Project Manual

Bridgeport Elementary School
Hardcourt Replacement & Ball Walls

DSA No. 03-125831 File No. 19-97

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December 2025

SGH Project No. 25-07144-00

SECTION 00 01 07

SEALS PAGE

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DIV. OF THE STATE ARCHITECT
APP: 03-125831 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/17/2026

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SECTION 02 41 00 – DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Selective demolition, dismantling, cutting and alterations as indicated, specified, and necessary for the completion of Work.

B. Removing demolished materials from site and protection of work to remain.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.1 GENERAL

A. Protection:

1. Do not begin demolition until temporary partitions, barricades, warning signs and other forms of protection are installed.

2. Protect existing improvements that are not to be removed from injury or damage resulting from the Contractor's operation. Replace damaged improvements in kind.

3. During demolition provide safeguards, including warning signs and lights, barricades, and the like, for protection of the public, Contractor's employees and existing improvements to remain.

B. Noise control: Refer to Division 1.

1. Exercise caution and care to prevent generation of unnecessary noise.

2. Keep noise levels to the minimum possible.

3. Discontinue noise producing operations, when requested by the District's Representative and reschedule at a mutually acceptable time.

C. Dust control: Control dust at all times.

1. Assume liability for claims related to flying dust caused by this work.

D. Water control:

1. Control the use of water to prevent damage to the existing facility and improvements to remain.

2. Assume liability for claims related to water seepage and leakage caused by this work.

E. Security: Coordinate security with District's Representative.

1. Take necessary precautions to keep trespassers out of demolition areas.

2. Properly secure demolition areas from entry when demolition is not in progress but do not block required exit ways.

F. Safety: If at any time the safety of existing construction appears to be endangered, take immediate measures to support such endangered construction; cease operations and immediately notify the District's Representative.

3.2 DEMOLITION

A. Existing conditions: Intent of Drawings is to show existing conditions with information developed from field surveys and to generally show the extent and type of demolition required.

1. Make a detailed survey of existing conditions prior to commencing demolition, and report discrepancies or conflicts between Drawings and actual conditions in writing to the Architect for clarifications and instructions.

2. Do not proceed where such conflicts or discrepancies occur prior to receipt of the instructions from the Architect.

B. Contractor shall be fully responsible for the adequacy and installation of temporary shoring and bracing systems used during demolition.

C. Demolition shall be performed by skilled and properly equipped personnel.

D. Remove existing construction only to the extent necessary for the proper installation of new construction and junction with existing materials. Cut back finished surfaces to straight, plumb or level lines as required.

E. If unanticipated conditions which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict.

1. Submit report to the Architect in written, accurate detail.

2. Pending receipt of directive from the Architect, rearrange demolition-schedule as necessary to continue overall job progress without delay.

F. Where openings are cut oversize or in improper location, replace to excess removed material, to the Architect's satisfaction, at no additional cost.

G. Coordinate demolition to assure the proper sequence, limits, methods and time of performance. Schedule demolition so as to impose a minimum of hardship on the present operation of the facilities and the performance of the work.

H. Whenever possible use small hand or small power tools designed for sawing or grinding; whenever possible avoid the use of tools with a hammering and chopping motion. Cut through finished surfaces from the exposed or finished side into concealed surfaces.

J. Materials not mentioned to be removed that interfere with new construction, except where structural integrity of the assembly is at risk, shall be cut to clean cut lines to provide for proper interface with new construction, or patching and repair, as required.

3.3 SALVAGE

A. Title to materials:

1. Except where indicated or specified otherwise, materials and equipment removed shall become the property of the Contractor and shall be removed from the site.

2. The District will not be responsible for the condition or loss of, or damage to, such property after notice to proceed.

3. Material and equipment shall not be viewed or sold on the site.

3.4 PATCHING

A. Patch materials to remain when damaged by demolition. Finish material and appearance of the patch or repair shall match the existing contiguous materials and finishes in all respects, as approved by the Architect.

3.5 CLEAN-UP/DISPOSAL

A. Debris, waste, and removed materials, other than items to be salvaged, are Contractor's property for legal disposal off the site.

B. Continuously clean-up and remove these items and do not allow to accumulate in the building and on the site. Refer to Division I for additional requirements on this subject.

END OF SECTION

SECTION 03 10 00 – CONCRETE FORMING AND ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formwork for cast-in-place concrete as indicated.

2. Installation of items to be embedded in concrete, such as anchor bolts, inserts, embeds, and sleeves.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 01 35 42, CALGreen Requirements

3. Section 03 20 00: Concrete Reinforcing.

4. Section 03 30 00: Cast-In-Place Concrete.

1.2 REFERENCES

A. American Concrete Institute (ACI) Publication:

1. ACI 318 - Building Code Requirements for Structural Concrete, Chapter 6, Formwork, Embedded Pipes, and Construction Joints.

2. ACI 347 - Guide to Formwork for Concrete.

B. American Plywood Association (APA):

1. Form No. V345 - Concrete Forming Design/Construction Guide.

C. National Institute of Standards and Technology (NIST):

1. NIST Voluntary Product Standard PS 1.

1.3 SUBMITTALS

A. Special Environmental Requirements Product Submittal Form, found in Appendix A of Section 01 35 42 CALgreen Requirements. Provide the following information for all concrete formwork:1. Local/Regional Materials.

B. Shop Drawings: Submit Shop Drawings indicating locations of forms, construction and expansion joints, embedded items, and accessories.

C. Product Data: Submit manufacturer's Product Data for form materials and accessories.

1.4 REGULATORY REQUIREMENTS

A. 2022 CBC- SS/CC, Title 24.

B. California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 4, Construction Safety Orders, Article 6, Excavations, Sections 1713 and 1717.

1.5 DELIVERY, STORAGE AND HANDLING

A. Storage shall prevent damage and permit access to materials for inspection and identification.

PART 2 – PRODUCTS

2.1 GENERAL

A. Form materials may be reused during progress of the Work provided they are completely cleaned and reconditioned, recoated for each use, capable of producing formwork of required quality, and are structurally sound.

B. Form Lumber: WCLIB Construction Grade or Better, WWPA No. 1 or Better.

C. Plywood: NIST Voluntary Product Standard PS 1, Group 1, Exterior Grade B-B Plyform or better, minimum 5-ply and 3/4 inch thick for exposed locations and at least 5/8 inch thick for unexposed locations, grade marked, not mill oiled. Furnished plywood with medium or high density overlay is permitted.

PART 3 - EXECUTION

3.1 GENERAL

A. Forms shall be constructed so as to shape final concrete structure conforming to shape, lines
and dimensions of members required by Drawings and Specifications, and shall be sufficiently
tight to prevent leakage of mortar. They shall be properly braced or tied together to maintain
position and shape. Forms and their supports shall be designed so that previously placed structures will not be damaged.

B. Use form coating at all surfaces in contact with concrete.

3.2 TOLERANCES

A. Permitted abrupt or gradual irregularities in formed surfaces as measured within a 5 feet length with a straightedge shall per ACI 347, Table 3.1:

Class of Surface			
A	B	C	D
1/8 inch	1/4 inch	1/2 inch	1 inch

1. Class A: Use for concrete surfaces prominently exposed to public view.

2. Class B: Use for coarse-textured concrete-formed surfaces intended to receive plaster, stucco or wainscoting.

3. Class C: Use as a general standard for permanently exposed surfaces where other finishes are not specified.

4. Class D: Use for surfaces where roughness is not objectionable and will be permanently concealed.

3.3 ERECTION

A. Plywood shall be installed with horizontal joints level, vertical joints plumb and with joints tight. Back joints by studs or solid blocking, and fill where necessary for smoothness. Reused plywood shall be thoroughly cleaned, damaged edges or surfaces repaired and both sides and edges oiled with colorless form oil. Nail plywood along edges, and to intermediate supports, with common wire nails spaced as necessary to maintain alignment and prevent warping.

B. Openings for Cleaning: Provide temporary openings at points in formwork to facilitate cleaning and inspection. At base of walls and wide piers, bottom form board on one face for entire length shall be omitted until form has been cleaned and inspected.

C. Chamfers: Provide 3/4 inch by 3/4 inch chamfer strips for all exposed concrete corners and edges unless otherwise indicated.

D. Reglets and Rebates: As specified in Section 03 30 00: Cast-In-Place Concrete.

3.4 REMOVAL OF FORMS

A. Forms shall not be removed until concrete has sufficiently hydrated to maintain its integrity and not be damaged by form removal operations. Unless noted otherwise and/or permitted by the Architect, columns and wall forms shall not be removed in less than five days, floor slabs in less than seven days, beams and girders in less than 15 days, pan forms for joists may be removed after three days, but joist centering shall not be removed until after 15 days, and ramp, landing, steps and floor slabs shall not be removed in less than seven days. Shoring shall not be removed until member

has acquired sufficient strength to support its weight, load upon it, and added load of construction.

B. Compressive strength of in-place concrete shall be determined by testing field-cured specimens representative of concrete location or members, as specified in Section 03 30 00: Cast-In-Place Concrete.

3.5 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.6 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 03 20 00 – CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete steel reinforcement.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 40 00: Testing and Inspection.
3. Section 03 10 00: Concrete Forming.
4. Section 03 30 00: Cast-In-Place Concrete.
5. Section 04 22 00: Concrete Unit Masonry.

1.2 REGULATORY REQUIREMENTS

A. Fabrication and placement of reinforcing shall be in accordance with requirements of 2022 CBC- SS/CC, Title 24, Chapter 19A.

1.3 REFERENCES:

A. American Society for Testing and Materials (ASTM):

1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
3. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

B. American Concrete Institute (ACI) Publication:

1. ACI SP-66 - ACI Detailing Manual.
2. ACI 318 - Building Code Requirements for Structural Concrete, as modified by CBC Sections 1903A and 1908A.

C. American Welding Society (AWS):

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

1.4 SUBMITTALS

A. Shop Drawings: Submit steel reinforcement Shop Drawings in accordance with ACI 315. Include assembly diagrams, bending charts and slab plans. Indicate lengths and location of splices, size and lengths of reinforcing steel.

B. Closeout Submittals: Record exact locations of reinforcing that vary from Shop Drawings.

1.5 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
2. American Welding Society (AWS).
3. American Concrete Institute (ACI).
4. CBC-SS/CC, Chapter 19A, Concrete.

B. Source Quality Control: Refer to Division 01 Sections for general requirements and to the following paragraphs for specific procedures. Testing laboratory retained by the Owner shall select test Samples of bars, ties, and stirrups from the material at the Project Site or from the place of distribution, with each Sample consisting of not less than two 18 inch long pieces, and perform the following tests according to ASTM A615, or ASTM A706, as applicable:

1. Identified Bars: If Samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with the identification certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when Samples are selected.
2. Unidentified Bars: When positive identification of reinforcing bars cannot be performed and when random Samples are obtained; perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.

C. Certification of Welders: Shop and Project site welding shall be performed by welding operators certified by AWS.

1.6 DELIVERY, STORAGE AND HANDLING

A. Avoid exposure to dirt, moisture or conditions harmful to reinforcing.

B. Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated for size and shape.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide reinforcing of sizes, gages and lengths indicated, bent to indicated shapes.

2.2 MATERIALS

A. Steel Reinforcing Bars: ASTM A615, or ASTM A706 deformed grade 60 billet steel unless otherwise specified or indicated.

B. Tie Wire: ASTM A82, fully annealed, copper-bearing steel wire, 16 gage minimum.

C. Chairs, Spacers, Supports, and Other Accessories: Standard manufacture conforming to ACI 315 fabricated from steel wire of required types and sizes. For reinforcement supported from grade, provide properly sized dense precast blocks of concrete.

2.3 FABRICATION OF REINFORCING BARS:

A. Comply with CRSI Manual of Standard Practice for Reinforced Concrete Construction for fabrication of reinforcing steel.

B. Bending and Forming: Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bend bars No. 6 size and larger in the shop only. Bars with unscheduled kinks or bends are not permitted. Provide only tested and permitted bar materials.

C. Welding: Provide only ASTM A706 steel where welding is indicated. Perform welding by the direct electric arc process in accordance with AWS D1.4 and specified low-hydrogen electrodes. Preheat 6 inches each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is not permitted. Do not tack weld bars. Clean metal surfaces to be welded of loose scale and foreign material. Clean welds each time electrode is changed and chip burned edges before placing welds. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds or parts of welds deemed defective, using chisel, and replace with proper welding. Prequalification of welds shall be in accordance with CBC-SS/CC requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Bars shall be bent cold. Bars partially embedded in concrete shall not be field bent except as indicated on reviewed Shop Drawings.

B. Before installation and just prior to placing concrete, clean reinforcing of loose scale, rust, oil, dirt and any coating that could reduce bond.

C. Accurately position, install, and secure reinforcing to prevent displacement during the placement of concrete.

D. Provide metal chairs to hold reinforcement the required distance above form bottoms. In beams and slab construction, provide chairs under top slab reinforcement as well as under bottom reinforcement. Space chairs so that reinforcement will not be displaced during installation. Provide metal spacers to secure proper spacing. Stirrups shall be accurately and securely wired to bars at both top and bottom. At slabs, footings, and beams in contact with earth, provide concrete blocks to support reinforcement at required distance above grade.

E. Install and secure reinforcement to maintain required clearance between parallel bars and between bars and forms. Lapped splices shall be installed wherever possible in a manner to provide required clearance between sets of bars. Stagger lapped splices. Dowels and bars extending through construction joints shall be secured in position against displacement before concrete is installed and subsequently cleaned of concrete encrustations while they are still soft.

F. Do not install reinforcing in supported slabs and beams until walls and columns have been installed to underside of slabs and beams or until construction joints have been thoroughly cleaned. Reinforcing shall be inspected before placement of concrete and cleaned as required.

G. Use deformed bars unless otherwise indicated, except for spiral reinforcement.

3.2 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.3 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 03 30 00 - CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete.

B. Concrete curbs for walls, floors and slabs on grade, footings.

C. Formwork, shoring, bracing and anchorage.

D. Concrete reinforcement and accessories.

E. Related Sections

1. Section 03 35 00, Concrete Floor Finishing.

2. Section 09 05 61, Common Work Results for Flooring Preparation

1.2 REFERENCE STANDARDS

A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.

