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**SECTION 07 92 00**

**JOINT SEALANTS**

**PART 1 – GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Furnishing and installing joint sealants and accessories complete where indicated and required, including at toilet.
  - 2. Work includes caulking and sealing of joints to seal perimeters of openings in walls, penetrations in walls, expansion and control joints, and as required.
  - 3. Work includes interior building sealing of joints in concrete pavement, where indicated and required.
- B. Related Sections include but are not necessarily limited to:
  - 1. Section 03 30 00: Cast-In-Place Concrete
  - 2. Section 32 13 13: Concrete Paving

**1.02 REFERENCES**

- A. ASTM International (ASTM):
  - 1. ASTM C717 - Terminology of Building Seals and Sealants
  - 2. ASTM C920 - Elastomeric Joint sealants
  - 3. ASTM C1193 - Guide for Use of Joint Sealants
  - 4. ASTM D6690 - Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
- B. South Coast Air Quality Management District (SCAQMD):
  - 1. Rule 102 - Definition of Terms
  - 2. Rule 1168 - Adhesive and Sealant Application

**1.03 SUBMITTALS**

- A. Submit under Section 01 33 00, Submittal Procedures.
- B. Product Data: Provide manufacturer's printed data and specifications for each joint sealant product required.

1. Indicate sealant chemical characteristics, performance criteria, limitations, color availability, material safety data sheets, physical and mechanical properties, and, as applicable, primer data sheets.
- C. Installation Instructions: Instructions for joint preparation and joint sealer application and curing for each type of sealant, and associated miscellaneous material required.
- D. Submit manufacturer's color chart showing color range available, prior to delivery of materials to Worksite.
  1. Colors as selected by Engineer of Record will be color to match adjacent surfaces.
- E. Samples: Minimum of four, 3 inch long samples of each color required (except black) for each type of sealant exposed to view; keyed to installation location.
  1. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain proper adhesion.
  2. Provide fully cured samples, 12 inches long, installed between two samples of materials to be sealed.
  3. Provide sample application of sealants at locations designated by OCTA Project Manager.
  4. Represent primary types of materials, substrate surfaces, joint size, exposure and other conditions to be encountered in Work.
- F. Certification:
  1. Certification by joint sealant manufacturer that sealants, including primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.
  2. Certification from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for use indicated.
- G. Compatibility and Adhesion Test Reports:
  1. Results of each compatibility and adhesion test from elastomeric sealant manufacturer to OCTA Project Manager and Contractor for approval prior to start of sealant work, indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants.
- H. CALGreen Code Submittals: Provide following submittals to verify conformance prior to verification by Enforcing Agency:
  1. Summary listing applicable products used.
  2. VOC content of each product used in grams per liter.

3. Material Safety Data Sheets (MSDS) cut sheets for applicable products used.
4. Product data cut sheets for applicable products used.
5. Highlight VOC limits on MSDS and product data sheets.
6. Organize material submittals into following major groupings:
  - a. Adhesives;
  - b. Sealants;
  - c. Caulks;
  - d. Primers.
7. Other documentation required by enforcing agency to verify compliance.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.
- B. Applicator Qualifications: Company specializing in performing Work of this section with minimum three years documented experience, minimum three successfully completed projects of similar scope and complexity, and approved by sealant manufacturer.
  1. Use only qualified workers thoroughly skilled and specially trained in techniques of installing sealant, who can acceptably demonstrate to OCTA Project Manager their ability to fill joints solidly and neatly.
  2. Installer Certification: Obtain written certification from manufacture, certifying that installer is approved by, licensed, or certified by manufacturer for installation of specified materials/products or systems.
  3. Provide list of minimum 5 projects similar in nature and size to that of this Project, where specified materials/products have been successfully installed/used.
- C. Samples: Visually examine for staining, dirt pickup, shrinkage, color, general Workmanship and appearance
- D. Compatibility and Adhesion Tests: Prior to start of sealant work, sealant manufacturer and sealant installer shall conduct compatibility and adhesion tests of sealant for each different sealing condition and substrate for entire Project.
- E. Pre-Installation Meeting:
  1. Arrange meeting when sealant contractor and sealant manufacturers have been selected, but prior to award of contracts.
  2. Schedule meeting with OCTA Project Manager, and General Contractor; arrange for attendance by sealant contractor and sealant manufacturers' technical representatives.

3. Meeting to include, but not limited to, following:
    - a. Review of preliminary test results on sealants.
    - b. Details of sealant joints.
    - c. Sealant application instruction and training of installers.
    - d. Scheduling and procedures for periodic field inspections by sealant manufacturers' technical representatives.
  4. Record minutes of meeting and promptly distribute copies of minutes to attendees and other interested parties as may be necessary.
  5. Record issues resolved during meeting.
    - e. Include copies of Drawings and application instructions used in meeting.
    - f. Record changes on Drawings and application instructions made at meeting.
- F. Pre-installation Field Testing:
1. Field test adhesion of joint sealant material to Project substrates.
  2. Verify joint sealant materials will satisfactorily adhere to substrates.
  3. Arrange field testing with manufacturer or designated representative.
  4. Notify parties minimum 7 days prior to field testing.
  5. Field test sealants in accordance with ASTM C 1193, Appendix X-1, Method A— "Field Applied Sealant Joint Hand-pull Tab" in compliance with manufacturer's recommendations.

## **1.05 DEFINITIONS**

- A. VOC: Volatile Organic Compound, as defined in SCAQMD Rule 102 – Definition of Terms:
1. Any volatile compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and exempt compounds.
- B. SCAQMD: South Coast Air Quality Management District
- C. Sealant and Caulking Terms: Comply with definitions of ASTM C717.
- D. For Work of this Section, "interior" or "interior locations" are defined as not open to exterior.
1. Rooms and spaces such as station concourse and platform are open to exterior and are considered exterior spaces

**1.06 CALGREEN CODE**

- A. Adhesives, adhesive bonding primers adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or South Coast Air Quality Management District (SCAQMD) Rule 1168 - Adhesive and Sealant Application, VOC limits, as shown in CALGreen Code Tables 5.504.4.1 and 5.504.4.2.
  - 1. Such products also shall comply with SCAQMD Rule 1168 prohibition on use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection B, below.
  - 2. Architectural Sealants: Not more than 250 g/L.
  - 3. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
  - 4. Sealant Primers for Porous Substrates: Not more than 775 g/L.
- B. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.
- C. Refer to Section 01 33 30, Submittal Procedures and CALGreen Code Requirements for material documentation submittal procedures.

**1.07 WORKSITE CONDITIONS**

- A. Perform Work when temperature is above 50°F; do not apply to moisture-laden surfaces.
- B. Do not proceed with installation of sealants during inclement weather unless installation complies with requirements and manufacturer's instructions.
- C. Do not proceed with installation of sealants under extreme temperature conditions which would cause joint openings at maximum or minimum width, and when extreme temperatures or heavy wind loads are forecast during period required for initial or nominal cure of elastomeric sealants.
- D. When possible, schedule installation and cure of elastomeric sealants, during periods of relatively low temperatures, within manufacturers recommended range to minimize subsequent tensile stresses upon cured sealants.
- E. Examine component surfaces and fillers of joints to be sealed, and conditions under which Work is to be done.
  - 1. Correct conditions detrimental to proper and timely completion of Work.

2. Do not proceed until unsatisfactory conditions have been properly corrected.

**1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in original, tightly sealed containers or unopened packages with manufacturer's name, labels, product identification, lot numbers (where appropriate), color, date of manufacture, and expiration period for use.
  1. Include pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials in conformance with manufacturers' written instructions, to prevent their deterioration or damage due to moisture, high and low temperatures, contaminants, or other causes.
- C. Store materials out of weather in original containers or unopened packages as recommended by manufacturer.
  1. Store primers and sealants with ambient temperature range of 60 to 80 degrees F.

**1.09 WARRANTY**

- A. Extend warranty period specified in General Conditions to 3 years for Work of this Section.

**PART 2 - PRODUCTS**

**2.01 MATERIALS - GENERAL**

- A. Sealant: Sealant for sealing of control joints and expansion joints in concrete paving shall be a two component polyurethane elastomeric based sealant conforming to ASTM C920, Type M, Grade P, Class 25, Use T<sub>1</sub> with a Shore A hardness of 30 plus or minus 5, or better.
  1. Reference Products:
    - a. "THC-900", manufactured by Tremco, 800-321-7906.
    - b. "Sikaflex®-2c NS TG", manufactured by Sika Corp., 800-933-7452.
    - c. "Urexpam® NR-200" manufactured by Pecora Corp., 800-523-6688.
  2. Color of sealant shall be selected by OCTA Project Manager from the manufacturer's full color range.
  3. Primer shall be as recommended by the sealant manufacturer for the use intended.
  4. Joint backing shall be as recommended by the sealant manufacturer.

- B. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, and Class,
- C. Product Variation: If more than one of manufacturer's products complies with requirements for items specified, provide specific product recommended by manufacturer for particular application and condition of use in each case
- D. Compatibility: Provide joint sealants, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 1. Determine proper hardness or consistency of elastomeric sealants in consultation with manufacturer, considering fire rating of wall, joint movement and exposure for size of joint indicated.
  - 2. Ranges of Hardness: Unless otherwise indicated, provide sealants within following ranges of hardness for fully cured sealant at 75°F:
    - a. Joints subject to maximum movement and nominal exposure to weather and abrasion including vertical wall joints not subject to vandalism: 15 to 25 Shore A durometer hardness.
    - b. Joints subject to moderate movements, weather exposure, vertical joints exposed to vandalism and horizontal joints not subject to abrasion: 25 to 40 Shore A durometer hardness.
    - c. Joints subject to minimum movement and severe abrasion including sidewalk and paving joints: 35 to 60 Shore A durometer hardness.
- E. Modulus of Elasticity: Unless otherwise indicated, for elastomeric sealants, provide sealants having lowest modulus of elasticity consistent with degree of exposure to wear, abrasion and vandalism.
  - 1. Sealant Exposed to Traffic: Strength and modulus sufficiently high to resist damage by traffic, including indentation by high (stiletto) heels.
- F. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside building envelope that comply with following limits for VOC content when calculated according to California Air Resources Board (CARB) regulations dated June, 2008:
  - 1. Architectural Sealants: Not more than 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
  - 3. Sealant Primers for Porous Substrates: Not more than 775 g/L.
- G. Colors: Provide color of exposed joint sealant indicated or as selected by Engineer of Record from manufacturer's standard colors.
  - 1. Unless specifically noted, sealant color shall match adjoining surface.



- a. Fully Concealed Joints: Manufacturer's standard sealant color with best overall performance characteristics for application indicated.
  - b. Exposed Joints: Color indicated or selected by Engineer of Record to match or blend with adjoining materials.
  - c. Provide colors, where exposed, to match grout color or adjoining materials determined by Engineer of Record.
2. Color shall be approved by Engineer of Record prior to application.
- H. Supply like items of materials by one manufacturer to achieve standardization for appearance, maintenance, and replacement throughout Project, unless otherwise approved by OCTA Project Manager.
- I. Sealant shall be uniform, homogeneous, free from lumps, skins, and coarse particles when mixed.
  1. Provide non-staining and non-bleeding sealant where joints abut porous materials such as masonry and like materials.
- J. Use of more than one type of sealant for same joint is not permitted.
- K. Horizontal and Sloping Joints of up to 1 Percent Slope: Use self-leveling joint sealant or nonsag sealant.
- L. Joints Steeper than 1 Percent Slope, Vertical Joints, and Overhead Joints: Use non-sag joint sealant.

### **2.03 SILICONE SEALANTS**

- A. Silicone rubber based, one-part, low-modulus, non-sag, neutral curing sealant conforming to ASTM C920, Type S, Grade NS, Class 50.
  1. Manufacturer and Product:
    - a. Dow Corning Corporation: Dow Corning 790
    - b. Momentive Performance Products: GE SCS2700 SilPruf LM
    - c. Pecora Corporation: Pecora 890 NST
    - d. Approved equivalent.
- B. Mildew-resistant one-part, non-sag, silicone rubber sealant conforming to ASTM C920, Type S, Grade NS, Class 25.
  1. Containing fungicide compounded specifically for mildew resistance and recommended by manufacturer for interior joints in wet areas; passing ANSI A136.1 test for mold growth.
  2. Manufacturer and Product:
    - a. Dow Corning Corporation: Dow Corning 786
    - b. Momentive Performance Products: Sanitary SCS1700

- c. Pecora Corporation: Pecora 898
  - d. Approved equivalent.
- C. Silicone rubber based, one-part, non-staining, medium-modulus, neutral curing sealant, conforming to ASTM C920, Type S, Grade NS, Class 50.
  - 1. Manufacturer and Product:
    - a. Dow Corning Corporation: Dow Corning 756 SMS
    - b. Momentive Performance Products: SCS9000 SilPruf NB
    - c. Pecora Corporation: 895 NST
    - d. Approved equivalent

#### **2.04 URETHANE SEALANTS**

- A. Multiple-component, polyurethane sealant conforming to following:
  - 1. ASTM C920, Type M, Grade NS, Class 25
  - 2. Manufacturer and Product:
    - a. BASF Building Systems: Sonolastic NP 2
    - b. Bostik, Inc.: Chem-Calk 505
    - c. Pecora Corporation: DynaTrol II
    - d. Approved equivalent.
- B. Multiple-component, self-leveling, polyurethane elastomeric sealant conforming to following:
  - 1. ASTM C920, Type M, Grade P, Class 25
  - 2. Manufacturer and Product:
    - a. BASF Building Systems: Sonolastic SL 2
    - b. Bostik, Inc.: Chem-Calk 555-SL;
    - c. Pacific Polymers, division of ITW: Elasto-Thane 227
    - d. Pecora Corporation: Urexpan NR-200
    - e. Sika Corporation: Sikaflex-2c NS TG
    - f. Approved equivalent.
- C. Two-part chemically-curing, cold-applied, non-sag, traffic-grade, polyurethane sealant, conforming to following:
  - 1. ASTM C920, Type M, Grade NS, Class 25
  - 2. Manufacturer and Product:
    - a. Pecora Corporation: DynaTred
    - b. W.R. Meadows, Inc.: Sof-Seal

- c. Approved Equivalent

## **2.05 ACCESSORY MATERIALS**

- A. Sealant Backer Rod: Compressible rod stock of extruded closed-cell polyethylene foam, polyethylene jacketed polyurethane foam, neoprene foam, or other flexible, permanent, durable, non-absorbent, non-staining, of appropriate diameter.
  - 1. Material as recommended by sealant manufacturer for compatibility with sealant in conformance with ASTM D1056, Type 2, with grade and class as approved by OCTA Project Manager.
  - 2. Provide products by one of following or approved equal:
    - a. Denver Foam by Backer Rod Mfg. Inc.
    - b. Sof-Rod by Nomaco, Inc.
    - c. Sealtight Kool-Rod by W.R. Meadows, Inc
    - d. Approved equivalent
- B. Bond Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant
  - 1. Provide self-adhesive tape where applicable.
- C. Joint Cleaner: Non-corrosive, non-staining type in conformance with sealant manufacturer's printed recommendations, compatible with joint-forming materials.
- D. Joint Primer: Provide type of joint primer in conformance with sealant manufacturer's printed recommendations for joint surfaces to be primed or sealed.
  - 1. Non-staining type, to suit application.
- E. Masking Tape: Pressure-sensitive adhesive-backed paper tape.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. General:
  - 1. Verify that joint dimensions and physical and environmental conditions are acceptable for sealant application.
  - 2. Preparation, priming, application and curing:
    - a. Comply with manufacturer's recommendations and actual proposed methods.
  - 3. Schedule applications, to allow for sufficient curing time, so samples may be examined and necessary adjustments made at least one week before date scheduled for commencing installation of Work.

