. Concrete Testing

1. Concrete shall be tested for compressive strength as specified in Section 03 31 00. Additionally, a set of 7 cylinders shall be prepared for every 10 precast units, or fraction thereof, cast in any one day. Two cylinders shall be tested at 3 Days, two cylinders at 7 Days, two cylinders at 28 Days, and one cylinder shall be retained for further testing as may be required. Cylinders shall be prepared and moist cured in accordance with ASTM C31/C31M, and tested in accordance with ASTM C39/C39M.

B. Reporting

1. The QC Inspector and independent testing laboratory shall provide reports to the Quality Control Manager (QCM) on a daily basis for each day that precasting operations are performed.

2. A daily production log for precasting shall be kept by the QCM for each day that precasting operations, including setting forms, placing reinforcement, casting, curing, post tensioning, and form release, are performed. The log shall include the facility location, and shall include a specific description of casting or related operations, any problems or deficiencies discovered, any testing or repair work performed, and the names of all QC personnel and

the specific QC inspections they performed that day. The daily report from each QC Inspector shall also be included in the log. This daily log shall be available for viewing, at the precasting facility.

3. All reports regarding material tests and any required survey checks shall be signed by the person who performed the test or check, and then submitted directly to the QCM for review and signature prior to submittal. Corresponding names shall be clearly printed or typewritten next to all signatures.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine all parts of the supporting structure and conditions under which the precast concrete units are to be erected and installed. Verify the locations of anchors to predetermine the accuracy of the installation of each member.

### 3.2 ERECTION / INSTALLATION

A. Transport and erect precast concrete units in accordance with PCI MNL-116 and as specified herein.

B. Erect precast concrete units and accurately install in place with mechanical hoisting equipment more than adequate for the loads.

C. Maintain precast concrete unit in upright position at all times. Handle unit only by indicated lifting devices or cushioned pads, and in a manner that will not overstress or damage the unit.

D. Erect precast concrete units in accordance with indicated erection tolerances and the requirements of ACI 117. Comply with erection sequences indicated. Position units to avoid eccentric application of forces, and make complete and uniform contact with bearing surfaces.

E. Provide anchorage and attachment welding and bolting, as indicated, in accordance with PCI MNL-116. Provide touch-up painting of field welds and abraded steel surfaces.

F. At completion, units shall be plumb, level, and square, true to line, with angles and edges parallel with related building lines.

### 3.3 REINFORCED CONCRETE DRAINAGE STRUCTURES

A. Precast reinforced concrete drainage structures shall be installed as shown on the approved Contract Drawings issued for construction according to manufacturer's recommendations.

B. Joint sealers shall be used as specified herein

C. Precast reinforced concrete drainage structures shall be in place and plumb prior to pouring associated appurtenant structures. Dowel extensions shall be cast into the structures as a means of anchorage as detailed on the approved Contract Drawings.

D. Precast reinforced drainage structures shall not be backfilled until the installation has been inspected and approved. Structures backfilled prior to approval shall be uncovered and re-backfilled at the Contractor's expense.

## PART 4 – MEASUREMENT AND PAYMENT

A. Work of this Section is considered incidental to work under other payment items requiring precast concrete. No separate measurement and payment will be made to the Contractor for Work of this Section.

**END OF SECTION**

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