B. CBC - 2022 California Building Code, Title 24.

1. CBC Chapter 11B, Accessibility to Public Buildings, Public Accommodations, Commercial Facilities and Publicly Funded Housing

2. Chapter 17A, Structural Testing and Special Inspections

3. CBC Chapter 19A, Concrete

C. ADA - Americans with Disabilities Act of 1990, as amended

1. ADA Standards - ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.

D. CBC - 2022 California Building Code, Title 24.

E. AC I - 224R-01 Control of Cracking in Concrete Structures.

F. AC I - 224.3R-2008 - Joints in Concrete.

G. AC I 301 - Structural Concrete for Buildings.

H. AC I 302.1R-04 - Guide for Concrete Floor and Slab Construction.

I. AC I 318-2014 - Building Code Requirements for Structural Concrete and Commentary

J. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

K. ASTM A706 - Low-Allow Steel Deformed Bars for Concrete Reinforcement.

L. ASTM E 1745 - Water Vapor Retarders Used In Contact with Soil or Granular Fill Under Concrete Slabs.

M. ASTM C33 - Concrete Aggregates.

N. ASTM C94 - Ready-Mixed Concrete.

O. ASTM C150 - Portland Cement.

P. ASTM C171 - Sheet Materials for Curing Concrete.

R. ASTM C856-04 - Practice for Petrographic Examination of Hardened Concrete.

S. ASTM E-96 - Water Vapor Transmission of Materials.

T. ASTM E1155 - Test for Determining Floor Flatness and Floor Levelness.

U. ASTM F1869 - Test Method for Measuring Moisture Vapor Emission.

V. ASTM F2170 - Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes.

1.3 SUBMITTALS

A. Product data for each type of manufactured material and product included.

B. Design mix for each concrete mix.

C. Steel reinforcement shop drawings, including materials, grade, bar schedules, spacing, bent bar diagrams, arrangement and supports.

D. Submit contraction (crack control) joint, expansion, isolation and construction joint layout to Architect for approval.

1.4 QUALITY ASSURANCE

A. Source Limitations: Specified cement and aggregates shall be from single sources only.

B. Mockups: Before casting concrete, build mockups concrete slab-on-grade and formed-surface panels to verify selections made under sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.

2. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces

3. Obtain Architect's approval of mockups before casting architectural concrete.

4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 REGULATORY REQUIREMENTS

A. Conform to Chapter 19A, California Building Code, 2022 Edition.

1.6 TESTS

A. Testing and analysis of concrete will be performed under provisions of Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Materials shall conform to CBC-19A, Sections 1903A.5 and AC I 318 Chapter 5.

B. Plywood for Forms: medium density overlay APA, MDO PLYFORM APA, unless indicated otherwise.

1. For concrete scheduled for coated, smooth-form finish, use high density overlay HDO PLYFORM

2. For concrete scheduled for exposed, rough-form surface, use PS-1, Group 1, exterior plywood.

3. For concealed surfaces, use, PS-1 Class I, Exterior, APA PLYFORM B-B.

C. Lumber for Forms: Douglas Fir species; construction grade with grade stamp clearly visible.

Furnish surfaced one face and one edge, where required for smooth form finish.

D. Form Ties: Removable metal of adjustable length, cone ends.

2.2 REINFORCING

A. Reinforcing Steel: ASTM A615, deformed billet steel bars, in grades as follows, and conforming to CBC-19, Section 1910A.2.

1. For No.4 and larger bars, use 60 ksi yield grade.

2. For ties and stirrups, and No. 3 and smaller bars, use 60 ksi yield grade.

3. For welded bars, use ASTM A706 60 ksi yield grade.

B. Welding Electrodes: low hydrogen grade E90XX for Grade 60 [E70XX for Grade 60].

C. Dowels: ASTM A615; 60 ksi yield grade, plain steel, uncoated finish.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type II, Portland Cement Type, conforming to Section 1910A.1,

CBC. [Color: White for colored concrete per Section 03 35 00]

B. Aggregates: Per CBC1903A.6. Refer to 2.06.C.

1. Aggregates for Stone Concrete: ASTM C33 and CBC

C. Water: Clear, from potable source, and not detrimental to concrete.

2.4 ACCESSORIES

A. Bonding Agent: Polyvinyl Acetate; HIBOND, manufactured by Lambert Corporation, Orlando, FL, LOCK BOND NO. 906, manufactured by MacklanBurg-Duncan Co., City of Industry, CA, or equal as approved in accordance with Division 01, General Requirements for substitutions.

B. Underslab 15 mil Vapor Barrier: ASTM E 1745, Class A, 15 mils thick, Permeance as tested before and after mandatory conditioning (ASTM E 1745 Section 7.1 and sub-paragraphs 7.1.1 - 7.1.5): less than 0.01 grains/(ft2/hr/inHg).

1. Subject to compliance with requirements, acceptable products include, but are not limited to, the following:

    a. Stegowrap Vapor Barrier, Stego Industries LLC

    b. Reef Industries, VaporGuard

    c. Reflex Super, Monarflex USA

    d. Perminator, W. R. Meadows.

    e. Or equal

C. Non-Shrink Grout: ASTM C1107, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 4,000 psi in 24 hours and 8,000 psi in 7 days; of consistency suitable for application and a 30 minute working time.

D. Combination Hardener, and Sealer: ASTM C779, ASHFORD FORMULA by Curecrete Chemical Co., Springville, UT; SHUR-SEAL by Paul M. Wolff Co., Orange, CA; Chemprobe CT Densifier 629 by Tnemec Company; LIQUI-HARD by W.R, Meadows, or equal as approved in accordance with Division 01, General Requirements for substitutions, at exposed concrete floors.

E. Form Release Agent: Colorless non-staining liquid chemical agent, free of wax or oils which will not absorb water. Material shall comply with AQMD, Local Regulations.

F. Corners: Chamfered type; maximum possible lengths.

G. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

2.5 CURING MATERIALS

A. Water: Clean and drinkable.

B. Water Curing: Equipment required to fog spray; no sprinkling permitted.

C. Polyethylene Film: ASTM C171, 10 mil thick, white polyethylene film, single sheet, manufactured from virgin resin with no scrap or additives, free of visible defects, uniform in appearance.

2.6 CONCRETE MIX

A. Mix and deliver concrete in accordance with 2022 CBC and Chapter 26 ACI 318-19.

1. Design Mix: Conform to Section 1903A & 1904A, 2022 California Building Code for Proportioning on the basis if field experience or trial mixtures method.

2. Do not exceed 0.45 water-cement ratio by weight for floor slabs and for other concrete.

3. Mix Design by California registered Civil Engineer.

B. Select proportions for concrete in accordance with the approved design mix.

1. Required Strength: As scheduled.

C. Provide concrete to the following criteria:

Element	Min. 28 day Strength psi	Max. Slump	Max. Size Aggregate	
Footings	4,500	4 inch	1 inch	Normal wt concrete
Slabs	4,500	4 inch	3/4 inch	Normal wt. Concrete
Other	4,500 (W/C = 0.50)	5 inch	3/4 inch	Normal wt. Concrete

D. Do not use admixtures containing calcium chlorides or any type of admixture unless approved by the Architect of Record, Structural Engineer of Record and the Division of the State Architect.

E. Ready-Mixed Concrete: Measure, batch, mix and deliver concrete according to ASTM C94 and ASTM C 1116, and furnish batch ticket information.

2.7 GRANULAR FILL

A. Crushed Aggregate Base (capillary break): 3/4 inch maximum grading, crushed rock and rock dust conforming to requirements of Section 200-2.2, SSPWC, with 3/8 inch sieve requirement waived, or Class 2 Aggregate Base as defined in Section 26, CSS.

2.9 JOINT DEVICES AND FILLER MATERIALS

A. Fiber Expansion Joint Filler - ASTM D1751: Closed cell, 1/2 inch max. thick; FIBER EXPANSION JOINT by American Highway Technology, Kankakee, IL, FIBRE EXPANSION JOINT or DECK-O-FOAM by W. R. Meadows, Dayton Superior or approved equal.

B. Joint Devices: Integral extruded polystyrene plastic; 1/2 inch thick, with removable top strip exposing sealant trough; JOINT CAPS.

C. Primer: As recommended by sealant manufacturer.

D. Joint Backing: ASTM C1330, Cylindrical, Type C, closed cell, polyethylene backer rod; oversized 30 to 50 percent larger than joint width. Green Rod by Nomaco Inc. or equal.

E. Sealant: Polyurethane two-component type, self-leveling, for level surface application, UREXPAN NR-200 or DYNATRED for sloped surfaces, manufactured by Pecora Corp., Harleysville PA, or equal. Color shall be selected by Architect from manufacturer's standard list of colors.

F. Saw Cut Joint Filler: Two-component epoxy resin, gray color, non-hardening, self-leveling, SIKADUR 51 (SL), by Sika Corp., Lyndhurst, NJ, or equal as approved in accordance with Division 01, General Requirements for substitutions.

PART 3 - EXECUTION

3.1 FORMWORK

A. Verify lines, levels and measurement before proceeding with formwork.

B. Hand trim sides and bottom of earth forms; remove loose dirt.

C. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of Section 26.11 of ACI 318-19.

D. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

E. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

F. Align joints and make watertight. Keep form joints to a minimum.

G. Obtain approval before framing openings in structural members which are not indicated on Drawings.

H. Provide chamfer strips on external corners.

I. Surface irregularities, ACI 347R Class A, gradual or abrupt irregularities of 1/8 inch for exposed to view concrete. Class B, 1/4 inch for plaster cement finish.

J. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

K. Architectural Forms: refer to drawings.

3.2 PROTECTION

A. Adequately protect staff, personnel and public from harm and accident during formwork. Conform to California Code of Regulations, Title 8, Subchapter 4, Construction Safety Orders.

B. Protect concrete surfaces that are to be color treated, or to be left exposed as the final finish surface, from damage by construction activities with durable temporary coverings until surface- treatment work commences. Floor protection shall be reinstalled and remain until acceptance by the Architect.

3.3 REINFORCEMENT

A. Place supports and secure steel reinforcement against displacement.

B. Accurately place and securely tie reinforcement with black annealed wire and securely hold in position during placing of concrete by means of precast concrete block supports.

Point wire tie ends away from the form. Unless otherwise indicated, the number, type, and spacing of supports shall conform to the ACI 315.

1. Tie reinforcement splices and intersections per CBC and CRSI, Chapter 10-General Principles for Placing, Splicing and Tying Reinforcing Bars.

C. Reinforcing: Steel # 4 bars: Place bars as indicated on drawings for slabs and #5 bars for footings, unless otherwise indicated on Drawings.

3.4 PREPARATION

A. Install Vapor Emission Treatment Systems

B. Prepare previously placed concrete by cleaning with sandblasting to remove laitance and expose clean aggregate.

C. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert 10 inch long No. 3 steel dowels at 18 inches oc and pack solid with non-shrink grout.

D. Under Interior Slabs on Grade: Install sub base as indicated on drawings, per Section 200-2.2, SSPWC or Class 2 CCS as capillary break. Over aggregate base place 15-mil vapor barrier in largest practical sections. Seal all 6-inch lapped seams, penetrations and foundation perimeters using manufacturer-approved tape only and install per manufacturer instructions. Install pipe boots at pipe penetrations. Install reinforcement and concrete as scheduled.

1. Installation of vapor barrier shall be in accordance with ASTM 1745-97 and manufacturer's instructions.

2. Tapes, mastics, sealants, and other products used with vapor barrier shall be from same manufacturer as, and certified compatible with, vapor barrier.

3.5 PLACING CONCRETE

A. Place concrete in accordance with Section 26.5, 26.6 & 26.11 of ACI 318-19. Remove loose dirt from excavations.

B. Notify Architect minimum 72 hours prior to commencement of operations. All excavations, forms and reinforcing shall be observed by the Architect and/or Engineer prior to placement.

C. Ensure reinforcement, inserts, embedded parts and accessories are not disturbed during concrete placement.

D. When detailed on the drawings, separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.

E. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface using one-component polyurethane sealant as specified in Section 07 92 00.

F. Place concrete continuously between predetermined expansion, control and construction joints.

1. Install expansion joints at vertical concrete walls at 24 feet on center unless noted otherwise on drawings.

G. Contraction Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch, place joints at column lines and at 15 ft. o.c. each way, maximum. Remove groover tool marks on exposed concrete surfaces. Contractor's option: Saw cut joints, early-entry dry-cut, per AC I 302.1 R.

H. Saw cut slabs when indicated on drawings, or as approved by Architect, at 15 ft. on center, within 4-12 hours after placing concrete. Saw cut joints with power saws equipped with shatterproof abrasive diamond-rimmed blades, cut 1/8" wide joint into concrete when cutting action will not tear, abrade, or otherwise damage surface. Cut no deeper than 1/4 depth of slab thickness. Fill cuts with non-hardening epoxy. Completely fill cut to surface of slab. Saw cut joints, early-entry dry-cut, per ACI 302.1 R.

I. Do not interrupt successive placement; do not permit cold joints to occur.

J. Avoid segregation of materials. Perform tamping and vibrating so as to produce a dense, smooth application free of rock pockets and voids. Do not use vibrators to move concrete horizontally.

K. Provide special mix prepared by the Testing Laboratory and approved by the Architect utilizing smaller aggregates in areas of reinforcing congestion to prevent the formation of rock pockets.

L. The unconfined vertical drop of concrete shall not be greater than 5 feet. Do not allow concrete to fall free from any height that will cause materials to segregate. Maximum height of free fall permitted in any case: 5 feet. Utilize trunks or additional chutes where doubt occurs. Conform to requirements of ACI 318-19 Chapter 26.

M. Construction Joints: Wash surface of each joint shortly after pouring to expose clean, sound aggregate. Sandblast surface to remove laitance remaining or loose aggregate as approved by the Architect. Conform to Chapter 26 of ACI 318-19. Apply bonding agent in accordance with manufacturer's instructions. Locate joints within the middle third of spans of slabs, beams and girders. Coincide construction joints with contraction, isolation, or expansion joints when possible. Locate where they lease affect the structural integrity of the element under consideration and are compatible with building’s appearance.

N. Isolation Joints: preformed joint filler depth of slab, fill top 1/2 inch with elastomeric sealant per Section 07 92 00. Locations: at columns, footings, and as noted on drawings.

3.6 SEPARATE TOPPINGS

A. Prior to placing floor topping, texture substrate concrete surface for bonded toppings or trowel finish for unbonded concrete toppings per ACI 3.02.1R, remove deleterious material. Broom and vacuum clean.