- B. Ensure that surfaces to be sealed are clean, dry, sound, and free of dust, loose mortar, oil, water, frost, surface dirt, and other foreign materials which could interfere with proper adhesion of joint sealants.
  - 1. Clean concrete, masonry, and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers.
    - a. Remove loose particles by vacuuming or blowing out joints with oil-free compressed air.
  - 2. Remove laitance and form release agents from concrete.
  - 3. Clean metal and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
  - 4. Mask adjacent surfaces where necessary to maintain neat edges.
  - 5. Joint Priming: Prime joint substrates where indicated or where recommended by sealant manufacturer based on preconstruction joint sealant substrate tests or prior experience.
    - a. Apply primer to comply with joint sealer manufacturer's recommendations.
    - b. Confine primers to areas of joint sealer bond.
    - c. Do not allow spillage or migration onto adjoining surfaces.
  - 6. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which would be permanently stained or damaged by such contact, or by cleaning methods required to remove sealant smears.
    - a. Remove tape immediately after tooling without disturbing joint seal.
- C. Compatibility of sealant with joint-shaping materials and release tapes shall be approved by OCTA Project Manager.
- D. Examine joint dimensions to achieve required width/depth ratios.

### **3.02 INSTALLATION**

- A. Install joint filler to achieve required joint depths:
  - 1. Install backup material or joint filler, setting blocks, spacer shims, and tapes in accordance with sealant manufacturer's printed recommendations.
  - 2. Use full-length sections of joint-filler material.
    - a. Where splices are required, minimize number of splices.
    - b. Make splices fitted and neat.
- B. Use bond breaker as recommended by sealant manufacturer.

- C. Install joint sealants in conformance with sealant manufacturer's printed instructions.
  - 1. Apply sealants with sufficient pressure to completely fill and seal joint.
- D. Tool joints flush after sealant is installed, unless otherwise recommended by manufacturer in writing and approved by OCTA Project Manager.
- E. Finish joints free of air pockets, foreign embedded matter, ridges, and sags.
- F. If leakage results from failure of sealant to bond to adjacent work or if sealant hardens, cracks, shrinks, runs, or stains adjacent work, remove defective work.
  - 1. Clean joints and install new sealant with OCTA Project Manager approved material.

### **3.03 FIELD QUALITY CONTROL**

- A. Pre-installation Field Testing:
  - 1. Field test adhesion of joint sealant material to Project substrates.
  - 2. Verify joint sealant materials will satisfactorily adhere to substrates.
  - 3. Arrange field testing with manufacturer or designated representative.
  - 4. Notify parties' minimum 7 days prior to field testing.
- 5. Field test sealants in accordance with ASTM C1193, Appendix X-1, Method A—"Field Applied Sealant Joint Hand-pull Tab" in compliance with manufacturer's recommendations.
- B. Cut and pull sealant from each sample joint; examine for internal bubbles and voids, adhesion, and general compatibility with substrate. Do not proceed with caulking until satisfactory performance is obtained.
- C. Perform inspections necessary to ensure proper preparation of locations to receive sealants and compliance with manufacturer's instructions for mixing, installation, curing and protection.

### **3.04 CURING AND PROTECTION**

- A. Cure sealants in accordance with manufacturer's instructions; obtain maximum bond to surfaces, cohesive strength and durability at earliest possible date.
- B. Installer: Advise Contractor of proper procedures for protection of compounds and sealants during remainder of construction period; ensure sealants will be without indication of deterioration and damage at time of acceptance by OCTA Project Manager.

**3.05 PERFORMANCE TESTS**

- A. After curing exterior joints exposed to weather, test for leaks by applying stream of water perpendicularly from 3/4 inch hose at normal city water pressure.
- B. Test approximately five percent of exposed joint system.
- C. Conduct tests in presence of OCTA Project Manager, who will determine actual percentage of joints to be tested and period of water flow exposure, based on observed leakage; repair leaks and retest as directed.

**3.03 CLEANING**

- A. Progress Cleaning: Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.
  - 1. Clean joints by mechanical means or with solvent as recommended by sealant manufacturer and compatible with finish material, to eliminate soiling and overlap on adjacent surfaces.
  - 2. Clean adjacent soiled surfaces.
- B. Repairs: Repair or replace defaced or disfigured finishes caused by joint sealer work.
- C. Protection: Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. No separate measurement or payment will be made for Work of this section.

**END OF SECTION**

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**SECTION 09 65 19**

**RUBBER TILE FLOORING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes interlocking anti-fatigue rubber tiles with open drainage system for industrial uses.

**1.02 REFERENCE STANDARDS**

- A. ASTM American Society of Testing and Materials
- B. ADA American Disabilities Act

**1.03 SUBMITTALS**

- A. Submit under Section 01 33 00, Submittal Procedures:
  - 1. Samples of proposed tile materials for approval prior to use.
  - 2. Product data including description, material, color, size, thickness, weight and other details for all permanent materials incorporated in the work.

**PART 2 - MATERIALS**

Interlocking industrial rubber mats/tiles for tough and harsh wet environments to help prevent slippage and with anti-fatigue properties are required. These rubber tiles shall be 18" X 18" nominal, at least 7/8" thick and have a large hole drainage system and a diamond stud top surface to allow for the proper drainage of fluids and slip protection. The tile material shall be grease-resistant rubber compound that can withstand common chemicals and oils found in industrial uses. Exposed edges shall be provided with yellow beveled borders to reduce trip hazards. Tiles shall have antimicrobial coating in order to provide resistance to mildew, fungus and odors in the mat. Provide black colored tiles for all general areas and yellow colored tiles at the eye-wash locations.

Rubber tiles shall be ADA compliant and meet ASTM F 1344, Class 1-A and 1-B Standard Specification for Rubber Floor Tile.

**PRODUCT PERFORMANCE AND TECHNICAL DATA**



- Hardness: ASTM D 2240 – Not less than 85 Shore A
- Abrasion Resistance: ASTM D 3389 < 8.0  $\Delta E$
- Acoustical: ASTM E- 492 Impact Insulation Class – 40 IIC (Test performed with 1/8" thick tiles)
- Electrostatic Propensity (AATCC 134): < 2 Kv
- Static Load Limit: ASTM F 970 – 250 PSI
- Fire Resistance ASTM E 648/NFPA 253 (Critical Radiant Flux), Class 1 ASTM E 662/NFPA 258 (Smoke Density), less than 450

### **PART 3 - EXECUTION**

#### **3.01 PREPARATION**

- A. Coordinate demolition specified in Section 31 11 50, Demolition and Removal.
- B. The Contractor shall remove and dispose all existing tiles.
- C. The concrete surfaces at the raised islands shall be thoroughly cleaned to remove any greasy debris before placing new tiles.
- D. New tiles not required under existing equipment.

#### **3.03 PROTECT EXISTING EQUIPMENT**

- A. Existing equipment shall be protected in place. The safe and proper handling of the existing equipment is the responsibility of the Contractor. The Contractor shall be liable for any injuries, line breakage, damage to the line and damage to property. In addition, Contractor shall be responsible for and shall reimburse OCTA for all damages during construction and for any product or service lost therefrom.

### **PART 4 - MEASUREMENT AND PAYMENT**

#### **4.01 MEASUREMENT**

- A. No separate measurement or payment will be made for Work of this Section.

**END OF SECTION**

**SECTION 09 91 00**

**PAINTING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
1. Furnishing and applying paint products to interior and exterior exposed items and surfaces throughout Contract to extent indicated.
  2. Surface preparation, priming, and finish coats of paint specified are in addition to shop priming and surface treatment.
  3. Paint exposed surfaces whether or not colors are designated in "Schedules", except where natural finish of material is specifically noted as surface not to be painted.
    - a. Where items or surfaces are not specifically mentioned, paint same as similar adjacent materials or areas.
    - b. Paint systems specified in other Sections list basic painting systems.
- B. Painting Not Included: Following categories of Work are not included as part of field-applied finish Work, or are included in other Sections of these Specifications:
1. Shop Priming: Included under various Sections for structural steel, miscellaneous metal items, hollow metal Work, and similar items; fabricated components including wood casework, and shop-fabricated or factory-built mechanical and electrical equipment and accessories.
  2. Pre-Finished Items: Painting is not required when factory-finishing is specified for items including toilet enclosures, acoustic materials, casework, finished mechanical and electrical equipment including light fixtures and distribution cabinets.
  3. Concealed Surfaces: Painting is not required on wall and ceiling surfaces in concealed areas and generally inaccessible areas including foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts, where applicable.
  4. Finished Metal Surfaces: Do not paint anodized aluminum, stainless steel, and similar finished materials unless otherwise indicated or scheduled.
  5. Operating Parts and Labels:
    - a. Do not paint moving parts of operating units, mechanical and electrical parts, including valve and damper operators, linkages, sensing devices, motor and fan shafts unless otherwise indicated.
    - b. Do not paint over code-required labels, such as UL and FM, equipment identification, performance rating, name, and nomenclature plates.
    - c. Do not paint automatic fire sprinkler heads.

- C. Related Sections include but are not necessarily limited to:
  - 1. Section 01 60 00: Product Requirements

## **1.02 REFERENCES**

- A. American National Standards Institute (ANSI):
  - 1. ANSI A13.1 - Scheme for Identification of Piping Systems
  - 2. ANSI Z53.1 - Safety Color Code for Marking Physical Hazards
- B. Society for Protective Coatings (SSPC):
  - 1. SSPC - Good Painting Practice, Volume 1
  - 2. SSPC SP 1 – Solvent Cleaning
  - 3. SSPC SP 3 – Power Tool Cleaning
  - 4. SSPC SP 6 – Commercial Blast Cleaning
- C. South Coast Air Quality Management District (SCAQMD):
  - 1. Rule 102 – Definition of Terms
  - 2. Rule 1113 - Architectural Coatings

## **1.03 CALGREEN REQUIREMENTS**

- A. Provide architectural paints and coatings complying with South Coast Air Quality Management District (SCAQMD) Rule 1113 - Architectural Coatings, and VOC limits, as shown in CALGreen Code Table 5.504.4.3.
- B. Provide aerosol paints and coatings meeting Product-Weighted Maximum Incremental Reactivity (PWMIR) Limits for Reactive Organic Compound (ROC) in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of California Code of Regulations (CCR), Title 17.
  - 1. Additionally, in areas under jurisdiction of SCAQMD, comply with percent VOC by weight of product limits of Rule 1113.
  - 2. Title 17 may be found at <http://ccr.oal.ca.gov/>.
- C. Provide verification of compliance with this section at request of enforcing agency.
  - 1. Documentation may include, but is not limited to, following:
    - a. Manufacturer's product specification
    - b. Field verification of on-site product containers

## **1.04 SUBMITTALS**

- A. Submit under Section 01 33 00, Submittal Procedures.

- B. Product Data: Manufacturer's technical data for each paint system specified, including block fillers and primers, including label analysis and instructions for handling, storage, and application of each material proposed for use.
  - 1. Provide paint samples of each specific color, specific coating, finish system and application.
  - 2. List each material and cross reference specific coating, finish system, and application. Identify material by manufacturer's catalog number and general classification.
  - 3. Indicate manufacturer's instructions for special surface preparation procedures and substrate conditions requiring special attention.
  - 4. Provide certification by the manufacturer that products supplied comply with South Coast Air Quality Management District (SCAQMD) Rule 1113 – Architectural Coatings, controlling use of volatile organic compounds (VOCs).
- C. CALGreen Code Submittals:
  - 1. Submit following to Resident Engineer to verify conformance prior to verification  
by Enforcing Agency:
    - a. Summary listing of applicable products used.
    - b. VOC content of each product in grams per liter.
    - c. Material Safety Data Sheets (MSDS) cut sheets for applicable products used.
    - d. Product data cut sheets for applicable products used.
    - e. Highlight VOC limits on MSDS and product data sheets.
    - f. Other documentation required by enforcing agency to verify compliance.
- D. Refer to CALGreen Code Requirements, for additional documentation submittal procedures.

### **1.05 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. Comply with referenced ASTM and SSPC standards as applicable to coatings indicated.
  - 2. Comply with Federal and state toxicity and air quality regulations and with Federal requirements on content of lead, mercury, and other heavy metals. Do not use solvents in paint products that contribute to air pollution. Comply with SCAQMD requirements for VOC content.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified with minimum 5 years' documented experience.

- C. Applicator Qualifications: Painting and Decorating Contractor licensed in State of California (C-33 Classification) having minimum 5 years documented experience and have successfully completed painting system applications similar in material and extent to those indicated for Project.
- D. Coordination of Work: Review related work in which primers are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
- E. Material Quality: Provide manufacturer's best quality commercial grade paint material of various coating types specified as regularly manufactured by acceptable paint material manufacturers.
  - 1. Vinyl acrylic and residential paints are not permitted.
  - 2. Paint material containers not displaying manufacturer's product identification will not be acceptable.
- F. Single-Source Responsibility: Provide primers and undercoat material produced by same manufacturer as finish coats for each type of coating. Use only thinners recommended by manufacturer and only within recommended limits.
- G. Pre-application Meeting: Schedule pre-application meeting prior to start of Work. Attendees to include Owner, Contractor, and Resident Engineer. Schedule of Work to be accomplished and list of labor, material and equipment rates for additional work will be established and maintained throughout Project. Furnish resumes of personnel to be used on Project in addition to complete set of submittal data.

#### **1.06 DEFINITIONS**

- A. Term "paint" and "coating" as used in this Section is interchangeable, and means coating systems, materials, including primers, emulsions, enamels, sealers and fillers, and other applied materials used as primers, intermediate, and finish coats.
- B. Term "exposed surfaces" includes areas visible when permanent or built in fixtures, convactor covers, covers for finned tube radiation, grilles, and similar components are in place.

#### **1.07 PROJECT CONDITIONS**

- A. Weather Conditions:
  - 1. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
  - 2. Do not apply exterior coatings during rain or snow, or when relative humidity is outside humidity ranges required by paint product manufacturer.
  - 3. Minimum Application Temperatures for Latex Paints: Between 50 deg F and 90 deg F.

4. Minimum Application Temperature for Solvent Thinned Paints: Between 45 deg F and 95 deg F.
  5. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.
- B. Provide lighting level of 80 foot candles mid-height at substrate surface.
- C. Labels: Do not paint over UL, FM, or other code required labels or equipment name, identification, performance rating, or nomenclature plates.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- A. Where products and manufacturers are listed, make submittals for proposed comparable products and substitutions in accordance with Section 01 25 00, Substitution Procedures, and Section 01 60 00, Product Requirements

### **2.02 MATERIALS**

- A. Basis of Design and Quality: Selections in finish schedule indicate colors and textures selected for aesthetics and have been approved by Engineer of Record. It is not intended to limit or restrict products by other manufacturers but to establish aesthetic, technical, and performance requirements to be met.
1. Paint Schedule is based upon products of Sherwin-Williams Corporation as Basis-of-Design, ProIndustrial Series, except where indicated otherwise, 100 percent acrylic paint.
    - a. Equivalent finish products manufactured by one of following will be acceptable, subject to compliance with specified requirements:
      - 1) Dunn-Edwards Corporation
      - 2) Pittsburgh Paints, PPG Industries.
      - 3) Frazee Paint.
- B. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials recommended by manufacturer and compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- C. Proprietary Names: Paint Schedule is based on paint systems of single manufacturer. Use of manufacturer's proprietary systems to designate materials and colors is not intended to imply that only products named are required to be used to exclusion of equivalent products of specified manufacturers.
- D. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags.

- E. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners, and other materials not specifically indicated but required to achieve finishes specified, of commercial quality.
- F. Patching Materials: Latex filler.
- G. Fastener Head Cover Materials: Latex filler.
- H. Primers:
  - 1. Gypsum Board: Specially formulated for priming new gypsum board and compatible with finish coats.
  - 2. Steel Items: Prime steel items that are to receive finish paint with one of following primers complying with SCAQMD VOC limits:
    - a. For Above-Grade Applications: Zinc-rich primer.
      - 1) Hydro-Zinc Series 94-H<sub>2</sub>O by Tnemec Company
    - b. Subject to compliance with requirements, provide indicated product, or comparable product by one of following, or approved equivalent:
      - 1) Carboline Company
      - 2) PPG Protective & Marine Coatings
  - 3. For Below-Grade Applications: Coal-tar epoxy coating, two coats, 5 mils per coat.
    - a. Touch-up on Worksite using product recommended by manufacturer; match finish coat thickness.
  - 4. Apply finish paint to visually exposed steel items per this section, or as noted on Drawings.
  - 5. Prep and prime hot-dipped galvanized materials scheduled to be painted per paint schedule indicated in this Section.
  - 6. Use galvanizing repair compound for field touch-up of hot-dipped galvanized materials not scheduled to receive paint.
- I. Colors: Provide color selections made by Engineer of Record, from manufacturer's full range of standard colors.
  - 1. Standard Gloss Ranges: Comply with ASTM D523.
    - a. Flat: Below 15 percent, measured at 85 degree meter.
    - b. Eggshell: 5 percent to 20 percent, measured at 60 degree meter.
    - c. Satin: 15 percent to 35 percent, measured at 60 degree meter.
    - d. Semigloss: 30 percent to 65 percent, measured at 60 degree meter.
    - e. Gloss: Over 65 percent, measured at 60 degree meter.
- J. Paintable Caulk:

1. Acrylic latex, one-part, non-sag, mildew resistant, non-bleeding and non-staining, acrylic emulsion compound conforming to ASTM C 834, Type OP, Grade NS, formulated to be paintable.
  - a. For use as interior caulk in non-working joints only.
  - b. Must be able to accommodate joint movement of not more than 5 percent in both extension and compression for total of 10 percent.
  - c. Backup and Bond Breaker: Products recommended by manufacturer
  - d. Provide one of following products.
    - 1) AC-20: Pecora Corporation.
    - 2) Bostik Home Painter=s Caulk: Bostik Construction Products.
    - 3) GE RCS20: Momentive Performance Materials

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that substrate conditions are ready to receive Work as instructed by product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of Work. Report condition that may potentially affect proper application.
- C. Test shop applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces are specified maximums:
  1. Gypsum Wallboard: 12 percent.
  2. Concrete and Concrete Unit Masonry: 12 percent.
  3. Concrete Floors: 8 percent.
- E. Notify Resident Engineer of anticipated problems using materials specified over substrates primed by others.

#### **3.02 PREPARATION**

- A. Prior to applying paint over entire surface, paint surface with proposed color, specific coating, finish system, and application.
- B. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in trades involved.
- C. Correct defects and clean surfaces which affect Work. Remove existing coatings exhibiting loose surface defects.



- D. Seal with shellac and seal marks which may bleed through surface finishes.
- E. Cleaning: Before applying paint or other surface treatments, clean substrates of substances impairing bond of various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from cleaning process will not fall on wet, newly painted surfaces.
- F. Impervious Surfaces: Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified. Provide barrier coats over incompatible primers or remove and reprime.
  - 1. Cementitious Materials: Prepare concrete, concrete masonry block, and mineral fiber reinforced cement panel surfaces to be painted. Comply with SSPC-SP 13 for preparation of wall surfaces to receive epoxy coating systems. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    - a. Roughen to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    - b. Use abrasive blast cleaning methods if recommended by paint manufacturer.
    - c. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause finish paint to blister and burn, correct conditions before application. Do not paint surfaces where moisture content exceeds that permitted by manufacturer's printed directions when measured by moisture meter.
    - d. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
    - e. Floor Slabs: Clean floors with 5 percent solution of muriatic acid or etching cleaner. Flush floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
      - 1) Brush Off Blast Cleaning, SSPC-SP 7: Dry blast cleaning of surfaces with commercial nonstaining, new, and clean, fine abrasive grit. Use dry blast cleaning over entire surface to remove contaminants and loosely adherent materials and to roughen surfaces for specified painting system.
  - 2. Concrete Masonry Units (CMU): Clean to remove contaminants. Test for alkali using red litmus paper. Use muriatic acid when recommended by manufacturer.
  - 3. Ferrous Metals:

- a. Ungalvanized Surfaces: Clean surfaces that have not been shop coated including field welds, field connections; remove oil, grease, dirt, loose mill scale, and foreign substances. Use solvent or mechanical cleaning methods complying with SSPC recommendations.
- b. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.
- c. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 6.
- d. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
- e. Touch up bare areas and shop applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as shop coat.
- f. Manual Cleaning Methods: Use one or combination of methods to obtain prepared visual surface condition based upon initial surface condition.
  - 1) Solvent Cleaning, SSPC-SP 1: Use solvent detergent or cleaning solution as recommended by finish system manufacturer. Apply solvent by either hand rubbing, wiping, or scrubbing with clean cloths and brushes. Rinse surfaces and remove solvent residue.
  - 2) Hand Tool Cleaning, SSPC-SP 2: Use hand methods such as wire brushing, chipping, sanding, scraping, and similar abrasive and impact equipment.
  - 3) Power Tool Cleaning, SSPC-SP 3: Use power operated brushes, chipping hammers, scalers, sanders, grinders, and similar abrasive and impact equipment.
  - 4) Blast Cleaning Methods: For architecturally exposed structural steel, provide dry blast cleaning of surfaces with commercial type of non-staining, new, unused, and clean, fine abrasive grit. Employ blast cleaning system with suitable dust removal equipment. Obtain prepared visual surface condition based upon initial surface condition.
  - 5) Commercial Blast Cleaning, SSPC-SP-6: Use dry blast cleaning as necessary to obtain thorough commercial cleaning with 2 mil (0.050 in.) anchor pattern and surface condition C or D Sa2.
4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
5. Aluminum: Clean surfaces to remove oil, grease, and other contaminants in accordance with SSPC-SP 1. Lightly abrade surface with nonmetallic pad.

6. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
  7. Pipe Covering and Insulation: Clean to remove loose, foreign, and objectionable material before applying sealing coat.
- G. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  2. Stir material before application to produce mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
  3. Use only thinners approved by paint manufacturer, within recommended limits, and complying with SCAQMD VOC requirements.
  4. Tinting: Tint each undercoat lighter shade to facilitate identification of each coat where multiple coats of same material are applied. Tint undercoats to match color of finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.
- H. Paintable Caulk Installation:
1. Comply with general sealant installation requirements in Section 07920.
  2. Use only for caulking of following joints in dry areas:
    - a. Between gypsum board walls and woodwork or millwork
    - b. Perimeter caulking of interior door and window frames
  3. Joint Design: Width of joint should be approximately 12 times anticipated movement and fall within range of 1/4 inch to 3/4 inch

### **3.03 APPLICATION**

- A. Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in finish schedules and as approved subject to visual inspection/verification.
  2. Number of coats and film thickness required are same regardless of application method. Do not apply succeeding coats until previous coat has dried and cured in accordance with manufacturer's recommendations.
  4. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to coating.
  5. Sand between applications where sanding is required to produce smooth even surface according to manufacturer's directions.
  6. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners,

crevices, welds, and exposed fasteners, receive dry film thickness equivalent to surfaces of flat surfaces.

7. Extend coatings as required to maintain system integrity and provide desired protection.
  8. Paint exposed and bare surfaces and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
  9. Back prime wood to be set against concrete, masonry or plaster.
  10. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  11. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  12. Finish interior of wall and base cabinets and similar field finished casework to match exterior.
  13. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
  14. Sand lightly between each succeeding enamel or varnish coat. Wipe clean of dust prior to recoating.
  15. Omit primer on metal surfaces that have been shop primed and touch up painted.
  16. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
    - a. Labels: Do not paint over UL, FM, or other code required labels or equipment name, identification, performance rating, or nomenclature plates.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Number of coats and film thickness required are same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce smooth, even surface according to manufacturer's written instructions; sand between applications.
  2. Omit primer on metal surfaces that have been shop primed and touchup painted.
  3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, it does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
  2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
  3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
  4. Apply each coat of paint slightly darker than preceding coat.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of entire system as recommended by manufacturer.
- E. Exposed Surfaces: Paint areas visible when permanent and built in fixtures, covers, grilles, mechanical and electrical equipment housings, ducts and conduits, are in place within finish areas.
1. Finish surfaces in back of movable equipment and furniture. Finish interior surfaces of ducts visible through grilles, interior surfaces visible through equipment covers, blank off panels, and visible duct metal behind registers and grilles in black matte finish system compatible with substrate.
- F. Concealed Members: Wherever steel and other metal parts to be painted will be built into and concealed by construction, paint as specified for exposed parts so that finish painting is completed before areas are concealed.
- G. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.
1. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
  2. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and insulation except where items are prefinished.
  3. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers, with one coat of flat black paint to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
  4. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

5. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
  6. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
  7. Mechanical items to be painted include, but are not limited to, following:
    - a. Piping, pipe hangers, and supports.
    - b. Heat exchangers.
    - c. Tanks.
    - d. Ductwork.
    - e. Insulation.
    - f. Motors and mechanical equipment.
    - g. Accessory items.
  8. Electrical items to be painted include, but are not limited to, following:
    - a. Conduit and fittings.
    - b. Switchgear.
    - c. Panelboards.
- H. Block Fillers: Apply block fillers to concrete masonry block at rate to ensure complete coverage with pores filled.
- I. Prime Coats: Before applying finish coats, apply prime coat of material, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure finish coat with no burn through or other defects due to insufficient sealing.
- J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats.
- L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint Work not complying with requirements.

- M. Touch Up for Previously Coated Surfaces:
1. Touch up marred, scraped, and blemished areas of surfaces which were factory primed or previously coated.
  2. Properly prepare and touch up scratches, abrasions, and blemishes and remove foreign matter before proceeding with succeeding coats.
  3. Feather touch up coating, overlapping minimum 2 inches onto adjacent unblemished areas, producing smooth, uniform surface.
  4. As soon after erection and installation as possible, touch up fasteners, welded surfaces and surroundings, field connections, and areas on which shop coat has been abraded or damaged with specified primer before corrosion and other damage occurs from exposure.

### **3.04 CLEANING**

- A. Cleanup: At end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from site. After completing painting, clean paint spattered surfaces. Do not scratch or damage adjacent finished surfaces.

### **3.05 SHOP PRIMING FOR STEEL**

- A. Clean surfaces according to AISC Specifications. Apply one shop coat of specified metal primer to minimum 1.0 mil dry film thickness. Work primer into joints. Do not prime following:
1. Steel surfaces embedded in concrete or masonry.
  2. Permanently concealed structural steel surfaces.
  3. Contact surfaces of high-strength bolted connections.
  4. Surfaces to receive directly adhered fireproofing.

### **3.06 PAINT SCHEDULE**

- A. Exterior Paint Systems: Verify that gloss of paint complies with gloss requirements of ASTM D523.
1. Concrete Masonry Units– 3 Coat Epoxy System over CMU Filler
    - a. Filler, minimum 7.0 mil DFT.
    - b. First and second coats, 3.0 mils minimum each DFT.
    - c. Topcoat, 3.0 mils DFT.
    - d. VOC: Per SCAQMD requirements.
    - e. Required Resistance: To repeated acid, alkaline, and water exposure as well as sunlight.
    - f. Filler: B42W200 CementPlex 875
    - g. 1st Coat: B73 Series ProIndustrial Zero VOC Catalyzed Epoxy



- h. 2nd Coat: B73 Series ProIndustrial Zero VOC Catalyzed Epoxy
  - i. Topcoat: B65 Series Acrolon 100
  - j. For train washer piping and conduit, omit block filler; prepare and prime as recommended by coating system manufacturer.
- 2. Ferrous Metal - 3 Coat System:
  - a. Prime coat and touch up coat on preprimed material, 2.0 mils DFT.
  - b. Second coat, 2.5 mils DFT (Gloss).
  - c. Third coat, 2.5 mils DFT.
  - d. VOC: Per SCAQMD requirements.
  - e. Percent Solids, Volume: 35 percent.
  - f. Percent Solids, Weight: 45 percent.
  - g. Primer: B66-310 Pro-Cryl Universal Primer
  - h. 1st Coat: B66-600 Series – ProIndustrial, Zero VOC, Acrylic Gloss enamel.
  - i. 2nd Coat: B66-600 Series – ProIndustrial, Zero VOC, Acrylic Gloss enamel.
- 3. Galvanized Metal - 3 Coat System:
  - a. Prime coat and touch up coat on preprimed material, 2.0 mils DFT.
  - b. Second coat, 2.5 mils DFT (Gloss).
  - c. Third coat, 2.5 mils DFT.
  - d. VOC: Per SCAQMD requirements.
  - e. Percent Solids, Volume: 35 percent.
  - f. Percent Solids, Weight: 45 percent.
  - g. Primer: B66-310 Pro-Cryl Universal Primer
  - h. 1st Coat: B66-600 Series – ProIndustrial, Zero VOC, Acrylic Gloss enamel.
  - i. 2nd Coat: B66-600 Series – ProIndustrial, Zero VOC, Acrylic Gloss enamel.
- 4. Aluminum - 3 Coat System:
  - a. Prime coat and touch up coat on preprimed material, each 2.0 mils DFT.
  - b. Second coat, 2.5 mils DFT (Gloss).
  - c. Third coat, 2.5 mils DFT.
  - d. VOC: Per SCAQMD regulations.
  - e. Percent Solids, Volume: 35 percent.
  - f. Percent Solids, Weight: 45 percent.
  - g. Primer: B66-310 Pro-Cryl Universal Primer



- h. 1st Coat: B66-600 Series – ProIndustrial, Zero VOC, Acrylic Gloss enamel.
    - i. 2nd Coat: B66-600 Series – ProIndustrial, Zero VOC, Acrylic Gloss enamel.
- B. Interior Paint Systems:
  - 1. Concrete Masonry Units - 3 Coat Eggshell System:
    - a. Prime coat, 12.0 mils DFT.
    - b. First and second Coat, 2.5 mils DFT.
    - c. VOC: Per SCAQMD regulations.
    - d. Percent Solids, Volume: 35 percent.
    - e. Percent Solids, Weight: 50 percent.
    - f. Primer: B25W25 PrepRite Block Filler
    - g. 1st Coat: B20-2600 ProMar 200 Zero VOC Eg-shel
    - h. 2nd Coat: B20-2600 ProMar 200 Zero VOC Eg-shel.
  - 2. Concrete Masonry Units (Where Indicated) – 3 Coat Epoxy System over CMU Filler:
    - a. Filler, 8-10 mils DFT.
    - b. First and second coats, 8-10 each DFT.
    - c. Topcoat, 3 mils DFT.
    - d. VOC: Per SCAQMD regulations.
    - e. Required Resistance: To repeated acid, alkaline, and water exposure as well as sunlight.
    - f. Filler: B42W46 Heavy Duty Block Filler.
    - g. 1st Coat: B58 Series Macropoxy 646-100
    - h. 2nd Coat: B58 Series Macropoxy 646-100
    - i. Topcoat: B65 Series Acrolon 100
  - 3. Concrete Floors – Epoxy/Urethane System, Orange Peel Texture (Non-Slip Finish) for floor striping and safety markings:
    - a. Surface Preparation: Shot blast or mechanically abrade (CSP 4-6) as recommended by coating manufacturer.
    - b. Epoxy primer, 6-8 mils DFT.
    - c. Intermediate coat, 1/8 inch DFT.
    - d. Grout coat, 8-10 mils DFT.
    - e. Finish coat, 2-4 mils DFT.
    - f. Total DFT: 1/8 inch system (125 mils).
    - g. VOC: Per SCAQMD requirements.