B. Place required dividers, edge strips, reinforcing and other items to be cast in.

C. Apply bonding agent [bond breaker] to substrate in accordance with manufacturer's instructions.

D. Place concrete floor toppings to required lines and levels. Place topping in checkerboard panels, maximum dimension not to exceed 20 ft.

E. Screed toppings level, maintaining surface flatness of maximum 1/8 inch in 10 ft.

F. Steel trowel finish concrete per Section 03 35 00 Concrete Floor Finishing.

3.7 CONCRETE FINISHING

A. Comply with recommendations in ACI 302.1R for screeding, floating, straightedging, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if areas is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth granular texture.

C. Trowel Finish: After float finish, minimum 2 trowel operations, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue trowel passes and restraighten until surface us free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

D. Install concrete floors and slabs in Levelness and Flatness in accordance with ASTM E1155, random traffic floors, and the following below: (SOV = Specified Overall Value and MLV = Minimum Local Value)

1. Finish floor slabs: Ff = 35 and Fl = 25 SOV; Ff = 24 MLV and Fl = 17 MLV for slabs-on-grade.

2. Finish floor slabs: Ff = 35 and Fl = 20 SOV; Ff = 21 and Fl = 15 MLV: for suspended slabs, shored.

3. Finish floors slab of on grade: Ff = 45 and Fl = 35 SOV; Ff = 30 and Fl = 24 MLV; for and treated Exposed Concrete Floors.

4. Finish floor slabs: Ff = 20 and Fl = 15 SOV; Ff = 14 MLV and Fl = 10 MLV; to receive concrete floor toppings, mortar setting beds for tile, bonded applied cementitious finish flooring material.

E. For Floor installation 10,000 sq. ft. or less in total project area, finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surfaces does not exceed 1/4", flat.

F. Provide formed and vertical concrete surfaces to be left exposed with smooth Rubbed Finish.

G. Provide multiple steel trowel finish at flat surfaces to receive floor finishes.

H. Seal concrete with Combination Hardener and Sealer at interior exposed concrete floors.

1. As specified in Section 03 35 00, Concrete Floor Finishing.

3.8 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads. Conform to Chapter 26 of AC I 318-19.

1. Minimum stripping time for walls and columns: 5 days.

2. Minimum stripping time for beams and structural slabs: 21 days.

B. Loosen forms carefully. Do not wedge pry bars, hammers or tools against finish concrete surfaces scheduled for exposure to view. Do not break-off-comers.

C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damage forms. Reshoring permitted only after 10 days and prior to stripping.

3.9 FINISH AT EXPOSED VERTICAL SURFACES

A. Rubbed Finish: Apply the following to Smooth-Formed Finished concrete per AC I 301:

1. Grout-Cleaned Finish (Sack-rubbed finish): Remove fins, rough spots, stains, and hardened mortar by carefully rubbing with a fine abrasive stone to a smooth even surface. Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water.

   Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

3.10 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.

B. Maintain concrete with minimal moisture loss at above 50 degrees F temperature for period necessary for hydration of cement and hardening of concrete. Dusting with dry cement to absorb excess water is prohibited.

C. Cure only as specified herein and in accordance with Section 26.5.3, AC I 318-19. Liquid membrane curing compound method not permitted for interior cast-in-place concrete slabs.

D. Moisture Retaining Coverings: spread polyethylene film over floor slab areas, lapping edges and sides, minimum 6 inches and sealing with pressure sensitive tape; cover with plywood or otherwise protect film from damage; maintain in place for minimum of seven (7) days unless noted otherwise on drawings. Do not permit traffic over floor slabs during the curing period.

E. Vertical Surfaces: fog spray water over surfaces and maintain wet for 10 days.

F. Quality Control: Proper curing of concrete surfaces shall be the responsibility of the Contractor under this section.

G. Flooding, sprinkling or ponding not permitted.

3.11 FIELD QUALITY CONTROL

A. Provide free access to Work and cooperate with Testing Laboratory.

B. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M)

within 72 hours of finishing.

C. Testing and Inspections in accordance with Division 01.

3.12 PATCHING

A. Architect will inspect concrete surfaces and determine imperfections, if any.

B. Clean all exposed concrete surfaces and all adjoining work stained by leakage of concrete.

Remove all fins, butts and projections by grinding. Patch voids, rock pockets, holes, cracks and similar imperfections by chipping loose concrete and exposing clean, sound aggregate.

C. Patch imperfections as approved and in accordance with AC I 301.

1. Clean all exposed concrete surfaces and all adjoining work stained by leakage of concrete.

2. Fill cone form tie recesses with portland cement mortar flush to finish surface.

3.13 DEFECTIVE CONCRETE

A. Defective Concrete: Remove concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by Architect.

C. Do not patch, fill, touch-up, repair or replace exposed concrete except upon express approval of Architect for each individual area.

3.14 PROTECTION FOR EXPOSED CONCRETE TO BE TREATED OR SEALED

A. Protection. There is no known satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Protect the concrete floor until ready for treatment/sealing.

1. All hydraulic powered equipment must be diapered to avoid staining of the concrete.

2. No trade shall park vehicles on interior slabs. If necessary, to complete their scope of work drop cloths shall be placed under vehicles at all times.

3. No pipe cutting machine shall be used on interior slabs.

4. Steel shall not be placed on interior slabs to avoid rust staining.

5. All equipment must be equipped with non-marking tires.

B. Flooring shall be protected as follows: Use "Ram Board Plus", Burbank, CA. "Builder Board with Liquid Shield" by Surface Shields, Oakland Park, ILL, or equal.

1. Ram Board: Heavy Duty temporary floor protection membrane, 38" wide x 100’ rolls, 46 mils thick.

2. Protect entire floor where area anticipated to be affected. Submit layout of protected area to Architect for approval.

3. Loose lay protection material over floor area; tape all seams; do not tape or otherwise attach to floor; follow manufacture's installation requirements.

4. Take other precautions as necessary to prevent damage in addition to requirements above, refer to Section 03 35 00. Submit to Architect for approval.

3.15 MOISTURE TEST FOR CONCRETE FLOORS

A. It shall be the General Contractor's responsibility to provide concrete floor slab meeting the maximum moisture vapor emissions herein specified, and the contractor shall exercise care in all aspects of mixing, placing, and curing the concrete floor slabs so that a minimum of mitigation treatment will be required.

B. Prior to ordering adhesive applied floor covering materials or coatings, conduct Calcium-Chloride Test Method in accordance with ASTM F 1869 to verify that concrete floor slabs are dry with maximum moisture vapor emissions of 3 pounds per 1,000 square feet in 24 hours and that slabs exhibit negative alkalinity, carbonation or dusting. Apply the moisture test in four (4) different areas of each floor location, with at least one test for each 1,000 square feet of floor area.

C. Prior to ordering adhesive applied floor covering materials or coating, conduct Relative Humidity Test Method in accordance with ASTM F 2170 to verify relative humidity and surface pH of concrete floor slabs, the method

1. Requires drilling holes at diameter not to exceed outside diameter of probe by more than 0.04 inch to depth equal to 40 percent of slab's thickness (elevated structural slab shall be tested at depth equal to 20 percent of slab thickness).

2. Place probe to full depth of test hole, place cap over probe.

3. Permit test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.

4. Remove cap and press button on the probe to obtain reading.

5. Relative humidity readings for substrates receiving non-permeable flooring are 75% or lower.

6. Testing shall require 3 tests in first 1,000 square feet, with one additional test per each additional 1,000 square feet of concrete slab surface.

D. The test area should be at the same temperature and humidity expected during normal use, minimum testing conditions shall be 75+ 10 degrees F. and 50+ 10% relative humidity. Maintain these conditions 48 hours prior to, and during testing.

E. Alkalinity Testing: Concrete floors shall be tested for alkalinity prior to the installation of adhesive applied floor covering materials or coating. Levels of pH shall not exceed the written recommendations of the flooring covering manufacturer or the adhesive manufacturer, or both.

END OF SECTION

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SECTION 03 35 19 – INTEGRALLY COLORED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Integrally colored finishes for site-cast concrete.
2. If this Section conflicts with Related Sections:
   a. This Section takes precedence for matters that affect concrete appearance.
   b. Related Sections take precedence for matters that affect concrete appearance.
   c. In case of conflicts, notify Architect for clarification.

B. Related Sections

1. Related Site Cast Concrete Sections:
   a. Division 03 Section “Cast-in-Place Concrete”: Basic requirements for concrete and coordination of sample submittal.
2. Other Related Sections:
   a. Division 32 Section “Concrete Paving”

1.2 REFERENCE STANDARDS

A. ACI 117 – Tolerances for Concrete Construction and Materials

B. ACI 303.1 – Cast-in-Place Architectural Concrete

C. ACI 305.1 – Hot Weather Concreting

D. ACI 306.1 – Cold Weather Concreting

E. ACI 308R – Curing Concrete

G. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete

H. ASTM C979 – Pigments for Integrally Colored Concrete

1.3 PREINSTALLATION MEETINGS

A. For work requiring special procedures or extensive coordination, consider requiring preinstallation conference. If needed, add agenda and list of conference participants.

B. Preinstallation Conference:

1. Conduct conference at Project site.
2. Comply with Division 01 Section “General Requirements”.
3. Review procedures required to produce specified results.

1.4 SUBMITTALS

A. Product Data:

1. Color additives.
2. Curing products.
3. Form facing materials.
4. Form release agents.
5. Proprietary cleaning agents.
6. Surface retarders.

B. Shop Drawings: Indicated extent of each color of integrally colored concrete.

C. Samples for Initial Selection: Submit color additive manufacturer's color chart.

D. Samples for Verification: Submit sample chip of specified concrete colors indicating manufacturers color name.

E. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with: ACI 303.1, ACI 305.1, ACI 306.1, ACI 118.

B. Obtain each material from same source and maintain high degree of consistency in workmanship throughout Project.

C. Installer Qualifications: Concrete work shall be by firm with five years experience with work of similar scope and quality.

D. Integrally Colored Concrete Mock-Up:

1. Provide full-scale mock-up under Division 01 Section "Quality Control". Construct at least one month before start of other concrete work to allow concrete to cure before observation.
2. At location acceptable to Architect, demonstrate methods used for construction, including forming and finishing conditions required for Project using materials, workmanship, joint treatments, and curing methods to be used throughout Project.
3. Accepted mock-up provides visual standard for work of Section.
4. Mock-up may remain as part of Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Color Additive: Deliver, store, and handle in accordance with manufacturer's instructions.

B. Concrete: Schedule delivery to provide consistent mix times from time color additive is placed in mixture until placement of integrally colored concrete.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cements:

1. Types: As specified in Related Sections.
2. Colors: As required to match Reference Sample.

B. Supplementary Cementitious Materials:

1. Types: As specified in Related Sections.
2. Colors: As required to match Reference Sample.

C. Fine Aggregate:

1. Types: As specified in Related Sections.
2. Color: Locally available natural aggregate.

D. Coarse Aggregate:

1. Types: As specified in Related Sections.
2. Color: Locally available natural aggregate.

E. Water: Clean and potable.

F. Admixtures: Do not use calcium chloride admixtures.

2.2 COLOR ADDITIVES

A. Manufacturer: Davis Colors

1. Contact Information:
   a. Phone: 800-356-4848 or 323-269-7311
   b. E-mail: info@daviscolors.com
   c. Web Site: www.daviscolors.com
2. Substitutions: Comply with Division 01 Section “Product Options and Substitution Procedures”.

B. Type:

1. Concentrated pigments specifically processed for mixing into concrete and complying with ASTM C979.
2. Color additives containing carbon black are not acceptable.

C. Color Additive Delivery:

1. Automated Dispensing: Meter and dispense colors using computer-controlled automated color weighing and dispensing system. Use Davis Colors Chameleon liquid metering system and Hydrotint liquid color additives.

2. Manual Dispensing: Use Davis Colors Mix-Ready powdered color additives in pre-measured disintegrating bags.

2.3 FORMED CONCRETE

A. Forms and Form Facing Materials:

1. Type: High density and non-vapor transmitting form face, free of rust or other defects deleterious to required finish, and with watertight joints.

B. For Ties: Corrosion-resistant ties, removable cones, and plugs.

C. Form Release: Use type that is non-staining and minimizes formation of bug-holes.

D. Curing Compound for Formed Surfaces: Complying with ASTM C309 and approved by color additive manufacturer for use on integrally colored concrete. Do not use white-pigmented curing compounds.

2.4 CONCRETE FLATWORK

A. Surface Retarder:

B. Curing Compound for Flatwork: Davis Colors W-1000 Clear Cure & Seal; complying with ASTM C309 and designed for use on integrally colored concrete.

C. Moist Curing Blankets: McTech Group (www.mctechgroup.com) disposable curing blankets designed for use on colored or decorative concrete and to keep surface of concrete moist for seven days.

2.5 ACCESSORIES

A. Reinforcing Bar Supports: Use corrosion-resistant types at locations contacting exposed surfaces.

B. Joint Sealants:

1. Color: Color selected by Architect from manufacturer's full range to match integrally colored concrete.

C. Cleaning Agents: Use products known to be compatible with integrally colored concrete.

2.6 MIXES

A. Slump: 4 inches. If greater slump is required, use water-reducing or super-plasticizing admixture; do not add water.

B. Color Additives: Mix in accordance with manufacturer's instructions. Mix until color additives are uniformly dispersed throughout mixture and disintegrating bags, if used, have disintegrated.

C. Do not retemper mix or add water in field.

2.7 CONCRETE COLORS

A. Concrete Colors:

1. Concrete Colors as selected from manufacturers standard color chart:

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not place integrally colored concrete where standing water is present.

3.2 INSTALLATION

A. Comply with color admixture manufacturer's recommendations unless otherwise specified in this Section.

3.3 FORMED SURFACES

A. Architectural Concrete

1. As-Cast Finish: Form or form facing material shall be:

a. Smooth.

2. Surface Tolerance: ACI 347:

a. Class A (+1.8 inch maximum irregularities).

b. Class B (+1/4 inch maximum irregularities).

B. Curing and Stripping:

1. Curing: Cure for duration recommended in ACI 308R. Maintain concrete between 65° and 85°F during curing.

2. Leave forms in place for as long as practical, and do not strip until concrete has reached a consistent age.

3. Stripping: If forms are removed before required curing duration, apply curing compound for formed surfaces. To extent practical, integrally colored concrete throughout project should be cured using the same methods and for the same durations.