- h. Required Resistance: Wet, chemical spills, forklift traffic, moderate abuse.
  - i. Epoxy Primer: Tnemec Series 201 Epoxoprime.
  - j. Intermediate Coat: Tnemec Series 237 Power-Tread (double broadcast or slurry broadcast).
  - k. Grout Coat: Tnemec Series 280 Tneme-Glaze.
  - l. Finish Coat: Tnemec Series 297 Enviro-Glaze with carborundum grit.
- 4. Galvanized Metal - 3 Coat System:
  - a. Prime coat and touch up coat on preprimed material, 2.0 mils DFT.
  - b. First and second coats, each 2.5 mils DFT.
  - c. VOC: Per SCAQMD requirements.
  - d. Percent Solids, Volume: 35 percent.
  - e. Percent Solids, Weight: 45 percent.
  - f. Primer: B66-310 Pro-Cryl Universal Primer
  - g. 1st Coat: B66-650 Series – ProIndustrial Zero VOC Acrylic semi-gloss enamel.
  - h. 2nd Coat: B66-650 Series – ProIndustrial Zero VOC Acrylic semi-gloss enamel.
- 5. Ferrous Metal and Aluminum - 3 Coat System:
  - a. Prime coat and touch up coat on preprimed material, each 2.0 mils DFT.
  - b. First and second coats, each 2.5 mils DFT.
  - c. VOC: Per SCAQMD requirements.
  - d. Percent Solids, Volume: 35 percent.
  - e. Percent Solids, Weight: 50 percent.
  - f. Primer: B66-310 Pro-Cryl Universal Primer
  - g. 1st Coat: B66-650 Series – ProIndustrial Zero VOC Acrylic semi-gloss enamel.
  - h. 2nd Coat: B66-650 Series – ProIndustrial Zero VOC Acrylic semi-gloss enamel.
- 6. Doors, Door Frames and Window Frames: Semi-gloss System:
  - a. Prime coat, 2.5 mils DFT.
  - b. First coat & second coat, 4.0 mils DFT.
  - c. VOC: Per SCAQMD requirements.
  - d. Percent Solids, Volume: 55 percent.
  - e. Percent Solids, Weight: 75 percent.
  - f. Primer: B66-310 Pro-Cryl Universal Primer

- g. 1st Coat: B66-650 Series – ProIndustrial Zero VOC Acrylic semi-gloss enamel.
    - h. 2nd Coat: B66-650 Series – ProIndustrial Zero VOC Acrylic semi-gloss enamel.
- 7. Door Edges, Stops, Door Rabbet Portion of Frames at Lightproof Doors - 2 Coat System – Semi-gloss System:
  - a. Prime coat, 2.5 mils DFT.
  - b. First coat, 2.5 mils DFT.
  - c. VOC: Per SCAQMD requirements.
  - d. Percent Solids, Volume: 55 percent.
  - e. Percent Solids, Weight: 75 percent.
  - f. Primer: B66-310 Pro-Cryl Universal Primer
  - g. 1st Coat: B66-650 Series – ProIndustrial Zero VOC Acrylic semi-gloss enamel.
  - h. 2nd Coat: B66-650 Series – ProIndustrial Zero VOC Acrylic semi-gloss enamel.
- 8. Gypsum Board - 3 Coat Eggshell System:
  - a. Primer, one coat 1.20 mils DFT.
  - b. First and second coats, each coat 2.5 mils DFT.
  - d. VOC: Per SCAQMD regulations.
  - c. Percent Solids, Volume: 35 percent.
  - e. Percent Solids, Weight: 50 percent.
  - f. Primer: ProMar 200 Interior Zero VOC Interior Latex Primer.
  - g. 1st Coat: B20-2600 ProMar 200 Zero VOC Eg-shel
  - h. 2nd Coat: B20-2600 ProMar 200 Zero VOC Eg-shel
- 9. Gypsum Board - 3 Coat Semigloss System:
  - a. Primer, one coat 1.20 mils DFT.
  - b. First and second coats, each coat 2.5 mils DFT.
  - c. VOC: Per SCAQMD requirements.
  - d. Percent Solids, Volume: 30 percent.
  - e. Percent Solids, Weight: 45 percent.
  - f. Primer: ProMar 200 Interior Zero VOC Interior Latex Primer.
  - g. 1st Coat: B31-2600 ProMar 200 Zero VOC semi-gloss
  - h. 2nd Coat: B31-2600 ProMar 200 Zero VOC semi-gloss
- 10. Gypsum Board (Wet Areas) - 3 Coat Gloss System:
  - a. Primer - 1.20 mils DFT.

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- b. First and second coats, each coat 2.5 mils DFT.
- c. VOC: Per SCAQMD regulations.
- d. Percent Solids, Volume: 35 percent.
- e. Percent Solids, Weight: 45 percent.
- f. Primer: ProMar 200 Interior Zero VOC Interior Latex Primer.
- g. 1st Coat: B66-600 Series – ProIndustrial, Zero VOC, Acrylic Gloss enamel.
- h. 2nd Coat: B66-600 Series – ProIndustrial, Zero VOC, Acrylic Gloss enamel..

**PART 4 - MEASUREMENT AND PAYMENT**

**4.01 MEASUREMENT**

- A. No separate measurement will be made for Work of this Section.

**4.02 PAYMENT**

- A. Payment for Work of this Section will be included in lump sum payment(s) for applicable building or facility in accordance with Schedule of Values.

**END OF SECTION**

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**SECTION 26 05 05**

**SELECTIVE ELECTRICAL DEMOLITION**

**PART 1 – GENERAL**

**1.01 SUMMARY**

- A. Work Included: Selective electrical demolition for remodeling.

**1.02 REFERENCE STANDARDS**

- A. Comply with NFPA 70 and local Agency Having Jurisdiction (AHJ) requirements.
- B. Comply with the provisions of applicable local, State, and Federal codes, specifications, standards, and recommended practices, and with OCTA policy.

**1.03 SUBMITTALS**

- A. Site Specific Work Plan (SSWP) containing the information specified herein.

**1.04 PROJECT COORDINATION**

- A. Cooperate with the OCTA Project Manager in all matters requiring coordination.
- B. Coordinate execution of the work with the OCTA Project Manager to eliminate or minimize to the greatest extent possible interference with bus operations.
- C. Keep OCTA Project Manager fully informed regarding all work.

**1.05 CONTRACTOR'S RESPONSIBILITY**

- A. Perform work in accordance with the contract and all applicable codes, ordinances, rules, regulations, orders, and other legal requirements of governmental bodies and public agencies having jurisdiction, including the OCTA.
- B. Damage caused by Contractor to third-party property, signal and communications equipment, or other facilities shall be repaired at Contractor's expense to a condition equal or better than the condition prior to Contractor entry and as accepted by the OCTA Project Manager. At the sole discretion of the OCTA Project Manager, the OCTA Project Manager may direct repairs to be performed by other contractors. Charges for those repairs shall be deducted from Contractor's payment due under this Contract.

- C. Items shown on the drawings to be protected in place shall be protected in place in accordance with SSPWC Section 7-9, Protection and Restoration of Existing Improvements, at no additional cost to the OCTA.
- D. Perform work within the operating envelope or which affects the operating system only after submitting a Site Specific Work Plan (SSWP) and receiving written approval of the SSWP from the OCTA Project Manager.
- E. Furnish all labor, materials, and equipment as required to perform and complete the work within the work windows in accordance with the approved schedule in the SSWP.

**1.06 SSWP – GENERAL CONTRACTOR REQUIREMENTS**

- A. SSWPs with potential to impact normal functioning of any part of the operating system shall include a detailed schedule of events indicating the expected hourly progress of each activity that has duration of one hour or longer. The schedule shall include a time at which each activity planned under the SSWP and the requested work window will be completed. The total duration of the construction activities shall be less than the approved work window. Contractor's failure to complete scheduled activities by the planned time or to put in place an approved contingency plan may adversely impact the operations of scheduled trains.
- B. The SSWP shall be prepared by the Contractor and shall include the following information:
  - 1. All activities necessary to perform construction activities.
  - 2. Conformance with all other requirements applicable under the contract documents.
  - 3. A schedule for the work showing each activity and where and how it affects normal operation. Each activity in the plan shall include all labor, materials, and equipment required to complete the activity within the OCTA allotted time period.
  - 4. List of approved proposed work plans to be performed under the SSWP, with names and phone numbers of Contractor's supervisors in charge of SSWP tasks.
- C. SSWPs must be of sufficient detail, clarity, and organization to permit easy review and approval by the OCTA Project Manager before the proposed work is performed. SSWPs shall be submitted to the OCTA Project Manager as follows:
  - 1. At least 14 calendar days prior to start of work.
- D. The OCTA Project Manager may request explanations and changes to the SSWP to conform the SSWP to the requirements of the contract documents. If the SSWP is not acceptable, Contractor shall revise the SSWP to make it acceptable. Contractor is responsible for submitting a revised SSWP that can be reviewed and approved by the OCTA at least seven days in advance of any work.

- E. Contractor will be informed if the SSWP is acceptable not less than seven calendar days prior to the scheduled start of work within the operating envelope. Once the SSWP is accepted, Contractor shall assemble the resources necessary to perform the work represented by the SSWP, so that necessary resources are available one day before the work is to be accomplished. At that time, the OCTA Project Manager will make a final decision as to whether or not the work is to proceed as planned or will be canceled. The prime consideration will be the stage of readiness of Contractor, which Contractor shall demonstrate to the OCTA Project Manager.

#### **1.07 SSWP – SPECIAL CONTRACTOR REQUIREMENTS**

- A. Contractor shall provide sufficient personnel, equipment, materials, and all other resources necessary to return impacted facilities to full service upon the conclusion of the approved work window.
- B. Electrical personnel assigned to this project shall be NFPA 70E certified.
- C. Contractor shall perform the work expeditiously and continuously with no gaps or breaks in work activities or substantive reductions in the labor force, equipment, and materials necessary to construct, reconstruct, or repair the impacted facility to full service upon conclusion of the approved work window.
- D. In general, open excavation areas shall be protected per OSHA regulations.

#### **1.08 WORK WINDOWS - GENERAL**

- A. Site-specific available work windows shall be as approved by the OCTA Project Manager under established procedures.
- B. A phased demolition and construction plan will be implemented to minimize impact to the bus base operation. The bus base areas outside of the construction zone shall remain fully functional.

### **PART 2 – PRODUCTS**

Not Used

### **PART 3 – EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify field measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition Drawings are based on field observation and existing record documents. Report discrepancies to Architect/Engineer before disturbing existing installation.



D. Beginning of demolition means installer accepts existing conditions.

### **3.2 PREPARATION**

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

B. Coordinate utility service outages with Utility Company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

### **3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK**

A. Demolish and extend existing electrical work as indicated on Drawings.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply. This includes but is not limited to power conductors, fire alarm cables, intercom cables, voice cables, data cables, coaxial cable, and control wiring unless noted otherwise.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces to match existing adjacent finishes.

E. Underground conduits can be abandoned after wiring is removed. Abandoned conduits shall be flash filled (Controlled Low-Strength Material – CLSM)

F. Disconnect abandoned outlets and remove devices. Remove abandoned outlet boxes if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlet boxes and flush junction boxes that are not removed.

G. Disconnect and remove abandoned panelboards and distribution equipment.

H. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

I. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

J. Repair adjacent construction and finishes damaged during demolition and extension work to match existing.

K. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

L. Extend existing installations using materials and methods as specified.

**3.4 CLEANING AND REPAIR**

- A. Clean and repair existing materials and equipment that remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- C. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps and broken electrical parts.

**3.5 INSTALLATION**

- A. Install relocated materials and equipment as indicated.

**PART 4 – MEASUREMENT AND PAYMENT**

No separate measurement or payment will be made for the work of this section.

**END OF SECTION**

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**SECTION 31 11 00**

**SITE CLEARING**

**PART 1 – GENERAL**

**1.01 SUMMARY**

A. Section Includes:

1. Clearing and grubbing of trees, stumps, undergrowth, brush, trash, grass, weeds, roots, rubbish, refuse, or other debris, stripping of topsoil, and protecting trees within the limits of excavation, embankment, borrow, and other areas as shown on drawings or required to perform the work of this contract.

B. Related Sections:

2. Section 01 57 13, Temporary Erosion and Sedimentation Control.

**1.02 SUBMITTALS**

A. Submit under Section 01 33 00, Submittal Procedures.

B. Site Clearing Plan: Site clearing plan and narrative shall be prepared by the Contractor and submitted to the OCTA Project Manager for approval prior to commencing work. The site clearing plan shall include:

1. Location and limits of clearing and grubbing.
2. Methods for protection of areas of vegetation designated as “no construction zones” and trees noted in plans to be saved.
3. Methods to be employed and equipment to be used.
4. Safety measures including signs, barriers, temporary walkways and hand railing.
5. Haul routes and disposal sites.

C. Permits, Notices, Certifications and Authorizations: The following permits, notices, certifications and authorizations shall be obtained by the Contractor with copies submitted to OCTA Project Manager:

1. Permits for transport of materials off the worksite where applicable and other permits as required by local agencies, project environmental documents and the project plans and specifications.
2. Delivery manifests for disposed materials in accordance with site clearing plan and permit conditions.

3. Private property owners' release for material removed and deposited on private property.
  - a. Releases shall absolve OCTA and its member agencies from any responsibility in connection with the disposal of materials on private property.
  - b. Releases shall be signed by the owner(s) of the property on which the material will be deposited.
  - c. Two copies of the releases shall be submitted to the OCTA Project Manager for approval not more than 15 days before the start of material being deposited on private property.
4. Disposal certification for materials removed from job site indicating they have been disposed of in accordance with applicable laws and regulations.

### **1.03 ENVIRONMENTAL CONDITIONS**

- A. On site burning or burial of site clearing materials will not be allowed.
- B. The contractor shall take possession of material and debris collected from site clearing procedures and shall be responsible for disposing of them in accordance with these specifications, any project permits and applicable laws and regulations.
- C. Contractor will provide noise abatement as required by environmental permits or local agency requirements. Control disturbances and nuisances to the public, workers and occupants of adjacent premises and surrounding areas.
- D. Site cleanliness, sweeping and dust control. Refer to Section 01 14 27, Legal Relations and Responsibility.
  1. Contractor shall maintain the construction site to minimize dust conditions that would adversely affect construction, including equipment operation and worker safety or surrounding areas.
  2. Contractor shall sweep or vacuum adjacent roadway and sidewalk surfaces of any dust or dirt from the construction site that accumulates. Special care shall be taken during sweeping or vacuuming of the roadway surface to adequately expose traffic marking and striping.
  3. Contractor shall control dust conditions through the use of water spray applied by hoses, sprinklers, or trucks at an appropriate rate and interval to settle the dust without creating muddy or sloppy conditions. Water and any dust control additives shall be environmentally safe and obtained from an approved source.

## **PART 2 – PRODUCTS**

Not Used.

### **PART 3 – EXECUTION**

#### **3.01 GENERAL**

- A. Perform clearing operation in a manner to control erosion within and adjacent to OCTA's right of way and easements.
- B. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing improvements indicated to remain in place.

#### **3.02 PREPARATION**

- A. Protect existing trees, other vegetation and existing site improvements on OCTA or adjacent property that are to remain.
  - 1. Do not smother trees by stockpiling construction materials or excavated materials within drip line.
  - 2. Avoid foot or vehicular traffic or parking of vehicles within drip line of trees or shrubs.
  - 3. Provide barricades, coverings, temporary fencing, or other types of temporary protection as required by the project environmental documents or OCTA Project Manager in accordance with the plans and specifications.
- B. Repair or replace trees, vegetation and existing site improvements that are to remain that are damaged by construction operations.
  - 1. Repair of damaged trees and shrubs to be performed by a certified arborist or tree surgeon.
  - 2. Remove trees that are damaged to the extent that a certified arborist or tree surgeon determines trees cannot be repaired and restored to full-growth status. Replace with new trees of minimum 4-inch caliper.
  - 3. Damaged vegetation shall be replaced in-kind as approved by OCTA Project Manager.
  - 4. Existing site improvements will be repaired or replaced as approved by OCTA Project Manager.
- C. OCTA will obtain approval for removal and alteration work, as required by the plans, on adjoining property prior to Contractor starting work.

**3.03 SITE CLEARING**

- A. Removal of Topsoil (fertile, friable soil of a loamy character with organic matter normal to the area):
  - 1. Strip topsoil to depths encountered.
    - a. Remove heavy growths of grass before stripping.
    - b. Stop topsoil stripping sufficient distance from trees shown to remain to prevent damage to main root system.
    - c. Separate from underlying subsoil or objectionable material.
  - 2. Stockpile topsoil where directed by OCTA Project Manager.
    - a. Construct stockpiles to freely drain surface water.
    - b. Provide temporary cover or seeding of stockpiles to prevent erosion in accordance with Section 01 57 13, Temporary Erosion and Sedimentation Control.
  - 3. Do not strip topsoil in wooded areas where no change in grade occurs.
  - 4. Topsoil from borrow sources shall be free of subsoil, objects over 2-inches in diameter, weeds and roots.
- B. Clearing: Clear from within limits of construction all trees (except those marked to remain), shrubs, brush, downed timber, rotten wood, heavy growth of grass and weeds, vines, rubbish and debris.
  - 1. Rubbish shall be removed from cleared areas and disposed of in accordance with project environmental documents and federal, state and local laws.
  - 2. Cleared areas shall be left smooth and free of obstructions or depressions that will impound water.