C. Repair:

1. Fill holes and defects in concrete surface within 48 hours of form removal.

2. Use patching materials and techniques approved in mock-up.

3. Make patches with stiff mortar made with materials from same sources as concrete. Adjust mortar mix proportions so dry patch matches dry adjacent concrete. Add white cement to mortar mix if necessary to lighten it.

3.4 FLATWORK

A. Finishing:

1. Trowel Finish: Provide smooth surface. Hard trowel to densify surface. Do not over-trowel or start troweling late.

a. Hand Trowel: Use steel trowel.

b. Machine Trowel: [Use steel trowel blades.][Use steel-reinforced plastic trowel blades such as Poly-Pro from Wagman Metal Products, Inc. (www.wagmanmetal.com)

B. Curing:

1. Apply moist curing blanket in accordance with manufacturer's instructions. Apply curing at consistent time for each pour.

2. Maintain concrete between 65° and 85°F during curing.

3.5 APPEARANCE TOLERANCES

A. Appearance: Minor variations in appearance of integrally colored concrete that are similar to natural variations in color and appearance of uncolored concrete are acceptable.

3.6 CLEANING

A. Efflorescence: Remove efflorescence as soon as practical after it appears and as part of final cleaning.

B. Use least aggressive cleaning techniques possible.

C. If proprietary cleaning agents are used, pre-wet surface, test cleaning agent on small, inconspicuous area, and check effects prior to proceeding. Thoroughly rinse surface afterwards with clean water. Follow cleaner manufacturer's instructions.

D. Do not use muriatic or hydrochloric acid on integrally colored concrete.

END OF SECTION

SECTION 04 22 00 – CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Reinforcing steel.
3. Mortar, grout and grouting.
4. Bolts, anchors, hardware, metal frames, and other insert items.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 40 00 - Quality Requirements
3. Section 03 10 00 - Concrete Forming and Accessories.
4. Section 03 20 00 - Concrete Reinforcing.
5. Section 03 30 00 - Cast-In-Place Concrete.
6. Section 05 12 00 - Structural Steel Framing.
7. Section 08 13 13 - Hollow Metal Doors and Frames.

1.2 REFERENCES:

A. American Society for Testing and Materials International (ASTM):

1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
2. ASTM C90 - Standard Specification for Load Bearing Concrete Masonry Units.
3. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
4. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
5. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
6. ASTM C150 - Standard Specification for Portland Cement.
7. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
8. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
9. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
11. ASTM C476 - Standard Specification for Grout for Masonry.
12. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

13. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.

14. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.

15. ASTM C1586 - Standard Guide for Quality Assurance of Mortars.

B. Masonry Standards Joint Committee (MSJC), The Masonry Society (TMS), American Concrete Institute (ACI) and American Society of Civil Engineers (ASCE).

1. TMS 602/ACI 530.1/ASCE 6 - Specification for Masonry Structures.

2. TMS 402/ACI 530/ASCE 5 - Building Code Requirements for Masonry Structures.

1.3 SUBMITTALS

A. Mix Design: Submit grout and mortar mix designs. Mix designs shall be signed and sealed by

a Civil or Structural Engineer registered in the State of California.

B. Product Data: Submit manufacturer's Product Data for assembly components, materials, and accessories. Submit certificates and data assuring that the proposed materials meet the specified ASTM standards.

C. Samples: Submit Samples for each type of required masonry unit, including reinforcement and accessories.

D. Shop Drawings: Indicate wall reinforcement, splice locations and bending diagrams.

E. Admixtures: Additives and admixtures to mortar and grout shall not be used unless approved by the enforcing agency. Submit product data for any proposed admixture.

1.4 REGULATORY REQUIREMENTS

A. Perform the Work in accordance with 2022 CBC-SS/CC, Chapter 21 A.

B. Comply with requirements of TMS 602.

1.5 QUALITY ASSURANCE

A. Comply with the requirements of Section 01 40 00 - Quality Requirements

B. Concrete Masonry Units:

1. Notify the testing laboratory a minimum of 45 days in advance of installing concrete unit masonry, to allow for preconstruction testing of the units.

a. Units will be sampled and tested in accordance with ASTM C140 for compressive strength, absorption and moisture content.

b. Units will be sampled and tested in accordance with ASTM C426 for linear drying shrinkage.

2. The material testing laboratory shall receive concrete masonry unit specimens for testing from masonry unit manufacturer. Number of specimens shall be as indicated in referenced ASTM standard tests. Testing laboratory will perform and send test results to the Architect and Project Inspector.

C. Portland Cement: Submit certification from the cement manufacturer that the cement proposed for use on the project has been manufactured in accordance with ASTM C150. Certification shall include test results made on cement samples during production.

D. Mortar and Grout Tests: Prior to the beginning of masonry work, mortar and grout will be tested, unless prism tests will be performed as indicated below.

1. Mortar: Shall conform to ASTM C270 Table 2 for Type S mortar.

a. Provide qualifications of mortar as meeting ASTM C270 at the beginning of the job and whenever mix design is changed.

b. Mortars will be evaluated during preconstruction and tested during construction for proportioning or compressive strength in accordance to ASTM C780.

2. Grout: Shall conform to ASTM C476, and will be tested in accordance with ASTM C1019. Compressive strength shall equal or exceed specified compressive strength (fm) at 28 days, but not less than 2,000 psi.

a. Ready-Mix Grout: Grout manufacturer shall furnish batch ticket informationin accordance to ASTM C94.

E. Prism Test: The compressive strength of concrete masonry will be determined by the prism test method prior to the start of construction and during construction in accordance with 2022 CBC- SS/CC Section 2105A.2, TMS 602 ITEM 1.4B.3 & 1.4B.4.

F. Masonry Core Testing: Core testing will be performed in accordance with 2022 CBC-SS/CC, Section 2105A.4.

G. Inspection During Installation: A special inspector will continuously observe the installation of reinforced masonry. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.

H. The Owner will be responsible for the costs of original tests and inspection.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store units above grade on level platforms or pallets, in a dry location.

B. Store cementitious materials and aggregates in such a manner as to prevent deterioration or intrusion of foreign matter or moisture.

C. Handle units on pallets or flat bed barrows. Free discharge from conveyor units or transportation in mortar trays is not permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Unit Masonry: Modular medium weight conforming to ASTM C90, hollow load-bearing concrete unit masonry. Masonry units shall meet the minimum compressive strength requirements of ASTM C90, or as indicated on project drawings, whichever is greater.

1. Concrete masonry unit sizes shall be as indicated on the drawings.
2. Provide open-end units at walls to be fully grouted.
3. Provide closed-end units at walls and at openings where ends will be exposed in finish Work; provide bond beam blocks where horizontal reinforcement is indicated.
4. Provide special shapes and accessory units at locations indicated on Drawings.
5. Provide units in colors and textures as indicated in the drawings.
6. Masonry unit shall have been cured for a minimum of 28 days.
7. Masonry unit shall have maximum liner shrinkage of 0.065 percent from saturated to oven dry.

B. Portland Cement: ASTM C150, Type II, from one source.

C. Hydrated Lime: ASTM C207, Type S.

D. Aggregates: ASTM C144 for mortar and ASTM C404 for grout.

E. Mortar: ASTM C270, Type S, conforming to the property specifications of CBC-SS/CC Table 2103A.2.

F. Grout: ASTM C476.

G. Admixture for Grout: Grout Aid, as manufactured by Sika Chemical Corp., or equal.

H. Water: Clean, potable, free from substances deleterious to mortar, grout or reinforcement.

I. Reinforcing Steel: Provide and install reinforcing steel in accordance with Section 03 20 00 Concrete Reinforcing.

J. Cleaning Materials: Sure Klean No. 600 detergent by ProSoCo.

K. Miscellaneous Materials: As required to complete the Work.

L. Anchor Bolts: Shall be hex headed bolts conforming to ASTM A307 Grade A with the dimensions of the hex head conforming to ANSI/ASME B18.2.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Discard units with cracks or other defects not complying with requirements of ASTM C 90.

3.2 CONSTRUCTION

A. Construct per applicable provisions of 2022 CBC-SS/CC and TMS 602.

B. Conform to TMS 602 for hot and cold weather masonry construction.

3.3 MORTAR AND GROUT MIXING

A. Mortar: Shall provide a minimum strength of 1,800 psi.

B. Grout: Shall provide a minimum strength of 2,000 psi or as indicated in the drawings, whichever is higher. Grout space requirements for coarse and fine grouts shall be per Table 7 of TMS 602. Add Sika Chemical Corp. Grout Aid for both low lift & high lift placement, per manufacturer's instructions.

C. Measurements: Measure in calibrated devices that can be checked at any time.

1. Add water for workable consistency.
2. Shovel measurements are not permitted.

D. Mixing: Mix in accordance to TMS 602.

1. Mortar: Mix cementitious materials and aggregates between three and five minutes in a mechanically operated mixer. Mix dry ingredients with a sufficient amount of water to provide a workable mix. Batches of less than one sack of cement, and fractional sack batches are not permitted.
2. Factory Blended Mortar: Mix in accordance with manufacturer's recommendations.
3. Grout: Add sufficient water for a workable mix that will flow into all voids of the masonry without separation or segregation. Grout slump shall be between 8 and 11 inches.

E. Re-tempering Time Limit: Use mortar within 2 14 hours after mixing. Discard any mortar that has been mixed longer or that has begun to set. If necessary, re-temper within this time limit, by replacing only water lost due to evaporation and by thoroughly remixing.

3.4 INSTALLATION OF MASONRY UNITS

A. Workmanship: Install masonry plumb and true to line with straight level joints of uniform thickness. Comply with TMS 602 tolerances. Maintain masonry clean during and after installation.

1. Lay-out and incorporate embedded hardware items.
2. Assist other trades with built-in items, which require cutting and fitting of masonry.
3. Cut block units with a diamond saw or carborundum wheel. Trowel or chisel cutting is not permitted.

4. Keep cavities clear of droppings and debris. Remove droppings prior to grouting.

B. Reinforcing Steel: Install as indicated on Drawings. Except as otherwise indicated, install reinforcement in accordance with standards of Concrete Reinforcing Steel Institute and to requirements specified in Section 03 20 00 - Concrete Reinforcing. Do not splice vertical reinforcement except where indicated on the Drawings.

C. Block Installation: Clean dirt and dust from surfaces before installation. Do not wet masonry units.

1. Foundation preparation: Clean top surface of concrete foundation of dirt, projections and laitance before starting masonry construction. Wet saw cutting of units immediately prior to laying is permitted.

a. Construction sequencing and erection prior to finished structure and full design strength being achieved is means and methods by Contractor. Design Team takes no exception to CMU block being laid on concrete footings once 60% design strength is verified by testing.

2. Install masonry with mortar to required joint thickness. Install blocks with 3/8-inch mortar bed. Fill head joints solid, install tightly to adjoining units. Provide 3/8-inch joint thickness.

a. Hold racking to a minimum.

b. No toothing is permitted.

c. If it becomes necessary to move a unit after it has been installed, remove the unit, discard the mortar, and install the unit in fresh mortar.

3. Anchor Bolts: Provide 1/2-inch minimum grout space between bolts and masonry.

4. Bond: Unless otherwise indicated, install units in common running bond.

5. Finish Joint Treatment: Unless otherwise indicated, cut both interior and exterior joints flush, and tool slightly concave to a dense, uniform surface.

6. Grouting: Unless noted otherwise on Drawings, completely fill cells with grout.

3.5 GROUTING

A. Prior to grouting all cells shall be cleaned so that all spaces to be filled with grout do not contain mortar projections greater than 1/4 inch, loose mortar or foreign material.

B. Grout materials and water contents shall be controlled to provide adequate fluidity for placement without segregation of the constituents and shall be mixed thoroughly. Reinforcement shall be properly positioned and solidly embedded in the grout.

C. The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.

D. Between grout pours, a horizontal control joint shall be formed by stopping all wythes at the same elevation and with the grout stopping at 1 ½" inches below a mortar joint, except at the top of the wall. Where bond beams occur, the grout pour shall be stopped a minimum of ½" inch below the top of the masonry.

3.6 LOW-LIFT GROUTING FOR HOLLOW MASONRY UNITS

A. Grouting shall meet the requirements of CBC-SS/CC Section 2104A.1.3.1.2.1 & 2104A.1.3.1.2.2.

B. After mortar joints have set, cells are cleaned of mortar and debris, and reinforcement is installed and inspected, grout cells in 4-foot maximum lifts. Horizontal and vertical reinforcement shall be held in place within permitted tolerances by suitable devices.

C. Grout may be installed by pump, tremie or bucket, using hoppers to avoid spilling on exposed surfaces.

D. All grout shall be consolidated and reconsolidated with a mechanical vibrator after placing so as to completely fill all voids and to consolidate the grout. Grouted walls shall be solid and without voids.

3.7 HIGH-LIFT GROUTING OPTION FOR HOLLOW MASONRY UNITS

A. Grouting shall meet the requirements of CBC-SS/CC Section 2104A.1.3.1.2.1, 2104A.1.3.1.2.3 and DSA IR 21-2.

B. High-lift grouting shall apply only to cell sizes available with 8 inch and wider block units. This method is subject to approval of the Division of the State Architect (DSA).

C. Provide bond beam units, inverted for start course, and omit alternate blocks or remove entire face shell of every other unit to allow access to all cells on bottom course for cleanouts.

D. Plug each cleanout by setting a face shell in mortar into opening and securely bracing it in place to prevent displacement. If masonry is not exposed in finish Work, cleanouts may be formed.

E. Grouting: Grouting shall be done in a continuous pour in lifts not exceeding 5-foot in height. The grouting of any section of a wall between control barriers shall be completed in one day, with no interruptions greater than one hour.

Consolidating: Grout shall be consolidated by mechanical vibration only, and shall be reconsolidated after excess moisture has been absorbed, but before plasticity is lost. Vibrating of reinforcing steel is not permitted.

3.8 CURING

A. Remove efflorescence, stains, debris, excess grout, and foreign matter.

B. During curing, or for any other purpose, do not saturate masonry with water.

3.9 PARGE COAT

A. Apply parge coat to the earth side of surfaces that are to receive waterproofing.

B. A Portland cement and sand mix (1:3.5 by volume) or Type S mortar may be used for the parge coat.

C. Parging should be applied to damp (not saturated) concrete masonry in two 1/4 inch thick layers. The first coat should be roughened when partially set, hardened for 24 hours, and then moistened before second coat is applied. The second coat should be trowelled to a smooth, dense surface.