**3.04 SITE GRUBBING**

- A. Within the limits of clearing, all stumps, roots, root mats, logs, debris and other objectionable material shall be removed as follows:
  - 1. Grubbing shall extend to the outside excavation and fill slope lines except that where tops of slopes are to be rounded, the areas shall extend to the outside limits of slope rounding.

2. Grub where subdrainage trenches will be dug, unsuitable material removed or Structures built.
3. Grub areas in which hillsides or existing embankments will be terraced.
4. Grub areas upon which embankments, foundations or other structures will be placed.
  - a. Areas beneath embankments greater than 3-feet in depth shall be free from all vegetation and roots to a depth of 6-inches below the ground surface (after topsoil has been removed).
  - b. For embankments 3-feet in depth or less, roots that are over 2-inch dia. shall be removed to a depth of 1-ft below ground surface.

### **3.05 OTHER DESIGNATED AREAS**

- A. Designated portions of the right-of-way other than excavations, borrow areas, and embankments shall be cleared off level with ground surface by cutting and removal of trees (standing or fallen), stumps, undergrowth, brush, vines, roots, and other vegetation, trash, or objectionable materials. Cleared areas shall be left smooth and free of obstructions or depressions that will impound water.

### **3.06 SCHEDULING**

- A. When required by OCTA Project Manager, complete clearing and grubbing work far enough in advance of other operations to permit the placement of construction stakes. Construction schedule shall be adjusted so cleared areas are not left susceptible to erosion or sediment runoff due to weather.

### **3.07 LIMITS OF WORK**

- A. Trees or other growth outside OCTA's right of way shall be preserved and protected from damage during construction operations. Refer to Section 01 14 43, Environmental Resource Protection for additional requirements.

### **3.07 DISPOSAL**

- A. Material and debris collected by site clearing procedures shall become Contractor's property and shall be promptly disposed of off site, in accordance with applicable laws, ordinances, rules, and regulations of local, state, and Federal agencies having jurisdiction. On-site burning of cleared material is not permitted.



**LNG UNDERGROUND STORAGE TANKS REMOVAL  
AT GARDEN GROVE AND ANAHEIM BUS BASES**

**IFB-7-1756  
EXHIBIT B**

**PART 4 - MEASUREMENT AND PAYMENT**

No separate measurement or payment will be made for the work of this section.

**END OF SECTION**

**SECTION 31 11 50**

**DEMOLITION AND REMOVAL**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. This Section consists of Contractor furnishing all labor, materials, and equipment necessary and incidental to the demolition, removal, disposal of underground storage tanks, associated appurtenances and miscellaneous items from the Worksite.
- B. Work under this Section shall include but shall not be limited to
  - 1. The demolition and disposal of miscellaneous concrete or asphalt paving, curb and gutter, curbs, sidewalks, walls, foundations, equipment, pavement, fencing, underground utilities, and associated structures, frames, covers, signs, landscaping, etc. as indicated on the Contract Drawings or as required for new construction.
  - 2. Protection of all OCTA and adjacent private property from damage during demolition and removal activities.

**1.02 RELATED WORK**

- A. Coordinate the Work of this Section with all other Contract Documents and in particular:
  - 1. Section 31 11 00, Site Clearing

**1.03 PROJECT CONDITIONS**

- A. The Contractor shall be responsible for visiting and examining the Project site to assess and personally determine the extent of demolition, associated Work, debris removal, disposal and general Work to be done under this Section.
- B. The LNG underground storage tanks to be removed include a total of four (4) 25,000± gallon stainless steel pressure vessel with outer steel jacket tanks (two each at Garden Grove and Anaheim Bases), approximately 75± feet long, 10 ±feet diameter, and 12 feet total height from the bottom of tank to the top flange sealing surface. Each LNG underground tank has an empty tank weight of approximately 90,000± pounds.
- C. Demolished materials from the removal of existing reinforced concrete pavement, curb, sidewalk, masonry walls, and etcetera shall be removed the same day and stockpiling of the demolished materials will not be permitted. These demolished materials shall not be used as backfill material.

- D. On-site burning, stockpiling, storage or burial of demolition materials will not be permitted.
- E. The Contractor shall take possession of all demolished materials, except as noted otherwise in the Contract Documents, and be responsible for disposing of them in accordance with applicable laws and regulations.
- F. Provide continuous noise and dust abatement as required, preventing disturbances and nuisances to the public, workers, and the occupants of adjacent premises and the surrounding areas. Dampen areas affected by demolition operation as necessary to prevent dust nuisance.
- G. When a certain level of noise or vibration is unavoidable because of the nature of the Work or equipment involved and such noise or vibration is objectionable to the occupants of adjacent premises, make arrangements with the governmental authorities having jurisdiction, and to perform such Work or operate such equipment at the most appropriate time periods of the day.

#### **1.04 SUBMITTALS**

Submit the following in accordance with Section 01 30 00, Submittals:

- A. Site demolition plan: Indicate methods, procedures, equipment, and structures to be employed. Specify safety measures in accordance with applicable codes including signs, barriers, and temporary walkways. Plans shall be prepared by a Professional Engineer licensed to practice in the state of California, when so required by the provisions of the California Board for Professional Engineer and Surveyors.
- B. Equipment, haul routes, and disposal sites to be used in the demolition and disposal Work.
- C. Permits and notices authorizing demolition.
- D. Truck mounted hydraulic crane including features, specifications, dimensions, travel proposals, working range, load charts,
- E. Copy of manifests showing delivery of disposed Materials in accordance with the plan and permit conditions.
- F. Private Property Owner's Release: If material demolished and removed from the Work site will be deposited on private property, submit to the OCTA Project Manager two copies of written releases not more than 15 days before the start of work. Releases shall absolve OCTA and its member agencies from any responsibility in connection with the disposal of Materials on private property and shall be signed by the owner(s) of the property on which the Material will be deposited.
- G. Certification that all demolished materials removed from the site have been disposed of in accordance with applicable laws and regulations.
- H. No private property owner will be allowed to transfer any material from OCTA property. It will be the contractor's responsibility to remove all demolished Material.

- I. An independent structural engineer licensed in the state of California shall inspect, evaluate and prepare an existing condition report before continuing with further excavation.

## **PART 2 - PRODUCTS**

### **2.01 PRODUCTS**

- A. The Contractor shall provide all temporary or permanent materials as required for the proper execution of the Work of this Section.
- B. Heavy equipment – two (2) truck mounted hydraulic cranes with a lifting capacity of at least ninety (90) tons shall be required to safely remove and place/load it on transporting vehicle.

## **PART 3 - EXECUTION**

### **3.01 EXISTING STEEL SHORING SYSTEM**

The original excavation shoring systems used for installation of the LNG tanks were left in place and buried underground. Sheet piling shoring systems designed for 20-year life were left in place underground after installation of the existing LNG tanks at Garden Grove and Anaheim bus bases. The existing shoring shall not be removed and shall be abandoned in place after removal of LNG tanks. See Section 31 20 00 Earthwork for more details.

### **3.02 OTHER EXISTING STRUCTURES AND RELATED FACILITIES**

- A. All existing and temporary fences (when no longer required to protect and secure the construction site), structures of any character not necessary to the construction of the Work, and other obstructions including all existing abandoned concrete signal foundations, footings and bases, upon or within the right-of-way shall be removed by the Contractor and disposed of to the satisfaction of the OCTA Project Manager.

### **3.03 PAVEMENT**

- A. The Contractor shall perform the demolition and removal of demolition debris in accordance with the submitted and approved plan.
- B. The Contractor shall saw-cut and remove pavement as needed in performance of this Work.

### **3.03 UTILITIES**

- A. The Contractor shall coordinate Work of this Section with utility companies and agencies in accordance with Section 01 41 00, Regulatory Requirements.

### **3.04 BACKFILL OF DEMOLITION EXCAVATIONS**

- A. Excavations created by demolition activities shall be backfilled in the same manner as excavations created for the location of existing underground utilities.
- B. Sand used to backfill after the existing underground tanks were installed shall be tested and if determined non-hazardous or uncontaminated may be stockpiled onsite at an OCTA approved location and covered with heavy visqueen and protected per approved site specific BMP.

Above mentioned sand can be used to backfill after the tanks have been removed. Soils that will not be reused at the site must be removed and disposed in accordance with the results of lab analysis.

### **3.05 TRANSPORTING REMOVED UNDERGROUND LNG TANKS**

The removed tanks have to be transported in one piece and no cutting or dismantling of the tanks will be allowed on site. Therefore, special Caltrans transportation permits (greater than 10 ft high) for oversize/overweight vehicles will be required to transport on the state highway network.

A Caltrans single trip permit will be required to transport removed tanks. A single trip permit is authorized at a maximum width of 14'-0"; a maximum overall length of 135'-0"; a maximum rear overhang of 35'; a maximum front overhang of 30'; a maximum height not be less than 3" below the lowest structure on the permitted route and a maximum of Purple weight. See Appendix G for more details.

## **PART 4 - MEASUREMENT AND PAYMENT**

- A. No separate measurement or payment will be made for the work of this section.

**END OF SECTION**

**SECTION 31 20 00**

**EARTHWORK**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Excavation, stockpiling of suitable excavated material, backfill, import (borrow) and removal and disposal of unsuitable materials. Controlled Low-Strength Material (CLSM), also known as “flash fill” for abandoned pipe backfill.
  - 2. Authorized excavation and replacement of unsuitable subgrade materials below design grades and elevations as directed by OCTA Project Manager.
- B. Related Sections:
  - 1. Section 31 10 00 Site Clearing.
  - 2. Section 01 14 25 Procedures in Construction
  - 3. Section 01 14 43 Environmental Resource Protection
  - 4. Section 31 11 50 Demolition and Removal

**1.02 REFERENCE STANDARDS**

- A. Caltrans: State of California Department of Transportation, Standard Specifications (2015).
- C. SSPWC: Standard Specifications for Public Works Construction.
- D. ASTM: ASTM International (formerly American Society for Testing and Materials).
  - 1. ASTM D422, Standard Test Method for Particle-Size Analysis of Soils.
  - 2. ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>).
  - 3. ASTM D2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.

4. ASTM D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
  5. ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
  6. ASTM D6938, In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- E. California Code of Regulations, Title 8, Subchapter 4, Construction Safety Orders.

**1.03 SUBMITTALS**

- A. Make submittals in accordance with the requirements of Section 01 33 00, Submittal Procedures.
- B. Plans and Procedures:
1. Submittals of plans and procedures to OCTA Project Manager shall be made and approval obtained prior to commencing work for, excavation, backfill, subgrade preparation, import (borrow) (on OCTA property and off OCTA property) and removal of unsuitable materials.
  2. Plans shall include, as necessary, haul routes, public streets to be used, traffic control and other incidental work necessary to complete grading, excavation, backfill, subgrade preparation, borrow (on OCTA property and off OCTA property) and removal of unsuitable materials
  3. Contractor shall submit an excavation, stockpiling, import (borrow) and backfill Plan:
    - a. Proposed excavation methods, procedure and equipment to be utilized.
    - b. Information provided to OCTA Project Manager does not relieve Contractor of responsibility for the successful excavation performance.
- C. Certificates:
1. Material Test Reports for products purchased and used in the project.
  2. Certification of proper disposal of demolition materials.
  3. Tickets or certification from material suppliers demonstrating compliance with Materials Tests or Specifications.
  4. Certified laboratory test reports for fill and backfill material, whether imported or obtained from OCTA property, documenting:
    - a. ASTM D422, Sieve Analysis.

- b. ASTM D1557 or ASTM D4254, Moisture Density Results.
- c. ASTM D4318, liquid limit, plastic limit and plasticity index.
- 5. OCTA Project Manager shall determine adequacy of the test reports or certifications in accordance with the Contract Documents and may require additional testing to confirm requirements with the Specifications.
- D. Submit verification documentation that Contractor has requested DigAlert field location of underground utilities.

#### **1.04 PROJECT CONDITIONS**

- A. Prior to commencing work, Contractor shall examine the contract documents, inspect the site, consult available record drawings of existing work and utilities and note conditions and limitations which may affect the work required by this section.
- B. Barricade open excavations, and post with warning lights excavations occurring on property adjacent to or within public access areas. Operate warning lights from dusk to dawn each day and as otherwise required by governing authorities.
- C. Protect utilities, structures, and facilities designated to be protected in place from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation and backfill operations.
- D. The work shall allow rainfall to drain freely at all times in accordance with project environmental requirements and permit conditions.
- E. Protect against erosion within and adjacent to rights-of-way.

#### **1.05 ENVIRONMENTAL CONDITIONS**

- A. The Contractor shall protect against erosion and uncontrolled run-off within and adjacent to right-of-way in accordance with the storm water management specified in Section 01 14 25 Procedures in Construction.
- B. The Contractor shall obtain all required permits for dewatering and legally dispose of water from dewatering operations. Comply with requirements of permits and agencies having jurisdiction over the project site.
- C. Cleanliness, Sweeping and Dust Control: Refer to Section 01 14 27, Legal Relations and Responsibilities for additional requirements.
  - 1. Contractor shall maintain the construction site to minimize dust conditions that would adversely affect construction.
  - 2. Contractor shall sweep or vacuum adjacent roadway and sidewalk surfaces of any dust or dirt from the construction site that accumulates.



Special care shall be taken during sweeping or vacuuming of the roadway surface to adequately expose traffic marking and striping.

3. Contractor shall control dust conditions through the use of water spray or dust palliative applied by hoses, sprinklers, or trucks at an appropriate rate and interval to settle the dust without creating muddy or sloppy conditions. Water and any dust control additives shall be environmentally safe and obtained from an approved source.
- D. Contractor shall provide noise abatement as required by environmental permits or local agency requirements. Control disturbances and nuisances to the public, workers and occupants of adjacent premises and surrounding areas. Conform to local agency noise regulations.
- E. Contractor shall obtain all required permits for rock excavation, including all permits for blasting.

#### **1.06 REGULATORY REQUIREMENTS**

- A. Comply with applicable Federal, state, and local laws, codes, ordinances, and regulations, including furnishing required excavation and rock excavation drawings to those authorities and obtaining permits. See Section 01 41 00, Regulatory Requirements.

#### **1.07 QUALITY ASSURANCE**

- A. Materials not meeting the requirements of this specification shall not be used in the work.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Backfill material shall consist of suitable material from project site excavation or off site import (borrow) as required to complete work and as approved by the OCTA Project Manager.
  1. Suitable backfill materials may be obtained from on site excavation and rough grading operations. Contractor will be allowed to temporarily stockpile earthen materials resulting from on-site excavation in a location designated by OCTA. If sufficient suitable materials are not available to meet requirements, the material shall be obtained from outside sources. Imported backfill (borrow) shall be clean, free from organic material, trash, debris, rubbish, broken Portland cement concrete, bituminous materials, or other objectionable substances. Removed concrete pavement will not be permitted to be used as backfill material and has to be removed and legally disposed. Stockpiling of removed concrete pavement will not be allowed and has to be disposed the same day. Soils that will not be reused at the site must be removed and disposed in accordance with the

results of lab analysis. Copies of soil analysis and the disposal location of any soils removed for off-site disposal must be sent to OCTA upon completion of the project.

2. Materials from on-site excavations, which may otherwise be suitable for use as fill, may contain excess moisture in their natural state, or may take on excess moisture during handling and stockpiling that would render them unsuitable for use as fill. The Contractor shall dry the material as necessary as specified in the Section entitled "Moisture Control" herein to attain the required minimum standard, at no additional expense to OCTA.
3. Nesting of rock pieces that will create voids will not be permitted.
4. Backfill material shall have organic matter content of less than 1 percent by weight as measured by ASTM D2974, shall not contain excessive fines or unsuitable products of demolition, and shall contain no rocks or lumps over 3-inches in greatest dimension.
5. Backfill material shall have plasticity index of 15 or less and a liquid limit of 30 or less and expansion index of 30 or less, except where otherwise approved by the OCTA Project Manager.
6. Materials not meeting these requirements will be classified as unsuitable and shall be removed and legally disposed off-site by the Contractor, or as directed by the OCTA Project Manager.

**B. Imported Backfill Material:**

1. Material shall have a Sand Equivalent value of not less than 20 and shall conform to the following grading in Table 1:

Table 1, Structural Backfill

Sieve Sizes	Percentage Passing
3"	100
No. 4	35-100
No. 30	20-100

2. Material shall be free of stones or lumps exceeding 3 inches in greatest dimension organic or other unsatisfactory material.
3. Imported Materials: All import fill soils shall be free from deleterious material and debris. Import materials shall have a very low expansion potential, i.e. an expansion index of less than 30. In addition materials for subgrade use shall have a maximum particle size of less than 3 inches and shall have less than 30 percent retained on the 3/4-inch sieve. All fill material shall be approved for use by the OCTA Project Manager and shall be certified according to paragraph 1.03C.

**C. Controlled Low-Strength Material (CLSM) (Flash Fill):**

Abandoned pipes shall be backfilled with CLSM per Caltrans Standard Specifications (2015) Section 19-3.02G and 19-3.03I, Controlled Low-Strength Material.

**PART 3 - EXECUTION**

**3.01 PROTECTION**

- A. Protect existing surface and subsurface features on-site and adjacent to site as follows:
  - 1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing items indicated to remain in place.
  - 2. Protect and maintain bench marks, monuments or other established reference points and property corners.
    - a. If disturbed or destroyed, replace at own expense to full satisfaction of OCTA and controlling agency.
    - b. Property corners, if disturbed or destroyed, shall be reset in accordance with applicable surveying law for the State of California after completion of rough grading and prior to commencing final excavation or grading operations.
  - 3. Verify location and protection of existing utilities.
    - a. Omission or inclusion of utility items on drawings does not constitute warranty as to non-existence or definite location. Locations of utilities shown on the drawings are provided for the Contractor's information only and the Contractor shall be responsible for verifying the location of all utilities to his own satisfaction.
    - b. Secure and examine local utility records for location data. In accordance with Section 01 41 00, Regulatory Requirements, the Contractor shall make all attempts to locate utilities including potholing if necessary prior to commencing excavations. If utilities cannot be located, the Contractor shall first pothole anticipated location(s) by hand methods. When located, complete excavation with caution to prevent damage.
      - 1) When utility lines not known or indicated on the Drawings are encountered within the area of operations, the Contractor shall notify the OCTA Project Manager and utility owner immediately. Take all required measures to protect the utility and prevent damage to the utility.

- c. Take necessary precautions to protect existing utilities from damage due to any construction activity.
- d. Repair damages to utility items at own expense.
- e. In case of damage, notify OCTA Project Manager at once so required protective measures may be taken.
- f. Excavations created for location of underground utilities shall be backfilled in accordance with the following:
  - 1) Backfill material shall be the same as described in Section 2.01. The layers below 12-inches from the top of compacted fill shall be compacted to 90 percent relative density per ASTM D1557 and shall contain no materials greater than 3 inches in maximum dimension.
  - 2) Place the uppermost 12 inches of compacted fill in two lifts of 6 inches (compacted). Each lift shall be compacted to 95 percent relative density per ASTM D1557 and shall contain no materials greater than 1 inch in maximum dimension.
- g. Any excavation that exposes or potentially could expose an existing underground utility or structure indicated as "protect in place," "to remain" or similar indication, or any unknown utility or structure found and deemed requiring special methods by the OCTA Project Manager, shall be classified as a structural excavation and backfill for purposes of replacing and compacting fill. This will be at no additional cost to OCTA.
  - 1) The Contractor shall not disrupt any service until utility owner and the OCTA Project Manager have determined the required action on such lines.
- 4. Maintain free of damage, existing sidewalks, structures, and pavement, not indicated to be removed in the plans.
  - a. Any item known or unknown or not properly located that is inadvertently damaged shall be repaired to original condition at no expense to OCTA.
- 5. Provide full access to public and private premises, fire hydrants, street crossings, sidewalks and other points as designated by OCTA to prevent serious interruption of travel and emergency services.
- 6. The Contractor shall take precautions to prevent damage to existing foundations and structures protecting them in place without undermining or causing movement.

7. Maintain stockpiles and excavations in such a manner to prevent movement or damage to structures on-site or on adjoining property that are not noted in plans as being demolished.
  8. At all times during the execution of this work, the Contractor shall maintain safe and stable excavations. Where required by California Construction Safety Orders, the Contractor shall employ side slope layback, benching, or shoring.
- B. Water and Storm Drainage Removal:
1. The Contractor shall provide, operate, and maintain an adequate system to remove water throughout the excavation and construction operation as necessary.
  2. Obtain all permits for and legally dispose of water from dewatering operations to facilitate construction. Comply with requirements of the permits, project environmental conditions and agencies having jurisdiction.
  3. Elements of the system shall be located to allow continuous water removal without interfering with other construction activities.
- C. Salvageable Items: Carefully remove items indicated to be salvaged, and store as directed by the OCTA Project Manager.
- D. Dispose of waste materials, legally, off site.
1. Burning, as a means of waste disposal, is not permitted.

### **3.02 SITE EXCAVATION AND GRADING**

- A. The work includes all operations in connection with excavation, borrow and backfill, grading, and disposal of excess materials in connection with the preparation of the site(s) for construction of the parking.
- B. Excavation and Grading: Perform as required by the Contract Drawings.
1. Prior to rough grading, the Contractor shall complete clearing and grubbing in accordance with Section 31 11 00, Site Clearing.
  2. Contract Drawings may indicate both existing grade and finished grade required for construction of Project.
    - a. Stake all units, structures, piping, fills and cuts, roads, parking areas and walks and establish their elevations upon completion of site clearing in accordance with Section 31 11 00, Site Clearing.
    - b. Perform other construction staking work required.

4. The Contractor shall perform grading as indicated to achieve the bottom elevation for the backfill. This work shall be considered incidental to construction of backfill.
5. Preparation of ground surface (grading):
  - a. Before backfill is started, scarify to a minimum depth of at least 6-inches and up to 18-inches (if necessary to reach the specified density) in all proposed backfill areas.
    - 1) Moisture content shall be brought to near optimum moisture content and compacted to 90 percent relative density per ASTM D1557 reached prior to placing any embankment fill if more than 12" of fill required.
    - 2) Moisture content shall be brought to near optimum moisture content and compacted to 95 percent relative density per ASTM D1557 reached prior to placing any backfill if 12-inches or less of fill is required is to be placed directly on the prepared base.
  - b. Where backfill is to be constructed against an existing ground surface that is steeper than one vertical to four horizontal, plow surface in a manner to bench and break up surface so that fill material will key into the existing surface.
    - 1) Benches shall have a minimum horizontal dimension of 5 feet and maximum dimension of 6-feet and a vertical rise of not more than 4 feet.
    - 2) Benches cut into the slope shall not be allowed to remain unsupported overnight.
6. In areas where unsuitable materials are encountered in the backfill footprint, OCTA Project Manager may direct removal and replacement with suitable materials placed and compacted in accordance with these Specifications.
7. Backfill shall be placed as promptly as work permits but not until completion of the following:
  - a. Approval by OCTA Project Manager of the excavation or backfill base preparation.
  - b. Recording of final location, elevation, and limits of any structure, utility or other underground feature that will remain in place and be covered by the backfill.
  - c. Removal of any trash and debris.

- d. Approved excavation bottoms shall be scarified to a minimum of 6 inches, moisture conditioned to near optimum moisture content and compacted to a minimum of 90 percent of the dry unit weight, based on ASTM D1557.
- 8. Protection of finished grade:
  - a. During construction, shape and drain embankment and excavations.
  - b. Maintain ditches and drains to provide drainage at all times. Protect newly graded areas from erosion.
  - c. Protect graded areas against action of elements prior to acceptance of work.
  - d. Contractor shall keep graded areas free of trash and debris until final inspection and acceptance by OCTA Project Manager.
  - e. Re-establish grade where settlement or erosion occurs.
  - f. Contractor shall not operate equipment supported directly on the roadbed unless it can be demonstrated through compaction testing to the OCTA Project Manager's approval that the equipment selected can be supported without creating softening, rutting or degradation of the roadbed.
  - g. Contractor will remove any excess material that was delivered and not used for the Project at its own expense.
- C. Construct backfill as required by the Contract Drawings:
  - 1. Construct backfills at locations and to lines of grade indicated.
    - a. Completed backfill and cut shall correspond to shape of typical cross section or contour indicated regardless of method used to show shape, size, and extent of line and grade of completed work.
  - 2. Provide approved fill material for backfill which is free from roots, organic matter, trash, frozen material as follows:
    - a. Ensure that stones larger than 3 inches are not placed in upper 12 inches of fill or embankment.
    - b. Do not place material in layers greater than 8-inches loose thickness.
  - 3. Compaction shall be by equipment approved by OCTA Project Manager to obtain specified density.



- a. Control moisture for each layer as necessary to meet requirements of compaction.
  - b. Before compaction, each layer shall be moistened or aerated as necessary to provide the optimum moisture content
  - c. Compaction shall not result in significant rutting under the action of the compactor on the final passes on a lift.
  - d. The compaction process must extend the full width of the embankment fill or cut section for the layer being worked.
4. Contractor shall properly place and compact all backfill. Deficiencies resulting from insufficient or improper compaction of such Material shall be corrected by the Contractor throughout the Contract period. When specified compaction density is not being obtained or subgrade surface damaged by equipment, Contractor shall:
- a. Stop placing additional fill if the previous lift did not meet the required dry unit weight, moisture content or if soil conditions are not stable.
    - 1) Material in place may be scarified, water content adjusted and area rerolled until required compaction is obtained.
    - 2) Alternatively, Contractor may remove not fully compacted material and replace with different material at no additional cost to OCTA.
    - 3) Contractor may proposed other means and methods to the OCTA Project Manager for approval.
  - b. If softening of the subgrade surface takes place under construction traffic to a degree unsatisfactory to OCTA Project Manager, Contractor shall rework or remove and replace the material, recompacting and grading as required at no additional cost to OCTA.
  - c. If a fill material is too wet:
    - 1) It shall be scarified or disked and aerated until the proper water content is attained.
    - 2) With approval of OCTA Project Manager, Contractor may blend drier soil with the wet fill to achieve a water content suitable for compaction.
    - 3) Contractor may propose other means and methods to the Engineer for approval.



**3.03 COMPACTION**

- A. Relative Compaction – shall be 90 percent relative compaction. The top 6 inches of subgrade material shall be compacted to a relative compaction of 95 percent.
- B. Maximum Lift Thickness
  - 1. Vibratory equipment including vibratory plates on backhoe dipsticks, vibratory smooth wheel rollers, and vibratory pneumatic-tired rollers – maximum lift thickness of 18 inches.
  - 2. Rolling equipment, including sheepfoot (both vibratory and non- vibratory), grid, smooth-wheel (non-vibratory), grid, smooth wheel (non-vibratory), and segmented wheels – maximum lift of 8 inches.
  - 3. Hand-directed mechanical compactors such as vibratory plates or tamper – maximum lift thickness of 4 inches.
- B. Contractor shall determine the type, size and weight of the compaction equipment best suited to perform the work at hand. Select and control the lift (layer) thickness within the requirements of the Specifications with approval of OCTA Project Manager. Proper control over the moisture content of the material shall be maintained to obtain required compaction results.
- C. In areas inaccessible to conventional compactors, or where maneuvering space is limited, approved impact rammers, small drum vibrators, vibratory plate, or pneumatic button head compaction equipment may be used with layer thickness not to exceed 6 inches before compaction.
- D. Compaction by jetting or flooding with water is not allowed.

**3.04 FIELD QUALITY CONTROL/QUALITY ASSURANCE**

- A. Inspections by Independent Testing and Inspection Agency or Agencies: The following applies to tests and inspections:
  - 1. The Authority will select and pay for an independent testing and inspection laboratory or agency, to conduct tests and inspections as indicated on Drawings or Specifications, and as required by authorities having jurisdiction.
  - 2. Costs for additional tests, inspections and related services, due to the following, shall be reimbursed to the Authority by the Contractor and no change in Contract Time shall result.
- B. Moisture density testing, to be performed by the OCTA's Soils Engineer, is required for all materials to be compacted.
- C. Extent of compaction testing will be as necessary to assure compliance with Specifications.

1. On-site density tests in accordance with ASTM D2922 and ASTM D3017 shall be used to demonstrate that proper compaction has been obtained.
2. Visual observation may be used to augment on-site density tests. Visual inspection in no way relieves Contractor of responsibility to perform on site density testing.
3. Density testing shall be performed in the following frequency:
  - a. At least one density test shall be performed in the prepared subgrade in backfill every 500 linear feet.
  - b. At least one density test is to be performed for each 30 cubic yards of structure compacted backfill.
  - c. Density tests shall be taken in areas representative of compactive efforts and not in areas of equipment traffic.
4. OCTA shall perform Quality Assurance (verification) testing for on-site density as determined by the OCTA Project Manager.
  - a. Testing will be by an independent certified soils testing laboratory.
  - b. Retests required due to Contractor not complying with the density requirements shall be paid for by the Contractor as a deduction from payment.
- D. Give minimum of 24 hour advance notice to OCTA Project Manager when ready for compaction or subgrade testing observation and inspection.
- E. Should any compaction density test or subgrade inspection fail to meet Specification requirements, perform corrective work as necessary including but not limited to rerolling and manipulation of moisture. Additional compaction testing shall be required to determine that corrective work provides compaction in the failed area meeting requirements of these Specifications.
- F. Contractor shall provide a record of compaction testing results including corrective actions taken if necessary on the approved form to the OCTA Project Manager.
- G. Contractor's corrective work to meet compaction requirements and retesting resulting from failing compaction density tests shall be at no additional cost to OCTA.

### **3.05 DEWATERING AND SHORING**

1. Dewatering:
  - a. Where groundwater is, or is expected, to be encountered during excavation, install a dewatering system to prevent softening and

disturbance of subgrade below foundations and fill material. The dewatering system shall be designed to allow foundations and fill material to be placed in the dry, and to maintain a stable excavation side slope.

- b. Groundwater levels shall be maintained at least 3 feet below the bottom of any excavation.
- c. Review soils investigation before beginning excavation and determine where groundwater is likely to be encountered during excavation.
- d. Employ a hydrologist for selecting and designing the dewatering system. Such design shall include field maintenance instructions for Contractor's personnel.
- e. Keep dewatering system in operation until dead load of structure exceeds possible buoyant uplift force on structure.
- f. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction.
  - 1) Install groundwater monitoring wells as necessary.
  - 2) Obtain dewatering permits in accordance with Project Environmental requirements.
- g. Upon completion of excavation and structure foundation work, do not turn off dewatering system in a manner that the upsurge in water weaken the subgrade.

2. Subgrade stabilization:

- a. If subgrade under foundations, fill material, slabs-on-grade, or equipment support pads is in a frozen, loose, wet, or soft condition before construction is placed thereon, remove frozen, loose, wet, or soft material and replace with approved compacted material as directed by OCTA Project Manager.
- b. Provide compaction density of replacement material as stated in this Specification Section.
- c. Loose, wet, or soft materials, when approved by OCTA Project Manager, may be stabilized by a compacted working mat of well graded crushed stone meeting requirements for Table 1, Imported Backfill material.
  - 1) Compact stone mat thoroughly into subgrade to avoid future migration of fines into the stone voids.

- d. Method of stabilization shall be as approved by OCTA Project Manager.
  - e. Do not place further construction on the repaired subgrades, until the subgrades have been approved by OCTA Project Manager.
3. Protection of structures:
- a. Contractor shall take precautions to protect new and existing structures from becoming damaged due to construction operations or other reasons.
  - b. Contractor shall take precautions to protect subgrade under new and existing foundations from becoming wet and undermined during construction due to presence of surface or subsurface water or due to construction operations.
4. Shoring:

The original excavation shoring systems used for installation of the LNG tanks were left in place and buried underground. Sheet piling shoring systems designed for 20-year life were left in place underground after installation of the existing LNG tanks at Garden Grove and Anaheim bus bases. A copy of the original structural calculations are included in the appendix for reference. The existing sheet pile shoring systems are expected to be in serviceable condition and the contractor shall utilize the existing shoring to facilitate removal of the existing LNG tank. The existing shoring shall not be removed and shall be abandoned in place after removal of LNG tanks.