D. The parge coat should be beveled at the top to form a wash, and thickened at the bottom to form a cove between the base of the wall and the top of footing.

3.10 CLEANING

A. At completion of masonry Work, remove misplaced mortar, grout or other foreign substances, and clean surfaces which will be exposed in finish Work with specified cleaner, or with clean water and stiff fiber brushes.

B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.11 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 11 68 33 – ATHLETIC FIELD EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Outdoor basketball equipment.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 – Cast-in-Place Concrete: Footings for field equipment.

B. Section 31 22 00 – Grading: Shaping subgrade to specified grade levels; removal of excess soil and rocks.

1.3 ABBREVIATIONS

A. NFHS – National Federation of State High School Associations; www.nfhs.com and www.nfhs.org.

1.4 REFERENCE STANDARDS

A. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A135/A135M – Standard Specification for Electric-Resistance-Welded Steel Pipe.

C. ASTM A500/A500M – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

D. ASTM A513/A513M – Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.

E. ASTM B26/B26M – Standard Specification for Aluminum-Alloy Sand Castings.

F. ASTM B108/B108M – Standard Specification for Alluminum-Alloy Permanent Mold Castings.

G. ASTM B179 - Standard Specification for Aluminum Alloys in Ingot and Molten Forms for Castings from All Casting Processes.

1.5 ADMINISTRATIVE REQUIREMENTS

1.6 SUBMITTALS

A. Product Data: Provide athletic field equipment manufacturer's product data indicating materials of construction, compliance with specified standards, installation procedures, and necessary safety limitations.

B. Shop Drawings: Submit detailed scale drawings showing athletic field equipment and perimeter layout.

1. Indicate locations and dimensions of footings and anchorage points.

2. Identify mounting elevations in relation to fixed survey points on site, and subgrade elevation.

C. Maintenance Data: Submit manufacturer's recommended maintenance instructions and list of replaceable parts for each athletic field equipment item, along with supplier's address and phone number.

D. Manufacturer's Field Report.

E. Manufacturer's Qualification Statement.

F. Installer's Qualification Statement.

G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in District's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.

B. Installer Qualifications: Company specializing in performing work of fixed of the type specified and with at least three years of documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

1.9 WARRANTY

PART 2 - PRODUCTS

2.1 ATHLETIC FIELD EQUIPMENT - GENERAL

A. Mount supporting posts in concrete footings, unless otherwise indicated, refer to Section 03 30 00 for additional concrete footing installation requirements.

1. Provide supports as required to mount equipment at proper height above finished grade.

B. Coordinate field grading as required for proper placement and arrangement of equipment, refer to Section 31 22 00 for additional information.

C. Safety and Warning Signage: Provide signage as indicated on drawings and required by authorities having jurisdiction.

2.2 OUTDOOR BASKETBALL EQUIPMENT

A. Manufacturer (per SUSD District Standards):

1. Basketball Backstops for Single Installation:

a. Heavy-Duty Alum. Rectangle, Model #19 by PW Athletic Mfg., Co. (or approved equal through substitution).

2. Substitutions: See Procurement and Contractor Requirements – SUSD Project Manual.

B. Outdoor Basketball Straight Post: Galvanized steel support post with offset, 4 ½" O.D. inch diameter, Model #1529 by PW Athletic Mfg., Co. (or approved equal through substitution).

1. Cap top of post to protect from weather.

2. Substitutions: See Procurement and Contractor Requirements – SUSD Project Manual.

C. Backboard: Anchored to extension arms.

1. Aluminum backboard with perimeter flange and reinforcing ribs, 60 inch by 42 inch overall size.

2. Color and Finish: White, powder coated, with contrast colored target and border lines.

D. Goal: Anchored to mounting plate through backboard to support post or extension arms.

1. Breakaway Extra Heavy duty double rim goal ring, Model #41 by PW Athletic Mfg., Co. (or approved equal through substitution).

2. Color and Finish: Orange powder coat.

3. Net: Super nylon, Model #34 by PW Athletic Mfg., Co. (or approved equal through substitution).

2.3 MATERIALS

A. Steel Pipe and Tube: Complying with ASTM A135/A135M, ASTM A500/A500M, or ASTM A513/A513M; hot-dip galvanized and free of excess weld and spatter.

1. Tensile Strength: 45,000 psi, minimum.

2. Yield Point: 33,000 psi, minimum.

3. Galvanizing: Hot-dip metal components in zinc after fabrication, in accordance with ASTM A123/A123M; remove tailings and sharp protrusions and burnish edges.

B. Cast Aluminum: ASTM B26/B26M, ASTM B108/B108M, or ASTM B179.

C. Powder Coating for Steel: Electrostatically applied and oven cured polyester powder over electrostatic zinc coating.

D. Concrete: As specified in Section 03 30 00.

PART 3 - EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Verify that athletic field equipment footings have been installed in proper locations and at proper elevations.

3.2 PREPARATION

A. Stake location of athletic field equipment elements, including necessary athletic field perimeters, surfacing, access and egress points, hard surfaces, walls, fences, [_____], and/or structures.

B. Stake layout of athletic field equipment perimeter in accordance with approved shop drawings before starting any work.

1. Verify that athletic field perimeters do not overlap hard surfaces, whether currently installed or not.

2. Verify that athletic fields are free of obstructions.

3. If conflicts or obstructions are found, notify Architect.

4. Do not proceed with this work until revised drawings have been provided, showing corrected layout, and that any obstructions have been removed or corrections to layout have been made.

3.3 INSTALLATION

A. Install concrete footings with top surface a minimum of 1/2 inch below required subgrade elevation and slope top to drain, unless otherwise indicated.

B. Install athletic field equipment in accordance with manufacturers' instructions, and rules and regulations of specified athletic association indicated for this work.

C. Install backboards and goal posts plumb, level, and rigid using manufacturer provided attachment hardware, and ensure backstops are accurately positioned and free of vibrations.

D. Install athletic field equipment without sharp points, edges, or protrusions; entanglement hazards or pinch, crush, or shear points.

E. Install safety and warning signage, as follows, in accordance with indicated requirements.

3.4 CLEANING

A. Clean athletic field equipment of construction materials, dirt, stains, filings, and blemishes due to shipment or installation; clean in accordance with manufacturer's instructions, using cleaning agents as recommended by manufacturer.

B. Clean athletic field area of excess construction materials, debris, and waste.

C. Remove excess and waste material and dispose of off-site in accordance with requirements of authorities having jurisdiction.

3.5 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 31 12 00 – EXISTING FACILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes requirements for connection to and abandonment of existing facilities.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1. Cement and Concrete for Exterior Improvements: 320523

1.3 CONDITION OF EXISTING FACILITIES

A. The District does not warranty the condition, size, material, and location of existing facilities.

1.4 LOCATION

A. The contractor shall be responsible for potholing and verifying in advance of the work the location of all existing utilities and pipelines as shown on the plans. Discrepancies shall be reported to the project engineer, prior to the fabrication of, or purchase of material affected by the discrepancy.

1.5 PROTECTION OF EXISTING UTILITIES AND FACILITIES

A. The contractor shall be responsible for the care and protection of all existing sewer pipe, water pipe, gas mains, culverts, power or communications lines, sidewalks, curbs, pavement, or other facilities and structures that may be encountered in or near the area of the work.

B. Contractor shall be responsible for locating existing underground utilities prior to beginning trenching or excavation activities and notify CPM of any discrepancies.

C. In the event of damage to any existing facilities during the progress of the work and of the failure of the contractor to exercise the proper precautions, the contractor will pay for the cost of all repairs and protection to said facilities. The contractor's work may be stopped until repair operations are complete.

1.6 PROTECTION OF LANDSCAPING

A. The contractor shall be responsible for the protection of all the tress, shrubs, irrigation systems, fences, and other landscape items adjacent to or within the work area, unless they are directed to do otherwise on the plans.

B. In the event of damage to landscape items, the contractor shall replace the damaged items in a manner satisfactory to the District's Project Manager.

C. When the proposed work is to be within planted or other existing improved areas, the contractor shall restore such areas to the original condition after completion of the work.

This restoration shall include grading, a placement of 5 inches of good topsoil, resodding, and replacement of all landscape items indicated.

PART 2 – MATERIALS

A. All materials used in making the connection or removing the facility from service shall conform to the applicable sections of these specifications.

2.2 GROUT

A. Grout shall consist of Portland cement and water or of Portland cement, sand, and water; and all grout mixtures shall contain 2% of bentonite by weight of the cement. Grout shall be a pump mix with a minimum of six sacks cement (56 lbs) per cubic yard.

B. Portland cement, water and sand shall conform to the applicable requirements of Section 320523 except that sand to be used shall be of such fineness that 100% will pass a standard 8-mesh sieve and at least 45%, by weight, will pass a standard 40-mesh sieve.

2.3 CONCRETE

A. Concrete used for the replacement of damaged or removed facilities shall be in accordance with Section 320523 and shall match the mix design of the existing facility and per the requirement of the jurisdictional agency.

PART 3 - EXECUTION

3.1 CONNECTION TO EXISTING FACILITIES

A. All connections shall be made by the contractor unless shown otherwise on the plans or specified herein.

B. The contractor shall notify the District's Project Manager a minimum of two working days before the time of any proposed shutdown of existing mains or services. The District's Project Manager may postpone or reschedule any shutdown operation if, for any reason, the District's Project Manager feels that the contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection work.

C. Connections shall be made only in the presence of the District's Project Manager, and no connection work shall proceed until the District's Project Manager has given notice to proceed.

D. The contractor shall furnish all pipe and materials including furnishing all labor and equipment necessary to make the connections, all required excavation, backfill, pavement replacement, lights, and barricades, and may be required to include a water truck, high line hose, and fittings as part of this equipment for making the connections. In addition, the contractor shall assist the District's Project Manager in alleviating any hardship incurred during the shutdown for connections.

E. The contractor will de-water existing mains, as required, in the presence of the District's Project Manager.

F. Connections shall be made with as little change as possible in the grade of the new main. If the grade of the existing pipe is below that of the new pipeline, a sufficient length of the new line shall be deepened so as to prevent the creation of any high spot or abrupt changes in grade of the new line. Where the grade of the existing pipe is above that of the new pipeline, the new line shall be laid at specified depth, except for the first joint adjacent

to the connection, which shall be deflected as necessary to meet the grade of the existing pipe. If sufficient change in direction cannot be obtained by the limited deflection of the first joint, a fitting of the proper angle shall be obtained and installed. Where the connection creates a high or low spot in the line, a standard air release or blow off assemble shall be installed as directed by the District's Project Manager.

G. Where connections are made to existing valves, the contractor shall furnish and install all temporary blocking, steel clamps, shackles, and anchors as required by the District's Project Manager, and he shall replace the valve riser box and cover and adjust the valve cover to the proper grade in accordance with these specifications. The District will operate all existing valves. All valves, existing or newly installed, shall be readily accessible at all times to the District's Project Manager for emergency operation.

H. New pipelines shall not be connected to existing facilities until the new pipelines have been successfully tested, disinfected and accepted by the District's Project Manager.

3.2 REMOVAL FROM SERVICE OF EXISTING MAINS AND APPURTENANCES

A. Existing mains and appurtenances shall be removed from service at the locations shown on the plans or as directed by the District's Project Manager.

B. Abandoned pipe shall be filled with grout.

C. Existing pipe and appurtenances removed from the ground will require backfill and repair of surface in accordance with Section 312200

D. The contractor shall remove and dispose of all removed pipe at his own expense at a legal disposal site.

E. Before excavating for new mains that are to replace existing pipes and/or services, the contractor shall make proper provisions for the maintenance and continuation of service as directed by the District's Project Manager unless otherwise specified.

3.3 CUTTING AND RESTORING STREET SURFACING

A. In cutting or breaking up street surfacing, the contractor shall not use equipment that will damage adjacent pavement.

B. All asphalt and/or Portland cement concrete surfaces shall be scored with sawing equipment of a type meeting the approval of the District; providing, however, that any cement concrete base under an asphaltic mix surface will not be required to be scored by sawing. Existing paving surfaces shall be saw cut back beyond the edges of the trenches to form neat square cuts before repaving is commenced.

C. Pavement, sidewalks, curbs, or gutters removed or destroyed in connection with performance of the work shall be saw cut to the nearest score marks, if any, and shall be replaced with pavement, sidewalks, curbs, or gutters of the same kind, or better, by the contractor in accordance with the latest specifications, rules, and regulations and subject to the inspection of the agency having jurisdiction over the street or highway.

D. Aggregate base shall be placed beneath the restored pavement to the thickness required by the agency having jurisdiction.

END OF SECTION

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SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Genral Conditions, Supplementary Conditions, Drawings, and Sections in Division 1 of these Specifications apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Preparing of subgrade for building slabs, walks, and pavements.

2. Drainage fill course for support of building slabs is included as part of this work.

3. Excavating and backflling of trenches within building lines.

4. Excavating and backfilling for underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.

1.3 DEFINITIONS

A. Excavation consists of removal of material in conformance with the soil investigation report and as shown on the civil drawings.

B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Geotechnical - Engineer. Unauthorized excavation, as well as remedial work directed by the Geotechnical Engineer, shall be at Contractors expense.

1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to the Geotechnical Engineer.

2. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Geotechnical Engineer.

C. Additional Excavation: When excavation has reached required subgrade elevations, notify the Geotechnical Engineer, who will make an inspection of conditions. If the Geotechnical Engineer determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by the Geotechnical Engineer. The Contract Sum may be adjusted by an appropriate Contract Modification.

1. Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.

D. Subgrade: The undisturbed earth or the compacted soil layer immediately below granular subbase, drainage fill, or topsoil materials.

1.4 SUBMITTALS

A. Test Reports: Geotechnical Engineer will submit the reports to the District, Architect and Contractor.

1.5 QUALITY ASSURANCE

A. All work shall be per the geotechnical report and geotechnical engineer's requirements.

B Standards:

1. Standard Specifications for Public Works Construction, latest edition.

C. Codes:

1. California Building Code, 2022 Edition

D. Testing and Inspection Service: District will employ and pay for a qualified independent geotechnical testing and inspection laboratory to perform soil testing and inspection service during earthwork operations.