Excavation shall be closely monitored in order to avoid damaging the tanks and other related appurtenances. After the surface improvements such as pavement and flat works are removed, hand excavations are recommended. Excavations shall be stopped after excavating to a depth of 5ft from the finished surface in order to inspect the condition of the buried steel shoring left in-place and obtain soil samples as necessary. OCTA's structural design engineer shall inspect and evaluate the condition before continuing with further excavation. This process of excavating about 5ft, inspecting and sampling soil shall continue until the tank foundation/footings are exposed.

5. Drainage:
- a. Control grading around structures so that ground is pitched to prevent water from running into excavated areas or damaging structures.

- b. Maintain excavations where foundations, floor slabs, equipment support pads or fill material are to be placed free of water.
  - c. Provide pumping required to keep excavated spaces clear of water during construction in accordance with Section 3.05-B.6, Dewatering, of these Specifications.
  - d. Should any groundwater, not noted in the Construction Documents be encountered in the excavation, notify OCTA Project Manager.
  - e. Provide free discharge of water by trenches, pumps, wells, well points, or other means as necessary and drain to point of disposal that will not damage existing or new construction or interfere with construction operations in accordance with Section 3.05 B.6 Dewatering, of these Specifications.
6. Backfilling Under Piping or Paving:
- a. When backfilling outside of structures requires placing backfill material under piping or paving, the material shall be placed from bottom of excavation to underside of piping or paving at the density required for fill under piping or paving as indicated in this Section.
  - b. This compacted material shall extend transversely to the centerline of piping or paving a horizontal distance each side of the exterior edges of piping or paving equal to the depth of backfill measured from bottom of excavation to underside of piping or paving.
  - c. Provide special compacted bedding or compacted subgrade material under piping or paving as required by other Sections of these Specifications.

#### **PART 4 – MEASUREMENT AND PAYMENT**

- A. No separate measurement or payment will be made for the work of this section.

#### **END OF SECTION**

**SECTION 32 11 23**

**AGGREGATE BASE COURSES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

A. Section Includes:

1. Material requirements for aggregate base courses, to be furnished and placed to lines, grades, and dimensions in accordance with drawings, specifications, and directions of OCTA Project Manager.

A. Related Sections:

1. Section 31 20 00, Earthwork.
2. Section 32 13 13, Concrete Paving
3. Section 32 12 16 Asphalt Paving

**1.02 REFERENCE STANDARDS**

A. ASTM: ASTM International.

B. Caltrans: State of California Department of Transportation, Standard Specifications.

**1.03 SUBMITTALS**

A. Submit under Section 01 33 00, Submittal Procedures.

B. Compliance: Supplier's certification that material delivered to the site is in compliance with the specifications.

C. Samples: As required by OCTA Project Manager, samples of not less than 150 lbs. Samples may be obtained independently by OCTA Project Manager's representative for testing to determine whether material delivered to the site is in compliance with specifications.

D. Equipment: List of all equipment used for placing and compacting sub-ballast.

**1.04 QUALITY CONTROL**

A. Provide and install materials in compliance with applicable sections of reference standards.

B. Establish and maintain required lines and elevations.

**PART 2 - PRODUCTS**

**2.01 MATERIAL REQUIREMENTS**

- A. Aggregate base shall conform to the requirements for Class 2 Aggregate Base in Section 26-1.02A of the Caltrans Standard Specifications. Aggregate may contain material processed from reclaimed asphalt concrete, Portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials. The amount of the reclaimed material shall not exceed 50% of the total volume of the aggregate used.
- B. Aggregate shall conform to the grading and quality requirements in the tables Section 26-1.02A. Aggregate shall be graded for 1-1/2 maximum size aggregate.

**PART 3 - EXECUTION**

**3.01 AGGREGATE BASE**

- A. Aggregate base shall not be spread until OCTA Project Manager has approved the earthwork and compacted sub-base.
- B. Spread and compact aggregate base in conformance with the requirements of Caltrans Standard Specifications Section 26. Compaction shall be to a minimum of 95 percent relative density per ASTM D 1557. Maximum lift is 6 inches.
- C. The surface of the aggregate base shall be stable to permit follow-on stages of construction without rutting.
- D. Aggregate base shall be finished to within 0.05 feet of the lines and grades indicated on the drawings and shall be maintained in a condition acceptable to OCTA Project Manager until paving material has been placed and approved.

**3.02 SUBGRADE PREPARATION**

- A. Immediately before spreading the aggregate base, the subgrade must comply with the specified compaction and elevation tolerance for the material involved and be free from loose or extraneous material.
- B. Areas of the subgrade lower than the grade may be filled with aggregate base.
- C. Subgrade shall be compacted per SSPWC Section 301, Treated Soil, Subgrade Preparation, and Placement of Base Materials.

**PART 4 - MEASUREMENT AND PAYMENT**

No separate measurement or payment shall be made under this Section.

**END OF SECTION**

**SECTION 32 13 13**

**CONCRETE PAVING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Portland cement concrete paving, including sidewalks, accessible ramps, driveways, and all other concrete flatwork.
- B. Related Sections:
  - 1. Section 03 30 00, Cast-In-Place Concrete
  - 2. Section 32 16 13, Concrete Curbs and Gutters

**1.02 REFERENCES**

- A. ASTM: ASTM International (formerly American Society for Testing and Materials).
- B. Caltrans: State of California Department of Transportation, Standard Specifications.
- C. SSPWC: Standard Specifications for Public Works Construction.
- D. California Code of Regulations (CCR), Title 24, California Building Code (CBC).
- E. ACI: America Concrete Institute.

**1.03 SUBMITTALS**

- A. Submit under Section 01 33 00, Submittal Procedures.
- B. Mix Designs: Submit concrete mix design documentation before bringing material to project site. Demonstrate conformance with specifications.
- C. Samples: Samples and test reports showing compliance with requirements in accordance with SSPWC Section 201-1.1.5.
- D. Product Data: For cement, aggregates, admixtures, curing materials, joint devices, bonding epoxy, and attachment accessories.
- E. Shop Drawings: For structural concrete and concrete slabs showing dimensioned locations, types of construction and expansion joints, and method of keying.
- F. Delivery tickets: Copies of delivery tickets to OCTA Project Manager for each load of concrete delivered to the site. Delivery tickets shall show date, time of loading, time of delivery, class, strength of concrete, contract number, mix design, slump ordered,



type of cement, admixtures, name of purchasing contractor, batch weights of all Materials, number of the revolution counter when the truck left the plant, any water added at the site, and the authorizing person.

**1.04 QUALITY ASSURANCE**

- A. Unless specified otherwise, work and materials for construction of the portland cement concrete paving shall conform to SSPWC Sections 201-1 and 302-6.
- B. Work, materials, and color of the handicap ramp paving shall conform to applicable sections of CCR Title 24 Section 1127B and Figures 11B-19A through 19C and 11B-20A through 20E as well as Americans with Disabilities Act (ADA) Accessibility Guidelines (ADAAG) for Buildings and Facilities.
- C. Paving work, base course, and related construction, shall be done only after all excavation and construction work which might injure the paving have been completed. Damage caused during construction shall be repaired before acceptance.
- D. Any existing paving area shall, if damaged or removed during the course of this project, be repaired or replaced under this section. Workmanship and materials for such repair and replacement, except as otherwise noted, shall match as closely as possible those employed in existing work.
- E. Pavement, base, or subbase shall not be placed on a muddy subgrade.
- F. Provide control joints as required. Provide sawcut joints. Match joints at existing pavement.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Aggregate Base Course: Conform to Section 32 11 23, Aggregate Base Courses.
- B. Steel Reinforcement: Steel reinforcing bars shall conform to ASTM A615, Grade 60 unless noted otherwise on the drawings.
  - 1. Bars employed as reinforcement shall be deformed type.
  - 2. Bars employed as dowels shall be hot-rolled plain rounds.
- C. Welded wire fabric reinforcement shall conform to the applicable requirements of ASTM A185. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement provided in roll form will not be permitted.
- D. Portland Cement Concrete:
  - 1. Portland cement concrete for pavements and slabs shall be air-entrained type with a maximum water-cement ratio of 5.0 conforming to ACI 325.9R, Guide for

Construction of Concrete Pavements and Bases. Minimum compressive strengths at 28 days shall be 4000 psi over class 2 base.

2. Concrete shall be air-entrained type, conforming to ASTM C94. Air content by volume shall be 6 percent plus or minus 1 percent, and shall be tested in conformance with ASTM C231.
  3. Concrete slump shall be no less than 2 inches nor did greater that 4 inches determine in conformance with ASTM C143.
  4. Cement shall be portland cement, conforming to ASTM C150, Type II. Only one color of cement, all of the same manufacturer, shall be used for the work.
  5. Fine and coarse aggregates shall conform to ASTM C33.
  6. Concrete shall contain a water reducing agent to minimize cement and water content of the concrete mix at the specified slump. Water reducing agent shall conform to ASTM C494.
  7. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixtures other than those specified shall be used in the concrete without the specific written permission of OCTA Project Manager in each case.
- E. Surface Retarder: Water-based top-surface retarder, equal to "Top-Cast®" By Grace Construction Products, 888-336-9303. Equal products by other manufacturers are acceptable upon approval by the OCTA Project Manager.
- F. Curing Material for Standard Gray Concrete:
1. Curing shall be by moist curing or by use of curing compound.
  2. Curing paper shall be non-staining, fiber reinforced laminated kraft bituminous product conforming to ASTM C171. Four mil polyethylene sheeting may be substituted for curing paper.
  3. Curing compound shall be a resin-based white pigmented compound conforming to ASTM C309, Type 2.
- F. Expansion Joints:
1. Expansion joint filler shall be preformed, non-bituminous type joint filler conforming to ASTM D1752, Type II.
    - a. Premolded filler shall be one piece for the full depth and width of the joint leaving a sealant recess as indicated.
    - b. Use of multiple pieces of lesser dimensions to make up required depth and width of joint is not be permitted.
    - c. Except as otherwise noted on Drawings, joint filler shall be 1/2 inch thick.

2. Expansion joint shall receive joint backer rod and shall be sealed with joint sealant.

**G. Control Joints:**

1. Control joints indicated to be tooled shall be made by scoring concrete slab after finishing of slab, with scoring tool which will cut into slab at least 1 inch, but in no case less than 25 percent of slab depth.
2. Control Joints indicated to be saw-cut shall be made using conventional concrete saws as soon as possible without dislodging aggregate to 1/4 slab thickness. Complete sawing of joints within 12 hours after finishing is completed. If early sawing causes undercutting or washing of the concrete, delay the sawing operation and repair the damaged areas. The saw cut shall not vary more than 1/2 inch from the true joint alignment. Discontinue sawing if a crack develops ahead of a saw cut. Immediately after each joint is sawed, thoroughly clean the saw cut and adjacent concrete surface. Respray surfaces treated with curing compound which are damaged during the sawing operations as soon as the water disappears. Protect joints in a manner to prevent the curing compound from entering the joints.
3. Control joints (noted as score lines on Drawings) shall meet the requirements of weakened plan joints in conformance with SSPWC Section 302-6.5.4.
4. Unless otherwise indicated on Drawings, control joints shall be line with existing joints located outside the paving limits.

**H. Construction Joints:**

1. Transverse construction joints shall be placed whenever placing of concrete is suspended for more than 30 minutes.
  - a. Butt joint with dowels or thickened edge joint shall be used if construction joint occurs at location of control joint.
  - b. Keyed joints with tie bars shall be used if the joint occurs at any other location.

- I. Sealant: Sealant for sealing of control joints and expansion joints in concrete paving shall be a two component polyurethane elastomeirc based sealant conforming to ASTM C920, Type M, Grade P, Class 25, Use T<sub>1</sub> with a Shore A hardness of 30 plus or minus 5, or better.

**1. Reference Products:**

- a. "THC-900", manufactured by Tremco, 800-321-7906.
- b. "Sikaflex® -2c NS TG", manufactured by Sika Corp., 800-933-7452.
- c. "Urexpan® NR-200" manufactured by Pecora Corp., 800-523-6688.

2. Color of sealant shall be selected by OCTA Project Manager from the manufacturer's full color range.
3. Primer shall be as recommended by the sealant manufacturer for the use intended.
4. Joint backing shall be as recommended by the sealant manufacturer.

### **PART 3 – EXECUTION**

#### **3.01 PREPARATION OF SUBGRADE**

- A. Areas to be paved shall be compacted and brought to subgrade elevation in conformance with the requirements of Section 31 20 00, Earth Moving, before work of this section is performed. Final fine grading, filling, and compaction of areas to receive paving, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this section.
- B. Excavations for utilities or other items required in pavement subgrade shall be completed before final compaction and fine grading of subgrade are performed. Where excavation must be performed in complete subgrade, subbase, base, or pavement, subsequent backfill and compaction shall be performed in conformance with Section 31 20 00, Earthwork.
- C. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 inches deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing pavement.
- D. Materials shall not be stored or stockpiled on prepared subgrade.
- E. Disposal of debris and other material excavated under this Section, and material unsuitable for or in excess of requirements for completing work of this Section shall be disposed of off-site.
- F. Prepared subgrade will be inspected by OCTA Project Manager. Subgrade shall be approved before installation of aggregate base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this section.

#### **3.02 AGGREGATE BASE COURSE**

- A. Aggregate base course for paving and the spreading, grading, and compaction methods employed shall be in conformance with Section 32 11 23, Aggregate Base Courses.
- B. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with aggregate. Materials spilled outside pavement lines shall be removed and area repaired.

- E. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise injured, shall be cleaned, replaced, or otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

**3.03 STEEL REINFORCEMENT AND DOWELS**

- A. Before being placed in position, reinforcing for reinforced concrete shall be thoroughly cleaned of loose mill and rust scale, dirt, and other foreign material which may reduce the bond between the concrete and reinforcing. Where there is delay in placing concrete after reinforcement is in place, bars shall be re inspected and cleaned when necessary.
- B. Any bar showing cracks after bending shall be discarded.
- C. Unless otherwise indicated on Drawings, reinforcing shall extend within 2 inch of formwork and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 inches.
- D. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel anchors shall be securely wired in the exact position called for, and shall be maintained in that position until concrete is placed and compacted. Chair bars and supports shall be provided in a number and arrangement satisfactory to OCTA Project Manager.

**3.04 PORTLAND CEMENT CONCRETE PAVING**

- A. Paving mix, equipment, methods of mixing and placing, and precautions to be observed as to weather, condition of base and the like, shall meet the requirements of SSPWC Section 302-6 and ACI 325.9R. Pavement shall be constructed in accordance with Drawings.
- B. Normal concrete placement procedures shall be followed. Concrete shall arrive at the job site so that no additional water will be required to produce the desired slump. When conditions develop that require addition of water to produce the desired slump, permission of OCTA Project Manager shall be obtained. The concrete shall be transported from the mixer to its place of deposit by a method that will prevent segregation or loss of material.
- C. Work shall not be performed during rainy weather or when temperature is less than 40 degrees F.
- D. Adjacent work shall be thoroughly protected from stain and damage during entire operation. Damaged and stained areas shall be replaced or repaired to equal their original conditions.
- E. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall thoroughly damp when concrete is placed. There shall be no free water on surface.