1.6 PROJECT CONDITIONS

A. Site Information: Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings.

B. Use of Explosives: Use of explosives is not permitted.

C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory and unsatisfactory soil materials are defined as those complying with ASTM D2487 and Geotechnical Engineer for the following:

1. Subbase Material

2. Drainage Fill

3. Backfill and Fill Materials

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavation consists of removal of material in conformance with the Geotechnical Report and as shown on the civil drawings.

3.2 STABILITY OF EXCAVATIONS

A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

3.3 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3.4 STORAGE OF EXCAVATED MATERIALS

A. Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

2. Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.

3.5 EXCAVATION FOR STRUCTURES

A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.

1. Excavations for footings and foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.6 EXCAVATION FOR PAVEMENTS

A. Cut surface under pavements to comply with cross-sections, elevations and grades as indicated and Geotechnical Report.

3.7 TRENCH EXCAVATION FOR PIPES AND CONDUIT

A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

B. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

1. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installation of pipe.

2. For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

3. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 114 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads ensure continuous bearing of pipe barrel on bearing surface.

3.8 BACKFILL AND FILL

A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, or as required by the Geotechnical Engineer.

1. Under grassed areas, uses satisfactory excavated or borrow material.

2. Under walks and pavements, use subbase materials, satisfactory excavated or borrow material, or a combination.

3. Under steps, use subbase material.

4. Under building slabs, use drainage fill material.

5. Under piping and conduit and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.

6. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass. under wall footings. Place concrete to level of bottom of adjacent footing.

    a. Concrete is specified in Section 32 05 23.

    b. Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Geotechnical Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

7. Provide 4-inch-thick concrete base slab support for piping or conduit less than 2'-6" below surface of roadways. After installation and testing of piping or conduit, provide minimum 4-inch-thick encasement (sides and top) of concrete prior to backfilling or placement of roadway subbase.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Inspection, testing, approval, and. recording locations of underground utilities have been performed and recorded.

3. Removal of concrete formwork.

4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

5. Removal of trash and debris from excavation.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

3.9 PLACEMENT AND COMPACTION

A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than I vertical to 4 horizontal so that fill material will bond with existing surface.

1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

B. Place backfill and fill materials per Geotechnical Engineer's requirements.

C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

D. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required . elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

E. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Geotechnical Engineer if soil density tests indicate inadequate compaction.

1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 1557:

a. Under structures, building slabs and steps, and pavements, compact top 12 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.

b. Under lawn or unpaved areas, compact top 6 inches of subgrade and each layer of backfill or fill material at 90 percent maximum density.

c. Under walkways, compact top 6 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.

2. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

a. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

b. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.10 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.

2. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.

3. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2 inch above or below required subgrade elevation.

C. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.

D. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.11 PAVEMENT SUBBASE COURSE

A. General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.

1. Refer to geotechnical report for sub base.

B. Grade Control: During construction, maintain lines and grades including crown and cross. slope of subbase course.

C. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12-inch width of shoulder simultaneous with the compaction and rolling of each layer of subbase course.

D. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

3.12 BUILDING SLAB DRAINAGE COURSE

A. General: Drainage course consists of placement of drainage fill material, in layers of indicated thickness, over subgrade surface to support concrete building slabs.

B. Placing: Place drainage fill material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

3.13 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable or Geotechnical Engineer's report and requirements.

2. Footing Subgrade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing. subgrade may be based on a visual comparison of each subgrade with related tested strata when acceptable to Geotechnical Engineer.

3. Paved Areas and Building Slab Subgrade: Perform at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case fewer than three tests. In each compacted fill layer, perform one field density test for every 2,000 sq.. ft. of overlaying building slab or paved area, but in no case fewer than three tests.

4. Foundation Wall Backfill: Perform at least two field density tests at locations and elevations as directed.

5. If in opinion of Geotechnical Engineer, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

3.14 EROSION CONTROL

A. Provide erosion control methods in accordance with requirements of authorities having jurisdiction. Erosion Control plan on file with the City of Simi Valley Engineering Department.

3.15 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.16 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from District's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of it off District's property.

1. Remove excess excavated material, trash, debris, and waste materials and dispose of it off District's property.

END OF SECTION

SECTION 32 05 23 – CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, Division 1 Specification Sections, and Agreements apply to this section.

B. See civil drawings and soils report for additional specifications.

1.2 SUMMARY

A. Extent of portland cement concrete paving is shown on drawings, including curbs, gutters, walkways not part of landscape work, and pavement at Loading Area.

B. Prepared subbase is specified in "Earth Moving" section.

1.3 SUBMITTALS

A. Provide samples, manufacturer's product data, test reports, and materials' certifications as required in referenced sections for concrete and joint fillers and sealers.

1.4 QUALITY ASSURANCE

A. Standards:

1. “Greenbook” - Standard Specifications for Public Works Construction, latest edition.

B. Codes:

1. California Building Code, 2022

1.5 JOB CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

1. Use flexible spring steel forms or laminated boards to form radius bends as required.

B. Coat forms with a nonstaining form release agent that will not discolor or deface surface of concrete.

C. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185.

D. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.

E. Fabricated Bar Mats: Welded or clip-assembled steel bar or rod mats, ASTM A 184. Use ASTM A 615, Grade 60 steel bars, unless otherwise indicated.

F. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

G. Hook Bolts: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concrete operations, and to permit removal without damage to concrete or hook bolt.

H. Concrete Materials: Unless otherwise specified on the Civil Drawings, concrete shall be 520-C-2500. Admixtures, bonding materials, curing materials, or other concrete additives shall be approved by the Engineer prior to use.

1. Expansion Joint Materials: Concrete Tie "Fiber Expansion Joint" or approved alternate, conforming to AASHO M-213, and ASTM D1751. Concrete Tie "Rubber Calk #280" or approved alternate, conforming to ASTM C920-79.

J. Antispalling Compound: Combination of boiled linseed oil and mineral spirits, complying with AASHTO M-233.

2.2 CONCRETE MIX, DESIGN, AND TESTING

A. Concrete mix design shall conform to the recommendations of the Geotechnical Engineer, as well as the Standard Specifications for Public Works construction. Portland cement concrete shall be sampled and tested in accordance with the ASTM and California tests.

B. Design mix to produce normal-weight concrete consisting of portland cement, aggregate, water-reducing or high-range water-reducing admixture (superplasticizer), air-entraining admixture, and water to produce the following properties:

1. Compressive Strength: See Section 201-1.1.2, Standard Specification for Public Works Construction, latest Edition.

2. Slump Limits: See Section 201-1.1.2, Standard Specification for Public Works Construction, latest Edition.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

B. Proof-roll prepared subbase surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.2 FORM CONSTRUCTION

A. Set forms to required grades and fines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

1. Top of forms not more than 1/8 inch in 10 feet.

2. Vertical face on longitudinal axis, not more than 1/4 inch in 10 feet.

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

3.3 REINFORCEMENT

A. Locate, place and support reinforcement as indicated on the Civil Drawings, Structural Drawings andlor Architectural Drawings.

3.4 CONCRETE PLACEMENT

A. General: See Standard Specification for Public Works Construction, Section 201-1.4, latest Edition for mixing and placing concrete, and as herein specified.

B. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

D. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

E. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

F. When adjacent pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained sufficient strength to carry loads without injury.

G. Fabricated Bar Mats: Keep mats clean and free from excessive rust, and handle units to keep them fat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

1. Place concrete in 2 operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

2. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to the governing agency inspector.

H. Curbs and Gutters: Automatic machine may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results that meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross-section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

3.5 JOINTS

A. General: Construct expansion, weakened-plane (contraction), and construction joints true to line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

B. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.

C. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than 1/2 hour, except where such placements terminate at expansion joints.

1. Construct joints as shown or, if not shown, use standard metal keyway-section forms.

2. Where load transfer-slip dowel devices are used, install so that one end of each dowel bar is free to move.

D. Expansion Joints: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, and other fixed objects, unless otherwise indicated.

1. Locate expansion joints at 50 feet o/c. for each pavement lane unless otherwise indicated on plans or specified in Soils Report.

E. Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.

F. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.

G. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

H. Fillers and Sealants: See Standard Specification for Public Works Construction, Section 201-3, latest Edition for preparation of joints, materials, installation, and performance.

3.6 CONCRETE FINISHING

A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10-ft, straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2-inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and when excess moisture or surface sheen has disappeared, complete troweling and finish surface as follows:

1. Broom finish by drawing a fine-hair broom across concrete surface perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to the Design/Builder.

a. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff bristled broom, perpendicular to line of traffic.

E. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by the Architect

F. Exposed Aggregate Finish

1. Place, screed, compact and float concrete as specified for all other slabs, using the gap-graded mix.

2. Apply the retarder in compliance with its manufacturers printed instructions before initial set takes place. Cover with wet curing burlap and cure for not less than 8 nor more than 18 hours; test surface with knife to determine when to commence revealing aggregates.

3. Test a sample panel, and after the concrete has set sufficiently use clean water and a stiff broom to remove the retarded cement paste, washing thoroughly until the aggregates are uniformly exposed approximately 1/8 inch deep and the finish matches the approved sample panel by the Architect.

4. Replace burlap, or apply curing compound to complete the curing cycle.

3.7 CURING

A. Protect and cure finished concrete paving in compliance with applicable requirements of Division 3 sections. Use membrane-forming curing and sealing compound or approved moist-curing methods.

B. Antispalling Treatment: Apply treatment to concrete surfaces no sooner than 28 days after placement, to clean, dry concrete free of oil, dirt, and other foreign material. Apply curing and sealing compound at a maximum coverage rate of 300 s.f. per gallon. Apply antispalling compound in 2 sprayed applications. First application at rate of 40 sq. yds. per gal.; second application, 60 sq. yds. per gallon. Allow complete drying between applications.

3.8 REPAIRS AND PROTECTIONS

A. Repair or replace broken or defective concrete, as directed by the Architect.

B. Drill test cores where directed by the Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just before final inspection.

END OF SECTION

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1

A. SUMMARY

1. Work included:

   a. Constructing one or more surface courses composed of a mixture of aggregate, filler if required, and asphalt concrete material, placed on a prepared base.

B. REFERENCES

1. American Society for Testing and Materials (ASTM):

   a. C 117 – Test Method for Material Finer than 75 μM (Number 200) Sieve in Mineral Aggregates by Washing.

   b. C 131 – Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

   c. C 136 – Method for Sieve Analysis of Fine and Coarse Aggregates.

   d. D 977 – Standard Specification for Emulsified Asphalt.

   e. D 1559 – Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.

   f. D 3381 – Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

   g. D 4318 – Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

2. State of California, Department of Transportation (Caltrans), Standard Specifications.

C. SUBMITTALS

1. Job-Mix Formula: Before producing asphalt concrete mixture, submit a job-mix formula for each mixture to the Architect for approval. Should a change in source of material be proposed, or should a job-mix formula prove unsatisfactory, submit a new job-mix formula for approval.

   a. Each job-mix formula submitted shall propose definite single values for:

      a. The percentage of aggregate passing each specified sieve, based on dry weight of aggregate. These percentages shall be within the range shown in Part 2 of this section.

      b. The percentage of asphalt concrete material to be added, based on the total weight of the mixture, and the percentage of any stabilizing agent such as lime, Portland cement, or antistrip agent.

b. In addition, the job-mix formula shall provide a mixture having a minimum wet retained strength of 125 psi, as determined by AASHTO T165-82, and an index of retained strength of not less then 70 percent.

2. Samples: Asphalt cement, 1-quart minimum sample for each load delivered.

3. Certificates:

a. Certification from supplier that asphalt cement is of correct type and meets requirements of this section. Two copies will be required for each load.

b. Two copies of certified weight ticket from supplier for each load of asphalt cement.

c. Two copies of certified weight tickets for each load of asphalt concrete.

D. DELIVERY, STORAGE, AND HANDLING

1. Asphalt Concrete Delivery.

a. Transport the mixture from the mixing plant to the point of use in vehicles having tight bodies previously cleaned of all foreign materials.

b. Treat bodies as necessary to prevent material from sticking to the bodies.

c. Cover each load with canvas or other suitable material of sufficient size and thickness to protect the asphalt mixture from the weather.

E. PROJECT CONDITIONS

1. Apply mixture only during daylight hours; when air temperature is 50 degrees Fahrenheit (F) or higher; when surfaces to be paved are dry and free of frost, snow, or ice; and when precipitation is not imminent.

PART 2 - PRODUCTS

A. AGGREGATE

1. The aggregate shall meet the general and physical requirements of ASTM C131.

2. Coarse aggregate is defined as that portion of a representative sample retained on a No. 8 sieve, whereas fine aggregate is defined as that portion passing the No. 8 sieve.

3. The aggregates for the mixture shall be graded and combined in such proportions that the resulting composite blend meets the requirements of the job-mix formula. The job-mix formula with the allowable tolerances shall be within the master range set forth in the following table.

B.	Sieve Designation	C.	Percent Passing
D.	¾-inch	E.	100
F.	⅜-inch	G.	60 – 85
H.	No. 4	I.	40 – 70
J.	No. 8	K.	28 – 52
L.	No. 30	M.	14 – 30
N.	No. 200	O.	3 – 12

P. ASPHALT CONCRETE MATERIAL

1. Asphalt cement, viscosity grade AR-8000, AASHTO M226-80, Table 1. The grade may be changed one step by the Architect at no additional expense to the Owner. The approximate percent of asphalt cement to be added to the mix shall be 5 to 7 percent based on total weight of mixture. The final percentage will be determined from the job-mix formula for each mixture specified. The asphalt cement used on the project shall be of the same grade and from the same supplier as that used and approved in the job-mix formula.

2. Prime/tack coat shall be Type SC-70 liquid asphalt conforming to the requirements of the Caltrans Standard Specifications Section 93 or asphalt emulsion conforming to the requirements of Caltrans Standard Specifications Section 94.

3. Asphalt concrete surfacing shall conform to the requirements of Caltrans Standard Specifications Section 39. Mineral aggregate shall be ½-inch maximum size, Type B.

Q. FILLER

1. If filler is required, the filler material shall meet the requirements of AASHTO M 17-77.

R. SEAL COAT: AI MS-19, SLURRY TYPE.

1. Asphalt Emulsion, www.aema.ora., SS1-h, per SSPWC Section 203-9.

2. Acceptable Manufacturers:

a. Asphalt Coating Engineering; Sure Seal.

b. Diversified Asphalt Product; Over Kote: www.diversifiedasphalt.com.

c. SealMaster Pavement Products & Equipment; MasterSeal: sealmaster.net.

d. Vulcan Materials Company; GuardTop: www.vulcanmaterials.com.

e. Western Colloid Products; Park Top: www.westerncolloid.com.

f. Satin Seal by Blue Diamond Co., Long Beach, CA.

PART 3 - EXECUTION

A. EQUIPMENT

1. Plant, hauling, placing, and rolling equipment shall be adequate to ensure uniformity and continuity of operations and be in good operating condition capable of performing according to manufacturer's specifications. The Contractor may, at his option, use the type plant he desires, provided the equipment meets the following requirements.

2. Requirements for All Plants:

a. Equipment for Preparation of Asphalt Concrete Material: Tanks for the storage of asphalt concrete material shall be equipped to heat and hold the material at the required temperatures. The heating shall be accomplished by steam coils, electricity, or other approved means so that flame will not be in contact with the tank. The circulating system for the asphalt concrete material shall be designed to ensure proper and continuous circulation during the operating period. Provision shall be made for measuring and sampling material in storage tanks.

b. Feeder for Dryer: The plant shall be provided with accurate mechanical means for uniformly feeding the aggregate into the dryer to obtain uniform production and temperature.

c. Dryer: The plant shall include a dryer or dryers that continuously agitate the aggregate during the heating and drying process.

d. Screens: Aggregate gradation control shall be provided either with plant screens or screenless plants in accordance with the following methods:

a. METHOD A: Plant screens shall screen the hot aggregate to the specified sizes and proportions and have normal capacities in excess of the full capacity of the mixer.

b. METHOD B: Screenless plants with cold feed control shall have the cold aggregate separated and stored in separate coarse aggregate and fine aggregate stockpiles.

e. Hot Aggregate Bins: Pugmill plants shall include storage bins of sufficient capacity to supply the mixer when it is operating at full capacity. Bins shall be arranged to ensure separate and adequate storage of appropriate fractions of the hot mineral aggregates. Separate dry storage shall be provided for filler or hydrated lime when used, and the plant shall be

equipped to feed such material into the mixer. Each bin shall be provided with overflow pipes, of such size and at such locations as to prevent backing up of material into other compartments or bins. Each compartment shall be provided with its individual outlet gate, constructed so that when closed there shall be no leakage. The gates shall cut off quickly and completely. Bins shall be so constructed that samples can be readily obtained. Bins shall be equipped with adequate tell-tale devices to indicate the position of the aggregates in the bins at the lower quarter points.

f. Asphalt Concrete Control Unit: Satisfactory means, either by weighing or metering, shall be provided to obtain the proper amount of asphalt concrete material in the mix. Means shall be provided for checking the quantity or rate of flow of asphalt concrete material into the mixer.

g. Thermometric Equipment: An armored thermometer of adequate range shall be fixed in the asphalt concrete feed line at a suitable location near the charging valve at the mixer unit. The plant shall also be equipped with an approved temperature measuring apparatus placed at the discharge chute of the dryer.

h. Emission Control: Dust, smoke, or other contaminants shall be controlled by appropriate devices at the plant site to meet air pollution requirements.

i. Commercial Binders or Fillers: When materials are to be used that require the mixing of commercial binders or fillers with the aggregate, a central mixing plant of the twin-pugmill type will be required. Other methods that ensure a thorough and homogeneous mixture will be permitted on written approval.

3. Requirements for Batching Plants:

a. Weight Box or Hopper: The equipment shall include a means for accurately weighing each size of aggregate in a weigh box or hopper suspended on scales and of ample size to hold a full batch without hand raking or running over. The gate shall close tightly so that material is not allowed to leak into the mixer while a batch is being weighed.

b. Asphalt Concrete Control: The equipment used to measure the asphalt concrete material shall be accurate to plus or minus 0.5 percent. The asphalt concrete material bucket shall be non-tilting type with a loose sheet metal cover. The length of the discharge opening or spray bar shall be not less than ¾ the length of the mixer and it shall discharge directly into the mixer. The asphalt concrete material bucket, its discharge valve or valves, and spray bar shall be adequately hosted. Steam jackets, if used, shall be efficiently drained and all connections shall be so constructed that they will not interfere with the efficient operation of the asphalt concrete scales. The capacity of the asphalt concrete material bucket shall be at least 15 percent in excess of the weight of asphalt concrete material required in any batch. The plant shall have an adequately heeled, quick-acting, nondrip, charging valve located directly over the asphalt concrete material bucket.

4. The indicator dial shall have a capacity of at least 15 percent in excess of the quantity of asphalt concrete material used in a batch. The dial shall be in full view of the mixer operator. The flow of asphalt concrete material shall be controlled so that it will begin when the dry mixing period is over. All of the asphalt concrete material required for one batch shall be discharged not more then 15 seconds after the flow has started. The size and spacing of the spray bar openings shall provide a uniform application of asphalt concrete material the full length of the mixer. The section of the asphalt concrete line between the charging valve and the spray bar shall be provided with a valve and outlet for checking the meter when a metering device is substituted for a asphalt concrete material bucket.

    a. Mixer: The batch mixer shall be an approved type capable of producing a uniform mixture within the job-mix tolerances. If not enclosed, the mixer box shall be equipped with a dust hood to prevent loss of dust.

5. The clearance of blades from all fixed and moving parts shall not exceed 1 inch unless the maximum diameter of the aggregate in the mix exceeds 1¼ inches, in which case the clearance shall not exceed 1½ inches.

6. Hauling Equipment: Trucks used for hauling asphalt concrete mixtures shall have tight, clean, smooth metal beds that have been thinly coated with a minimum amount of paraffin oil, lime solution, or other approved material to prevent the mixture from adhering to the beds. Each truck shall have a cover of canvas or other suitable material of such size as to protect the mixture from the weather.

7. Rollers: Rollers shall be of the steel-wheel, vibratory, pneumatic tire type, or combination, capable of reversing without backlash. Steel-wheel rollers other than vibrating shall be capable of exerting a force of not less than 250 psi of width of the roller. Vibrating steel-wheel rollers shall have a minimum weight of 6 tons.

8. Pneumatic-tired rollers shall have smooth tread tires of equal size that will provide a uniform compaction pressure for the full width of the roller and shall be capable of exerting a ground pressure of at least 80 psi.

B. SAWCUTTING, REMOVAL, AND PREPARATION OF EXISTING PAVEMENT

1. Existing asphalt pavement to be removed shall be cut by a wheel cutter or other device capable of making a neat, reasonably straight and smooth cut without damaging adjacent pavement that is not to be removed.

2. The existing pavement shall be saw cut and trimmed after placement of required base course material and just prior to placement of asphalt concrete for pavement replacement, and the trimmed edges shall be painted with a coating of prime coat immediately prior to constructing the new abutting asphalt pavements.

3. All existing aggregate base material and asphalt concrete removed, and any excess new material shall be hauled away from the project site and legally disposed of by the Contractor.

C. APPLICATION

1. Conditioning of Existing Surface: When the surface of the existing pavement or old base is irregular, it shall be brought to uniform grade and cross section as directed.

2. Paint contact surfaces of curbing, gutters, manholes, and other structures with a thin, uniform coating of asphalt concrete tack/primer coating emulsion before placing the asphalt concrete mixture against them.

D. MIXING

1. Combine aggregates in the mixer in the amount of each fraction of aggregates required to meet the job-mix formula. The asphalt concrete material shall be measured or gauged and introduced into the mixer in the amount specified by the job-mix formula.

2. After the required amounts of aggregate and asphalt concrete material have been introduced into the mixer, the materials shall be mixed until a complete and uniform coating of the particles is secured.

3. The asphalt concrete material and aggregate for pugmill mixtures shall be introduced into the mixer within 35°F of each other. Temperature of pugmill mixtures shall be controlled between 225 and 300°F.

4. Material delivered to the paver shall not be less then 225°F.

E. SPREADING AND FINISHING MIX

1. The mixture shall be laid upon an approved surface, spread and struck off to the grade and elevation established. Use asphalt concrete pavers to distribute the mixture either over the entire width or over such partial width as may be practicable.

2. The longitudinal joint in one layer shall offset that in the layer immediately below by approximately 6 inches.

3. Where paving operations are on the present traveled roadway, and where the thickness of pavement course being placed is greater then 1 inch, the Contractor shall arrange his paving operations so that there will be no exposed longitudinal joint between adjacent travel lanes at the end of a day's run.

4. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the mixture shall be spread, raked, and luted by hand tools. For such areas the mixture shall be dumped, spread, and screeded to give the required compacted thickness.

5. Transport and place asphalt concrete mixture on the roadway in a manner that will minimize segregation. Remove segregated areas behind the paver immediately and replace the segregated material with specification material before the initial rolling has taken place. The removal and replacement of nonspecification material or unacceptable work shall be accomplished at no additional expense to the Owner.

6. Place asphalt concrete material as continuously as possible. Rollers shall not pass over the unprotected end of a freshly laid mixture unless authorized by the Architect. Form transverse joints by cutting back on the previous run to expose the full depth of the course. When directed, use a coat of asphalt concrete tack/primer emulsion coating on contact surfaces of all joints just before additional mixture is placed against the previously rolled material.

F. COMPACTING MIX

1. After the asphalt concrete mixture has been spread and struck off, and surface irregularities have been adjusted, thoroughly and uniformly compact mixture by rolling.

2. Roll surface when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving.

3. The number, weight, and type of rollers furnished shall be sufficient to obtain the required compaction while the mixture is in a workable condition.

4. Begin rolling at the sides and proceed longitudinally parallel to the road centerline, each trip overlapping one-half the roller width, gradually progressing to the crown of the road. When paving in echelon or abutting a previously placed lens, roll the longitudinal joint first, then follow regular rolling procedure. On super elevated curves, begin rolling at the low side and progress to the high side by overlapping of longitudinal trips parallel to the centerline.

5. Continue rolling until all roller marks are eliminated and the minimum density specified has been obtained.

6. Any displacement occurring as a result of the reversing of the direction of a roller, or from other causes, shall be corrected at once by the use of rakes and addition of fresh mixture when required. Care shall be exercised in rolling not to displace the line and grade of the edges of the asphalt concrete mixture.

7. To prevent adhesion of the mixture to the rollers, keep wheels properly moistened with water or water mixed with very small quantities of detergent or other approved material. Excess liquid will not be permitted.

8. Along forms, curbs, headers, walls, and other places not accessible to the rollers, thoroughly compact mixture with herd tampers or with mechanical tampers.

9. Remove mixture that becomes loose and broken, mixed with dirt, or is in any way defective, and replace with fresh hot mixture; compact to conform with the surrounding area.

G. SEAL COAT

1. Apply seal coat after surface coarse application, in accordance with manufacturer's recommendations.

2. Apply seal coat to surface and asphalt curbs in accordance with SWPPP (Greenbook). Subsection 302-8.2

3. Add water to specified seal coat material. When air temperatures of 90 degrees F or more are encountered during application, consult manufacturer for recommendations.

4. If pavement surface exhibits imperfections of roller marks, rock pockets, ridges or depressions as determined by the Architect, the addition of sand aggregate to seal coat, and amounts thereof, shall be as recommended by the manufacturer.

5. A second application shall be made after first coat has dried to the touch. When sand is added to the first seal coat, two additional coats without extra sand shall be applied.

6. Allow seal coat to dry before permitting traffic or striping.

H. ACCEPTANCE REQUIREMENTS

1. Surface Tolerance: The variation between any two contacts with the surface shall not exceed 1 inch vertical in a 10-foot length. Correct all humps or depressions exceeding the specified tolerance by removing defective work and replacing it with new material at no additional expense to the Owner.

2. Density: Acceptable density of the in-place asphalt concrete pavement shall be 95 percent of the optimum values as determined from the job-mix formula. Field sampling and density determinations shall be made in accordance with AASHTO T230-68, or an acceptable nuclear procedure.

3. A uniform compacted thickness shall be obtained for each course equal to or greater than the design thickness shown. Individual tests shall not vary by more than plus or minus ¼ inch.

4. Mix Tolerances: The following tolerances for the job-mix formula will be allowed per single test:

I.	Sieve Designation	J.	Percent Passing
K.	No. 8 and larger sieves	L.	+ 8
M.	Smaller than No. 8 to larger than No. 200 sieve	N.	+ 6
O.	No. 200 sieve	P.	+ 3
Q.	Asphalt content, weight percent total mix	R.	+ 0.5

S. FIELD QUALITY CONTROL

1. Placement

   a. Place the mixture on the roads, pavements, or walks at a temperature not less than 225°F.

2. Tests

   a. The type and size of the samples shall be suitable to determine conformance with stability, density, thickness, and other specified requirements. Use an approved power saw or core drill for cutting samples. Furnish all tools, labor, and materials for cutting samples, testing, and replacing the pavement where samples were removed. Take a minimum 1 sample per 200 tons of asphalt concrete placed.

3. Acceptance Criteria

a. General: Acceptance will be based on the following characteristics of the bituminous mixture and completed pavement as well as the implementation of the Contractor's Quality Control plan and test results:

   a. Stability

   b. Flow

   c. Air Voids

   d. Mat Density

   e. Joint Density

   f. Thickness

b. Smoothness

c. Grade

d. Aggregate Gradation

END OF SECTION

SECTION XX XX XX – SPECIFICATION TITLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Parking lot markings, including parking bays, crosswalks, accessibility symbols, and curb markings.

B. "No Parking" curb painting.

C. Exterior athletic court markings.

D. Playground markings.

1.2 RELATED REQUIREMENTS

A. Section 32 13 13 - Concrete Paving: Surface for painting.

1.3 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. FED-STD-595C - Colors Used in Government Procurement (Fan Deck); 2008 (Chg Notice 1).

C. FS TT-B-1325 - Beads (Glass Spheres); Retro-Reflective; 2007d (Validated 2017).

D. FS TT-P-1952 - Paint, Traffic Black, and Airfield Marking, Waterborne; 2015f.

E. SAE AMS-STD-595 - Colors Used in Government Procurement; 2017a.

F. SSPWC - Greenbook: Standard Specifications for Public Works Construction; latest adopted edition.

G. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

H. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; Current Edition.