- F. Concrete which has set or partially set before placing shall not be employed. Retempering of concrete will not be permitted.
- G. Concrete shall be thoroughly spaded and tamped to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.
- H. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar scum and laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 inch thick, shall be well scrubbed into thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

### **3.05 FINISHING**

- A. Concrete flatwork surfaces shall be screeded off and finished true to line and grade, and free of hollows and bumps. Surface shall be dense, smooth, and at exact level and slope required.
- B. Unless otherwise indicated on Drawings, horizontal surfaces of concrete surfaces which are intended for pedestrian traffic shall be given a light rotary sweat finish. Surfaces intended for vehicular traffic shall receive a heavy broom finish with direction of brooming in concrete surface perpendicular to traffic direction or match existing finish outside the paving limits. All finish textures shall be approved by OCTA Project Manager.
- C. Surface Retarded Concrete: Where shown on the drawings, concrete shall be given a surface retarder coating to provide an etched finish. Provide Nos. 3 and 25 etch finishes according to the manufacturer's technical data sheets and specifications; provide in locations as shown on the drawings. Surface textures shall be approved by OCTA Project Manager.
  - 1. Surface retarder shall be spray applied to the concrete after evaporation of initial bleed water. Apply in rates as recommended by the manufacturer. Protect all adjacent surfaces from spray.
  - 2. Wash the retarded cement matrix away using high-pressure water within 24 hours of application. It may be necessary to remove the retarded matrix the same day as application during hot weather or for the lightest etch. Conform to manufacturers recommendations.
- D. Broom Finish: After concrete has set sufficiently to prevent coarse aggregate from being torn from surface, but before it has completely set, brooms shall be drawn across it to produce a pattern of small parallel grooves. Broomed surface shall be uniform, with no smooth, unduly rough or porous spots, or other irregularities. Coarse aggregate shall not be dislodged by brooming operation.
- E. Immediately following finish operations, arises at edges and both sides of expansion joints shall be rounded to 1/4 inch radius. Control joints to be tooled shall be scored

into slab surface with coring tool. Adjacent edges of control joint shall at same time be finished to 1/4 inch radius.

- F. Accessible ramp finish shall conform to the requirements of CBC Section 1127B.5.5-7. Refer to Section 32 17 26, Tactile Warning Surfacing for requirements for detectable warning surfacing.
- G. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

### **3.06 CURING**

- A. Keep concrete continuously damp from time of placement until end of specified curing period. Water not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete placement. Between finishing operations, protect surface from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed over it, and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.
- B. Concrete surfaces shall be cured by completely covering with curing paper or application of a curing compound.
  - 1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period surface shall be checked frequently, and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.
  - 2. If concrete is cured with a curing compound, apply compound shall be applied at a rate of 200 square feet per gallon, in 2 applications perpendicular to each other.

### **3.07 EXPANSION JOINTS**

- A. Expansion joints shall be located per SSPWC and/or Caltrans standard drawings. Expansion joint shall be formed in the concrete to required width preformed joint filler in place. Joint filler shall extend the full depth of the slab unless otherwise noted on Drawings. Joint filler shall extend the full length of the expansion joint.
- B. Use non-bituminous type joint filler. Cure concrete for at least 10 days with liquid curing compound or sheet material except as otherwise specified. Provide reinforcing bars or mesh only where indicated. Conform to requirements specified in this section for slab finishing and curing as applicable.
- C. Concrete Walks: Provide 1/2 inch expansion joints as specified at curbs and where walks abut rigid structures, aligned with joints in curbs where adjoining, and apply



light broom finish perpendicular to traffic direction. Score walks as shown or directed.

**3.08 CONTROL JOINTS**

- A. Saw cut joints indicated shall be sawn by using a diamond blade concrete power saw. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workers and equipment without damage to the slab. Saw shall cut into slab as noted on drawings, but in no case less than 25 percent of slab depth. Cuts shall be full depth for entire area indicated; no radical transitions.
- B. Unless otherwise indicated, score lines shall be tooled into the concrete slab, with 3 inch wide border and troweled edges, in pattern indicated on Drawings, or every 10 feet on center maximum. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workers without damage to the slab, but before slab has achieved its final set.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. No separate measurement or payment will be made for the work of this section.

**END OF SECTION**



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**SECTION 32 16 14**

**CONCRETE CURBS AND GUTTERS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Placement of curbs and gutters, longitudinal gutters and wheel stops, and related material, including labor, materials, and equipment.
- B. Related Sections:
  - 1. Section 03 11 00, Concrete Forming.
  - 2. Section 03 20 00, Concrete Reinforcing.
  - 3. Section 03 30 00, Cast-in-Place Concrete.
  - 4. Section 32 13 13, Concrete Paving.

**1.02 REFERENCE STANDARDS**

- A. ASTM: ASTM International (formerly American Society for Testing and Materials).
- B. Caltrans: State of California Department of Transportation, Standard Specifications.
- C. SSPWC: Standard Specifications for Public Works Construction.

**1.03 SUBMITTALS**

- A. Submit under Section 01 33 00, Submittal Procedures.
- B. Compliance: Concrete mix and materials, test reports, and manufacturer or supplier's certification that materials delivered to site are in compliance with specifications.
- C. Samples: Samples and test reports showing compliance with requirements in accordance with SSPWC Section 201-1.1.5.
- D. Product Data: Manufacturer's product data or catalog cuts and certificate of conformance for joint filler or other materials which are specified to conform to publications referenced under "Products" in this section.

**1.04 QUALITY ASSURANCE**

- A. Establish and maintain required lines and elevations. Make gradual and smooth transitions to pavements.

**PART 2 - PRODUCTS**

**2.01 PORTLAND CEMENT CONCRETE**

- A. Portland cement: Shall be Type II conforming to SSPWC Section 201-1.2.1.
- B. Aggregate: Shall conform to SSPWC Section 201-1.2.2.
- C. Air-Entraining Admixture: All concrete for curbs and gutters shall air-entrained. Admixture shall conform to SSPWC Section 201-1.2.4d.

**2.02 REINFORCEMENT**

- A. Reinforcement for this portion of the work shall conform to the provisions of Section 03 20 00, Concrete Reinforcing, and chairs shall be plastic or concrete.

**2.03 JOINT FILLER**

- A. Premolded joint fillers shall conform to SSPWC Section 201-3.2., non-bituminous.

**PART 3 - EXECUTION**

**3.01 EXTRUDED PORTLAND CEMENT CONCRETE CURBS**

- A. Concrete curbs and gutters shall be constructed of portland cement concrete of the class and other requirements specified in Section 303-5 of the SSPWC.
- B. For curbs constructed on existing paving, refer to the drawings for details and requirements for attaching curbs to existing paving.
- C. Space joints in extruded curbs to match joints in adjacent paving. When the adjacent paving is not jointed, locate joints at angles, corners, points of curvature, and points of tangency at intervals of not more than 15 feet.
- D. Joints shall be 1/8-inch minimum thickness and constructed to a minimum depth of 1-inch by scoring with a tool which will leave the corners rounded and destroy aggregate interlock to a depth of 1 inch.
- E. Place expansion joint filler to full cross-section with 1/4-inch thick filler in the curb at abutting structures and at 100-foot intervals.
- F. Cure the extruded concrete for not less than 72 hours by the methods specified in Section 03 30 00, Cast-in-Place Concrete

**3.02 CAST-IN-PLACE CONCRETE CURB AND COMBINED CURB AND GUTTER**

- A. Construction of cast-in-place curb and combined curb and gutter shall meet the requirements of Section 03 30 00, Cast-in-Place Concrete.

**PART 4 - MEASUREMENT AND PAYMENT**

- A. No separate measurement or payment will be made for the work of this section.

**END OF SECTION**

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**SECTION 32 17 23**

**PAVEMENT STRIPING AND MARKINGS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

A. Section Includes:

1. Labor, materials, and equipment necessary and incidental to applying pavement striping and marking on platforms, roadways and parking lots and painting of curbs,.

**1.02 REFERENCE STANDARDS**

- A. Caltrans: State of California Department of Transportation, Standard Specifications.
- B. Caltrans: State of California Department of Transportation, California MUTCD.
- C. CCR, Title 24: California Code of Regulations: California Building Code.

**1.03 SUBMITTALS**

- A. Product Data: Technical data for each type of pavement marking materials. Provide manufacturer's recommendations for application, including limitations, safety, and environmental requirements, application rates, dry film thickness (DFT), and equipment required for application.
- B. Shop Drawings: Pavement marking plans indicating lane separations, directional markings, and defined parking spaces. Show striping widths and colors. Dimension all parking space striping.
- C. Test Reports and Certifications: Manufacturer's certification that products used comply with SCAQMD regulations for VOC content.

**1.04 QUALITY ASSURANCE**

- A. Pavement striping and marking shall be performed by workers with proven skills required to perform the work in accordance with the correct location, alignment, and dimensions of the striping and markings as shown in the drawings or as modified by OCTA Project Manager.
- B. At no additional cost to OCTA, repair or replace pavement markings which fail to present a uniform appearance and those which are marred and damaged by traffic or by other causes.

- C. Until acceptance by OCTA Project Manager, Contractor shall be responsible for maintenance of pavement striping and markings until the roadway and/or parking area is open to vehicular traffic.
- D. Pavement striping and marking, whether temporary or permanent, shall be completed before the roadway or parking area is opened for vehicular traffic.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver paint materials to site in manufacturer's original, unopened, and labeled containers. Keep containers in clean condition, free of foreign materials, and paint residue. Protect from freezing. Remove paints exposed to freezing conditions and replace at no expense to OCTA when required by OCTA Project Manager.

#### **1.06 PROJECT CONDITIONS**

- A. Striping and Marking: Apply traffic paints when temperature surfaces and surrounding air temperatures are between 50 deg F and 90 deg F and weather is not windy or humid, unless otherwise permitted in writing by paint manufacturer and authorized by OCTA Project Manager.
  - 1. Do not apply paints to wet or damp surfaces.
  - 2. Do not apply paints to asphalt or asphalt sealers which have not thoroughly cured and dried.
- B. Take precautions to avoid effects of wind drift during the application of liquid materials.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Paint for traffic striping and marking shall comply with Caltrans Standard Specifications Sections 84-1 and 84-3. Type of paint shall either be fast dry or rapid dry solvent borne.
- B. Glass Beads: Conform to California State Specification No. 8010-004 (type II).
- C. Project applicants shall require by contract specifications that materials that do not require painting be used during construction to the extent feasible. Contract specifications shall be included in the proposed project construction documents, which shall be reviewed and approved by the City of Anaheim and Garden Grove as applicable.

#### **2.02 COLORS**

- A. Color for roadways shall be Caltrans Standard Specifications "white" and "yellow" unless otherwise indicated on drawings.

- B. Parking Areas: Colors per Caltrans Standard Specifications Section 84-3.02.
  - 1. Red: Safety and restricted marking (fire lanes and curb markings).
  - 2. Yellow: Traffic and safety markings (directional markings and graphics, lane and curb markings).
  - 3. Blue: Accessible parking stalls and graphics and disability markings.
  - 4. White: Traffic lanes, parking stalls, and elsewhere.

### **PART 3 – EXECUTION**

#### **3.01 PREPARATION**

- A. Layout chalk markings at locations and to dimensions indicated on approved shop drawings. Use stencils, templates, forms, and guidelines for word markings, letters, numerals, and symbols.
- B. Verify that pavement surface is dry, free of dirt, grease, oil, acids, laitance, curing compounds, or foreign matter that will reduce the bond between the paint and pavement.
  - 1. Bituminous Surface: Allow bituminous pavement minimum 30 days to cure prior to application of paint. If paint curls or discolors, removed paint, prepare surface, and recoat.
  - 2. Portland Cement Concrete Surface: Allow portland cement concrete to cure for a minimum of 28 days prior to application of paint. Test for moisture prior to application of paint.
- C. Clean contaminated areas with solution of trisodium phosphate (10 percent  $\text{Na}_3\text{PO}_4$  by weight) or other approved cleaning solution. Rinse with clean water and dry prior to application of paint.

#### **3.02 APPLICATION**

- A. Paint traffic stripes, lines and pavement markings in accordance with the provisions in Sections 84-1, General, and 84-3, Painted Traffic Stripes and Pavement Markings, of the Caltrans Standard Specifications, details shown on drawings, the Caltrans Standard Plans, and the California Building Code.
- B. Paint: Mix paint in accordance with manufacturer's instructions. Apply at recommended application rate and surface temperature. Addition of thinner is not permitted.
- C. Apply paint by using a striping machine, except for special areas and markings that are inaccessible or not adaptable to machine application, in which case hand application will be permitted with approved masking or stencil use.



- D. The striping machine shall be an approved spray-type marking machine capable of producing the specified dimensions of the markings, striping, etc. with clear-cut edges and uniform smooth film thickness.
- E. The minimum wet film thickness of the paint shall be 15 mils or in accordance with the manufacturer's recommendation and approved by OCTA Project Manager.
- F. Striping: Provide straight edged uniform line width as shown on the drawings, or if not shown, 4 inches. At accessible parking stalls conform to CBC Figures 11B-18A, 18B and 18C as applicable.
  - 1. Stall Divisions: Provide standard and compact size parking stalls as shown, white for standard stalls; blue for accessible stalls.
  - 2. Temporary Installation: After completing reconstruction of asphalt paving, contractor is required to temporary install one coat of striping. Contractor is required to seal coat (two seal coats) thirty days after completion of reconstruction asphalt paving. Following seal coat work, contractor is required to install two coats of striping. The second coat of striping shall contain reflective glass beads, added at the rate of 6 pounds per gallon of traffic paint.
  - 3. Provide two coats for all painting work. All car parking stalls striping, pavement markings, letters, numbers, words, captions, and signage painting shall be aligned straight, clean, without paint smears, blurs, and splatters. All striping and related signage shall be in place, completed and dry prior to the opening of the area for traffic. Add reflectorized glass beads to the second coat of paint striping, for all pavement striping and markings.
- G. Arrows and Pavement Signs: Paint directional arrows and markings with stencils. At islands and no parking areas, stripe areas with 4 inch wide stripes.
- H. Fire Lane Markings: Comply with governing fire OCTA's requirements. Use approved stencils for lettering and graphics.
- I. For traffic and parking stall striping glass beads shall broadcast into wet paint at the rate of approximately 5 lbs/gallon of paint.

### **3.03 TOLERANCES**

- A. Width of Stripe: Maximum variance of 1/4 inch.
- B. Alignment of Stripe: Maximum deviation 1/2 inch in 50 feet.

**3.02 CLEANUP**

- A. Clean up overspray with approved materials and leave a clean and complete project. Remove surplus materials and rubbish and legally dispose of offsite.

**PART 4 - MEASUREMENT AND PAYMENT**

No separate measurement or payment will be made for the work of this section.

**END OF SECTION**

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**SECTION 33 05 24**

**UTILITY PROTECTION**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes locating or uncovering portions of existing utility, pipelines and installing; backfilling; cleaning up; and all incidental work necessary to complete the protection of the pipelines.
- A. Related Sections include but are not necessarily limited to:
  - 1. Section 31 20 00, Earthwork

**1.02 REFERENCE STANDARDS**

- A. ASTM American Society of Testing and Materials
- B. Caltrans Caltrans Standard Specifications
- C. SSPWC Standard Specifications for Public Works Construction
- D. AASHTO American Association of State Highway Transportation Officials
- E. API American Petroleum Institute

**1.03 SUBMITTALS**

- A. Submit under Section 01 33 00, Submittal Procedures:
  - 1. Results of field investigations geo-located Cadd file and a hard copy.
  - 2. Samples of proposed fill materials for approval prior to use.
  - 3. Product data for all permanent materials incorporated in the work.

**PART 2 - MATERIALS**

Not Used

**PART 3 - EXECUTION**

**3.01 NONDESTRUCTIVE UTILITY LOCATION**

- A. All available existing utility information has been shown on the drawings, however OCTA cannot guarantee the exact location of these facilities. There may be unidentified or unrecorded utilities in the area. Contractor shall utilize non-destructive methods of utility location within a radius of 200 ft from the project site.
- B. The Contractor shall uncover the utility or pipelines as directed by the OCTA, being careful not to damage any existing utilities.
- C. Backfilling shall be done and compacted to 95% standard density. It shall be the responsibility of the Contractor to clean up the right-of-way, restore all previous grade work and provide sufficient backfill to compact and restore the ground to its original level.

### **3.03 DAMAGE**

- A. Utilities and pipelines, unless otherwise indicated, shall be in operation during the construction work. The safe and proper handling of the utilities and pipelines is the responsibility of the Contractor. The Contractor shall be liable for any injuries, line breakage, damage to the line and damage to property. In addition, Contractor shall be responsible for and shall reimburse the Commission or owner of the utility, or pipeline for all damages during construction and for any product (gas, oil or service) lost therefrom. Precautions must be taken to contain any possible oil spills. Any spillage of gas or oils shall be contained and if the material is not contained and causes damages or gets into natural drainage courses, the Contractor shall be solely responsible.

## **PART 4 - MEASUREMENT AND PAYMENT**

### **4.01 MEASUREMENT**

- A. No separate measurement and payment will be made for Work of this Section.

**END OF SECTION**