I. SCAQMD 1113 - Architectural Coatings; 1977 (Amended 2016).

1.4 SUBMITTALS

A. See Procurement and Contractor Requirements – SUSD Project Manual, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Certificates: Submit for each batch of paint and glass beads stating compliance with specified requirements.

D. Maintenance Materials: Furnish the following for District's use in maintenance of project.
   1. See Procurement and Contractor Requirements – SUSD Project Manual, for additional provisions.
   2. Extra Paint: 2 containers, 1 gallon size, of each type and color.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with Volatile Organic Compound (VOC) Content Restrictions regarding CalGreen requirements.

a. Comply at time of installation with Air Quality standards of:

1) South Coast Air Quality Management District, SCAQMD 1113.

2) California Air Resources Board (CARB).

2. For accessibility markings see Part 3 Article "Installation".

3. Conform to State of California, Department of Transportation (CALTRANS) Standard Specifications, Section 84, Traffic Control Markings, as amended and adopted by authorities having jurisdiction.

4. Where reference is made to Standard Specifications, the following shall apply.

a. Perform off-site Work in public rights-of-way in accordance with requirements of authorities having jurisdiction. For conditions not indicated otherwise on Contract Drawings, conform to Standard Details adopted by authorities having jurisdiction, including ASTM D3763.

b. Perform on-site Work as indicated and referenced on the Contract Drawings and as specified herein.

b. Applicator Qualifications: Company regularly engaged in pavement marking, well-experienced in use of machine-applied painted stripes and other markings, with three years of verifiable experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.

B. Deliver glass beads in containers suitable for handling and strong enough to prevent loss during shipment accompanied by batch certificate.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 FIELD CONDITIONS

A. Do not install products under environmental conditions outside paint manufacturer's absolute limits.

1. Do not apply marking paint when weather is foggy or rainy, or when ambient or pavement temperatures are below 40 degrees F., or when such conditions are anticipated within eight hours of application.

B. Do not apply marking paint when wind velocity causes uncontrollable overspray or excessively rapid drying.

C. Sequence and Schedule: Apply pavement markings after asphaltic concrete and portland cement concrete and interlocking concrete paving Work are complete and properly cured and, if applicable, sealer has been applied to asphaltic concrete and landscaping Work is complete.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide standard factory-mixed, quick drying and non-bleeding colors, conforming to Standard Specifications, as amended and adopted by the AHJ, City, and County, as applicable.

B. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; color(s) as indicated.

1. Parking Lots: Fast-dry type. If required by authorities having jurisdiction for Work in public rights-of-way, include reflective material in paint. Paint for marking curbs shall not require reflective material. See Color Schedule in Part 3.

2. Accessibility Symbols: Blue shall conform to Color No. 15090, FED-STD-595C. (SAE AMS-STD-595)

C. Recreational Area Paint:

1. Paint: Water emulsion-based traffic paint; FS TT-P-1952.

2. Color: To be selected by Architect from full range.

3. Basis of Design Product: 6700 100%Acrylic Traffic Marking Paint as manufactured by Vista Paint, or approved equal.

4. Products:

a. Behr: www.behr.com.

b. Dunn Edwards: www.dunnedwards.com.

c. Sherwin Williams; 2 Coats of SW Armorseal 8100 with Armorseal High Wear Additive in second coat: www.sherwin.com.

d. Vista Paint Corporation: www.vistapaint.com.

e. Substitutions: See Procurement and Contractor Requirements – SUSD Project Manual.

D. Paint For Obliterating Existing Markings: FS TT-P-1952; black for bituminous pavements, gray for portland cement pavements.

E. Reflective Glass Beads at accessible spaces: FS TT-B-1325, Type I (low index of refraction), Gradation A (coarse, drop-on); with silicone or other suitable waterproofing coating to ensure free flow.

1. Comply with CALTRANS State Specification No. 8010-51J-22, Type II, and CBC Section 11B-502.6 Identification.

F. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as to perform satisfactorily during period for which its use is required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Clean surfaces thoroughly prior to installation.

1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.

2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.

D. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

E. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

1. Lay out markings as shown on Drawings. Use guide lines, templates and forms for precise edges and spacings.

a. At off-site and on-site public rights-of-way, obtain review and approval of layout by authorities having jurisdiction.

F. Temporary Pavement Markings: When required or directed by Architect, apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.

1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.

2. At Contractor's option, temporary marking tape may be used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to District.

3.3 INSTALLATION

A. Regulatory Accessibility Requirements for Installation:

1. Pavement markings for disability requirements shall meet requirements of California Building Code (CBC), Title 24, Part 2, Chapter 11B and ADA Accessibility Guidelines for Buildings and Facilities, per latest amendments.

a. Accessible parking spaces serving a particular building or facility shall be located, and dispersed if serving more than one accessible entrance, on the shortest accessible route to an entrance or to multiple accessible entrances. CBC Sections 11B-208.3.1

b. Accessible parking spaces in a parking facility not serving a particular building or facility shall be located on the shortest accessible route to an accessible pedestrian entrance of the parking facility. CBC Sections 11B-208.3.1

c. Minimum number of required accessible parking spaces shall be provided in accordance with CBC Table 11B-208.2 for each parking facility provided.

d. For every six or fraction of six accessible parking spaces, at least one shall be an accessible van parking space. CBC Section 11B-208.2.4

e. Accessible parking spaces and access aisles shall comply with CBC Section 11B-502 and shall be dimensioned to the centerline of the marked lines as follows:

1) Parking spaces and access aisles shall be marked according to CBC Figures 11B-502.2, 11B-502.3, and 11B-502.3.3.

(a) Their surfaces shall comply with CBC Section 11B-302 and shall be at the same level with slopes not steeper than 1:48 in any direction. CBC Section 11B-502.4.

2) Parking spaces shall be 9 x 18 feet minimum and van parking spaces shall be 12 x 18 feet minimum with an adjacent access aisle of 5 x 18 feet minimum.

(a) Access aisles shall be placed on either side of the parking spaces except be located on the passenger side for van parking spaces.

(b) Van parking spaces shall be permitted to be 9 x 18 feet minimum where the access aisle is 8 x 18 feet minimum.

3) Access aisles shall be marked by a blue painted borderline around their perimeter.

(a) The area within the blue borderlines shall be marked with hatched lines a maximum of 36 inches on center in a color contrasting with that of the aisle surface, preferably blue or white.

(b) Access aisle markings may extend beyond the minimum required length. CBC Section 11B-502.3.3

(c) At drive aisle provide minimum 12 inch high white letters with the text "NO PARKING" per CBC Figure 11B-502.3.3.

4) Access aisles (parking spaces as well- similar application) shall not overlap the vehicular way. CBC Section 11B-502.3.4

5) A vertical clearance of 98 inches minimum shall be provided for accessible parking spaces, access aisles, and vehicular routes serving them. CBC Section 11B-502.5

2. At least one passenger loading zone shall be provided in every continuous 100 linear feet of loading zone space, or fraction thereof, complying with CBC Sections 11B-209 and 11B-503 as follows:

a. Vehicle pull-up spaces shall be 9 x 20 feet minimum.

1) Access aisles shall be 5 x 20 feet minimum and shall be adjacent and parallel to the vehicular pull-up spaces.

2) They shall be at the same level with slopes not steeper than 1:48 in any direction. CBC Section 11B-503.4

b. Access aisles for passenger drop-off and loading zone shall be marked with a painted borderline around their perimeter.

1) The area within the borderlines shall be marked with hatched lines a maximum of 36 inches on center in a color contrasting with that of the aisle surface. CBC Section 11B-503.3

c. A vertical clearance of 114 inches minimum shall be provided for vehicle pull-up spaces, access aisles, and a vehicular route serving them connecting a vehicular entrance and a vehicular exit. CBC Section 11B-503.5

3. Bus loading zones and bus stops shall comply with CBC Sections 11B-209 and 11B-810.2 as follows:

    a. Boarding and alighting areas shall be of 8 x 5 feet minimum, with 8 feet measured perpendicular to the curb or vehicle roadway edge, and with 5 feet measured parallel to the vehicle roadway.

        1) Slopes in 8 foot direction shall be 1:48 maximum.

        2) Slopes in 5 foot direction shall be the same as that of the roadway, to the maximum extent practicable. CBC Figure 11B-810.2.2.

    b. Bus shelters shall provide a minimum 30 x 48 inches clear floor or ground space (36 x 48 inches or 36 x 60 inches as applicable in an alcove), with slopes not steeper than 1:48 in any direction, entirely within the shelter complying with CBC Section 11B-305.

    c. Bus shelters shall be connected by an accessible route complying with CBC Section 11B-402 to a boarding and alighting area complying with CBC Section 11B-810.2; CBC Figure 11B-810.3.

    d. Newly constructed bus stop boarding and alighting areas shall provide a detectable transition between the boarding/alighting area and the roadway; the detectable transition shall consist of a curb with the face sloped at 35 degrees maximum from vertical or detectable warnings complying with CBC Sections 11B-705.1.1 and 11B-705.1.2.4.

B. General: Using proper masking, stencils and application equipment, apply marking paint at rate recommended by paint manufacturer or approximately one gallon per 150 square feet (equivalent to approximately one gallon for 450 lineal feet of 4-inch wide stripe), whichever is greater.

    1. Equipment shall be capable of operating at 125 psi air pressure, agitate paint constantly and hold exactly to the alignment.

    2. Equipment used for applying reflectorized striping shall be equipped with a bead dispenser capable of applying beads at the specified rate.

C. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

D. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.

E. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

F. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

G. Apply markings in locations determined by measurement from survey control points;

preserve control points until after markings have been accepted.

H. Apply uniformly painted markings of color(s), lengths, and widths as indicated on drawings true, sharp edges and ends.

1. Apply paint in one coat only.

2. Wet Film Thickness: 0.015 inch, minimum.

3. Length Tolerance: Plus or minus 3 inches.

4. Width Tolerance: Plus or minus 1/8 inch.

I. Curbs: Paint full vertical face and first 6-inches of horizontal plane at top of curb or combination curb/paving. Provide minimum 2 coats paint.

1. Provide stenciled text in the height, spacing and typeface as indicated on Drawings.

J. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.

1. Mark the International Symbol of Accessibility at indicated parking spaces.

a. Accessibility Logo: Provide minimum of 2 coats paint.

1) Comply with CBC Figure 11B-703.7.2.1.

b. Stall Marking:

1) Use single-line style striping between parking stalls, unless otherwise indicated.

2) Comply with local agency regulatory requirements.

3) Accessible Stalls: Comply with ADA Standards and local agency regulatory requirements.

(a) Painted lines and markings on pavement shall be minimum 3 inches wide, color as indicated on Drawings

c. Hatching: Provide hatching in parking areas, including accessible parking stalls, as indicated on Contract Drawings or as required by Standard Details. Should Contract Drawings and Standard Details conflict, comply with the more stringent.

2. Hand application by pneumatic spray is acceptable.

K. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

L. Recreational Areas: Provide minimum 2 coats paint.

3.4 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

1. Prevent construction activities over completed markings, except light vehicular and pedestrian traffic.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Touch-up paint as required to provide clean, straight lines and full coverage of surfaces.

E. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

F. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

G. Replace removed markings at no additional cost to District.

1. Clean up all oil, paint splatters and other stains from surfaces in preparation for Substantial Completion review.

3.4 COLOR SCHEDULE

A. Parking and On-Site Roadways

Location	Color	Reflectance**
Driving lane striping	White	82%
Parking space striping	White	82%
Accessibile Parking, ISA, and zone markings	Blue No. 15090 per FED-STD-595C (SAE AMS-STD-595)	52%
Accessible loading and cross-hatching	A. White with Blue perimeter at Asphalt Paving. B. Blue at Concrete Paving*	82% / 52% 52%
12 inch high Text: "NO PARKING", "LOADING ZONE", and "FIRE LANE", etc.	White	82%
Firelanes / No Parking zone markings Special Use Markings	Red No. 31350 per FED-STD-595C (SAE AMS-STD-595)	52%
Loading zone markings	Orange Yellow No. 33538 per FED-STD-595C (SAE AMS-STD-595)	52%
Directional arrows	White	82%
Speed Bumps	Orange Yellow No. 33538 per FED-STD-595C (SAE AMS-STD-595)	52%
Black special-use pavement markings, if indicated on Drawings	Black No. 37038 per FED-STD-595C (SAE AMS-STD-595)	NA

*Contrasting color per CBC.

a. See also Division of the State Architect IR 11B-7.

**Daylight directional reflectance (without glass beads) , when tested in accordance with Federal Test Method Standard 141A, Method 612.

B. Athletic Courts and Recreational Areas

1. Colors shall be as follows:
   a. Basketball / Volleyball / Ball Wall Court Striping - white
   b. Path of Travel - blue.
   c. Track Striping - white.
   d. Numbers / Letters on track – black on white background.
   e. Hopscotch, Four Square, Agility Ladder, Tetherball – white.
   f. Vari-Beam – white lines, red, green, yellow dots.
   g. Dots – blue, red, yellow.
   h. Bullseye – red, white, blue.
   i. Number/Alphabet grids- white lines, white numbers and letters, backgrounds blue, green, red.
   j. Pacer Lines – white lines, spacer dots- blue, red, yellow, and green.
   k. Midline Jumping Grid – white lines, footprints – green, orange.
   l. Locomotor Snake – green, orange, white.
   m. Sensory Path – white, dark green, green, light green, yellow-green, yellow, orange, light tan, light brown, dark brown, light grey, dark grey, black.
2. The following colors are per the Federal Specification SAE AMS-STD-595

   (FED-STD-59) 5 color chip numbers:
   a. Yellow - 33538
   b. Green - 34108
   c. Black - 37038
   d. Blue – 5180
   e. Red - 31136
   f. White - 37925
3. The following standard colors are per Pantone color reference:

Color	Color Code	R/G/B	C/M/Y/K
Dark Green	2411 C	28/66/32	75/2/100/77
Green	2266 C	51/85/37	64/1/98/66
Light Green	2465 C	30/111/48	78/0/99/43
Yellow-Green	368 C	120/190/33	54/0/100/0
Orange	3564 C	239/106/0	0/62/100/0
Light Tan	4250 C	187/168/135	20/26/41/5
Light Brown	7559 C	143/103/42	10/40/88/40
Dark Brown	2322 C	78/53/36	27/63/84/72
Light Grey	Cool Gray 7C	151/153/155	38/29/24/5
Dark Grey	4194 C	86/99/97	63/43/45/31

END OF SECTION

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